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B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern) (Sem. - I) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Solve Q. No.1 or Q. No 2, Q. No.3 or Q. No 4, Q. No.5 or Q. No 6, from Section - I and solve Q. No.7 or Q. No 8, Q. No.9 or Q. No 10, Q. No.11 or Q. No 12 from Section - II.*

2) *Answers to the two sections must be written in separate answer books.*

3) *Figures must be drawn wherever necessary.*

4) *Use of non programmable pocket calculator is allowed.*

SECTION - I

Q1) a) Explain " ill conditioned matrix".   **[6]**

b) Solve the following equations using Gauss elimination method

$5x_1 - 2x_2 + 4x_3 = 5$

$-2x_1 + x_2 + x_3 = 1$

$4x_1 + x_2 + 0x_3 = 6$ **[10]**

OR

Q2) a) Explain by flow chart gauss elimination method.   **[6]**

b) Solve by Gauss Seidal method the following equations :
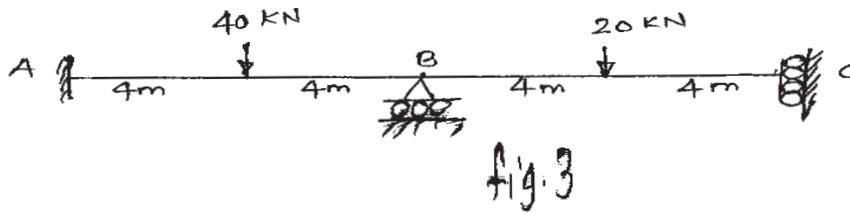
$3x_1 + 2x_2 + 3x_3 = 80$

$x_1 - 9x_2 + 2x_3 = 1$

$2x_1 + 3x_2 + 6x_3 = 31$ **[10]**

Q3) A continuous beam ABC is loaded as shown in fig. 3. It has constant flexural rigidity. Fixed support at A, roller support at B & guided support at C. Analyse the beam using flexibility method. **[16]**
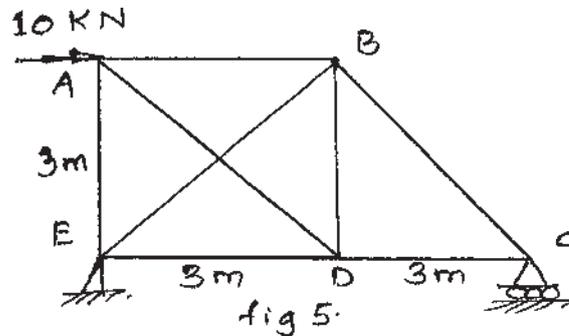

fig.3

OR

Q4) Portal frame ABC is loaded as shown in fig. 4. It is subjected to udl 40 kN/m over span AB. Draw BMD taking EI constant for AB & BC. Use flexibility method for analysis. **[16]**

fig·4
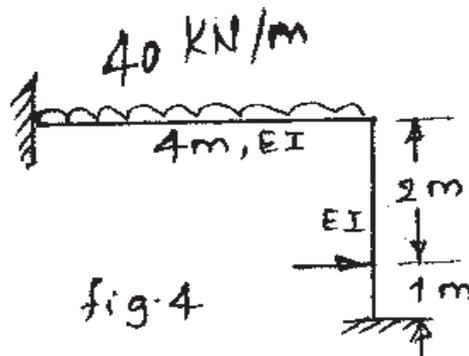
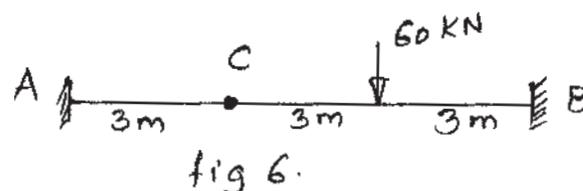*Q5)* A pin jointed truss is as shown in figure 5. Analyse the truss by flexibility method. **[18]**

fig 5·

OR

Q6) Analyse the beam AB, having internal hinge at C. Use stiffness method. EI is uniform for all spans. Refer fig. 6. **[18]**

fig 6·

*Q7)* a) Differentiate between structure Approach & member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. **[8]**

b) Show that stiffness matrix of a member of a structure, in structure co. ordinate system is obtained by transformation. **[8]**

$[S_m] = [R]^T [S_m] [R]$ where

$[S_m]$ is member stiffness matrix in member co. ordinate and $[R]$ is rotation matrix of the member.

OR

Q8) Analyse & draw BMD for portal frame as shown in Fig. 8. Use stiffness matrix method. **[16]**
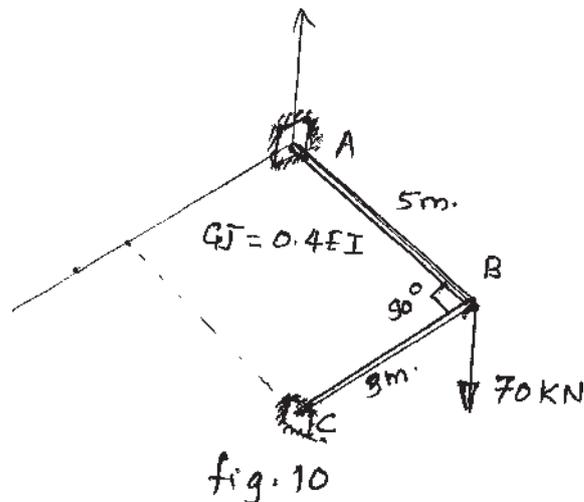

fig 8
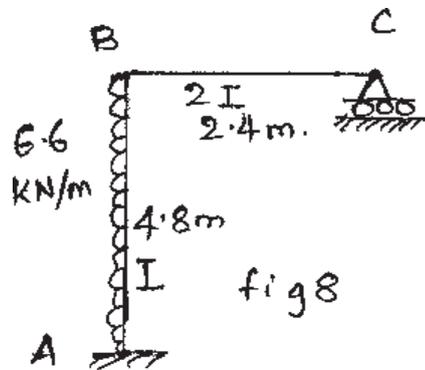
Q9) a) Using proper DOF's write stiffness matrix equation for a member of orthogonal grid structure. **[8]**

b) Using structure approach develope stiffness matrix of grid structure as shown in fig 9.b. Take E = 2 × 10⁵ Mpa

$I = 20 \times 10^5$ mm⁴, $G = 0.8 \times 10^5$ Mpa

$Ip = 50 \times 10^5$ mm⁴ for both members **[8]**

fig 9.6
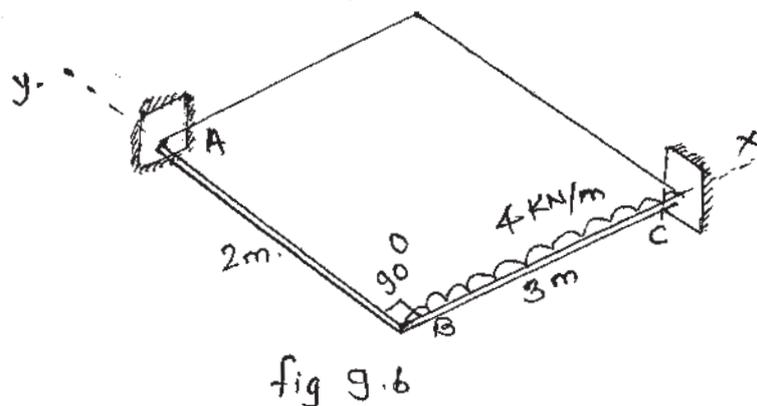
OR

Q10) Analyse & draw BMD for grid structure as shown in fig 10. Use stiffness method. **[16]**

fig. 10

Q11) A two bay two storey frame is to be analysed by computer programme of stiffness matrix method.

    a)   Illustrate node numbering and determine the half band width & size of stiffness matrix to be stored. **[6]**

    b)   Prepare flow chart for the Programme & state input required for the same. **[6]**

    c)   How will you input support conditions of the structure. **[6]**

OR

Q12) a)   State importance of band width in stiffness analysis by computer and measures to keep it minimum. **[6]**

    b)   State maxwell's reciprocal theorem & indicate where its effect is evident in Matrix analysis of structure. **[6]**

    c)   Explain properties & special characteristics of stiffness matrix of a structure. **[6]**

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B.E. (Mechanical)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Course) (Elective-I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Answer any THREE question from each section.*
2) *Answer THREE questions from Section I and THREE question from section II.*
3) *Answers to the two sections should be written in separate answer books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define following terms.   **[8]**

   i)   Turbines

   ii)   Pumps

   iii) Compressible Flow Machines

   iv)   Incompressible Flow Machines

   b) Calculate the specific speeds in the following cases;   **[8]**

   i)   A centrifugal compressor which develops a pressure ratio of 2 while running at 24000 rpm and discharging 1.5 kg/s of air.

   ii)   An axial compressor stage requiring a power of 460 kW and discharging 15 kg/s of air while running at 6000 rpm.

OR

Q2) a) Draw and explain performance curves for following: **[8]**

   i)   Characteristic curve for pump.

   ii)   Characteristic curve for compressor.

   iii) Characteristic curve for axial fan.

   iv)   Characteristic curve for centrifugal fan.

   b) Write equations of energy transfer between fluid and rotor.   **[6]**

   c) Define specific speed. What is its significance?   **[2]**

Q3) a) Find the overall efficiency of a centrifugal pump which delivers 50 lit/s of water to a height of 10 m through 140 mm diameter and 100 m long pipeline. The Darcy's f = 0.05 for pipeline. Assume inlet losses in suction pipe equal to 0.33 m and power required to drive the centrifugal pump is 20 kW. **[8]**

b) Explain different types of Losses in pumps. **[8]**

OR

Q4) a) Explain Cavitations in centrifugal pump. **[8]**

b) What is NPSH derive the expression of the same. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation: Atmospheric Pressure =1.01 bar; vapour pressure = 0.022 bar; losses in suction pipe = 1.42 m; effective head of pump = 49 m; and cavitation factor = 0.115. **[8]**

Q5) a) Explain the design procedure of centrifugal pump. **[8]**

b) Write a note on pump performance due to wrong estimation of system head. **[10]**

OR

Q6) a) Explain various application areas of centrifugal pump. **[10]**

b) Write a short note on pump selection. **[8]**

SECTION - II

Q7) a) Discuss various applications of fan. **[6]**

b) An axial fan stage consisting of rotor and UGVs has the following data; **[10]**

Rotor blade air angle at exit	10°
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	1 kW
Flow coefficient	0.245

(Inlet flow conditions p_1 = 1.02 bar, T_1 = 316K)

Determine the rotor blade angle at entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction and specific speed.

OR

Q8) a) How does dust erosion of centrifugal impellers occurs? What is its effect on the performance? **[8]**

b) A centrifugal blower takes in 180 m³/ min of air at p_1 = 1.013 bar and T_1 = 43°C, and delivers it at 750 mm of W.C. Taking the efficiencies of the blower and drive as 80% and 82% respectively, determine the power required to drive the blower and the sate of air at exit. **[8]**

Q9) a) Explain design procedure for selection and optimization of Blowers. **[8]**

b) What are the main causes of noise generation? What are the methods of reducing fan noise? **[8]**

OR

Q10) a) Write a short note on "blade twist stage design". **[8]**

b) What is surging? What are its effects? What is stalling? How it is developed? **[8]**

Q11) a) Prove the following for isentropic flow in a radial-tipped impeller.

$$\psi = 1$$

$$P_{ro} = \left(1 + \frac{u_2^2}{C_p T_{01}}\right)^{\frac{\gamma}{\gamma-1}}$$

[8]

b) What is the work done factor for an axial compressor stage? How does it vary with the number of stages? **[6]**

c) Derive the relation $\psi = \phi (\tan \beta_1 - \tan \beta_2)$ for an axial compressor stage with constant axial velocity. **[4]**

OR

Q12) a) Draw velocity triangles at the entry and exit for the following axial compressor stages: **[6]**

i) R = 1/2   ii) R < 1/2   iii) R > 1/2

b) What is "slip factor"? What is its effect on the flow and the pressure ratio in the stage? **[6]**

c) Explain briefly what is the purpose of inlet guide vanes and inducer blades. Why is the radial-tipped impeller most widely used in centrifugal compressor stages? **[6]**

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B.E. (Mechanical)
TRIBOLOGY
(2008 Pattern) (Sem. - I) (Elective-I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) Answers to the two sections should be written in separate books.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION - I

Unit - I

Q1) a) Explain the effect of temperature and pressure on the viscosity of lubricating oil. **[6]**

b) What do you mean by Tribology? Explain the importance of Tribology in industry. **[6]**

c) State the different ways of the disposal of used oils. **[4]**

OR

Q2) a) Explain the following properties of lubricants in brief: **[8]**

     i)   Viscosity   ii)   Viscosity Index

     iii)   Alkalinity   iv)   Demulsibility

b) Discuss and classify sliding contact bearing. **[8]**

Unit - II

Q3) a) What is meant by Abrasive wear? Deduce the equation for volume of abrasive wear per unit sliding distance with conical abrasive particles.**[8]**

b) Explain the friction measurement using Pin on disk method. **[4]**

c) Explain the following terms : **[4]**

     i)   Real area of contact   ii)   Apparent area of contact.

OR

P.T.O.

Q4) a) Using deformation theory, derive the equation for coefficient of friction due to deformation with usual notations. **[8]**

b) Explain the following terms : **[8]**

   i) Two body and three body abrasive wear.

   ii) Corrosive wear.

Unit - III

Q5) a) Derive the expression for pressure distribution in narrow width tapered pad bearing with neat sketch. State the assumption made. **[10]**

b) Explain the following terms with respect to hydrodynamic journal bearings:

   i) Design variables   ii) performance Variables

   iii) Sommerfield Number   iv) Eccentricity ratio. **[8]**

OR

Q6) a) The following data is given for a 360° hydrodynamic bearing :
   - Radial load = 10kN
   - Journal speed = 1450 rpm
   - I/d ratio = 1
   - Bearing length = 50 mm
   - Radial Clearance = 20 microns
   - Eccentricity = 15 microns
   - Specific gravity of lubricant = 0.86
   - Specific heat of lubricant = 2.09 kJ/kg °C

   Calculate

   1) The minimum oil film thickness

   2) The coefficient of friction

   3) The power lost in friction

   4) The viscosity of lubricant in cP

   5) The total flow rate of lubricant in lit/min

   6) The side leakage.

   7) The average temperature, if makeup oil is supplied at 30°C

   Dimensionless parameters are as follows :

I/d	ho/c	ε	s	(r/c).f	Q/(r.c.n.l)	Qs/Q	Pmax/p
	0.2	0.8	0.0446	1.7	4.62	0.842	3.195
1	0.4	0.6	0.121	3.22	4.33	0.680	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066

   Note : Assume linear interpolation for intermediate values. **[14]**

b) Explain the mechanism of pressure development in hydrodynamic thrust bearings. **[4]**

SECTION - II

Unit - IV

Q7) a) State and explain different types of energy losses in hydrostatic bearing. **[6]**

b) Following data is given for a hydrostatic thrust bearing :

i) Supply pressure = 6N/mm²

ii) Shaft diameter = 500 mm

iii) recess diameter = 300 mm

iv) Shaft speed = 750 rpm

v) Specific gravity of oil = 0.86

vi) Specific heat of oil = 1.76 kJ/Kg°C

vii) Oil viscosity = 28 cP

viii) Film thickness = 0.18 mm

Find (A) Load-carrying capacity of the bearing (B) flow requirement in l/min (C) Viscous power loss (D) pumping power loss (E) temperature rise. Assume that the total power loss in the bearing is converted into frictional heat. **[12]**

OR

Q8) a) Derive the equation for load carrying capacity for given velocity of approach and film thickness in case of rectangular plate approaching a plane. **[8]**

b) A rectangular plate having 50 mm length and an infinite width is approaching a fixed plane surface. Initially oil-film thickness is 0.035 mm. and Viscosity of oil is 75cP. Load supported per unit width of plate is 30 k N/m. **[10]**

Calculate

i) The time required to squeeze the film to 0.008 mm

ii) Maximum pressure

iii) Average pressure

Unit - V

Q9) a) Write short note on Hertz theory and Ertel-Grubin theory. **[10]**

b) Explain the principle and application of Elastohydrodynamic Lubrication. **[6]**

OR

*Q10)*a) Explain requirements of Gas lubrication and its merits, demerits and application. **[10]**

b) Write short note on shields and gaskets. **[6]**

Unit - VI

*Q11)*a) What is surface Engineering? Explain its concept and scope. **[8]**

b) Explain the concept and general characteristics of superficial layer. **[8]**

OR

*Q12)*Write short note on any two of the following : **[16]**

a) Electroplating

b) Cladded Coating.

c) Metal Spraying.

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B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions ot the candidates :

1) *Answer 3 questions from Section - I and 3 questions from Section -II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) What are vehicle specifications? Describe specification of any one medium motor vehicle of your choice. **[8]**

b) Explain front engine rear wheel drive vehicle with of neat sketch. Describe its advantages and disadvantages over other layouts. **[8]**

OR

Q2) a) Sketch a typical layout of a passenger car and briefly describe its various parts. **[8]**

b) Write note on different types of material used for chassis frame. **[8]**

Unit - II

Q3) a) How you will classify clutches? Describe with neat sketch function and working of multi-plate clutch. **[8]**

b) Explain torque converter with neat sketch. **[8]**

OR

Q4) a) What is an epicyclic Gear box? Describe its principle and working with the help of a neat sketch. **[8]**

b) Draw a neat sketch of a typical differential unit in the back axle of a vehicle and explain its working. **[8]**

Unit - III

Q5) a) Enumerate different types of steering gears. Discuss salient features for each of them. Explain the construction and working of a rack and pinion type steering gear. **[10]**

b) How the tyres are classified and rated? **[8]**

OR

Q6) a) Explain how the wheel alignment and it's balancing is performed in a service station. **[10]**

b) Explain with neat sketch construction of stub axle and wheel mounting. **[8]**

SECTION - II

Unit - IV

Q7) a) Distinguish between independent suspension and conventional suspension system. **[10]**

b) Sketch and describe disc brakes. What are their advantages? **[8]**

OR

Q8) a) Explain self leveling suspension system. **[8]**

b) Explain air brake system in detail. Also state its advantages over hydraulic brake system. **[10]**

Unit - V

Q9) a) Explain starting system used in automobile vehicle. **[5]**

b) Explain in brief electrical car layout. **[6]**

c) Explain with neat sketch lead acid battery. **[5]**

OR

Q10) Write short notes on any four: **[16]**

a) Electronic stability control

b) Sensors and actuators

c) Vehicle charging system

d) Dash board instruments

e) Electric Horn

Unit - VI

Q11) Write short notes on any four: **[16]**

    a)   Active safety and passive safety

    b)   Air bags

    c)   Vehicle performance curves

    d)   Seat belt

    e)   Types of Collisions

<div align="center">OR</div>

Q12) a)   Explain ergonomic consideration for vehicle. **[6]**

    b)   A passenger car 13349.44 N. The rolling resistance may be assumed as 44.489 N of vehicle weight. The air resistance is given by $0.00017 \, AV^2$ where A = frontal area and V is car speed. The frontal area of the vehicle is 2.312 m² and car speed is 48.27 km/hr: **[10]**

        i)   Determine the power required to propel the vehicle on level road.

        ii)   If the tractive effort available at the wheels is 1859.97, find the maximum gradient which the vehicle can climb.

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B.E. (Mechanical Engineering)
MACHINE TOOL DESIGN
(Sem. - I) (2008 Pattern) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to both the sections should be written separately.*
2) *Use of non-programmable pocket calculator is allowed.*
3) *Use of mobile and other electronic gadgets are not allowed.*
4) *Assume suitable data, if necessary.*
5) *Figures to the right indicates marks.*

SECTION - I

Q1) a)   Explain Geneva mechanism with neat sketch.   **[8]**

b)   What is aim of speed and feed rate regulation.   **[8]**

OR

Q2) Find the speed steps arranged in geometric, harmonic and logarithmic progressions for the following conditions : $n_{min} = 30$rpm, $n_{max} = 375$rpm, $z=12$. **[16]**

Q3) Explain static stiffness of machine tool.   **[16]**

OR

Q4) Explain dynamic stiffness of machine tool.   **[16]**

Q5) a)   Explain functions and types of guideways.   **[8]**

b)   Explain stick-slip motion in slideways.   **[10]**

OR

Q6) Explain design procedure of hydrodynamic slideways.   **[18]**

Q7) a) Find the axial static load to which a ball recirculating lead screw can be subjected if the diameter of the ball is 3 mm, the pitch circle radius of the screw 20 mm having a semicircular profile and '4' circuits before recirculation. Young's modulus of both ball and screw material can be taken as 0.21×10^6 N/mm^2. Allowable Hertz's contact stress is 2300 N/mm^2. What will be the static load in a ball recirculating load screw of trapezoidal profile? **[12]**

(take αk = βk = 45° & refer Fig. 1 for required data)
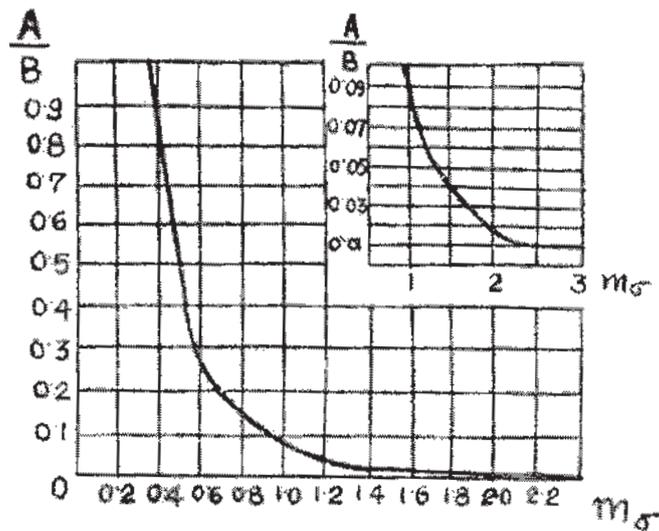
Fig. 1

b) Show with neat sketches, at least two methods of preloading of a ball lead screw. **[6]**

OR

Q8) a) Explain why the distribution of the load over the threads is more uniform in a ball lead screw in comparison to sliding friction lead screw. **[6]**

b) Describe various methods of compensation of backlash in ordinary sliding screw assemblies. **[6]**

c) What is the effect of lubrication on efficiency of power screw. **[6]**

Q9) Explain and draw the control circuit diagrams for **[16]**
   a) Push button control
   b) Thermal relay and
   c) Electrical braking system.

OR

*Q10)*a) Explain stick-slip vibrations of machine tools.   **[6]**

b) What is meant by coefficient of static compliance as applicable to dynamic behavior of machine tool members? Explain how to estimate dynamic rigidity of machine tool-work piece system analytically.   **[10]**

*Q11)*a) Explain the special constructional features of CNC machine tools.   **[7]**

b) Describe the following alignment tests of machine tools   **[9]**

    i)   Spindle of center lathe running true.

    ii) Internal taper of spindle end parallel to lathe bed.

    iii) T slots of milling machine table parallel to its slide.

<div align="center">OR</div>

*Q12)*a) Explain design features of step-less drives.   **[8]**

b) With neat sketch, explain the principle of obtaining step less speed variation in a variator with epicyclic mechanism.   **[8]**

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SEAT No. :

[Total No. of Pages : 7

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B.E. (Mechanical)

QUANTITATIVE AND DECISION MAKING TECHNIQUES

(2008 Pattern) (Sem. - I) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

 1)   *All the questions are compulsory.*

 2)   *Two separate answer books are used for Section - I and Section - II.*

 3)   *Figures to the right indicate full marks.*

 4)   *Use of calculator is permitted.*

 5)   *Assume suitable data, if necessary.*

SECTION - I

Unit-I

Q1) a)   Explain the Steps in Decision Making.   **[6]**

 b)   Solve the following game by graphical method and find the game value.**[12]**

Player B

		1	2	3	4
	1	19	6	7	5
Player A	2	7	3	14	6
	3	12	8	18	4
	4	8	7	13	−1

OR

Q2) a)   Define with respect to theory of games   **[8]**

   i)   Minimax and Maximin principle.

   ii)   Rules for column and row dominance.

   b)   Reduce following game by dominance property and solve it.   **[10]**

Player B

		1	**2**	**3**	**4**	**5**
	1	1	3	2	7	4
Player A	**2**	3	4	1	5	6
	3	6	5	7	6	5
	4	2	0	6	3	1

Unit-II

Q3) a)   Define following terms of Linear Programming.   **[4]**

   i)   Feasible Solution

   ii)   Artificial Variables

   b)   Solve LPP by Suitable Method   **[12]**

   Maximize:

   $$Z = X_1 - 3X_2 + X_3$$

   Subject to:

   $$3X_1 - X_2 + 2X_3 \leq 7$$
   $$2X_1 + 4X_2 \geq -12$$
   $$-4X_1 + 3X_2 + 8X_3 \leq 10$$

OR

Q4) a)   Discuss the concept of sensitivity analysis in L.P.P.   **[6]**

   b)   A firm manufactures three products S_1, S_2 and S_3 on which the profits earned are Rs. 2, Rs. 5 and Rs. 4 respectively. Each product need two types of raw materials R_1 and R_2 which the firm can purchase up to a maximum of 500 and 400 units respectively. Design production plan so as to maximize the profit.   **[10]**

Raw Material	Consumption of raw materials per unit product		
	S_1	S_2	S_3
R_1	0.5	1	1
R_2	2	0.5	0.5

Unit-III

Q5) a) Write a short note on 'Degeneracy in Transportation Problem'. **[6]**

b) Solve the following Transportation problem involving three sources and three destinations. The cell entries represent the cost of transportation per unit. Obtain the initial solution by VAM method and find optimal solution by MODI method. **[10]**

Destinations

		1	2	3	Supply
	1	1	4	8	10
Sources	2	7	2	3	20
	3	5	4	2	15
Demand		23	12	10	

OR

Q6) a) Explain Hungarian Method of solving assignment problem **[6]**

b) A company is faced with the problem of assigning six Machines to five different Jobs. The costs estimated in hundreds of rupees are given in the table below. Solve the problem assuming that the objective is to minimize the total cost. **[10]**

Jobs

Machines	1	2	3	4	5
1	2.5	5	1	6	2
2	2	5	1.5	7	3
3	3	6.5	2	8	3
4	3.5	7	2	9	4.5
5	4	7	3	9	6
6	6	9	5	10	6

SECTION - II

Unit-IV

Q7) a) Discuss various costs involved in inventory control. **[6]**

b) A company has a demand of 12000 units/year and it can produce 2000 such units per month. The cost of one set up is Rs. 400 and the holding cost / unit / month is Re. 0.15. Find the optimum lot size and the total cost per year, assuming the cost of one unit as Rs. 4. Also find the maximum inventory, manufacturing time and total time. **[10]**

OR

Q8) a) Explain: Single Channel Poisson Arrivals with exponential service, infinite population model. **[6]**

b) A repair shop attended by a single mechanic has an average of 4 customers per hour who bring small appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him 6 minutes on an average. Arrivals are Poisson and service time has the exponential distribution. **[10]**

i)   Find the proportion of time during which the shop is empty.

ii) Find the probability of finding at least one customer in the shop.

iii) The average number of customers in the system.

iv) The average time, including service, spent by a customer.

Unit-V

Q9) a) Explain Average (Accounting) Rate of Return Method with its Merits and Demerits.   **[8]**

b) Calculate the payback periods of the following projects each requiring a cash outlay of Rs. 12000. Suggest which one is acceptable if the standard payback period is 6 years.   **[8]**

Year	Cash in flows		
	Project X (Rs.)	Project Y (Rs.)	Project Z (Rs.)
1	2400	5000	500
2	2400	3000	1500
3	2400	2000	2000
4	2400	1000	3000
5	2400	500	5000
6	2400	0	0

OR

Q10) a) Discuss the replacement policy for the items that fail suddenly.   **[6]**

b) A firm is thinking of replacing a particular machine whose cost price is Rs. 12200. The scrap price of this machine is only Rs. 200. The maintenance costs are found to be as follows: **[10]**

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs.)	220	500	800	1200	1800	2500	3200	4000

Determine when the firm should get the machine replaced.

Unit-VI

Q11)a) State the rules of drawing network. **[6]**

b) A project schedule has the following characteristics: **[12]**

Activity	Time (Weeks)	Activity	Time (Weeks)
1 - 2	4	5-6	4
1 - 3	1	5-7	8
2 - 4	1	6-8	1
3 - 4	1	7-8	2
3 - 5	6	8-10	5
4 - 9	5	9-10	7

i) Construct the network.

ii) Compute E and L and total float for each activity.

iii) Find the critical path.

OR

Q12)a) Explain Dummy Activity, Forward pass Computations and Slack for an Event. **[6]**

b) In the PERT network, the activity time estimates (in weeks) are given. If the scheduled completion time is 23 weeks, calculate the latest possible times of events. Calculate slack for each event and identify the critical path. What is the probability that the project will be completed on the scheduled date? **[12]**

Activity	t_o	t_m	t_p
1 - 2	3	3	3
2 - 3	3	6	9
2 - 4	2	4	6
3 - 5	4	6	8
4 - 6	4	6	8
5 - 6	0	0	0
5 - 7	3	4	5
6 - 7	2	5	8

Use Normal Distribution Table mentioned below:

Z	1.42	1.65	1.92	2.3
P	0.922	0.95	0.972	0.991

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P1350

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B.E. (Mechanical Engg.)

POWER PLANT ENGINEERING

(2008 Pattern) (Sem.-II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) Answer 3 questions from Section - I and 3 questions from Section - II.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Unit-I

Q1) a) What are the different types of power plants where electricity is produced in bulk quantities? Why electricity is the most convenient form of energy. **[6]**

b) What are the factors you will consider for locating the conventional base load thermal power plants? **[10]**

OR

Q2) a) What do you understand by radioactive decay? What are radioisotopes? Explain. **[4]**

b) What do you mean by half life? Why are half lives regarded as fingerprints of radioisotopes? **[4]**

c) Explain the characteristic features of a BWR. Explain with a neat sketch with advantages and disadvantages of BWR. **[8]**

Unit-II

Q3) Write short notes on:

a) Mechanical stokers used in thermal power-plants. Explain any one with sketch.

b) Fluidized Bed Combustion boilers.

c) Ash handling system. **[3 × 6 = 18]**

OR

Q4) a) What is a coal-oil mixture? How is it prepared? What are merits of COM as a boiler fuel? **[8]**

b) What is boiler dranght? Which are its types? How they are Produced? Explain what is balanced dranght. **[5]**

c) Why are centrifugal fans with backward-curved blading normally used for FD fans. **[5]**

Unit-III

Q5) a) What are the main features of high pressure boilers? With neat sketch explain any one of these. **[8]**

b) What are the advantages of High Pressure boilers. Explain. **[8]**

OR

Q6) a) What is erosion of turbine blades? Explain how it is prevented? **[8]**

b) Explain ideal regenerative feed heating. Why it is not used in practice? Explain how the practical 'regeneration' is achieved? **[8]**

SECTION - II
Unit-IV

Q7) a) Discuss the phenomenon of a supersaturated flow through a nozzle. **[4]**

b) Steam at a pressure of 30 bar & 280°C is passed through a nozzle. The back pressure is 0.5 bar. Find the maximum possible discharge through the nozzle; if the throat area is 5 cm^2 (500 mm^2). Assuming an isentropic efficiency of 85%; find the loss of energy. **[12]**

OR

Q8) a) Explain condenser efficiency and vacuum efficiency. **[4]**

b) Draw a neat sketch of a modern surface condenser and list its advantages and disadvantages. **[6]**

c) What are the sources of air leakage in a condenser? How it affects the condenser performance? **[6]**

Unit-V

Q9) a) Explain : **[10]**

    i) Nozzle control governing.

    ii) Stage efficiency and reheat factor.

b)   A 50% reaction turbine runs at 3000 rpm. The angles at exit of fixed bladings and inlet of moving blades are 20°. The mean ring diameter is 0.7 met. and steam condition is 1.5 bar & 0.96 dry. Find the power developed by the stage for 50 kg/sec steam flow and the height of blades.   **[8]**

<p align="center">OR</p>

*Q10)*a)   Define the terms :- degree of reaction and 50% reaction turbines.

Derive an expression for maximum diagram efficiency for blading of a reaction turbine stage. List the assumptions made.   **[10]**

b)   Following data refers to the working of a single stage impulse: **[8]**

i)   Enthalpy drop of steam in nozzle = 500 kJ/kg.

ii)   Blade speed = 300 m/sec.

iii)   Nozzle angle = 25°.

iv)   Outlet Blade angle = 35°.

Calculate the power developed by the turbine & stage efficiency.

<p align="center"><u>Unit-VI</u></p>

*Q11)*a)   Discuss the nature of load duration curves for any two consumers & explain the load curve.   **[6]**

b)   The daily load for a power plant is given by the equation, $L = (290 + 12t - t^2)$ where "t" is time in hours from 0 to 24 hrs and "L" is load in MW. Calculate: **[10]**

i)   Maximum demand & the time when it occurs.

ii)   Plant load factor.

<p align="center">OR</p>

*Q12)*a)   Discuss in detail how energy cost is calculated.   **[8]**

b)   A thermal power plant consists of 2×60 MW units running for 8000 hours and one 30 MW unit running for 2000 hours per year. Energy produced by the plant is 876×10^6 kwh per year. Determine load factor and plant use factor. Assume maximum demand is equal to the plant capacity.   **[8]**

<p align="center">⌘⌘⌘</p>

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B.E. (Mechanical)

COMPUTATIONAL FLUID DYNAMICS

(2008 Pattern) (Elective-III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Derive unsteady differential continunity equation in 3 - dimensions for compressible flow. **[10]**

b) Explain concept of substantial derivative. **[8]**

OR

Q2) a) Derive mass conservation equation for. **[10]**

   i) Nozzle

   ii) Pipes in series and pipes in Parallel.

b) Derive transport equation for energy transfer in a bar having uniform heat generation throughout its length. **[8]**

Q3) a) Flow between two pipes is expressed as:

$$\frac{\partial^2 u}{\partial y^2} = -1 \text{ per cm. sec}$$

Distance between plates is 3 cm, if upper plate is moving at velocity 1cm/s while lower is fixed, find velocity distribution assuming 4 nodes. Node - 1 is on lower plate & Node - 4 is on upper plate. Mesh size

$$\Delta y = L/_{n-1}$$ **[10]**

b) Explain relative merits and demerits of underrelaxation and overrelaxation. **[6]**

OR

P.T.O.

Q4) a) Discuss pointwise merits and demerits of explicit and implicit discretization techniques. **[6]**

b) Explain tri-diagonal algorithm. **[10]**

Q5) a) Derive finite difference approximation of d^2T/dx^2 to its simplest form. **[6]**

b) Unsteady equation for pinfin is given as:

$$\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2} - m^2(T - T_\infty).$$

Show that for stable time marching time - stop should be a function of fin-constant m^2. Assume explicit solution technique. **[10]**

OR

Q6) Explain following terms. **[16]**
   a) Cauchy stress tensor
   b) Order it accuracy
   c) Hyperbolic equations
   d) Boundary conditions of Neumonn and mixed kind.

SECTION - II

Q7) a) Comment on following statement with essential proof- **[10]**

"ADI method and Crank-Nicolson method are unconditionally stable."

b) Discuss lax-wendroff technique for linear wave equation. **[8]**

OR

Q8) a) Computational algorithm is to be constructed to solve unsteady heat conduction equation over a slab of rectangular shape of LXW = 1m × 2m using equation

$$\rho C_p \frac{\partial T}{\partial t} = K\left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} \right) + Q_v$$

   i) We can choose two stencils of grid 32 × 32 nodes and 32 × 64 nodes. Justify which is preferable. **[2]**

   ii) Assuming 32 × 64 nodes as right choice, how many difference equations are generated, (exclude corner nodes)? How many equations are dedicated to boundary conditions and how many to interior? If nodal temperature is a variable, how many variables are created? Exclude 4 corner nodes. **[6]**

b) Write down 3 - dimensional unsteady convection - diffusion equation for temperature variation. How many initial & boundary conditions are needed? Also, explain concept of false diffusion. **[10]**

Q9) a) Pipe of length 4 meter is carrying a fluid whose thermal diffusivity is unity. (Thermal diffusivity is defined as $k/\rho C_p$), with a velocity of 1 m/s. Ends of pipe are maintained at 500°C and 200°C. Find out temperature distribution in pipe assuming pipe being divided in 4 elements.

Transport Equation : $\dfrac{\partial}{\partial x}(u\mathrm{T}){=}\alpha\dfrac{\partial^2\mathrm{T}}{\partial x^2}$ **[10]**

b) Explain the concept of staggened grid. **[6]**

OR

Q10) a) Explain SIMPLE algorithm. **[10]**

b) Explain any two methods of validation of CFD results. **[6]**

Q11) a) What are practical guidelines for grid generation. **[10]**

b) Match the pair & give short reason. **[6]**

1) Maccormack method.   1) Bisection method
2) Non linear alzebric equation 2) O.D.E. & P.D.E.
3) Shooting method.   3) O.D.E. solver
4) SIMPLE method   4) Pune based scienlist
                              5) Predictor-corrector method.

OR

Q12) Write short notes on any two of the following : **[16]**

a) Selection of a CFD domain.

b) Post processing of CFD results.

c) Structured and unstructured grid.

d) Steps in a typical industrial CFD simulation.

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[4164] - 445

B.E. (Mechanical)

ROBOTICS

(2008 Pattern) (Sem. - II) (Elective - III)

Time :3 Hours]   **[Max. Marks :100**

Instructions :-

1) *Answer three questions from Section - I and three questions from Section -II.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Use of logarithmic tables slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain briefly the use of a robot in a palletizing operation. **[4]**

b) What is an industrial robot? State its applications in industry? **[6]**

c) Sketch and explain various types of joints in manipulator mechanisms. **[6]**

OR

Q2) a) Explain with the help of a neat sketch the basic components of a robot connected as a system. **[6]**

b) Sketch and explain 3 DOF associated with wrist. **[6]**

c) Explain the recent trends in industrial robots. **[4]**

Q3) a) Explain briefly various drive methods used for robot gripper systems. **[6]**

b) Discuss various considerations for selection of a gripper. **[4]**

c) Write short note on photosensors. **[6]**

OR

Q4) a) Explain vacuum grippers, with reference to the principle, use and applications. **[6]**

b) Discuss briefly the various kinds of sensors used in robotics. **[4]**

c) What is a "universal gripper"? Explain briefly. **[6]**

Q5) a) State the comparison of robot drive system with its advantages and limitations. **[6]**

b) What are the feature and application of "hydraulic actuators"? **[6]**

c) Explain different steps in trajectory planning. **[6]**

OR

Q6) a) Compare hydraulic and electrical actuators in robots. **[6]**

b) Write a note on industrial robot control system. **[6]**

c) State the features of "pneumatic actuators". **[6]**

SECTION - II

Q7) a) Explain Denavit-Hartenberg parameters with suitable examples and sketch.**[8]**

b) A planner 2R manipulator has link lengths 11= 100mm and 12 = 70mm. State and explain whether the manipulator can reach points P, Q, R separately. Where P is at (15,15), Q is at (15,70) and R is at (15,170)**[8]**

OR

Q8) a) Explain Newton's - Euler's dynamic formulation? **[8]**

b) A moving frame is rotated about a fixed frame in the following manner,

i) Rotation of 90° about U.

ii) Rotation of 1800° about Z.

iii) Rotation of 90° about Y.

iv) Rotation of –90° about X.

v) Rotation of 90° about V.

vi) Rotation of –90° about U.

A point has co ordinates (15,–27,38) with respect to moving frame. Map the point in the fixed frame. **[8]**

Q9) a) Explain different types of speed reduction and transmission systems used in robots. **[6]**

b) Explain use of robot in plastic molding. **[6]**

c) What do you mean by robot vision? Explain briefly. **[6]**

OR

*Q10)*a) Explain briefly "Vision hardware". **[6]**

b) Write various technical features required of robot for spot welding and spray coating applications. **[6]**

c) Discuss the term stiffness with reference to gears, belts and shafts. **[6]**

*Q11)*a) Explain manual mode of programming in robot. **[6]**

b) State various robot languages. Discuss them in brief. **[4]**

c) Compare between Computer control and robot software control? **[6]**

OR

*Q12)*a) Explain generation of robot programming languages. **[4]**

b) Explain Wait, DELAY, SIGNAL command with suitable examples. **[6]**

c) How is sensing in robot programming classified? Explain briefly. **[6]**

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B.E. (Mechanical)
RELIABILITY ENGINEERING
(2008 Pattern) (Sem.-II) (Elective-IV)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

   1)   *All questions are compulsory.*

   2)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

   3)   *Answers to the two sections should be written in separate books.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Use of slide, electronic pocket calculator is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain Bath Tub curve.   **[8]**

     b)   In life testing of 110 machine components the number of failures during each time of interval of 20 hours is as below.   **[4]**

Time interval (hours)	No. of failures
$T \le 1000$	0
$1000 < T \le 1020$	20
1040	60
1060	10
1080	10
1100	5

       Estimate MTTF.

     c)   Write down the causes of failures and unreliability.   **[4]**

<p align="center">OR</p>

Q2) a)   Explain the term MTTF and MTBF.   **[8]**

     b)   Explain the term failure density fd.   **[4]**

     c)   Explain Maintainability and availability.   **[4]**

Q3) a) The time to wear out of a cutting tool Edge is distributed normally with $\mu = 2.8$hr and $\sigma = 0.6$hr

     i) What is the probability that the tool will wear out in less than 1.5 hour?

     ii) How often the cutting edges be replaced to keep the failure rate less than 10% of the tool.

     Consider $\phi(-2.1667) = 0.0151$ and $z = -1.28$. **[6]**

  b) Explain system reliability model in series configuration. **[6]**

  c) Explain Delta star method to determine reliability of bridge network. **[6]**

OR

Q4) a) Fatigue life data for industrial rocker arm is fit to longnormal distribution. The following parameters are obtained. **[6]**

     $y_0 = 2 \times 10^7$ cycles, $w = 2.3$

     i) To what value should the design life be set if probability of failures is not to exceed 1%.

     ii) If the design life is set to 1.0×10^6 cycles what will be the failure probability.

     Take $\phi(-2.32) = 0.01$ and

     $\phi(-1.302) = 0.096$

  b) Explain system reliability model in parallel configuration. **[6]**

  c) Discribe Redundance Allocation. **[6]**

Q5) a) Discribe ARINC apportionment technique. **[6]**

  b) Write note about cold, Hot and standby redundancy. **[4]**

  c) A system requires a reliability of 0.9 for 10 hours of operation. There are four units connected in series with failure rates $\lambda_1 = 0.003$, $\lambda_2 = 0.006$, $\lambda_3 = 0.008$, $\lambda_4 = 0.010$ allocate reliabilities to four units. **[6]**

OR

Q6) a) Discribe AGREE apportionment technique. **[6]**

  b) Explain minimum Effort method to determine reliability. **[6]**

  c) Write objectives of Apportion Method. **[4]**

SECTION - II

Q7) a) Explain Maintainability with derivation and diagram Enlist the factors affecting maintainability. **[8]**

b) A sulphur dioxide scrubber is Known to have a MTBF of 137 days. Testing a scrubber requires half a day and mean time to repair is 4 days. **[4]**

     i) Chose the test period to maximise availability.

     ii) What is maximum availability.

c) Discribe Reliability centered maintenance. **[4]**

<div align="center">OR</div>

Q8) a) Explain availabilty and its types. **[8]**

b) If an inherent availability 0.9 is mean and MTBF is 200 hours. What is maximum possible MTTR? **[4]**

c) Write note on TQM. **[4]**

Q9) a) Discribe FMECA. **[5]**

b) Write note about Monte carlo Evaluation. **[6]**

c) For the logic diagram shown construct the fault tree. **[5]**
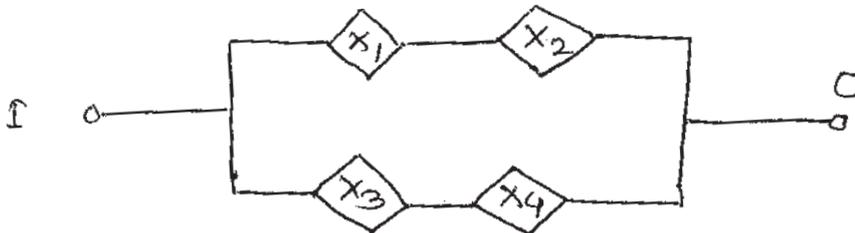
<div align="center">OR</div>

Q10) a) Explain fault Tree Analysis. **[5]**

b) Explain Minimal cut set Method. **[5]**

c) Draw Fault Tree for the motor circuit shown in figure the top event for the fault tree analysis is simply failure of the motor to operate. **[6]**
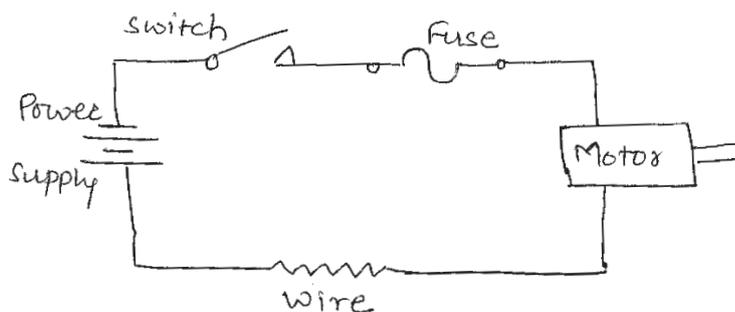
Q11)a) Discribe Reliability Testing. **[8]**

b) Load and capacity on a device are known within a factor of two with 90% confidence. What value of safety factor co/lo, must be used if failure probability is to be no more than 1%. Take $\phi(\beta) = 0.99$, $\beta = 2.3$ **[4]**

c) Derive Reliability function using markov model. **[6]**

OR

Q12)a) Explain Accelerated life Testing and HALT. **[8]**

b) In short sample accelerated life testing of a system based weibull distribution, the following data is recorded. **[10]**

Failure Number	1	2	3	4	5	6	7	8	9
MTTF (hour)	24	22	12	28	35	38	30	19	25

Plot the variation of Reliability against time using.

i) Mean ranking method and

ii) Median ranking Method.

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B.E. (Mechanical S/W)

REFRIGERATION AND AIR CONDITIONING

(2008 Pattern) (Elective-II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

  1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

  2)   *Answers to the two sections should be written in separate books.*

  3)   *Neat diagrams must be drawn wherever necessary.*

  4)   *Figures to the right indicate full marks.*

  5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables P-h chort is allowed.*

  6)   *Assume suitable data, if necessary.*

SECTION - I

Unit-I

Q1) a)   Write a note on 'magnetic refrigeration.   **[5]**

  b)   What is the necessity of air-craft refrigeration.   **[3]**

  c)   Explain boot strap system with the help of T-S diagram. Derive expression for COP.   **[8]**

OR

Q2) a)   An open air refrigeration system operating between pressures of 10.5 bar and 1.05 bar, is required to produce 10 tonnes of refrigeration. Temperature of air leaving the cooler is 15°C and leaving the refrigerator room is –7°C. Neglecting all losses and clearance, calculate.   **[12]**

  i)   Temperatures at salient points.

  ii)   Weight of air circulated in kg/min.

  iii) Piston displacement of compressor and expander in m³/min.

  iv)   Net work of the cycle.

  v)   C.O.P.

  vi)   Power required to drive the compressor.

  b)   Write a note on solar refrigeration system.   **[4]**

Unit-II

Q3) a) How refrigerants are classified? Explain with examples and give the nomenclature of refrigerant (refrigerant number). **[10]**

b) Define refrigeration recovery, recycling and reclaming. **[6]**

OR

Q4) a) What are the alternative refrigerants for CFCs (R-11 and R-12) and HCFCs (R-22). Discuss with their properties. **[8]**

b) What is an azeotrope? **[4]**

c) What is ODP and GWP? **[4]**

Unit-III

Q5) a) What is multipressure system? Explain multievaporator system with a neat sketch and p-h diagram. Where it is used? **[8]**

b) Explain electrolux refrigeration system with a neat sketch. **[6]**

c) In an absorption refrigeration system, heating cooling and refrigeration takes place at temperature of 100°C, 20°C, and –10°C respectively. Find the theoretical COP of the system. **[4]**

OR

Q6) a) Explain lithium bromide absorption system. What are limitations of it and where it is used? **[8]**

b) A single compressor using R-12 as a refrigerant has three evaporators of capacity 10 TR 20 TR and 30 TR. All the evaporators operate at –10°C and vapour leaving the evaporators are dry and saturated. The condenser temperature is 40°C. Assuming is entropic compression. Find : **[10]**

i) The mass of refrigerant flowing through each evaporator.

ii) The power required for compressor.

iii) The COP of the system.

iv) Piston displacement if η_{volume} = 90%.

v) Heat rejected in the condenser.
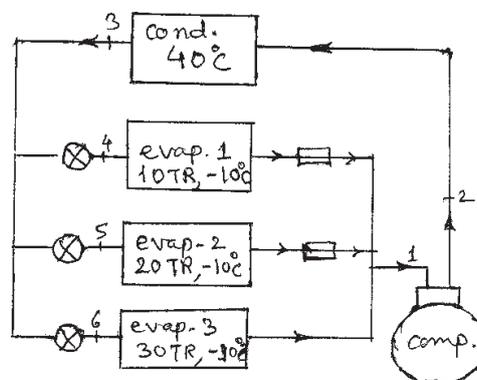
Que -6 (b) Figure

SECTION - II
Unit-IV

Q7) a) Compare unitary and central air conditioning system. Explain all air system with neat diagram. **[8]**

b) What is infitration load and ventilation loads. Discuss in details with methods to calculate infitration load. **[8]**

OR

Q8) a) Write short notes on any two : **[10]**
   i) All water system.
   ii) Air-water combination system.
   iii) Automobile air conditioning system.

b) Explain with hand drawn psychrometric chart the concept of RSHF, GSHF and ERSHF. **[6]**

Unit-V

Q9) Write short notes on any three : **[18]**
   a) Thermostatic expansion value.
   b) Cutouts for refrigeration units.
   c) Humidi stat.
   d) Solenoid valve.

OR

Q10) a) Explain with neat sketches the different duct systems used in practice. **[6]**

b) Briefly explain the equal friction loss method of duct design giving its advantages. **[6]**

c) Prove that the equivalent circular diameter of a rectangular duct is given by $D_e = 1.265 \left[\dfrac{(ab)^3}{a+b} \right]^{0.2}$ **[6]**

Unit-VI

Q11) a) Explain the applications of refrigeration for food preservation. Explain how the refrigeration controls the spoilage of food. **[6]**

b) What factors are to be considered while storing the foods in cold storages. **[6]**

c) Explain briefly marine refrigeration. **[4]**

OR

Q12) a) What are the different applications of cryogenics. Discuss in detail. **[10]**

b) What is normal boilin point of air, hydrogen and helium. Explain the method of liquefaction of any one of it. **[6]**

p-h chart

Refrigerant R-12
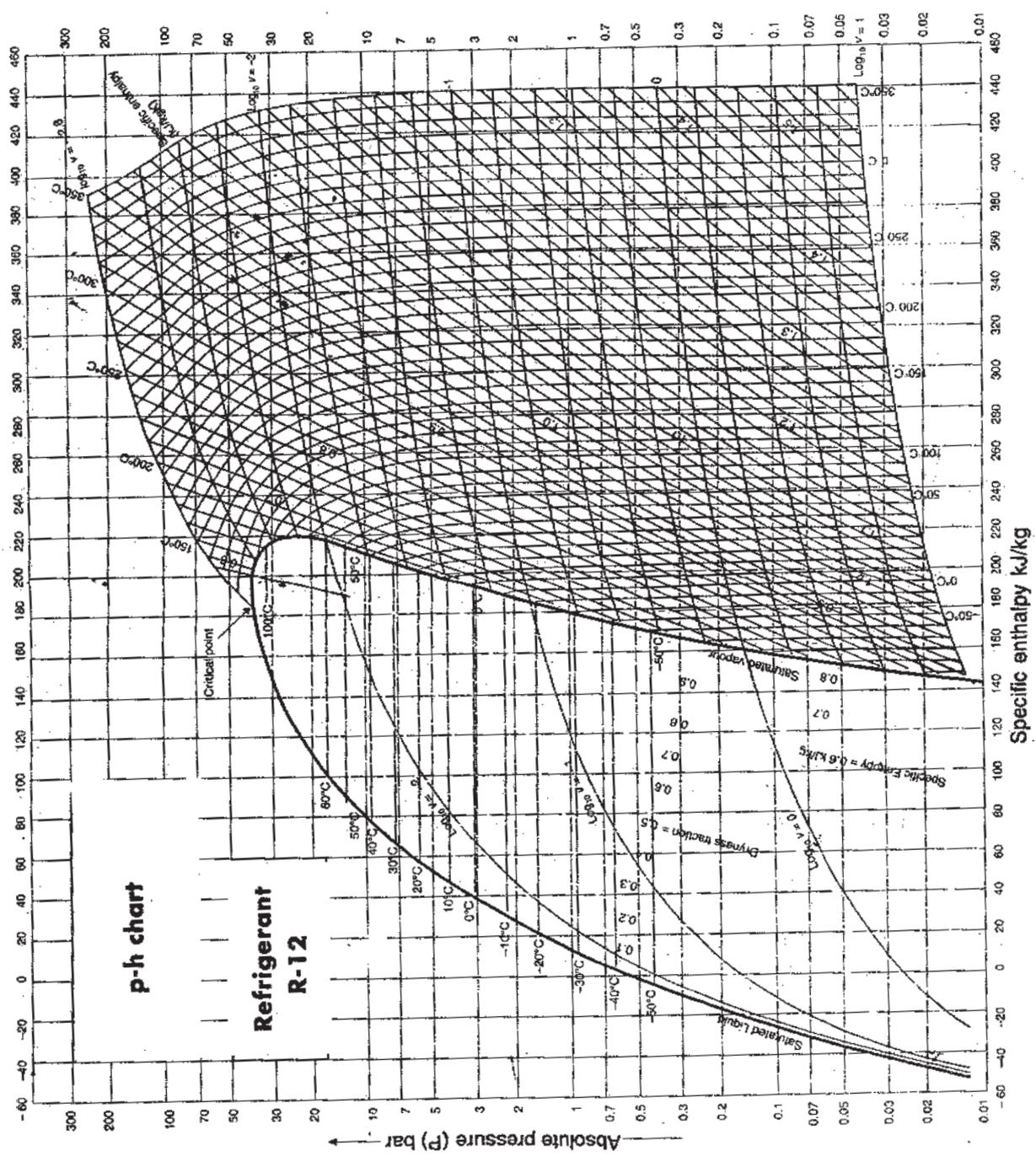
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B.E. (Mech. S/W)
OPERATIONS RESEARCH
(2008 Pattern) (Sem. - I) (Elective - III)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates :-

1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What methods are used to solve operations research problem? Explain in brief. **[6]**

b) What are the limitations of LPP. **[4]**

c) Write the dual of the problem. **[6]**

Min $Z = 3x_1 - 2x_2 + 4x_3$

Subject to: $3x_1 + 5x_2 + 4x_3 \geq 7$

$6x_1 + x_2 + 3x_3 \geq 4$

$-7x_1 - 2x_2 - x_3 \leq 10$

$x_1 - 2x_2 + 5x_3 \geq 3$

$4x_1 + 7x_2 - 2x_3 \geq 2$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

OR

Q2) a) Define operations Research. Describe briefly its function. **[6]**

b) Solve by simplex method. **[10]**

Max $Z = 3x_1 + 2x_2 + 5x_3$

Subject to: $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

$x_1 \geq 0 \ x_2 \geq 0 \ x_3 \geq 0$

Q3) a) Explain mathematical formulation of Transportation problem. **[5]**

b) Determine an intial Basic feasible solution to the following

Transportation problem by North West corner method & use MODI method to test optimality of solution. **[11]**

		Ware houses			Supply
	W_1	W_2	W_3	W_4	
Factory A	14	25	45	5	6
B	65	25	35	55	8
C	35	3	65	15	18
Requirement	4	7	6	13	

OR

Q4) a) Write short note on travelling salesman problem. **[6]**

b) Solve the following salesman problem by branch and bound method and Determine minimum cost of assignment. **[10]**

	1	2	3	4	5
1	0	3	6	2	3
2	3	0	5	2	3
3	6	5	0	6	4
4	2	2	6	0	6
5	3	3	4	6	0

Q5) a) Explain EOQ models with quantity discounts. **[6]**

b) A contractor has to supply 10000 bearings per day to an automobile manufacturer. When he started production runs, he can produce 25000 bearings per day. The cost of holding a bearing in stock for a year is Rs 2 and setup cost of production run is Rs 180. How frequently should production run be made. Assume 300 working day in a year. **[12]**

OR

Q6) a) Explain Johnson's steps for finding an optimal sequence for processing 'n' job on two machines. **[6]**

b) Find the optimal order quantity for a product for which the price breaks are as follow : **[12]**

quantity (q)	unit cost (Rs.)
o < q < 500	Rs 10
500 ≤ q ≤ 750	Rs 9.25
750 ≤ q	Rs 8.75

The monthly demand for the product is 200 units storage cost is 2% of the unit cost and ordering cost is Rs 100.

SECTION - II

Q7) a) State the limitations of Game theory. **[4]**

b) Solve the following game. **[12]**

person B

		B$_1$	B$_2$	B$_3$	B$_4$
	A$_1$	2	1	0	−2
Person A	A$_2$	1	0	3	3

OR

Q8) a) Explain different types of replacement problems by giving examples.**[6]**

b) A firm is considering when to replace its machine whose price is Rs. 12,200. The scrap value of machine is Rs. 200 only. From past experience maintanance cost of machine is as under. **[10]**

Year	1	2	3	4	5	6	7	8
maintanance cost (Rs.)	200	500	800	1200	1800	2500	3200	4000

Q9) a) Explain types of queueing model. **[6]**

b) A Telephone exchange has two long distance operators. Telephone company finds that during peak period long distance calls arrive at an average rate 15/hr. The longest service of these calls is exponential distribution with mean length 5 min. **[10]**

i) What is probability that a subscriber will have to wait for his long distance call during peak hours of a day.

ii) If the subscriber will wait and serve in turn, what is expected waiting time.

OR

Q10) a) Explain the principle of optimality of dynamic programming. **[6]**

b) Explain formulation of nonlinear programming problem. **[6]**

c) Explain formulation of goal programming problem. **[4]**

*Q11)*a)   Discuss the fulkerson's rule used in network analysis.   **[6]**

b)   A project shedule has the following characteristics.   **[12]**

activity	T_o	T_m	T_p
1-2	1	2	3
2-3	1	2	3
2-4	1	3	5
3-5	3	4	5
4-5	2	3	4
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6
7-9	4	6	8
8-10	1	2	3
9-10	3	5	7

i)   Construct the network.

ii)   Find critical path & expected project completion time.

OR

*Q12)*a)   Write short notes on project crushing   **[6]**

b)   Find critical path by during network. Find the total duration for all project. The activities presidence and their delays are given below.   **[12]**

Activity	Predecessor	Duration
A	-	4
B	A	6
C	A	4
D	C	7
E	C	9
F	C	8
G	E	6
H	F	5
I	G,H	4
J	B	3
K	J	2

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[4164] - 459

B.E. (Mechanical S/W)
COSTING AND COST CONTROL
(2008 Pattern) (Sem. - II) (Elective - IV) (Self Study)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :
- *1)*   *Answer any three questions from each section.*
- *2)*   *Answer to the two sections should be written in separate books.*
- *3)*   *Neat diagram must be drawn whenever necessary.*
- *4)*   *Figures to the right indicate full marks.*
- *5)*   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Define cost and explain how the costs are classified.   **[8]**

     b)   Distinguish between financial accounting & cost accounting.   **[8]**

OR

Q2) a)   Prepare cost statement of the M/s Ravishankar & Co. From the following information extracted from the records of the M/s Ravishankar & Co.**[8]**

Stock position of the firm

Particulars	1-4-2010 (Rs)	31-3-2011 (Rs)
Stock of raw materials	80,000	1,00,000
Stock of finished goods	2,00,000	3,00,000
Stock of work in progress	20,000	28,000

Particulars	Rs.	Particulars	Rs.
Indirect labour	1,00,000	Administrative expenses	2,00,000
Oil	20,000	Electricity	60,000
Insurance on fixtures	6,000	Direct labour	6,00,000
Purchase of raw Material	8,00,000	Depreciation on machinery	1,00,000
Sales commission	1,20,000	Factory Rent	1,20,000
Salaries of salesmen	2,00,000	Property tax on building	22,000
Carriage outward	40,000	Sales	24,00,000

b) State and explain limitations of financial accounting? **[8]**

Q3) a) Explain in detail elements of cost also distinguish between direct cost and indirect cost with examples. **[8]**

b) What do you understand by direct expenses? What are their characteristics? **[8]**

OR

Q4) a) State the meaning and scope of cost accounting. **[4]**

b) Are direct expenses more important than indirect expenses? Explain **[4]**

c) Define and explain in details the following with suitable examples **[8]**
Manufacturing overheads
Indirect labour cost
Sales and distribution overhead

Q5) a) State the basis of apportionment of expenses of following service departments. **[8]**

i) Maintenance Deptt.   ii) Payroll & time keeping Dept.
iii) Personnel dept.   iv) Store keeping dept.
v) Purchase dept.   vi) Weltare dept.
vii) Internal transport dept.

b) What do you understand by classification, allocation and apportionment in relation to overhead expenses? Explain. **[10]**

OR

Q6) A company has three production departments (M1, M2 and A1) and three service department, one of which Engineering service department, servicing the M1 and M2 only. The relevant information is as follows: **[18]**

Production departments	Product X	Product Y
M1	10 Machine hours	6 Machine hour
M2	4 Machine hours	14 Machine hours
A1	14 Direct Labour hours	18 Direct Labour hour

The annual budgeted overhead cost for the year are

Production departments	Indirect Wages (Rs)	Consumable Supplier (Rs).
M1	46,520	12,600
M2	41,340	18,200
A1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

Depreciation on Machinery (Rs.)	39,600
Insurance of Machinery (Rs.)	7,20019
Insurance of Building (Rs.)	3,240

(Total building insurance cost for M1 is one third of annual premium)

Power (Rs.)	6,480
Light (Rs.)	5,400
Rent (Rs.)	12,675

(The general service deptt. is located in a building owned by the company). It is valued at Rs. 6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.
The following data are also available :

Department	Book value Machinery (Rs.)	Area (Sq. ft.)	Effective H.P. hours	production Direct Labour hour	Capacity Machine hour
M1	1,20,000	5,000	50	2,00,000	40,000
M2	90,000	6,000	30	1,50,000	50,000
A1	30,000	8,000	05	3,00,000	
Stores	12,000	2,000	-		
Engineering Service	36,000	2,500	10		
General Service	12,000	1,500	-		

a) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.
b) Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.

c) Calculate suitable overhead absorption rate for the production departments.

d) Calculate the overheads to be absorbed by two products, X and Y.

SECTION - II

Q7) What is by-product and how is it different from joint product? What are the various methods of accounting for by-product? Explain each of the methods. **[18]**

OR

Q8) a) Discuss the distinguishing features of process cost system. **[10]**

b) What are the methods of apportioning joint costs? Explain any one in brief. **[8]**

Q9) a) A company produces a single article and sells it at Rs. 10 each. The marginal cost of production is Rs. 6 each and total fixed cost of the concern is Rs. 400/ annum. **[8]**
Construct a breakeven chart and show the following :
Breakeven point
Margin of safety at sale of Rs. 1,500
Angle of incidence
Increase in selling price if breakeven point is reduced to 80 units.

b) State the limitations and uses of breakeven charts. **[8]**

OR

Q10) a) Explain -- margin of safety shows the financial strength of a business. **[8]**

b) CVP analysis is a useful technique for managerial decision-making. Discuss. **[8]**

Q11) a) Distinguish between standard cost and estimated cost? Explain the advantages and limitations of standard costing. **[8]**

b) Explain why marginal cost is decision making tools for management? State its usefulness and limitations. **[8]**

OR

Q12) Write a short note (Any Two) **[16]**

a) Activity based costing

b) Techniques of marginal costing

c) Basis of standard costing

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[4164] - 577

B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1)   Answer any 3 questions from each section.
2)   Answers to the two sections should be written in separate answer books.
3)   Neat diagrams must be drawn wherever necessary.
4)   Figures to the right indicate full marks.
5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   List and explain the benefits of the Automation in a plant.   **[8]**

   b)   With a suitable example explain the role of SCADA in Automation.   **[8]**

OR

Q2) a)   With an example explain the term control system audit and its advantages.   **[8]**

   b)   Explain the role of each layer in "Automation Pyramid".   **[8]**

Q3) a)   Explain different transmission modes in Modbus protocol.   **[8]**

   b)   List and explain at least five Universal commands used in HART.   **[10]**

OR

Q4) a)   What is LAS? Explain the role of LAS in foundation Fieldbus network. **[8]**

   b)   Explain the Foundation Fieldbus model with an example.   **[10]**

Q5) a)   Explain the PLC programming methods as per IEC 1131-1   **[8]**

   b)   Write the procedure for selection of analog I/O module for PLC.   **[8]**

OR

Q6) a)   With some suitable example explain the "Sequential function Chart."**[8]**

   b)   With an example explain the role of PLC in a SCADA system.   **[8]**

Q7) a)　With some suitable example explain four major components of the DCS system. **[8]**

b)　With the help of block diagram explain the Architecture of DCS from any make. **[8]**

OR

Q8) a)　List and explain the logical function blocks in the DCS system. **[8]**

b)　Explain four level display hierarchy. **[8]**

Q9) a)　Describe how DCS supports ERP. **[8]**

b)　What is alarm? Explain how alarms are classified and prioritized. **[10]**

OR

Q10) a)　List and explain advanced function blocks in the DCS system. **[8]**

b)　With the help of an example explain what is "Third party Interface." **[10]**

Q11) a)　What is process Hazard Analysis? How it is carried out. **[8]**

b)　What is HaZOp. Also explain the procedure of it. **[8]**

OR

Q12) a)　What is process Hazard Analysis? How it is carried out. **[8]**

b)　Explain IEC 61511 standard for Functional safety. **[8]**

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[4164] - 579

B.E. (Instrumentation & Control)
FIBER OPTIC INSTRUMENTATION
(Sem. - II) (2008 Pattern) (Elective - III)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates :

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is necessary.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) With a suitable ray diagram, explain 'Total Internal Reflection'. How 'Total Internal Reflection' is achieved in an optical fiber? **[8]**

b) Explain with suitable diagrams (any two) : **[8]**

i) Acceptance angle.

ii) Numerical Aperture

iii) Skew rays.

OR

Q2) a) An optical fiber has a numerical aperture of 0.25 and cladding refractive index of 1.555. Determine **[6]**

i) The acceptance angle for the fiber in water of refractive index of 1.33.

ii) The critical angle at the core-cladding interface.

b) Briefly indicate with the aid of suitable diagrams the difference between meridional and skew ray paths in step index fibers. **[6]**

c) With suitable diagram, explain Goos-Haenchen shift. **[4]**

Q3) a) What do you mean by signal degradation in an optical fiber? Discuss various signal degradation mechanisms in an optical fiber. **[9]**

b) Write a note on 'Optical Time Domain Reflectometer' (OTDR). Also describe the role of OTDR in distributed optical fiber sensing. **[9]**

OR

Q4) a) Compare stimulated Brillouin and stimulated Raman scattering in optical fibers. **[6]**

b) Explain the reasons for pulse broadening in optical fiber. **[6]**

c) Differentiate between Microbending and Macrobending. Also explain what the critical bending radius for an optical fiber. **[6]**

Q5) a) What are the requirements for photo-detectors in an optical fiber? Enlist some photo-detectors, which are used in optical fiber. **[8]**

b) Compare PN diode with P-I-N photodiode. **[8]**

OR

Q6) a) What is difference between splices and connectors. Describe any two types of splices in optical fibers with suitable diagrams. **[8]**

b) Discuss the principles of operation of the two major categories of demountable optical fiber connectors. Describe in detail a common technique for achieving a butt jointed fiber connector. **[8]**

SECTION - II

Q7) What are the advantages of Intensity Modulated Optical Sensors (IMOS)? Describe following techniques of sensing which is based on intensity modulation. Also enlist different parameters, which can be sensed by using these techniques. **[18]**

a) Evanescent field

b) Coupling.

c) Encoding based position sensors.

OR

Q8) a) What are the characteristics of light, which may be monitored in sensing applications? Describe one technique of sensing which is based on phase modulation. **[10]**

b) Write a note on 'Encoding based position sensors'. **[8]**

Q9) a) What is 'Optical Fiber Brag Grating'? Explain with suitable diagram working of 'Optical Fiber Brag Grating'. **[10]**

b) Explain a fabrication technique of 'Optical Fiber Brag Grating'. **[6]**

OR

*Q10)*a) What do you understand by 'Distributed Optical Fiber Sensing'? Enlist the advantages of Distributed Optical Fiber Sensing. **[8]**

b) Explain Distributed Optical Fiber Sensing for temperature monitoring. What are limitations of this type of sensing? **[8]**

*Q11)*a) What do you understand by 'Integrated Optics Device'? What are advantages of Integrated Optical Devices over conventional optical devices? **[8]**

b) Explain with the aid of suitable diagrams, following integrated optical devices: **[8]**

    i) Beam splitter

    ii) Directional coupler

OR

*Q12)*a) Sketch the major elements of a fiber amplifier and describe the operation of the device. Indicate the benefits of fiber amplifier technology in comparison with that associated with Silicon Laser Amplifiers (SLAs).**[12]**

b) What are the advantages of Optical Amplifiers over conventional electric amplifiers used in optical applications? **[4]**

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[4164] - 581

B.E. (Instrumentation and Control)
BUILDING AUTOMATION - II
(2008 Pattern) (Elective-III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain Psychometric chart.   **[10]**

b) Define: **[8]**

   i)   Enthalpy

   ii) Specific Heat

   iii) Latent Heat

   iv) Sensible Heat

OR

Q2) a) Explain different types of heat measurement, different units used with suitable. Examples.   **[8]**

b) Explain various dampers used in ventilation section of HVAC system. Explain preheat control in detail.   **[10]**

Q3) a) Explain Absolute humidity and Relative humidity.   **[8]**

b) Explain different types of heat loss from Human body.   **[8]**

OR

Q4) a) Explain Vapor Compression Cycle.   **[8]**

b) Described methods of ventilation with diagrams.   **[8]**

Q5) a) Describe chiller in detail.   **[6]**

b) Discuss advantages and disadvantages of DDC in detail.   **[10]**

OR

Q6) a) Define: **[8]**

      i)   Optimum start

      ii)   Night cycle

      iii) Night purge

      iv) Load reset

    b) Explain ON-OFF control with respect HVAC application. **[8]**

SECTION - II

Q7) a) Describe BACnet protocol. **[10]**

    b) Explain LON Bus protocol. **[8]**

<div align="center">OR</div>

Q8) a) Explain way of communications in HVAC. **[10]**

    b) Describe Motor Control Center. **[8]**

Q9) a) Draw and explain Regulatory Control and various I/P-O/P symbols. **[8]**

    b) What is the necessecity energy management? List Energy Measurement Devices and explain any one. **[8]**

<div align="center">OR</div>

Q10) a) Explain advantages of BMS. **[8]**

    b) Explain functions of Integrated Building Management systems. **[8]**

Q11) a) Explain BMS Ventricles. **[8]**

    b) Describe IBMS architecture. **[8]**

<div align="center">OR</div>

Q12) a) Explain the verticals of BMS for **[8]**

      i)   Commercial.

      ii)   Education.

    b) Explain features and benefits of IBMS. **[8]**

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[4164] - 632
B.E. (Petroleum Engineering)
PETROLEUM FORMATION EVALUATION
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-
1) Answers to the questions of Section -I and Section - II should be written in separate answer books.
2) Neat diagrams should be drawn wherever necessary.
3) Assume additional data, if necessary.

SECTION - I

Q1) Explain the logging environment in an open hole. How is wireline logging operation carried out? What are different effective depths of investigations of various logging tools? Give significance of these different depths of investigations. **[16]**

OR

Q2) Why do we need different types of resistivity tools? Describe the principles and commonly used tools in electrical resistivity logging. **[16]**

Q3) Describe two important tools that are used to determine density. What will be the effects of (a) grain size, (b) barite, (c) depth of investigation, and (d) nature of source on nuclear density tools. **[16]**

OR

Q4) a) How is drilling time data collected? How is it useful in formation evaluation? **[10]**

   b) Write a note on sidewall coring and its applications. **[6]**

Q5) Write notes on <u>any three</u> of the following : **[18]**
   a) Cement bond logs,
   b) Temperature log.
   c) Production log.
   d) Induction log.
   e) SP log.
   f) Caliper logs

P.T.O.

SECTION - II

Q6) Explain the 'quick - look' log interpretation method in details. **[16]**

OR

Q7) Answer the following : **[16]**

   a) What are the different physical properties of clays that are relevant to log Interpretation?

   b) Explain the empirical relationship between water resistivity, porosity and water saturation.

   c) Explain important types of cross plots and their applications.

   d) What are the different methods of calculating reservoir parameters?

Q8) Explain the terms : **[16]**

   a) Movable hydrocarbons, and

   b) Residual oil saturation.

How are they determined?

OR

Q9) Explain in details uses of logging surveys in various stages of petroleum exploration in an area. **[16]**

Q10)a) Write a detailed note on 'Mud logging'. **[10]**

   b) Give a quick look interpretation and geological interpretation of the logs given in the figure 1. Assume logically significant additional data and state values clearly. Calculate Sw. **[8]**

DEEP RESISTIVITY

mV 60   SP O   0.2   8

DEPTH

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P1667
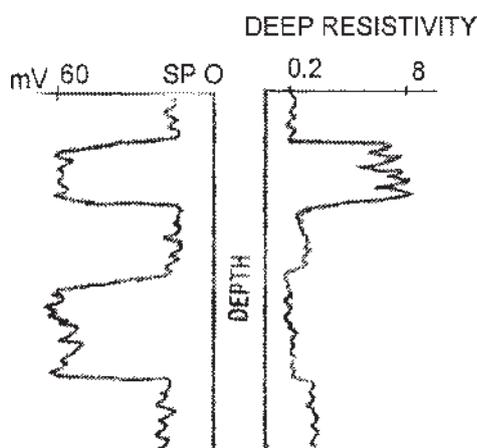
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B.E. (Petroleum Engineering)
PETROLEUM EXPLORATION
(Sem. - I) (2008 Pattern) (Elective - I)

*Time :3 Hours]*   *[Max. Marks :100*

Instructions to the candidates :-
   1)   *Answers to the two sections should be written in separate books.*
   2)   *Neat diagrams should be drawn wherever necessary.*
   3)   *Use of cm scale graph paper is allowed.*
   4)   *Figures to the right indicate marks.*

SECTION - I

Q1) a)   Below is a diagram of an inferred section of a faulted basaltic sill along a traverse taken for gravity survey. Interpret the type of fault. Determine the value of gravity anomaly due to structure in the figure. Draw a relevant anomaly curve for the figure.   **[8]**
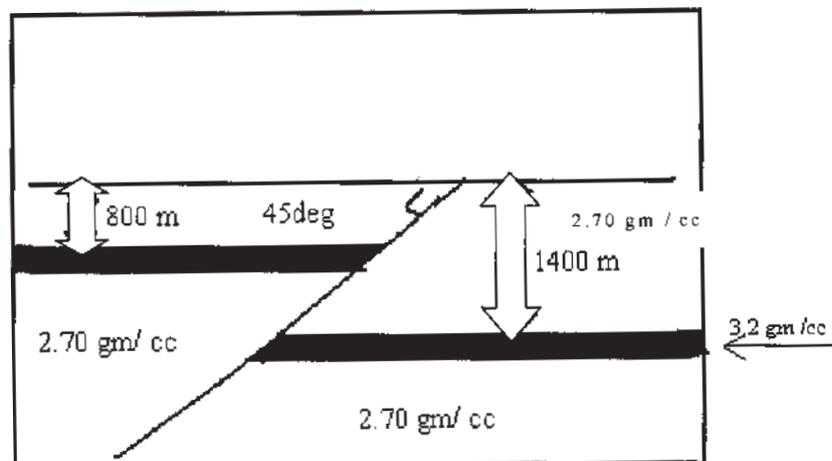
    b)   Discuss Wenner arrangement for VES and Lateral Profiling in Electrical resistivity method.   **[8]**

OR

Q2) a)   Explain the working principle of a proton- precession magnetometer with suitable diagram.   **[8]**

    b)   Compare sphere anomaly curves for Gravity and magnetic surveys. **[8]**

P.T.O.

Q3) a) Following is a data recorded during a Schlumberger spread lateral traverse arrangement in a sedimentary basin to delineate a sandstone -mudstone-sandstone sequence. Draw a graph of electrode spacing in mVs apparent resistivity in Ωm. Identify the mudstone on the curve and estimate the thickness of mudstone. Justify your answer. (use cm scale graph paper).**[8]**

Electrode spacing in m	Apparent resistivity in Ω m	Electrode spacing in m	Apparent resistivity in Ω m
0.69	86	10.00	950
1.0	99	14.68	500
1.47	120	21.54	350
2.15	455	31.62	210
3.16	765	46.42	140
4.64	925	68.13	80
6.81	1300	100.00	50

b) For a CDP reflection survey with 750 m source-detector points at 50 m intervals has been planned. What will be the distance between adjacent common reflecting points or common midpoint? What will be the actual length of the profile on the reflectors? **[8]**

OR

Q4) a) What is the principle of radioactive survey? Explain with suitable diagram the working principle of scintillation counter used in a radioactivity survey. **[8]**

b) How are isotope surveys useful in geochemical exploration of petroleum? **[8]**

Q5) a) What is 4 D seismic survey? How does it differ from 2D and 3D survey? **[10]**

b) Explain in Brief "Vibrosis" and "Air Gun" technique to acquire the seismic data. **[8]**

SECTION - II

Q6) a) What are "Seismic facies"? How are they mapped? **[8]**

b) To evaluate the prospect for hydrocarbons in a sedimentary basin, seismic reflection survey was conducted using a split spread arrangement record. Calculate the dip moveout for a dipping reflector using following data generated during the survey. Draw the relevant graph of Distance in (m) Vs Time in ms. **[8]**

Given : i) Velocity : 1800 m/s,

ii) Thickness : 35 m,

iii) Dip amount : 12^0.

Geophone	Distance m	Time in ms	Geophone	Distance m	Time in ms
12	36	49.09	05	15	42.18
11	33	47.91	04	12	41.49
10	30	46.79	03	9	40.88
09	27	45.73	02	6	40.36
08	24	44.74	01	3	39.94
07	21	43.81	Source	0	39.61
06	18	42.96			

Q7) Explain deterministic and probabilistic approach in risk analysis. **[16]**

OR

Q8) a) Explain in brief important parameters that need to be analyzed in the mapping of petroliferous basins. **[12]**

b) What is a frontier basin? **[4]**

Q9) How one may proceed for exploration of hydrocarbons taking into consideration basin classification and history of occurrence of hydrocarbons? **[18]**

OR

Q10) Discuss how are spatiotemporal changes and their mapping using GIS and remote sensing modeling carried out? Discuss this with suitable examples. **[18]**

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[4164] - 671
B.E. (Petrochemical Engineering)
POLYMER REACTION ENGINEERING
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Answers to the two sections should be written in separate books.*
2) *Solve any three questions from each section.*
3) *Numbers to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain the distinctive features of Polymerization Reaction Engineering. **[8]**

b) Discuss the distinction between addition polymerization Vs condensation polymerization. **[8]**

Q2) a) Discuss all the mechanism steps to be used in Free radical polymerization with one suitable example. **[12]**

b) Derive the necessary equation of the rate of Initiation (ri) in terms of Initiator concentration [I]. **[6]**

Q3) Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 8.35 gmole/lit, and the concentration of initiator is kept constant at 0.04 gmole/lit. Assume termination takes place only by combination. The rate constant are as $K_0 = 3* 10^{-6}$ sec^{-1}, $K_p = 176$ lit/gmole. Sec, $K_c = 3.6* 10^7$ lit/gmole. Sec, f = 0.6 the volume of the reactor filled by the reacting system is 3760 lit. **[16]**

For a reaction time of 180 min, compute the following:

a) The percentage of the styrene polymerized,

b) The number average molecular weight.

Q4) a) Explain the following quantities to be used in the Characterization of Long Chain Molecules : **[12]**

    i)   Weight Fraction,

    ii)   First moment of Pj's

    iii)   Number Average degree of Polymerization.

    iv)   Weight Average Degree of Polymerization

    v)   Number Average Molecular Weight

    vi)   Weight Average Molecular Weight.

b) Find the Polydispersity Index of the mixture composed of 20 molecules of 1000 monomer lengths and 380 molecules of 1 monomer lengths. **[4]**

SECTION - II

Q5) a) Discuss importance and types of copolymers. **[8]**

b) Discuss copolymer behavior based on monomer reactivity ratio. **[8]**

Q6) a) Write a note on Aqueous Emulsifier Solutions. **[6]**

b) Discuss the necessary equation for the steady state population balance equation for the particles having 'n' radicals in the Emulsion polymerization. **[10]**

Q7) a) Write a short note on Reactor Selection for carrying out polymerization reaction. **[9]**

b) Write in detail about the process control strategies in polymerization process. **[9]**

Q8) a) Draw process flow sheet for the production of Nylon 6 and explain the process in detail. **[9]**

b) Write a short note on polymerization of Styrene. **[7]**

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[4164] - 701

B.E. (Computer Engineering)
SOFTWARE ARCHITECTURE
(2008 Pattern) (Sem. -I) (Elective-I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the concept of Robust Software Architecture? Specify software architecture requirements. **[8]**

b) Discuss the Architectural structure and views? What makes a good architecture? **[8]**

OR

Q2) a) Explain with suitable example : **[8]**

i) Architecture is high level design.

ii) Architecture is the overall structure of the system.

iii) Behavior of each software element is a part of architecture.

iv) Architecture has Components and Connectors.

b) Explain various documentations you require to do performance analysis of Software Architecture. **[4]**

c) Explain various stakeholders for software architecture. **[4]**

Q3) a) Explain in brief, Modifiability Quality Attribute, specify with example. **[4]**

b) Specify the need of various Quality Attributes. **[4]**

c) How to achieve performance in software architecture using various tactics? **[8]**

OR

Q4) a) Explain and illustrate following concepts in context of Quality Attribute/ Tactics with example. **[8]**

      i) Components/Interfaces and Reusability.

      ii) Intrusion Detection.

   b) Explain the concept of Availability and discuss various availability tactics for fault detection. **[8]**

Q5) a) Give intent, application, advantages of following patterns : **[10]**

      i) Factory Pattern

      ii) Event Listener

      iii) Adaptor Pattern

   b) Define design patterns, discuss the characteristics of design pattern. **[8]**

<div align="center">OR</div>

Q6) a) What are design patterns? How they are documented using a template? Explain the way they are documented with examples to illustrate from ITERATOR pattern. **[10]**

   b) Explain when proxy pattern will be applied. Give the solution of proxy pattern using UML diagrams. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) What is XML? Give any example of user defined tags in XML? **[4]**

   b) Explain with diagram, JDBC Architecture. **[8]**

   c) Discuss how various java based client and server side TECHNOLOGIES, that are part of J2EE/ advanced java can be combined to develop an application. **[6]**

<div align="center">OR</div>

Q8) a) Explain how J2EE architecture supports MVC architecture. **[4]**

   b) Explain what enterprise Java bean and Entity beans. **[4]**

   c) Differentiate between RMI and RPC. **[4]**

   d) Explain Socket and what is use of port in socket? Explain with diagram. **[6]**

Q9) a) Write a note on Java Applets. **[4]**

b) Discuss how various Java based client and server side technologies that are of J2EE/ Advanced Java can be combined to develop an application. **[6]**

c) Write a note on DOM (Distributed Object Memory) **[6]**

OR

*Q10)*a) Explain with diagram, Life cycle method of Applets. **[4]**

b) Compare Dynamic Link Library (DLL) vs. Static Library. **[4]**

c) What is the use of CSS in XML document? How will you create CSS for particular XML file? What are the different kinds of parsers used in XML? **[8]**

*Q11)*a) Explain with diagram, JSP architecture? Explain various different tags of JSP. **[8]**

b) Explain the need of server side technology in multi-tier architecture. **[8]**

OR

Q12) a) Write a note on server side technology : **[8]**

i) JSF

ii) SOA

b) Explain with example, Concept of Java Servlet. **[8]**

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[4164] - 702

B.E. (Computer)
MULTIMEDIA SYSTEMS
(2008 Course) (Elective-II) (410445)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answer 3 questions from each Section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Black figures to the right indicate full marks.
5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Describe basic architecture of multimedia database. **[8]**

     b) Explain the concept of interactivity. Explain any one Interaction device in detail. **[8]**

OR

Q2) a) Write in brief about multimedia authoring tools. **[8]**

     b) What is streaming media & why is it required ? Explain example of audio/video format for streaming. **[8]**

Q3) a) Explain following image file formats. **[8]**

         1. GIF   2. BMP   3. TIFF   4. JPEG

     b) Explain following encoding techniques :

         1. RLE   2. Arithmetic coding. **[8]**

OR

Q4) a) Explain JPEG-DCT image coding standard. **[8]**

     b) Explain different types of compression. **[8]**

Q5) a) Differentiate between CD and DVD. Explain different DVD formats.**[9]**

     b) Explain audio file formats.

         i) WAV

         ii) AVI

         iii) MPEG Audio.

P.T.O.

Q6) a) Explain differential pulse code modulation in detail. [6]

b) Explain MIDI file format. [6]

c) Write short note on digital audio. [6]

SECTION - II

Q7) a) Explain different text file formats. [9]

b) Explain CCIF, CIF & SIF in detail. [9]

OR

Q8) a) Write in brief about video capturing. [9]

b) Explain the following – [9]

1. LZ coding   2. LZW coding   3. Huffman coding.

Q9) a) Define rendering. Explain any two rendering algorithms. [8]

b) What is use of animation? Explain types of animation. [8]

OR

*Q10)*a) Explain principles of animation. [8]

b) Explain "Open GL in detail over windows/Linux". [8]

*Q11)*a) Write short note on Multimedia web based applications. [8]

b) Explain concept of Multimedia over IP. [8]

OR

*Q12)*a) Explain use of multimedia in educational purpose & industrial training. [8]

b) Write short note on – [8]

1. Web based applications

2. Media on demand.

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[4164] - 703

B.E. (Computer)
MOBILE COMPUTING

(Sem. - I) (2008 Pattern) (Elective-II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answer to each section should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Explain the following in GSM context.

     i) Justify why phased implementation has been adopted for GSM.

     ii) State main objectives of future PLMTS. **[10]**

   b) Explain the operational requirement of GSM. **[6]**

OR

Q2) a) Define the following terms : IMEI, IMSI, TMSI, SIM. **[8]**

   b) Narrate the distinction between the following service areas :

     GSM, PLMN, MSC, LA and cells. **[8]**

Q3) a) What are the messages (information) transmitted over BCCH, FCCH and SCH? Justify why hopping cannot be used for these channels. **[8]**

   b) List different logical channels and their associated functions. **[8]**

OR

Q4) a) State reasons for using a dummy burst over the air. **[8]**

   b) What are the TDMA standards and applications ? **[8]**

Q5) a) Why initialization is necessary for mobile after the power is turned on?**[8]**

   b) What are different cases of handovers? Draw the signal and response diagram. **[10]**

OR

Q6) a) Define the functions performed within the following procedures. **[10]**

       i)   Identification

      ii)   Encryption and Ciphering

     iii) Call clearing

     iv) IMSI attach and detach

      v)   Location update

   b) Name three distinct states of the mobiles. What functions must mobile perform in these states. **[8]**

SECTION - II

Q7) a) For what reason is the PIN number is used? What is its main purpose? **[8]**

   b) Explain four different types of security services provided by GSM. **[8]**

<div align="center">OR</div>

Q8) a) Explain the various components of information security. **[8]**

   b) Explain the Symbian OS architecture? **[8]**

Q9) a) Compare Spectrum efficiency of CDMA with FDMA. **[8]**

   b) Name the three classes of handover. What are the two modes of handover? **[8]**

<div align="center">OR</div>

Q10) a) Differentiate CDMA and TDMA. **[8]**

   b) Explain both the spread spectrum technologies. **[8]**

Q11) a) Explain MAP protocols for basic services support. **[8]**

   b) Enumerate the basic function of MM,CC, RR layers. Illustrate with some examples. **[10]**

<div align="center">OR</div>

Q12) a) What is the main purpose of TMSI reallocation? **[8]**

   b) Define the terms: primitives, entity, SAP and procedure. **[10]**

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[4164] - 704

B.E. (Computer Engineering)
EMBEDDED SYSTEMS
(2008 Pattern) (Elective-II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions :-

   1)   *Answers to the two sections should be written in separate answer books.*

   2)   *In section I attempt : Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6.*
       In section II attempt : Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or
       Q.No. 12.

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different categories of Embedded Systems depending on
       the area of applications? Give examples.   **[8]**

    b) What challenges are faced while designing an embedded system?   **[4]**

    c) Explain how Embedded processor and media processor are different
       than a general purpose processor.   **[6]**

OR

Q2) a) What are different components of an Embedded system?   **[6]**

    b) Differentiate between RISC and CISC architecture of the processors
       used in embedded systems.   **[6]**

    c) How embedded systems are classified depending on complexity?   **[6]**

Q3) a) Discuss different structural units in a processor in an embedded system.
       Mention few advanced units.   **[8]**

    b) Describe different operating modes of ARM7 processor.   **[8]**

OR

Q4) a) It is required to design a mobile phone system. For this application, select the appropriate processor based on **[6]**

     i) Instruction cycle time

     ii) Bus width

     iii) MIPS

     iv) On chip cache

     v) On chip RAM/ROM

    b) Discuss different types of read only memories used in embedded systems. Mention area of application for each. **[6]**

    c) Which parameters are dependent on supply voltage and clock frequency in a system? **[4]**

Q5) a) Differentiate between parallel and serial ports in a system. **[4]**

    b) Discuss I^{2}C protocol w.r.t. following points. **[8]**

     i) Data transfer speed

     ii) Arbitration

     iii) Data frame Format.

    c) Discuss few optical devices commonly used in embedded systems along with applications. **[4]**

<div align="center">OR</div>

Q6) a) Discuss the topology used by devices to communicate through USB protocol. Mention different types of data transfer. **[8]**

    b) Discuss the arbitration mechanism in CAN in detail. **[6]**

    c) What are the data converters? **[2]**

<div align="center">

SECTION - II
</div>

Q7) a) Explain the process of converting an assembly program into a file for ROM image. **[6]**

    b) How Java is useful in embedded system programming? Also mention its disadvantages. **[6]**

    c) Discuss various debugging tools used in developing an embedded system. **[6]**

<div align="center">OR</div>

Q8) a) Explain the process of converting a C program into a file for ROM image. **[6]**

b) Explain the use of data structures namely stack and tree in brief. **[6]**

c) With the help of neat diagram, explain software development cycle for embedded system. **[6]**

Q9) a) Compare the following scheduling models of RTOS, based on worst case latency.

    i) Cooperative ordered list.

    ii) Cooperative Time slicing (rate monotonic) **[6]**

b) What are basic functions of device drivers? **[4]**

c) Discuss various handheld operating systems. **[6]**

OR

Q10) a) Discuss different ways in which interrupts are handled in RTOS environment. **[6]**

b) What care must be taken to eliminate shared data problem? **[6]**

c) Compare assembly language programming and high level language programming. **[4]**

Q11) a) Explain Automatic cruise control system with respect to hardware and software components. **[8]**

b) Differentiate between soft real time operating system and hard real time operating system. **[4]**

c) Discuss different features of Micro C/OS-II. **[4]**

OR

Q12) a) Discuss different applications where VxWorks is used. Also list its features. **[6]**

b) Give details of hardware and software components of IP phone. **[6]**

c) Differentiate between Embedded OS and desktop OS. **[4]**

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[4164] - 706

B.E. (Computer Engg.)
ADVANCED COMPUTER ARCHITECTURE
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

   1) Attempt : Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section I.
        Attempt : Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section II.
   2) Answers to the two sections should be written in separate answer books.
   3) Neat diagrams must be drawn wherever necessary.
   4) Figures to the right indicate full marks.
   5) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is significance of 'Scalability? Derive the Amdahl's law for speedup performance.   **[10]**

   b) Discuss Feng's classification for parallel computer Architecture in detail.   **[8]**

OR

Q2) a) Explain the important Architecture features of explicitly parallel instruction computing. (EPIC)   **[10]**

   b) Explain with suitable example - various levels of pipelining.   **[8]**

Q3) a) Discuss various pipeline hazards. Give hazard detection and resolution techniques.   **[8]**

   b) Explain internal forwarding with proper example.   **[8]**

OR

Q4) a) Prove that 'n' stage pipeline processor can be at most 'n' times faster than the corresponding non-pipelined processor.   **[8]**

   b) Explain any four features of ultra SPARC. Explain the concept of Register Stack Engine (RSE).   **[8]**

P.T.O.

Q5) a) With suitable example explain following features implemented in CRAY-1 architecture **[8]**
  i) Vector chaining.
  ii) Vector looping.
  b) With suitable example, explain the necessity of data Routing in Array Processors. **[8]**

OR

Q6) a) Discuss a problem of 3×3 matrix multiplication on mesh network. Obtain it's time complexity. **[8]**
  b) Discuss any one parallel sorting algorithm for Array processor. **[8]**

SECTION - II

Q7) a) Explain the architecture of IBM Power 4 Processor. **[8]**
  b) What is Multiport Memories? Explain in brief. **[8]**

OR

Q8) a) Compare loosely coupled and Tightly coupled multiprocessor system. **[8]**
  b) Compare between: **[8]**
  i) Write - Thought and Write - Back caches.
  ii) Write - Update and Write - Invalidate protocol.

Q9) a) Compare and explain various multithreaded processor architecture. **[8]**
  b) Explain with suitable examples shared memory parallel programming. **[8]**

OR

Q10) a) Discuss the various contest switching policies implemented in multithreading architecture. **[8]**
  b) Explain with suitable example message passing parallel programming. **[8]**

Q11) a) What are the issues in multiprocessor Operating system? Discuss in detail. **[10]**
  b) Write note on Neuro-Computing paradigms. **[8]**

OR

Q12) a) State and explain control and data parallelism used in CCC by means of standard constructs. **[8]**
  b) Write parallel algorithm to computer matrix. **[10]**
  $Z = A*B + (C+D)*(I+G)$

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[4164] - 707

B.E. (Computer)
PATTERN RECOGNITION

(2008 Pattern) (Semester - II) (Elective - III)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates :-

1) *Attempt : Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section I.*
   Attempt : Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section II.
2) *Answers to the two sections should be written in separate answers books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Differentiate supervised learning and unsupervised learning. **[8]**

b) Explain the concept of feature extraction in pattern recognition system with examples. **[8]**

OR

Q2) a) What are the problems arise by activities in design of pattern recognition System? **[8]**

b) Explain the concept of Classification and Post processing in pattern recognition. **[8]**

Q3) a) Write a short note on Minimum error rate classification. **[8]**

b) With the help of suitable diagram explain classifiers and functional structure of general statistical pattern classifier. **[10]**

OR

Q4) a) Explain the uni-variate and multivariate normal density functions with examples. **[10]**

b) What are challenges in Bayesian decision theory? **[8]**

P.T.O.

Q5) a) Discuss the general principal of Maximum likelihood estimation. **[8]**

b) Write a short note on General theory of Bayesian Parameter estimation. **[8]**

<div align="center">OR</div>

Q6) a) Write Expectation Minimization (EM) algorithm. Explain EM for 2D normal model. **[8]**

b) Illustrate a Gaussian mixture distribution in one dimension and also illustrate a mixture of three Gaussian in 2 dimensional space. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) Write HMM Decoding algorithm. With the help of example explain the state sequence decoding of hidden Markov model. **[8]**

b) Explain Principal Component Analysis (PCA) with analytical treatment. **[8]**

<div align="center">OR</div>

Q8) a) Consider training and HMM by the forward and backward algorithm for a single sequence of length T where each symbol could be one of c values. What is the computational complexity of a single revision of all values $\hat{a}_{ij}$ and $\hat{b}_{ij}$. **[8]**

b) Write a short note on Fisher-Linear Discriminant. **[8]**

Q9) a) Write a short note on support vector machine. **[8]**

b) Explain 2 category and multi category case of linear discriminant functions. Also explain linear decision bounding for 4 class problem with the help of suitable diagram. **[10]**

<div align="center">OR</div>

Q10) a) Explain Parzen window approach for density estimation. State and explain examples of 2dimentional circularly symmetric normal Parzen window for 3 different values of h. **[8]**

b) Explain following scattered criteria's with the help of suitable examples. **[10]**

i) The scattered matrices ii) The trace criteria

iii) Determinant criteria iv) Invariant criteria

Q11) a) When a test pattern is classified by a decision tree, that pattern is subjected to a sequence of queries, corresponding to the nodes along a path from root to leaf ? Prove that for any decision tree. **[8]**

b) Write algorithm for K-means clustering with the help of diagram. Explain how the K-means clustering produces a form of stochastic hill climbing in the log likelihood function. **[8]**

<div align="center">OR</div>

Q12) a) Write a short note on application of normal mixture. **[8]**

b) Explain following criteria functions for clustering : **[8]**

    i)   The sum of squared error.

    ii)   Related minimum variance.

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[4164] - 708

B.E. (Computer Engineering)
HIGH PERFORMANCE NETWORKS
(2008 Pattern) (Sem.-II) (Elective-III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 form section I. Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 form section II.

2) Answers to the TWO sections should be written in SEPARATE answer books.

3) Figures to the right indicate full marks.

4) Neat diagrams must be drawn wherever necessary.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain Gigabit Ethernet architecture with diagram. **[8]**

b) Explain Gigabit Ethernet physical layer with respect to 1000 Base-X family. **[10]**

OR

Q2) a) Explain how flow control provided in Gigabit Ethernet? **[8]**

b) Differentiate between 10 Mbps, 100 Mbps and 1000 Mbps network characteristics. **[10]**

Q3) a) Explain in brief ISDN related protocols at User-Network interface in the context of OSI Model. **[8]**

b) Compare between Frame relay and X.25. **[8]**

OR

Q4) a) Explain various Acknowledged LAPD operations with examples. **[8]**

b) Describe various frame relay congestion control techniques in brief. **[8]**

Q5) a) Explain traffic management functions to maintain QoS of ATM connections. **[10]**

b) Draw and explain ATM Cell Format at network-network interface. **[6]**

OR

P.T.O.

Q6) a) Explain the need of ATM Adaptation layer. What are different types supported in ATM? Explain AAL Type 1. **[8]**

b) Explain functional architecture of B-ISDN. **[8]**

SECTION - II

Q7) a) Compare different DSL technologies. **[8]**

b) What is DSL technology? What are the services provided by the telephone companies using DSL? Distinguish between a DSL modem and a DSL access multiplexer. **[10]**

OR

Q8) a) Explain architecture of VDSL. **[8]**

b) Explain what is asymmetric DSL? Explain in detail modulation technique in ADSL. **[10]**

Q9) a) What is MPLS? Draw and explain structure of label. **[8]**

b) Explain MPLS Protocol stack architecture. **[8]**

OR

Q10) a) Explain working of MPLS with suitable diagram. **[8]**

b) Explain working of RSVP. **[8]**

Q11) a) Explain various IEEE 802.16 Standards related to WiMAX. **[8]**

b) Explain OFDM in WiMax in brief. **[8]**

OR

Q12) a) Differentiate between Fixed WiMax and Wifi networks. **[8]**

b) Explain WiMax MAC layer in brief. **[8]**

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SEAT No. :

[4164] - 710

B.E. (Computer)
NEURAL NETWORK

(2008 Pattern) (Sem.-II) (Elective-III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

   1)   *Answer 3 questions from Section - I and 3 question from Section - II.*

   2)   *Answers to the two sections should be written in separate answer books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of electronic pocket calculator is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Define Neural Network? Explain the characteristics of Neural Network.**[8]**

      b)   Compare and contrast the biological and artificial neural network.   **[8]**

OR

Q2) a)   What are the different models of Neuron? Explain any one in detail. **[8]**

      b)   What are the basic learning laws? Explain each in brief.   **[8]**

Q3) a)   Distinguish between Learning and Training. List out steps in training algorithm.   **[8]**

      b)   Explain ADALINE and MADALINE. List out some applications.   **[8]**

OR

Q4) a)   Explain Back-Propogation Algorithm.   **[8]**

      b)   What is XOR problem? Also explain how to overcome it.   **[8]**

Q5) a)   Describe the Boltzmann machine and Explain basic of Boltzmann learning law and it's significance.   **[9]**

      b)   Draw the architecture of Bidirectional Associative Memory (BAM) and explain in detail.   **[9]**

OR

Q6) a) Explain Auto and Hetero Associative Memory. **[9]**

b) Draw and explain architecture of Hopfield Model. **[9]**

SECTION - II

Q7) a) Differentiate in between Feedback and Feed Forward Neural networks. **[8]**

b) Explain Stochastic Process in detail. **[8]**

OR

Q8) a) Explain Stimulated Annealing algorithm and it's structure in detail. **[8]**

b) Draw the architecture of a Multi Layer Perceptron (MLP) and explain its operation. Mention its advantages and disadvantages. **[8]**

Q9) a) Distinguish between Supervised and Unsupervised Learning. **[8]**

b) Draw and explain the architecture of Adaptive Resonance Theory. **[8]**

OR

Q10) a) What is the purpose of Learning Vector Quantization? Explain in detail. **[8]**

b) What are the different types of Hebbian Learning? Explain basic Hebbian learning. **[8]**

Q11) a) Enlist applications of Neural Networks and Explain any two in brief. **[9]**

b) What is the significance of neural networks in the NET talk application? **[9]**

OR

Q12) a) Write a short note on: (any three) **[18]**

    a) Pattern classification.

    b) Optimization by Neural Networks.

    c) Applications in Decision Making.

    d) Associative Memories.

    e) Applications in Image Processing.

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[4164] -711

B.E. (Computer Engineering)
ADVANCED DATABASES
(2008 Pattern) (Sem. - II) (Elective-III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain speedup and scaleup in parallel databases with suitable diagram. **[5]**

b) Explain range partitioning sort in parallel database along with its suitability. **[5]**

c) Explain partitioning techniques in parallel database along with examples.**[6]**

OR

Q2) a) Explain fragment and replicate join schemes. **[8]**

b) Describe the benefits and drawbacks of pipelined parallelism. **[4]**

c) The histograms are used for constructing load balanced range partitions suppose you have a histogram where values are between 1 and 100, and are partitioned into 10 ranges, 1-10, 11-20,......... 91-100, with frequencies 15, 5, 20, 10, 10, 5, 5, 20, 5 and 5, respectively. Give a load-balanced range partitioning function to divide the values into 5 partitions. **[4]**

Q3) a)　Consider the relations:
　　　employee (name, address, salary, plant-number)
　　　machine (machine-number, type, plant-number)
　　　Assume that the employee relation is fragmented horizontally by plant-number, and that each fragment is stored locally at its corresponding plant site. Assume that the machine relation is stored in its entirety at the Armonk site. Describe a good strategy for processing each of the following queries.

　　　i)　Find all employees at the plant that contains machine number 1130.

　　　ii)　Find all machines at the Almaden plant.

　　　iii)　Find employee ⋈ machine. **[6]**

　b)　Explain two phase commit protocol. How three phase commit protocol overcomes the disadvantages of two phase commit protocol. **[6]**

　c)　Explain distributed transaction management. **[6]**

<p style="text-align:center">OR</p>

Q4) a)　Explain following concurrency control schemes along with advantages & disadvantages in distributed databases.

　　　i)　Distributed lock manager.

　　　ii)　Majority protocol. **[8]**

　b)　List the difference between directory and database. Also explain LDAP. **[6]**

　c)　When is it useful to have replication or fragmentation ? Explain your answer. **[4]**

Q5) a)　What is N tier architecture? Explain its advantages with example. **[8]**

　b)　Explain the components of an XML document with suitable example. **[8]**

<p style="text-align:center">OR</p>

Q6) a)　Which are different parsers for XML? Explain them in brief. **[6]**

　b)　How will you define simple and complex types using XML schemas? Explain with example. **[6]**

　c)　Explain the following with respect to web architecture.

　　　i)　Web server

　　　ii)　Common gateway interface. **[4]**

SECTION - II

Q7) a) Explain the architecture of Data warehouse. **[8]**

b) Differentiate between OLTP and OLAP systems. **[4]**

c) Suppose that a data warehouse for Big - University consists of the following four dimensions: Student, course, semester and instructor, and two measures count and average - grade where average- grade measure stores the actual course grade of the student. Draw a snowflake schema diagram for the data warehouse. **[4]**

OR

Q8) a) What is noisy data? Explain data cleaning process. How missing values are handled? **[8]**

b) Explain the following operations of OLAP on multidimensional data with example.

i) Roll up and drill down.

ii) Slice and dice. **[4]**

c) Write a note on data marts. **[4]**

Q9) a) A database has five transactions. Let min-sup = 20% and min-cont = 75%

TID	Items
100	X, Y, Z
200	X, Z, W,
300	Y, W
400	U, V, W
500	V, Y, Z
600	U, X, Z

i) Find all frequent itemsets using Apriori Algorithm.

ii) List all strong association rules. **[8]**

b) State and explain the algorithm for inducing a decision tree from training tuples. **[8]**

c) Differentiate between classification and clustering. **[2]**

OR

*Q10)*a) Explain the architecture of typical data mining system. **[6]**

b) Suppose that the data mining task is to cluster points (with (x,y) representing location) into three clusters, where the points are A1 (2,10), A2 (2,5), A3 (8,4), A4 (5,8), A5 (7,5), A6 (6,4), A7 (1,2), A8 (4,9). The distance function is euclidean distance. Suppose initially we assign A1, A4 and A7 as the center of each cluster respectively. Use the K-means algorithm to show final three clusters. **[8]**

c) Explain the following terms with example.
   i) Closed frequent itemset
   ii) Maximal frequent itemset **[4]**

*Q11)*a) Explain typical architecture of information retrieval system. **[8]**

b) Write short notes on -
   i) Vector-space model
   ii) TF-IDF method of ranking **[8]**

                    OR

*Q12)*a) Explain page rank algorithm with example. **[6]**

b) Write a short note on web crawler. **[4]**

c) Explain the terms. **[6]**
   i) Inverted index.
   ii) Ontology.
   iii) Homonyms.

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[4164] - 714

B.E. (Computer Engineering)
CLOUD COMPUTING

(2008 Pattern) (Sem.-II) (Elective-IV)

Time :3 Hours]   *[Max. Marks :100*

Instructions to candidates :-

1) *Answer THREE questions from each section.*
2) *Answers to the TWO sections should be written in SEPARATE answer books.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Cloud computing, Enlist and explian essential characteristics of cloud computing. **[8]**

b) Explain the services provided by the Amazon infrastructure cloud from a user perspective. **[8]**

c) What is self service provisioning? **[2]**

OR

Q2) a) What is cloud computing? Enlist and explain three service models, and four deployment models of cloud computing. **[8]**

b) Explain a user view of Google App Engine with suitable block schematic. **[8]**

c) Explain in brief, how cloud helps reducing capital expenditure? **[2]**

Q3) a) What is the difference between process virtual machines, host VMMs and native VMMs ? **[8]**

b) Enlist and explain some of the common pitfalls that come with virtualization. **[8]**

OR

Q4) a) What is the fundamental differences between the virtual machine as perceived by a traditional operating system processes and a system VM? **[8]**

b) Compare the SOAP and REST paradigms in the context of programmatic communication between applications deployed on different cloud providers, or between cloud applications and those deployed in -house. **[8]**

Q5) a) Explain the architecture of cloud file systems (GFS, HDFS). **[8]**

b) Explain with suitable example, how a relational join could be executed in parallel using MapReduce. **[8]**

OR

Q6) a) Explain how Big tables are stored on a distributed file system such as GFS or HDFS. **[8]**

b) Explain with suitable example the MapReduce model. **[8]**

SECTION - II

Q7) a) Why Cloud Computing brings new threats? **[6]**

b) What is secure execution environment and communication in cloud? **[6]**

c) Explain different threats and vulnerabilities specific to virtual machines. **[6]**

OR

Q8) a) Explain the two fundamental functions, identity management and access control, which are required for secure cloud computing. **[7]**

b) Explain risks from multi-tenancy, with respect to various cloud environments. **[7]**

c) What is trusted cloud computing? **[4]**

Q9) a) Explain issues in cloud computing with respect to implementing real time application over cloud platform. **[8]**

b) Enlist and explain the principal design issues that are to be addressed while designing a QoS-aware distributed (middleware) architecture for cloud. **[8]**

OR

*Q10)*a) What is quality of service (QoS) monitoring in a cloud computing? **[8]**

b) Enlist and explain different issues in inter-cloud environments. **[8]**

Q11) a) Explain conceptual representation of the Eucalyptus Cloud. Explain in brief the components within the Eucalyptus system. **[8]**

b) What is Nimbus? What is the main way to deploy Nimbus Infrastructure? What is the difference between cloudinit.d and the Context Broker? **[8]**

OR

*Q12)*a) What is Open Nebula Cloud? Explain main components of Open Nebula. **[8]**

b) Explain Xen Cloud Platform (XCP) with suitable block diagram. **[8]**

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[4164] - 715

B.E. (Computer Engineering)
INFORMATION SECURITY
(2008 Pattern) (Elective-IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) Answer any 3 questions from each section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Assume suitable data, if necessary.

SECTION - I

Q1) a)   Explain OSI security architecture.   **[6]**

b)   Discuss in brief the "security life cycle"   **[6]**

c)   Define an active attack Explain any two active attacks with example. **[6]**

OR

Q2) a)   What is the need of Information security? Explain legal, ethical and professional issues associated with it.   **[8]**

b)   i)   Construct a playfair matrix with the key largest.

ii) Construct a playfair matrix with the key occurrence. Make a reasonable assumption about how to treat redundant letters in the key.

iii) Using the following playfair matrix encrypt this message.

"Must see you over Cadogan West. Coming at once."

M	F	H	I/J	K
U	N	O	P	Q
Z	V	W	X	Y
E	L	A	R	G
D	S	T	B	C

                                                                        [10]

Q3) a)   What is the Feistel Cipher structure? Explain in detail.   **[8]**

b)   Why RC 5 is suitable for smart card like devices? Explain the working of RC 5.   **[8]**

OR

P.T.O.

Q4) a) Explain IDEA algorithm in detail. Enlist its strengths. **[8]**

b) What is block cipher? Explain the various block cipher modes of operations. **[8]**

Q5) a) Explain the Elliptic Curve Cryptography (ECC) DIFFIE-HELLMAN algorithm. **[8]**

b) Explain the RSA public-key encryption algorithm with example. **[8]**

OR

Q6) a) Describe key-distribution in Cryptosystem. **[8]**

b) What is field? Define and explain with example. **[8]**

SECTION - II

Q7) a) Why MAC is needed? What are the requirements of MAC function? Explain MAC function in detail. **[10]**

b) Describe the purpose, format and use of x.509 digital Certificates. **[8]**

OR

Q8) a) Explain Birthday-Paradox and Birthday attack on Hash functions. Discuss strengths of SHA-1 against birthday attacks. **[10]**

b) Give HMAC design objectives and explain the HMAC algorithm. **[8]**

Q9) a) Explain the IPSEC Services and authentication header. **[8]**

b) What is SSL protocol stack? Explain the SSL Record format and SSL record protocol operations. **[8]**

OR

Q10) a) Describe the various configurations for firewall. **[8]**

b) How TLS is different than SSL? Explain in detail. **[8]**

Q11) a) Explain the web-trust model used in PGP. Which certificates are used in PGP? **[8]**

b) Describe the web and email security considerations. **[8]**

OR

Q12) a) Explain the message/ content types in S/MIME. **[8]**

b) What is dual signature? How it is used in SET (Secure Electronic Transaction). **[8]**

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[4164] - 730

B.E. (IT)

MULTIMEDIA SYSTEMS

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates :-

1) *Answers to the two sections should be written in separate answer books.*
2) *From section I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define multimedia system. What are its building blocks? Explain in brief. **[6]**

b) What are multimedia authoring tools and explain any three in brief? **[12]**

OR

Q2) a) What is the role of multimedia in internet development? Write your own viewpoints. **[8]**

b) Elaborate the support of windows for multimedia. **[5]**

c) Explain any one software tool which is used to develop multimedia contents. **[5]**

Q3) a) What are image acquisition techniques? What is image enhancement by spatial filtering? **[8]**

b) Elaborate RLE compression technique with appropriate example. **[8]**

OR

Q4) a) Elaborate on BMP and TIFF image file formats. **[8]**

b) What is shannon fano algorithm? Elaborate with an example. **[8]**

Q5) a) Write a short note on characteristics of sound. **[8]**

b) Write a short note on ADPCM. **[8]**

OR

Q6) a) What are the building blocks of an audio system? Write the function of each block. **[8]**

b) What is MP3? Draw the block diagram of MPEG3. What is the difference in MP3 and MPEG4? Elaborate. **[8]**

SECTION - II

Q7) a) Write short note on video transmission standards. **[8]**

b) What is the development in video recording, storage and transmission in the last ten years? Comment. **[10]**

OR

Q8) a) Write a short note on any two video file formats. **[8]**

b) Write a short note on H261, H263. **[10]**

Q9) a) Elaborate on the basics of VRML. **[8]**

b) Write a short note on forms of Virtual Reality. **[8]**

OR

Q10) a) Write a short note on Virtual Reality chair. **[8]**

b) Write a short note on 3d sound system. **[8]**

Q11) a) What are the principles of animation? Elaborate on this. **[8]**

b) Elaborate on any two animation techniques. **[8]**

OR

Q12) a) What are the applications of animation? Elaborate on this. **[8]**

b) Elaborate on morphing, masking in the context of animation. **[8]**

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[4164] - 743

B.E. (Biotechanology)
BIO-THERAPEUTICS TECHNOLOGY
(2008 Course) (415461)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :-

1) *Answer 3 questions from each Section I and 3 question from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Make necessary assumptions wherever necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) Define following :   **[16]**

    i)   Factor of Safety   ii)   Young's Modulus

    iii) Stress Concentration   iv)   Fatigue

    v)   Creep   vi)   Endurance Limit

    vii) Poisson's Ratio   viii) Polar Moment of Inertia

<div align="center">OR</div>

Q2) What are the various types of theories of elastic failure? Explain each. **[16]**

Q3) a)   Write a note on general design consideration.   **[6]**

       b)   Explain multi-shell construction of high pressure vessel.   **[6]**

       c)   Write a short note on purging of vessels.   **[6]**

<div align="center">OR</div>

Q4) a)   Explain auto frottage and shrink fit construction for high pressure vessels.   **[8]**

       b)   A vessel is to be designed to withstand an internal pressure of 150 MN/m². An internal diameter of 30 cm is specified, and steel having yield point of 450 MN/m² has been selected. Calculate the wall thickness required by the various theories with a factor of safety 1.5 and $\mu = 0.3$. **[10]**

Q5) a) Explain different types of jackets used in construction of reaction vessel. **[8]**

b) Explain shaft design based on Torque and bending moment. **[8]**

OR

Q6) a) Explain any four types of agitators with neat sketch. **[10]**

b) Write a short note on jackets and coils with a neat sketch. **[6]**

SECTION - II

Q7) a) A single effect evaporator is to be operated at absolute pressure of 0.13 bar. Estimate the heat transfer area necessary to concentrate 4500 kg/hr of caustic soda solution from 10% to 40% (by weight) using saturated steam at 117°C as heating media. The overall heat transfer coefficient may be taken as 1.25 kW/m²°C. **[12]**

Data : Specific heat of feed = 4000 J/Kg°C

Specific heat of Product = 3260 J/Kg°C

Feed temperature = 18°C

BPR of Solution = 30°C

Density of Boiling liquid = 1390 kg/m3

The liquid level in the evaporator is 1200 mm above the heating surface.

b) Explain various methods of feeding for multiple effect evaporators. **[6]**

OR

Q8) a) What are the advantages of plate heat exchanger? With neat sketches show the various flow patterns in plate heat exchanger. **[10]**

b) Explain design of Long tube vertical evaporators with neat sketch. **[8]**

Q9) a) Explain the design of liquid distributors and redistributors. **[8]**

b) Discuss various feed arrangements to be considered for distillation column along with neat sketches. **[8]**

OR

*Q10)*a) Explain segmental downcomer, chord type downcomer, circular type downcomer with neat sketches. **[8]**

b) Explain design variables in distillation column. **[8]**

Q11) What are various types of filter used in biotechnological industry? Explain
any four. **[16]**

OR

Q12) Write short notes on : **[16]**

    a)   Steam sterilization procedures

    b)   Filter integrity testing

    c)   Validation of filters

    d)   Tangential flow filtration.

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Total No. of Questions : 12]

P1651

SEAT No. :

[Total No. of Pages : 2

[4164] - 746

B.E. (Biotechanology)

BIO-THERAPEUTICS TECHNOLOGY

(2008 Pattern) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates :-

1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6 , Q.No.7 or Q. No. 8 , Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) Define the terms "traditional pharmaceutical products", "biologic" and "biopharmaceutical agents". Describe difference between them along with their examples, advantages and limitations. **[18]**

OR

Q2) Give an overview of biopharmaceutical industry with respect to its, operation and function. **[18]**

Q3) What is transfection? Describe different transfection methods of bacterial cells. **[16]**

OR

Q4) Answer following :

a) Describe the different components of a typical cloning and expression vector. **[8]**

b) Enlist the different stages of a clinical trial. Give importance of each stage in drug development. **[8]**

Q5) Answer the following :

a) Compare and contrast between transgenic plants and animals, as sources of recombinant therapeutic proteins. **[8]**

b) "Monoclonal antibodies can be used as therapeutic agents". Elaborate.**[8]**

OR

P.T.O.

Q6) Write short notes on. (Any four)   [4×4=16]
   a) Pre-clinical trials
   b) Advantages of mammalian cell lines in biotherapeutic production.
   c) Protein engineering
   d) Stages in drug development.
   e) Biotherapeutic agents currently available in market.

SECTION - II

Q7) Define decontamination and sanitation. Describe both with respect to their, procedure, significance and limitations in a typical biotherapeutic production process.   [18]

OR

Q8) What are the characteristics of water used for production of biopharmaceutical products? Explain the process of obtaining the same at industrial scale. [18]

Q9) Enlist the different types of impurities normally encountered during biotherapeutic production. Also mention the methods of detection and removal of the same.   [16]

OR

Q10) Answer the following :
   a) Formulation of a drug depends on the physico-chemical properties and target site of the drug. Justify.   [8]
   b) Write a short note on physical and chemical instability issues of a drug.[8]

Q11) Answer the following :
   a) What is cGMP and cGLP. Describe their significance in production of a drug?   [8]
   b) How are trials for testing of toxicity of a drug, carried out?   [8]

OR

Q12) Write short notes on : (Any four)   [4×4=16]
   a) IPR   b) Trademarks
   c) Clinical research   d) PEGyaltion
   e) Slow release formulations   f) Role of QC

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[4164] - 415

B.E. (Civil)

TRANSPORTATION ENGINEERING - II

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

  1) *Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6 from Section - I and answer Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from Section - II.*
  2) *Answer to the two sections should be written in separate books.*
  3) *Figures to the right indicate full marks.*
  4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  5) *Assume suitable data if necessary.*
  6) *Neat diagrams must be drawn wherever necessary.*

SECTION - I
Unit - I

Q1) a) Explain in brief the classification of Roads by Nagpur Road Plan. **[5]**

   b) What are the different causes of Traffic accidents? Discuss briefly? **[5]**

   c) Highlight the salient features of Bombay road development plan.   **[4]**

   d) Write a short Note on Preparation of master plan.   **[3]**

OR

Q2) a) Describe the following terms with respect to traffic engineer's.   **[5]**
   i)   Road user characteristics.
   ii)   Spot speed studies.

   b) Enlist the various road pattern's and explain star and grid pattern in brief with sketch.   **[5]**

   c) Write an explanatory note on Highway planning Survey's.   **[4]**

   d) Write a short note on traffic control devices.   **[3]**

Unit - II

Q3) a) What is super elevation? Why it is necessary? State the minimum and maximum values of super elevation as per Indian road congress.   **[5]**

   b) Write a short note on :   **[6]**
   i)   Grade compensation.
   ii)   Widening of pavement on Horizontal roads.

P.T.O.

c) The speed of overtaking and overtaken vehicles are 70 and 40 kmph, respectively on two way traffic roads. If the acceleration of overtaking vehicle is 0.99 m/sec². **[6]**
   i) Calculate safe overtaking sight distance.
   ii) Mention the minimum length of over taking zone (assume t = 2 sec).

OR

Q4) a) Write a short note on Highway drainage. **[5]**

b) State clearly the difference between S.S.D. and O.S.D. and also enlist the various factor's which influence on both distances. **[6]**

c) The radius of horizontal curve is 400 m, the total pavement width at curve is 7.6 m and the super elevation is 0.07. Design the transition curve length for a speed of 100 kmph. Assume pavement to be rotated about the inner edge. **[6]**

Unit - III

Q5) a) Explain these terms : **[6]**
   i) ESWL
   ii) Modulus of Subgrade reaction.
   iii) Radius of relative stiffness.

b) Describe briefly the various factors influences the pavement design. **[4]**

c) With the aid of neat sketches explain the design of joints in cement concrete pavement. **[6]**

OR

Q6) a) Explain the Westergaards stress equations for wheel loads at all the three regions of cement concrete pavement. **[6]**

b) Explain the construction procedure of W.B.M. roads. **[4]**

c) Enlist the various tests for judging the suitability of road stones. Explain briefly the Aggregate crushing test. **[6]**

SECTION - II
Unit - IV

Q7) a) Differentiate between : **[3 × 2 = 6]**
   i) Apron and Hanger.
   ii) Minimum Turning Radius and Minimum Circling radius.
   iii) Runway and Taxiway.

b) Enlist the various Aircraft characteristics and explain any two in brief. **[5]**

c) The length of Runway under standard conditions is 2100m. The Airport site has an elevation of 270 m above mean sea level. Its reference temperature is 30°C. If the runway is to be constructed with an effective gradient of 0.20%. Determine the corrected runway length. Also, carryout the usual checks as per ICAO. **[6]**

OR

Q8) a) Enlist the characteristics of a good airport layout. Draw a neat sketch of typical airport layout of single runway. **[5]**

b) Write short notes on any two of the following : **[2 × 3 = 6]**

  i)   Sketch showing the airport component parts.

  ii) Factors which govern the site selection for an airport.

  iii) Zoning Laws.

c) Explain the wind rose type - II with the aid of a neat sketch for orientation of runways. Also, state clearly the meaning of **[6]**

  i)   Wind coverage.

  ii) calm period.

Unit - V

Q9) a) Derive an equation for economical span of a bridge. State the assumptions clearly. **[5]**

b) A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 200m³/sec Assume Lacey's silt factor equal to 1.0. Find the maximum depth of scour when the bridge consists of 2 spans of 40m each. **[4]**

c) Draw sketches of any two types of abutment and state the conditions under which they are recommended. **[4]**

d) Write a short note on requirement of traffic in the design of highway bridges. **[4]**

OR

Q10) a) How do you determine the flood discharge by direct method. **[5]**

b) The normal velocity of flow in a river is 2m/sec. The normal, artificial waterway and the enlarged area upstream of the bridge respectively are 8000m², 7000 m² and 9000 m². Determine the height of afflux using Merriman's formula. Also find the increase in velocity due to afflux. Assume g = 9.81 m/sec/sec and Coefficient of discharge, C = 0.98. **[4]**

c) Write short notes on any two of the following : **[2 × 4 = 8]**
  i) IRC class A type of loading.
  ii) Cylinder pier.
  iii) Loads acting on a bridge structure.
  iv) Linear Waterway of a bridge.

Unit - VI

Q11) a) Define a bearing and state the purposes for providing bearings in bridges?
[4]
  b) Write notes on **[2 × 4 = 8]**
  i) Maintenance of bridges.
  ii) Waterway of a culvert.
  c) Draw the illustrative sketches of **[4]**
  i) Suspension bridge.
  ii) Bascule bridge.

OR

Q12) a) Explain any two types of erection methods employed during construction of bridges. **[4]**
  b) Differentiate between Fixed Span and Movable span bridges. Give one example each of fixed span and movable span bridge. **[4]**
  c) Write a short note, along with a neat sketch, on a cable stayed bridge.**[4]**
  d) What do you mean by 'Floating bridge? What are the advantages of floating bridge over fixed bridge. **[4]**

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[4164] - 417

B.E. (Civil)

ADVANCED FOUNDATION ENGG.

(Sem. - II) (2008 Course) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Your answer will be valued as a whole.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain 'significant depth' and discuss Is code provisions for subsoil exploration for construction of foundations of important structures. **[9]**

b) Discuss IRC, provisions for explorations, with special reference to number of boring along the centreline of road. **[8]**

OR

Q2) a) Discuss the different guidelines for construction of important structures, for the depth of exploration. **[9]**

b) Discuss in brief the different case studies for failures of foundation. **[8]**

Q3) a) Explain the following : **[8]**

     i)   Conventional method for Raft foundation Design.

     ii)   Soil line method, for Raft foundation Design.

b) A square footing 1.2m × 1.2m rests at a depth of 1m in a saturated clay layer 4m deep. The clay is NC with q_u = 40 kN/m², LL = 30%, γ_{sat} = 17.8 kN/m³, w = 28% & g = 2.68. Determine the safe load, which the footing can carry with a FOS = 03 against shear. Also determine the settlement if the footing is loaded with this safe load. Use, N_c = 5.7, N_q = 1 & N_r = 0. **[9]**

P.T.O

Q4) a) Discuss the steps for Hansen's method, for design of shallow foundations subjected to inclined loads. **[9]**

b) Discuss the various softwares used for geotechnical design & explain the use of software 'Geo-slope'. **[8]**

Q5) a) Discuss various types of piles based upon the function & materials used. **[8]**

b) How the allowable load for the pile, under test is determined in a cyclic pile load test? Explain with graph. **[8]**

OR

Q6) a) What do you mean by 'laterally loaded piles'? How modulus of subgrade reaction & relative stiffness factor is determined for LLP? **[8]**

b) Explain the steps for 'Reese & Matlock' method. **[8]**

SECTION - II

Q7) a) How will you determine the load carrying capacity of underseamed pile in the following conditions, **[8]**

i) Clayey soils.

ii) Sandy soils

b) A clay layer, 5 m thick, is to be consolidated with the help of sanddrains of dia. 30 cm & spaced at 2.7 mc/c. Determine the influence of the wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay without sand drains would be equal to 20%. For following conditions. **[9]**

i) $Kr = kz$ ii) $Kr = 5kz$.

Assume, square pattern for sand drains for $Uz = 20\%$, $Tv = 0.031$. $Ur = 0.34$, $Tr = 0.081$, for $Tr = 0.407$, $Ur = 0.87$.

OR

Q8) a) Explain double seamed under seam pile construction. **[8]**

b) Explain the design steps for construction of vertical sand drains. **[9]**

Q9) a) Explain the design provisions for, **[8]**

    i)   Well curb.

    ii)   Cutting edge.

    iii)   Steining thickness.

    iv)   Bottom plug.

  b) Explain the design of 'grip length' & 'normal scour depth' suggested by 'Lacey'. Also discuss. method for scour level, according to IRC. **[9]**

<div align="center">OR</div>

Q10) a) Discuss the various provisions made as per IRC for well foundation design. **[8]**

  b) Explain the 'Banerjee & Gargopadhyay Analysis' for design of well foundation. **[9]**

Q11) a) Differentiate clearly bet^n Rockfill cofferdam & cellular cofferdam. **[8]**

  b) Explain the steps for design of 'Anchored sheet pile' using 'Free earth support' method. **[8]**

<div align="center">OR</div>

Q12) a) Discuss the common types of cofferdam construction. **[8]**

  b) Compute the embedment depth & pull in the anchor rod, for a sheet pile cofferdam of 6m high, retaining soil as a backfill & below dredge line, the same soil, with following properties, $\phi = \phi' = 30°$ C = 0, $\gamma_{sat} = 20$ kN/m^3, r = 18 kN/m^3, Anchor rod = 1 m below the top. GWT = 3 m above dredge line.

    Use free earth support method. **[8]**

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B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

(Sem. - II) (2008 Pattern) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1)   *Answers to the two sections should be written in two separate books.*
2)   *Figures to the right indicate full marks.*
3)   *All questions are compulsory.*
4)   *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) What are Precambrian metamorphic rocks? Where they occur in Maharashtra state? Explain their engineering significance with suitable examples. **[12]**

b) Flow groups. **[6]**

OR

a) Engineering significance of Vindhyans and Kaladgis Maharashtra State. **[10]**

b) Region 2. **[4]**

c) Topographical expression of dykes. **[4]**

Q2) a) Discuss in detail old and recent theories about origin of Tachylytic Basalts. **[6]**

b) Discuss in detail how economy has been achieved at Varasgaon and Mula dam sites by interpreting correctly local geological conditions. **[10]**

OR

a) What will happen if reservoir is located on Laterites and jointed quartzites. **[6]**

b) Tail channel erosion in Panshet dam. **[4]**

c) Significance of dykes from dam foundation point of view. **[6]**

Q3) a) Engineering significance of older alluvium. **[8]**

b) Discuss in detail various methods of water conservation with suitable Examples. **[8]**

OR

a) Discuss water bearing characters of Compact basalt and volcanic breccias. **[8]**

b) Transported soils of Maharashtra state. **[4]**

c) Multiaquifer system. **[4]**

SECTION - II

Q4) a) Explain various physical properties of rock masses in detail. **[9]**

b) Explain Barton's system of classification of rock masses. **[9]**

OR

a) Write on the Wickeham's concept of Rock Structural Rating (R. S. R.) in detail. **[8]**

b) **Only mention** the parameters in case of R. M. R. system of classification of rock masses. **[4]**

c) Resistivity survey. **[6]**

Q5) What are fractures? Mention their important field characters. Discuss their engineering significance from tunneling point of view. Give case histories.**[16]**

OR

a) Describe Tunneling through Amygdaloidal basalts with examples. **[8]**

b) Location and depth of drill holes for bridge foundation. **[4]**

c) A tunnel associated with dyke/dykes. **[4]**

Q6) Write notes on:

a) Relationship between major faults and major earthquakes. **[8]**

b) Problems with open excavations in city areas. **[4]**

c) Dyke rock as a construction material. **[4]**

OR

a) Suitability of Deccan baslt as a construction material. **[7]**

b) Foundation of monumental buildings. **[4]**

c) Fault zone treatment. Give examples. **[5]**

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[4164] - 420

B.E. (Civil)

CONSTRUCTION MANAGEMENT

(Sem. - II) (2008 Pattern) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answers to the two sections should be written in separate books.

2)   Neat diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

4)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5)   Assume suitable data, if necessary.

SECTION - I

Q1) a) What are role of project management consultants and its type explain in detail. **[8]**

b) State the role of construction industry in infrastructure development.**[6]**

c) What is role of construction industry in economic development? **[4]**

OR

Q2) a) Explain in detail functions of communication. **[6]**

b) What are the reasons behind project overruns and how to combat them?**[6]**

c) What is project monitoring and how its reporting is done? **[6]**

Q3) a) Explain in detail the purpose of construction scheduling? **[6]**

b) What is work breakdown structure? **[6]**

c) List out the various symbols used for different activities. **[4]**

OR

Q4) a) Define scheduling. What are the factors affecting scheduling. **[6]**

b) Define work study and Explain the basic procedure of work study. **[6]**

c) Write a short note on Line of Balance (LOB). **[4]**

Q5) a) Write short note on means of finance. **[4]**

b) Explain in detail Building and other Construction Workers Act 1996. **[6]**

c) Explain in brief project cash flow projections and statements. **[6]**

<div align="center">OR</div>

Q6) Write short note on following, any four : **[16]**

a) Workman's Compensation Act 1923

b) Child Labour Act

c) Working Capital

d) Project Balance Sheet

e) Profit and Loss account Statement

<div align="center">

SECTION - II

</div>

Q7) a) What is Risk Management? Explain in detail various Risks in construction. **[8]**

b) Explain Concept of value and Define Value analysis. Write in detail steps in value analysis. **[10]**

<div align="center">OR</div>

Q8) a) What are key factors that affects energy consumption in building. **[10]**

b) Write down in detail role of insurance in construction Risk management? **[8]**

Q9) a) What is (EOQ) Economic Order Quantity? Derive the expression for EOQ. **[8]**

b) Define Human Resource Management and describe a procedure suitable for employment in large construction industry. **[8]**

<div align="center">OR</div>

Q10) a) Write down functions of materials management and explain them. **[8]**

b) Write short note on : **[8]**

i) Staffing policy and pattern.

ii) Performance appraisal and Job Evaluation.

Q11) a) Define Artificial Intelligence and write down applications of Artificial Intelligence in Civil engineering **[12]**

b) Differentiate between Biological neuron and artificial neuron. **[4]**

<div align="center">OR</div>

Q12) a) Write short note on the following : **[12]**

    i)   Artificial Neural networks.

    ii)   Fuzzy Logic.

    iii) Genetic Algorithm.

b) What is training of neurons? explain. **[4]**

<div align="center">✪✣✪✣</div>

SEAT No. :

[Total No. of Pages : 7

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B.E. (Civil)

STATISTICAL ANALYSIS & COMPUTATIONAL METHODS IN CIVIL ENGINEERING

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer any 3 questions from each section.*

   2)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

   3)   *Answers to the two sections should be written in separate answer books.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Figures to the right indicate full marks.*

   6)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   7)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the role of statistics in engineering applications.   **[3]**

    b) Write an expression for coefficient of skewness and coefficient of Kurtosis and state what these coefficients indicate.   **[5]**

    c) The following table gives the SO_2 concentration in ppm in the ambient air observed at a monitoring station. Determine the mean, median, mode and standard deviation for this data.   **[8]**

Sr.No	1	2	3	4	5	6	7	8	9	10
SO_2 conc. in ppm	0-1.5	1.5-3.0	3-4.5	4.5-6.0	6.0-7.5	7.5-9.0	9.0-10.5	10.5-12	12-13.5	13.5-15
No. of observations	12	18	6	2	4	3	1	1	2	1

P.T.O.

Q2) a) Write a short note on methods of sampling. **[4]**

b) The following table gives the BOD in *mg/l* observed at a sampling station. Determine the Karl Pearson's coefficient of skewness and coefficient of Kurtosis. **[12]**

Sr.No	1	2	3	4	5	6	7
BOD (*mg/l*)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of observations	8	12	20	10	6	3	1

Q3) a) In the first week of August every year, the probability for a rainy day is 0.75. What is the probability that there will be exactly 5 rainy days in that week? What is the probability that there will be atmost 2 rainy days? **[4]**

b) The diameter D of wires installed in an Electro Static Precipitator (ESP) has a standard deviation of 0.01 in. What should be the value of mean if the probability of its exceeding 0.21 in is to be 1%. Use the std. normal table given in Q.4b. **[4]**

c) Mechanical engineers while testing a new arc welding technique, classified welds with respect to appearance and X-ray inspection. The results are shown in table below. Use the 0.05 level of significance to test the independence of the criteria of classification. [Use chi-square Table].**[8]**

Appearance → X-ray Inspection ↓	Bad	Normal	Good
Bad	20	7	3
Normal	13	51	16
Good	7	12	21

$\upsilon\downarrow$	$\alpha = 0.05$
3	7.8147
4	9.4877
5	11.07
6	12.59
7	14.067

OR

Q4) a) The ppm concentration of a toxic substance in a wastewater is known to be normally distributed with mean μ = 100 and standard deviation σ = 2.0. Calculate the probability that the toxic substance concentration C is **[6]**

i)   less than 98

ii) between 98 and 104

iii) greater than 104

Use the standard normal distribution table given in Q.4b.

b) The following table gives tensile strength of concrete cylinders in lb/in^2. Test the goodness of fit for normal distribution at 5% significance level using chi-square test. **[10]**

Tensile strength of concrete cylinders	No. of observations
< 325	6
325 - 335	6
335 - 345	11
345 - 355	14
355 - 365	16
365 - 375	15
375 - 385	8
385 - 395	10
395 - 405	8
> 405	6

Use the following chi-square distribution table for α = 0.05.

υ	3	4	5	6	7
χ^2	7.8147	9.4877	11.07	12.59	14.067

Use the Standard Normal Distribution Table given below.

Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
area	0.0000	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.2580	0.2881	0.3159	0.3413

Z	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
area	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641	0.4713	0.4772

Z	2.1	2.2	2.3	2.4	2.5
area	0.4821	0.4861	0.4893	0.4918	0.4938

Q5) a) The pressure and volume of a gas are related by the equation

$$pv^b = a \text{ or } \left[v^b = \frac{1}{p} a \text{ where a and b are constants} \right] \text{ Fit this equation}$$

for the following data using the principle of least squares. **[12]**

p	0.5	1.0	1.5	2.0	2.5	3.0
v	1.62	1.00	0.75	0.62	0.52	0.46

b) For the following data find $f(g)$ using Newton's forward interpolation formula. **[6]**

x	8	10	12	14	16
f(x)	1000	1900	3250	5400	8950

OR

Q6) a) The amount A of a substance remaining in a reacting system after an interval of time t in a certain chemical experiment is given in the following table. Find the value of A when t = 6. Use Lagrange's Interpolation formula. **[6]**

t	3	7	9	10
A	168	120	72	63

b) The average yearly rainfall over a basin and the corresponding yearly runoff, both expressed in cm, for a period of 9 years are given below. Establish the relation between rainfall and runoff of the form $Y = ax + b$. Also compute the coefficient of correlation between them. **[12]**

Year	1	2	3	4	5	6	7	8	9
Rainfall	113	127	108	167	99	152	165	160	149
Runoff	74	96	59	109	57	109	124	134	106

SECTION - II

Q7) a) Solve the following system of equations by Gauss - elimination method. **[8]**

$$x_1 + x_2 + 2x_3 = 4$$

$$2x_1 + 5x_2 - 2x_3 = 3$$

$$x_1 + 7x_2 - 7x_3 = 5$$

b) Use Gauss - Seidel iterative method to solve the following equations. [The percent relative error $E_s < 5\%$] **[8]**

$$83x_1 + 11x_2 - 4x_3 = 95$$

$$7x_1 + 52x_2 + 13x_3 = 104$$

$$3x_1 + 8x_2 + 29x_3 = 71$$

OR

Q8) a) Solve the following equations using Gauss - Jordan method. **[8]**

$$2x_1 + x_2 + x_3 = 10$$

$$3x_1 + 2x_2 + 3x_3 = 18$$

$$x_1 + 4x_2 + 9x_3 = 16$$

b) Use Gauss - Seidel iterative method to solve the following equations. [Relative error $E_s < 5\%$] **[8]**

$$5x_1 + x_2 + 2x_3 = 19$$

$$x_1 + 4x_2 - 2x_3 = -2$$

$$2x_1 + 3x_2 + 8x_3 = 39$$

Q9) a) Find the positive real root of **[8]**

$$x \log_{10} x = 1.2$$

Using bisection method in four iteration in the interval $(2, 3)$

b) Find the real root of $x^3 - 3x + 1 = 0$ lying between 1.5 and 2 upto three decimal places by Newton Raphson method. **[8]**

OR

Q10) a) Using False Position method, find the root of **[10]**

$$f(x) = x^2 - \log_e x - 12 = 0$$

upto four iteration, in the interval $(3, 4)$

b) Explain - Newton Raphson method, to find the roots of the nonlinear equation. **[6]**

Q11) a) A river is 80 m wide. The depth y in meter at a distance x from one bank is given by the following table. Calculate area of cross section of the river using Simpsons's rule **[9]**

x	0	10	20	30	40	50	60	70	80
y	0	4	7	9	12	15	14	8	3

b) Evaluate $I = \int_0^1 \dfrac{dx}{1+x^2}$ using Gauss Quadrature three point formula. **[9]**

Q12) a) The following table gives the velocity (v) of a particle at time (t) Find the distance moved by the particle in 12 seconds. **[9]**

t(sec)	0	2	4	6	8	10	12
v (m/s)	4	6	16	34	60	94	136

b) Using Simpson's 3/8th rule. evaluate $I = \int\limits_{0}^{1} \dfrac{dx}{1 + x}$. **[9]**

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B.E. (Civil)

HYDROPOWER ENGINEERING

(Sem. - II) (2008 Pattern) (Open Elective)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different sources of energy? Differentiate between renewable and non renewable energy sources. **[8]**

b) Differentiate between hydropower and thermal power. **[8]**

OR

Q2) a) Explain hydropower potential of India on the basis of river systems, number of schemes and percentage potential developed. **[8]**

b) What is pumped storage plant? What are its advantages and limitations.**[8]**

Q3) a) State the different types of runoff river plants. Explain the components and their functions of runoff river plant. **[8]**

b) Differentiate between microhydro power and storage hydro power plants. **[8]**

OR

Q4) a) Differentiate between base load and peak load plant. **[8]**

b) Classify the hydropower plant on the basis of functions and plant capacity. **[8]**

Q5) a) The runoff river hydropower plant has inflow of 30 cumecs and it works on head of 50 m with a provision for pondage to meet daily demand with load factor of 75%. Determine the power generation capacity of plant at 85% over all efficiency. What amount of pondage is needed if the plant operates at the peak station for six hours? **[10]**

b) Define and state the equations for : **[8]**
   i)   Load factor
   ii) Capacity factor
   iii) Utilization factor
   iv) Plant factor

<p align="center">OR</p>

Q6) a) A run of river plant operates as a peak load station with weekly load factor of 30%. What will be minimum flow in the river so that the station may act as base load station? **[10]**

Assume :-
   i)   Rated installed capacity of generator = 15,000 kW
   ii) Operating head = 25 m
   iii) Plant efficiency = 75%

Also determine the daily load factor if the river flow is 15 cumec.

b) What is load duration curve? With the help of graph explain its significance and applications. **[8]**

<p align="center"><u>**SECTION - II**</u></p>

Q7) a) Sketch the details of typical power house and show all components. State functions of all components. **[8]**

b) State advantages and disadvantages of underground power house. **[8]**

<p align="center">OR</p>

Q8) a) What are the safety requirements of power house? **[8]**

b) State any four power plant equipments and their functions. **[8]**

Q9) a) Differentiate between reaction turbine and impulse turbine. **[8]**

b) Determine the number of turbines & diameter of runner for a power plant having 30 cumecs inflow, 15 m head. The efficiency of the turbine is 80% with the speed of 200 rpm. Assume the specific speed as 225 and speed ratio as 0.8. **[10]**

OR

Q10) a) What is the significance of surge tank and state its advantages? **[8]**

b) A turbine generates 20,000 kw power at the head of 250 m with two jets. If the overall efficiency of turbine is 75% and velocity of water in the jet is 95% of the theoretical velocity. Determine - **[10]**

i) The quantity of water in cumecs.

ii) The size of the jet.

Assume C_d = 0.98 & speed ratio = 0.45.

Q11) a) What are the provisions related to safety and electricity supply as per electricity act 2003? **[8]**

b) What is the concept of carbon credits? Explain its significance. **[8]**

OR

Q12) a) What are the duties of electricity generation companies? **[8]**

b) What are the factors governing the pricing of electricity? **[8]**

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[4164] - 434

B.E. (Mechanical)

ENERGY AUDIT & MANAGEMENT

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
   1)   *Answer 3 questions from Section I and 3 questions from Section II.*
   2)   *Answers to the two sections should be written in separate books.*
   3)   *Neat diagrams must be drawn wherever necessary.*
   4)   *Figures to the right indicate full marks.*
   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables and time value of money factor table is allowed.*
   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1)   a)   Explain current energy scenario in India.   **[8]**

      b)   Describe Energy & Environment.   **[8]**

<div align="center">OR</div>

Q2)   a)   Describe need for renewable Energy.   **[8]**

      b)   Write note on energy policy.   **[8]**

Q3)   a)   Explain different instruments and equipments used for Energy audit. **[8]**

      b)   What are the Energy conservation opportunities for pumping system?**[8]**

<div align="center">OR</div>

Q4)   a)   Describe Energy conservation opportunities in boiler and Steam system**[8]**

      b)   Write short note on Energy Audit software.   **[8]**

Q5)   a)   How you will determine cost of electricity generated in case of Thermal Power Plant?   **[8]**

      b)   Write short notes on.   **[10]**

         i)   Net Present Value (NPV).

         ii)   Return On Investment. (ROI).

<div align="center">OR</div>

Q6) a) What are the advantages and limitations of simple pay back Period. **[8]**

b) An Economizer cost Rs. 200, 000 and will lost for 10 years. It will generate saving of Rs. 35, 000 per year, with maintenance cost Rs. 5,000 per year. If minimum attractive rate of return (MARR) is 10% and salvage value of Rs. 5,000 at the end of 10 year. State whether the Investment is attractive? **[10]**

SECTION - II

Q7) a) What are the different heat losses occurring in oil fired furnace? Explain in brief **[10]**

b) Explain different efficient steam distribution methods. **[8]**

OR

Q8) a) A centrifugal pump is pumping 85 m³/hr of water and pressure rise in the pump is 6 kg/cm² (gauge). If power drawn by motor is 25 kW. Find out the pump efficiency. Assume motor efficiency as 90% and water density as 998 kg/m³. **[10]**

b) Explain the energy saving opportunities in compressed air system. **[8]**

Q9) a) The lighting connected load for the small industry consisting of 140 Fluorescent tubes of 55 W each with magnetic ballast. In first option, the magnetic ballast of Fluorescent tubes is replaced by electronic ballast and power consumption of same fluorescent tubes reduces to 40W. Calculate the simple payback period of above replacement if cost of electronic ballast is Rs. 110. In second option, fluorescent tubes is replaced by energy efficient fluorescent tubes of 20 W and cost of Rs. 450 each. Calculate simple payback period. Which energy saving option is better and why? Consider usage of 16 hours per day and an electrical tariff of Rs. 4 per KWh. **[8]**

b) Explain why efficiency of Energy Efficient Motor is more than conventional motor? **[8]**

OR

Q10) a) Explain the terms. **[8]**

 i) Power Factor.

 ii) Maximum Demand.

 iii) Copper losses.

 iv) Stray losses.

 v) Luminous efficiency.

b) What are different types of motor? Explain motor speed control systems.**[8]**

Q11) a) Describe factors influencing cogeneration choice. **[8]**

b) Describe heat wheel used for waste heat recovery with neat sketch. **[8]**

OR

Q12) a) Explain in brief. **[8]**
i) CDM projects.
ii) Carbon credit Calculation.

b) Classify the waste heat recovery with example. Write down the benefits. **[8]**

Time Value of Money Factors—Discrete Compounding
i = 10%

	Single Sums		Uniform Series				Gradient Series	
	To Find F Given P (F|P,i%,n)	To Find P Given F (P|F,i%,n)	To Find F Given A (F|A,i%,n)	To Find A Given F (A|F,i%,n)	To Find P Given A (P|A,i%,n)	To Find A Given P (A|P,i%,n)	To Find P Given G (P|G,i%,n)	To Find A Given G (A|G,i%,n)
n								
1	1.1000	0.9091	1.0000	1.0000	0.9091	1.1000	0.0000	0.0000
2	1.2100	0.8264	2.1000	0.4762	1.7355	0.5762	0.8264	0.4762
3	1.3310	0.7513	3.3100	0.3021	2.4869	0.4021	2.3291	0.9366
4	1.4641	0.6830	4.6410	0.2155	3.1699	0.3155	4.3781	1.3812
5	1.6105	0.6209	6.1051	0.1638	3.7908	0.2638	6.8618	1.8101
6	1.7716	0.5645	7.7156	0.1296	4.3553	0.2296	9.6842	2.2236
7	1.9487	0.5132	9.4872	0.1054	4.8684	0.2054	12.7631	2.6216
8	2.1436	0.4665	11.4359	0.0874	5.3349	0.1874	16.0287	3.0045
9	2.3579	0.4241	13.5795	0.0736	5.7590	0.1736	19.4215	3.3724
10	2.5937	0.3855	15.9374	0.0627	6.1446	0.1627	22.8913	3.7255
11	2.8531	0.3505	18.5312	0.0540	6.4951	0.1540	26.3963	4.0641
12	3.1384	0.3186	21.3843	0.0468	6.8137	0.1468	29.9012	4.3884
13	3.4523	0.2897	24.5227	0.0408	7.1034	0.1408	33.3772	4.6988
14	3.7975	0.2633	27.9750	0.0357	7.3667	0.1357	36.8005	4.9955
15	4.1772	0.2394	31.7725	0.0315	7.6061	0.1315	40.1520	5.2789
16	4.5950	0.2176	35.9497	0.0278	7.8237	0.1278	43.4164	5.5493
17	5.0545	0.1978	40.5447	0.0247	8.0216	0.1247	46.5819	5.8071
18	5.5599	0.1799	45.5992	0.0219	8.2014	0.1219	49.6395	6.0526
19	6.1159	0.1635	51.1591	0.0195	8.3649	0.1195	52.5827	6.2861
20	6.7275	0.1486	57.2750	0.0175	8.5136	0.1175	55.4069	6.5081
21	7.4002	0.1351	64.0025	0.0156	8.6487	0.1156	58.1095	6.7189
22	8.1403	0.1228	71.4027	0.0140	8.7715	0.1140	60.6893	6.9189
23	8.9543	0.1117	79.5430	0.0126	8.8832	0.1126	63.1462	7.1085
24	9.8497	0.1015	88.4973	0.0113	8.9847	0.1113	65.4813	7.2881
25	10.8347	0.0923	98.3471	0.0102	9.0770	0.1102	67.6964	7.4580
26	11.9182	0.0839	109.1818	9.159E-03	9.1609	0.1092	69.7940	7.6186
27	13.1100	0.0763	121.0999	8.258E-03	9.2372	0.1083	71.7773	7.7704
28	14.4210	0.0693	134.2099	7.451E-03	9.3066	0.1075	73.6495	7.9137
29	15.8631	0.0630	148.6309	6.728E-03	9.3696	0.1067	75.4146	8.0489
30	17.4494	0.0573	164.4940	6.079E-03	9.4269	0.1061	77.0766	8.1762
36	30.9127	0.0323	299.1268	3.343E-03	9.6765	0.1033	85.1194	8.7965
42	54.7637	0.0183	537.6370	1.860E-03	9.8174	0.1019	90.5047	9.2188
48	97.0172	0.0103	960.1723	1.041E-03	9.8969	0.1010	94.0217	9.5001
54	171.8719	5.818E-03	1.709E+03	5.852E-04	9.9418	0.1006	96.2763	9.6840
60	304.4816	3.284E-03	3.035E+03	3.295E-04	9.9672	0.1003	97.7010	9.8023
66	539.4078	1.854E-03	5.384E+03	1.857E-04	9.9815	0.1002	98.5910	9.6774
72	955.5938	1.046E-03	9.546E+03	1.048E-04	9.9895	0.1001	99.1419	9.9246
120	9.271E+04	1.079E-05	9.271E+05	1.079E-06	9.9999	0.1000	99.9860	9.9987
180	2.823E+07	3.543E-08	2.823E+08	3.543E-09	10.0000	0.1000	99.9999	10.0000
360	7.968E+14	1.255E-15	7.968E+15	1.255E-16	10.0000	0.1000	100.0000	10.0000

◆◆◆◆

[4164]-434   4

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B.E. (Mechanical)

ADVANCED AIR CONDITIONING AND REFRIGERATION

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:
 1) *Answer three questions from each section.*
 2) *Answers to the two sections should be written in separate books.*
 3) *Neat diagrams must be drawn whenever necessary.*
 4) *Figures to the right indicate full marks.*
 5) *Use of logarithmic tables, Mollier chart, electronic pocket calculator, p - h charts is allowed.*
 6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain Vortex tube expansion cycle. **[6]**

 b) A R-134 a condensing units is specified to give 20 TR capacity for air - conditioning under standard operating conditions of 40°C condensing and 10°C evaporating temperature. What would be its capacity in TR for food freezing for which the evaporator temperature is -30°C? Also obtain the capacity of air - conditioner for condensing temperature of 40°C. **[12]**

Ts(°C)	h_f(kJ/kg)	h_g(kJ/kg)	S_f(kJ/kg)	S_g(kJ/kg)	v (m^3/kg)
–30	162.33	387.08	–	1.7766	0.2240
10	213.39	410.85	–	1.7460	0.0525
40	256.43	426.17	1.1930	1.7350	0.0199
60	288.34	433.91	1.2893	1.7263	0.0114

OR

Q2) a) Write a short note on :

 i) Vapour defrosting.

 ii) Reverse cycle defrosting. **[10]**

 b) Explain rating cycle for domestic refrigerators. **[8]**

P.T.O.

Q3) a) Discuss the various methods of capacity controls of centrifugal compressor. **[6]**

b) An open - type compressor employing R-22 has a cooling capacity of 6.25 TR operating at an evaporating temperature of 5°C and a condensing temperature of 50°C. If the ambient DBT is 35°C and the altitude is 1.525 km, what is the capacity of an air-cooled condenser? Take HRF = 1.2; correction factor for TD = 1.2; Altitude correction factor = 0.893. What is its capacity at the ground level. What is the capacity of water - cooled condenser? **[6]**

c) State design aspects of evaporator design. **[4]**

OR

Q4) a) Discuss various types of cooling tower. **[8]**

b) Discuss the procedure for estimating length of capillary tube & derive the expression of the same. **[8]**

Q5) a) Explain the construction working of externally compensated regulating valve. **[6]**

b) Describe the methods of controlling IAQ. **[6]**

c) Explain the followings; **[4]**

 i) Thermal overload protection for hermetic motors.

 ii) Adjustable speed drives.

OR

Q6) a) Explain the methods of purging noncondensables. **[6]**

b) List the pollutants & contaminants present in the air with source. **[6]**

c) Discuss the types of safety valves. **[4]**

SECTION - II

Q7) a) Explain the purpose and scope of ECBC. **[6]**

b) A 25 cm thick wall is exposed to the periodic temperature and incident radiant variation on an hourly basis between 7 am and 6 pm is given in the table. Determine heat gain of the room per unit area of the wall. The outdoor maximum and minimum temperatures are 40°C and 22°C respectively. The outside and inside design temperatures are 40 and 25°C respectively. What is the time of maximum heat gain from the wall? **[12]**

Density of material, $\rho = 2400$ kg/m³

Thermal conductivity, k = 1.5 W/mK

Outside wall coefficient, $h_0 = 23$ W/m²K

Inside wall coefficient, $h_i = 7$ W/m²K.

Time	7 am	8 am	9 am	10 am	11 am	12 noon	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm
Wall Mass (kg/m²)	Equivalent Temperature Difference (ΔT_E)°C											
500	3.9	3.3	3.3	3.3	3.3	3.3	3.9	4.4	5.5	6.7	9.4	11.1
600	6.1	5.5	5.0	4.4	4.4	4.4	5.0	5.5	5.5	5.5	6.1	6.7

OR

Q8) a) Draw and discuss modified comfort chart. **[8]**

b) Write a short note on "Choice of Supply Design Conditions". **[6]**

c) Write a short note on Sol - air temperature. **[4]**

Q9) a) Write a short note on "Air - conditioning of Multiplexes". **[8]**

b) Draw and explain air - to - liquid heat pump circuit. **[8]**

OR

Q10) a) Write a short note on "Clean Room". **[6]**

b) Discuss the HVAC design criteria for IT centers. **[6]**

c) State applications of heat pump. **[4]**

Q11) a) Draw circuit of Liquefaction process of hydrogen. **[4]**

b) Discuss various applications of cryogenics. **[8]**

c) Explain the term FOM and liquid yield. **[4]**

OR

Q12) a) 2 kg of dry air at 30°C and 1 bar compressed isothermally to 20 MPa in a compressor in a Linde cycle. Make - up air is added to suction at 30°C and 1 bar. Determine the yield of liquid and temperature of air before throttling. Draw the schematic diagram with T-s and p-h diagram. Use p-h chart of air. **[8]**

b) Discuss various properties of cryogenic fluids. **[8]**

ENTHALPY (kJ/kg)

PRESSURE (MPa)

AIR

♦♦♦♦

4
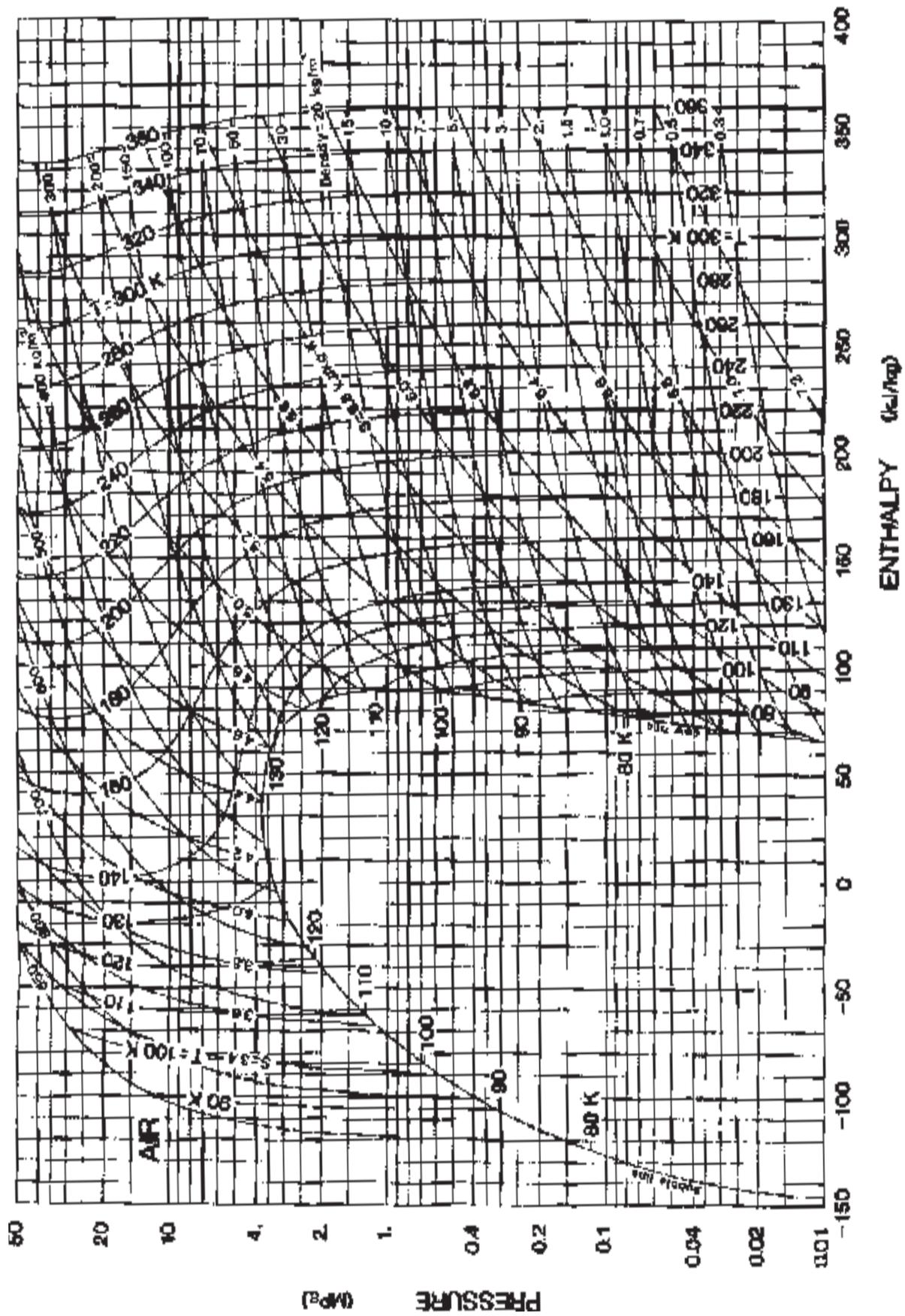
[4164] - 447

B.E. (Mechanical)

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1)   Answers to the two sections should be written in separate books.
  2)   Neat diagrams must be drawn wherever necessary.
  3)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
  4)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Classify heat exchangers according to construction. **[5]**
   b) Explain construction and working of hairpin heat exchanger. **[5]**
   c) State general assumptions for thermal design of heat exchanger. **[6]**

OR

Q2) a) Explain series arrangement of hairpin heat exchangers with figure and state advantages of arrangement. **[5]**
   b) State uses of pipe in pipe heat exchangers. **[5]**
   c) What will be the hydraulic diameter of an annulus with longitudinal finned tube with following specifications? **[6]**
   Inner diameter of shell 0.0525 m
   Outer diameter of tube 0.0266m
   Number of tubes 1
   Thickness of fin 0.9 mm
   Axial height of fin from outer periphery of tube is 0.0127m
   Number of fins per tube 30

Q3) a) Oil with a flow rate of 50 kg/s enters a baffled shell and tube heat exchanger at 32°C and leaves at 25° C. Heat will be transferred to 150 kg/s of water (through tube) coming from a supply at 20°C. A single tube pass and single shell pass is used. The tube diameter is 19 mm OD and 16 mm ID and tubes are laid out on a 25mm square pitch. The max length of exchanger is of 8m. The maximum flow velocity through tube is to be 2m/s . Perform tube side analysis of heat exchanger with following steps. **[8]**
   i) Calculate Reynolds number at tube side (considering properties of water at 20°C)
   ii) Calculate h_i – Inside heat transfer coefficient, assuming f = 0.0058 (Data / charts attached can be used)

b) Explain tube layout pattern with figure. **[4]**

c) What is impingement baffle? State its use. **[4]**

OR

Q4) a) Draw block diagram and temperature profile for 'G' Shell 1-2 heat exchanger : Nozzles are at center, split flow, longitudinal baffles, Hot fluid enters from shell whereas cold fluid passes from tube. **[5]**

b) Explain : Segmental baffles have a tendency to poor flow distribution if spacing of baffle is not properly selected. **[5]**

c) Explain stepwise process of heat exchanger analysis by Kern's method. **[6]**

Q5) a) State salient features of Plate fin heat exchanger. **[5]**

b) Compare 'shall and tube Heat Exchanger' and 'compact heat exchanger'. **[5]**

c) An automotive radiator has 40 tubes of inner diameter of 0.5 cm and 60 cm long in a closely spaced plate finned matrix, so that both fluids unmixed. Hot water enters the tube at 90°C at a rate of 0.6 kg/s and leaves at 65°C . Air cross flows the radiator through the inner fin spaces and is heated from 20°C to 40°C. Calculate overall heat transfer coefficient using LMTD method, based on inner surface of this radiator. (Data/ charts attached can be used) **[8]**

OR

Q6) a) Draw sketch showing plate fin heat exchanger (PFHE) flow arrangement : (a) crossflow; (b) counter flow; and (c) cross - counter flow. **[5]**

b) What are Tube - Fin Heat Exchangers? Describe with fiutre. **[5]**

c) A shell - and - tube heat exchanger with 2 - shell passes and 8 - tube passes is used to heat ethyl alcohol (Cp = 2670 J/kg. °C) in the tubes from 25°C to 70°C at a rate of 2.1 kg/s. The heating is to be done by water (Cp = 4190 J/kg. °C) that enters the shell at 95°C and leaves at 60°C. If the overall heat transfer coefficient is 800 W/m². °C, determine the heat transfer surface area of the heat exchanger using Effectiveness – NTU method.(Data / charts attached can be used) **[8]**

SECTION - II

Q7) a) Explain vertical condenser with figure. **[5]**

b) Which parameters are to be specially considered for design of condensers/ evaporators compared to design of heat exchangers? **[5]**

c) Draw sketch and explain in brief spiral condenser. **[6]**

OR

Q8) a) Explain any one air cooled condenser with its disadvantages. **[5]**

b) Why condenser operations fail? State any five reasons. **[5]**

c) Describe direct expansion evaporator with sketch. **[6]**

Q9) a) Explain Direct - Contact or Open Evaporative Cooling Tower in brief.**[5]**

b) How cooling tower is to be maintained in good working condition? **[5]**

c) The cooling used in a power plant consists of 10 big fans. The quantity of cooling water circulated through the tower is 1000kg per minute and it is cooled from 35°C to 30°C. The atmospheric conditions are 35°C DBT and 25°C WBT. The air leaves tower at 30°C and 90% RH. Find capacity of each fan in cubic meter per minute. (Data/charts attached can be used). **[6]**

OR

Q10) a) What is Fogging (Cooling Tower Plume)? How it can be estimated? **[5]**

b) Explain Horizontal Spray cooling tower with figure. **[5]**

c) Enlist factors to be considered during selection of pump for cooling tower. **[6]**

Q11) a) Explain any three types of wicks used in heat pipes? **[6]**

b) Enlist prime requirements of working fluid used in heat pipes. **[6]**

c) Describe heat pipe start up process. **[6]**

OR

Q12) a) What is the need of cooling of electronic components? **[6]**

b) Explain liquid cooled PCB. State its advantages and disadvantages. **[6]**

c) What are effective lengths of pipes? How it is important in liquid cooling of electronics system? **[6]**

♦♦♦♦

Co - relations for fully developed Turbulent forced convection through a circulate duct with cost properties.

N_4 Relation	Conditon
$N_4 = 0.022 Re^{0.8} Pr^{0.3}$	Pr (0.5 – 1) Re (5000 and above)
$N_4 = \dfrac{(f/2)(Re-1000)Pr}{1+12.7(f/2)^{1/2}[Pr^{2/3}-1]}$	Re(2300 – 10^4) Pr (0.5 – 2000)
$N_4 = \dfrac{(f/2)Re.Pr}{1.07+12.7(f/2)^{1/2}[Pr^{2/3}-1]}$	Pr (0.5 – 2000) Re (10^4 – 5 × 10^6)

TABLE A1
Air at Sea-Level Atmospheric Pressure

Temp. T °F	T °C	Density ρ kg/m³	Coef. Exp. $\beta \times 10^3$ 1/K	Specific Heat c_p J/kg K	Thermal Cond. k W/m K	Absolute Viscosity $\mu \times 10^6$ N s/m²	Kinematic Viscosity $\nu \times 10^6$ m²/s	Prandtl Number Pr —
32	0	1.293	3.664	1003.9	0.02417	17.17	13.28	0.7131
41	5	1.269	3.598	1004.3	0.02445	17.35	13.67	0.7127
50	10	1.242	3.533	1004.6	0.02480	17.58	14.16	0.7122
59	15	1.222	3.470	1004.9	0.02512	17.79	14.56	0.7118
68	20	1.202	3.412	1005.2	0.02544	18.00	14.98	0.7113
77	25	1.183	3.354	1005.4	0.02577	18.22	15.40	0.7108
86	30	1.164	3.298	1005.7	0.02614	18.46	15.86	0.7103
95	35	1.147	3.244	1006.0	0.02650	18.70	16.30	0.7098
104	40	1.129	3.193	1006.3	0.02684	18.92	16.76	0.7093
113	45	1.111	3.142	1006.6	0.02726	19.19	17.27	0.7087
122	50	1.093	3.094	1006.9	0.02761	19.42	17.77	0.7082
131	55	1.079	3.048	1007.3	0.02801	19.68	18.24	0.7077
140	60	1.061	3.003	1007.7	0.02837	19.91	18.77	0.7072
149	65	1.047	2.957	1008.0	0.02876	20.16	19.26	0.7067
158	70	1.030	2.914	1008.4	0.02912	20.39	19.80	0.7062
167	75	1.013	2.875	1008.8	0.02945	20.60	20.34	0.7057
176	80	1.001	2.834	1009.3	0.02979	20.82	20.80	0.7053
185	85	0.986	2.795	1009.8	0.03012	21.02	21.32	0.7048
194	90	0.972	2.755	1010.3	0.03045	21.23	21.84	0.7044
203	95	0.959	2.718	1010.7	0.03073	21.41	22.33	0.7041
212	100	0.947	2.683	1011.2	0.03101	21.58	22.79	0.7038

TABLE A2
Water at Sea-Level Atmospheric Pressure

Temp. T °F	°C	Density ρ kg/m³	Coef. Exp. $\beta \times 10^3$ 1/K	Specific Heat c_p J/kg K	Thermal Cond. k W/m K	Absolute Viscosity $\mu \times 10^6$ N s/m²	Kinematic Viscosity $\nu \times 10^6$ m²/s	Prandtl Number Pr −
32	0	999.9	−0.068	4217.5	0.5580	1794	1.794	13.56
41	5	1000	0.018	4202.7	0.5677	1530	1.530	11.33
50	10	999.7	0.095	4192.4	0.5774	1296	1.296	9.410
59	15	999.1	0.16	4185.8	0.5870	1136	1.137	8.101
68	20	998.2	0.22	4181.7	0.5967	993	0.995	6.959
77	25	997.1	0.26	4179.5	0.6064	880.6	0.883	6.069
86	30	995.7	0.31	4178.6	0.6155	792.4	0.796	5.380
95	35	994.1	0.35	4178.5	0.6243	719.8	0.724	4.818
104	40	992.2	0.39	4179.0	0.6325	658.0	0.663	4.348
113	45	990.2	0.42	4179.9	0.6401	605.1	0.611	3.951
122	50	988.1	0.45	4181.1	0.6472	555.1	0.562	3.586
131	55	985.8	0.48	4182.6	0.6536	512.6	0.520	3.280
140	60	983.5	0.51	4184.5	0.6594	470.0	0.478	2.983
149	65	980.8	0.54	4186.8	0.6643	436.0	0.445	2.748
158	70	978	0.57	4189.5	0.6686	402.0	0.411	2.519
167	75	974.9	0.60	4192.9	0.6724	376.6	0.386	2.348
176	80	971.7	0.63	4196.6	0.6753	350.0	0.361	2.175
185	85	968.5	0.66	4201.0	0.6778	330.5	0.341	2.048
194	90	965	0.69	4205.7	0.6797	311.0	0.322	1.924
203	95	961.7	0.72	4210.6	0.6811	294.3	0.306	1.819
212	100	958.4	0.75	4215.5	0.6822	277.5	0.290	1.715
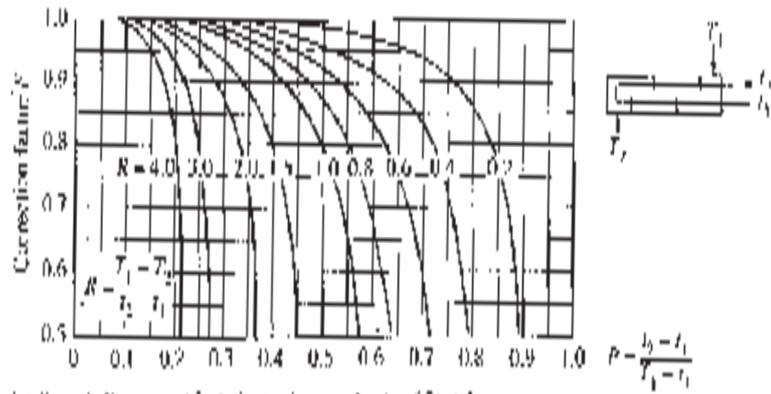
(a) One-shell pass and 2, 4, 6, etc. (any multiple of 2), tube passes
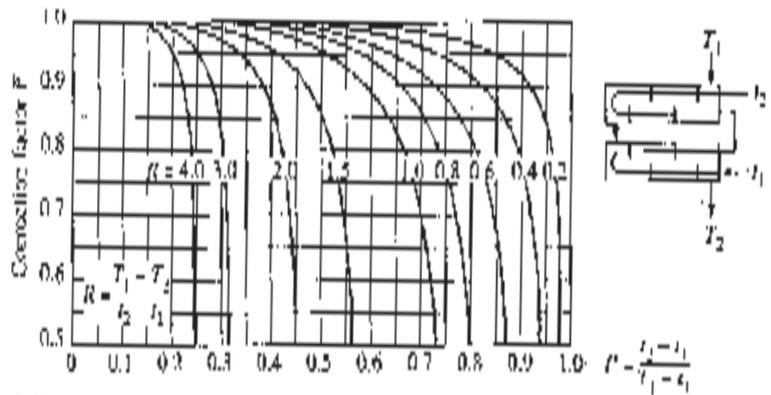
(b) Two-shell passes and 4, 8, 12, etc. (any multiple of 4), tube passes
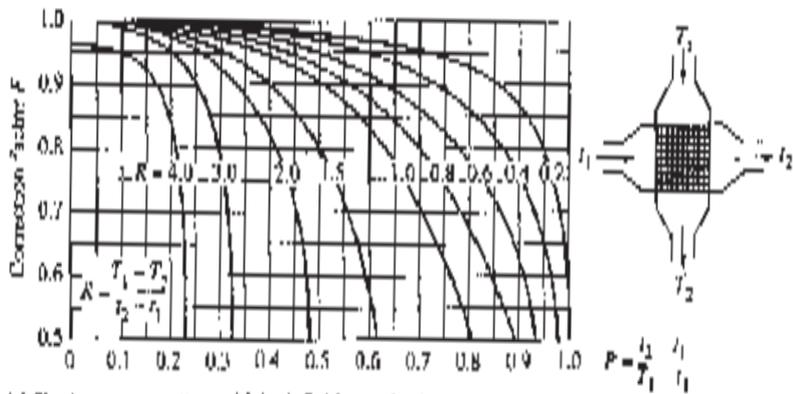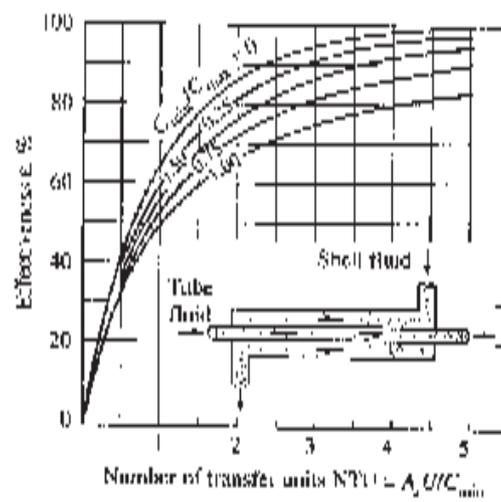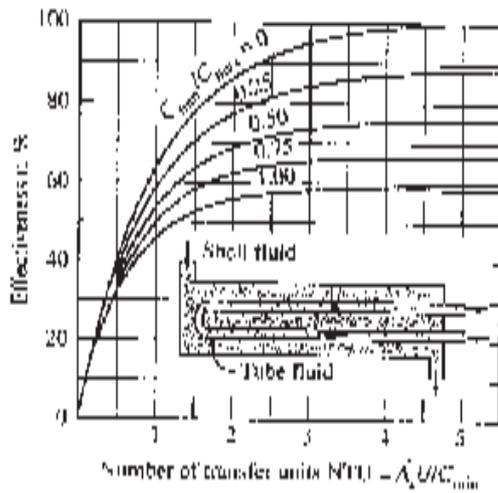

(c) Single-pass cross-flow with both fluids *unmixed*

FIGURE

Correction factor F charts for common shell and tube and cross-flow heat exchangers (from Bowman, Mueller, and Nagle, Ref. 2).
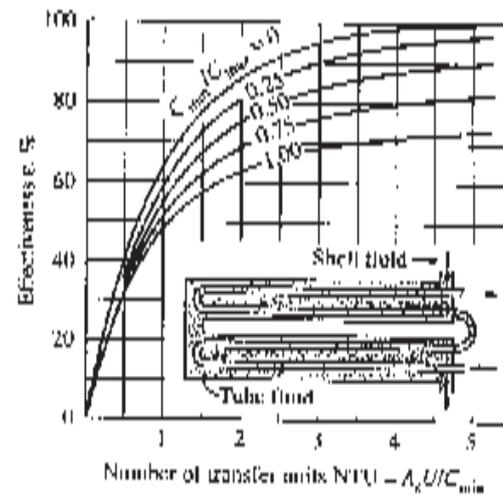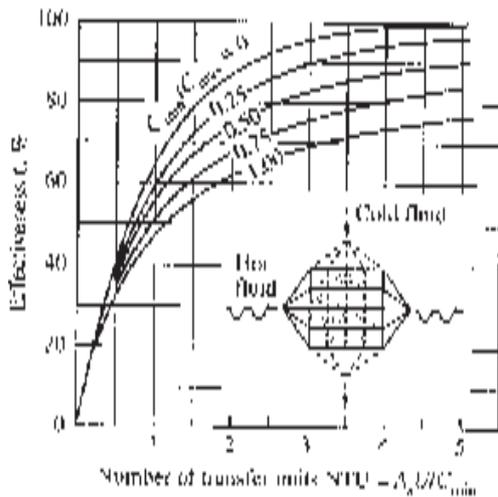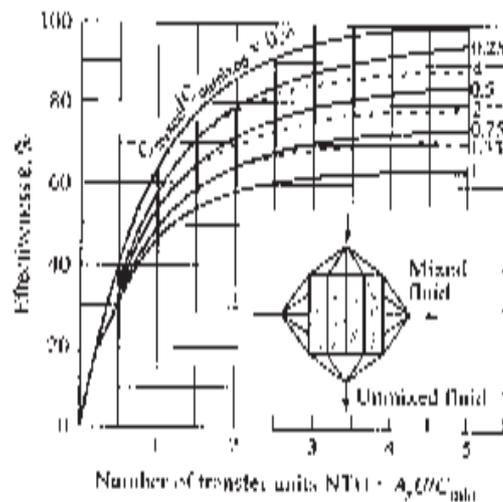
(f) Single-pass cross-flow with one fluid *mixed* and the other *unmixed*
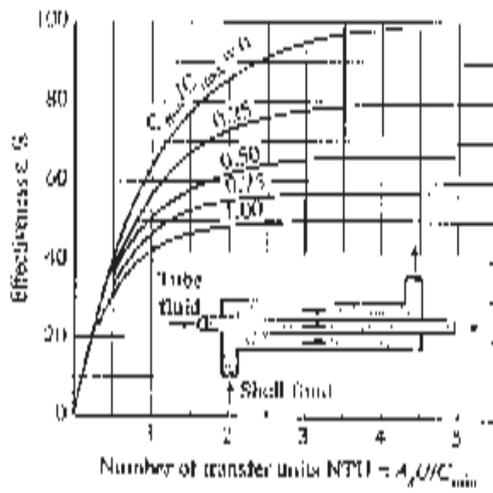
(a) Parallel-flow

(b) Counter-flow

(c) One-shell pass and 2, 4, 6, ... tube passes

(d) Two-shell passes and 4, 8, 12, ... tube passes

(e) Cross-flow with both fluids unmixed

(f) Cross-flow with one fluid mixed and the other unmixed

FIGURE

Effectiveness for heat exchangers

PSYCHROMETRIC CHART
NORMAL TEMPERATURES
STANDARD ATMOSPHERIC PRESSURE (760 mm Hg)
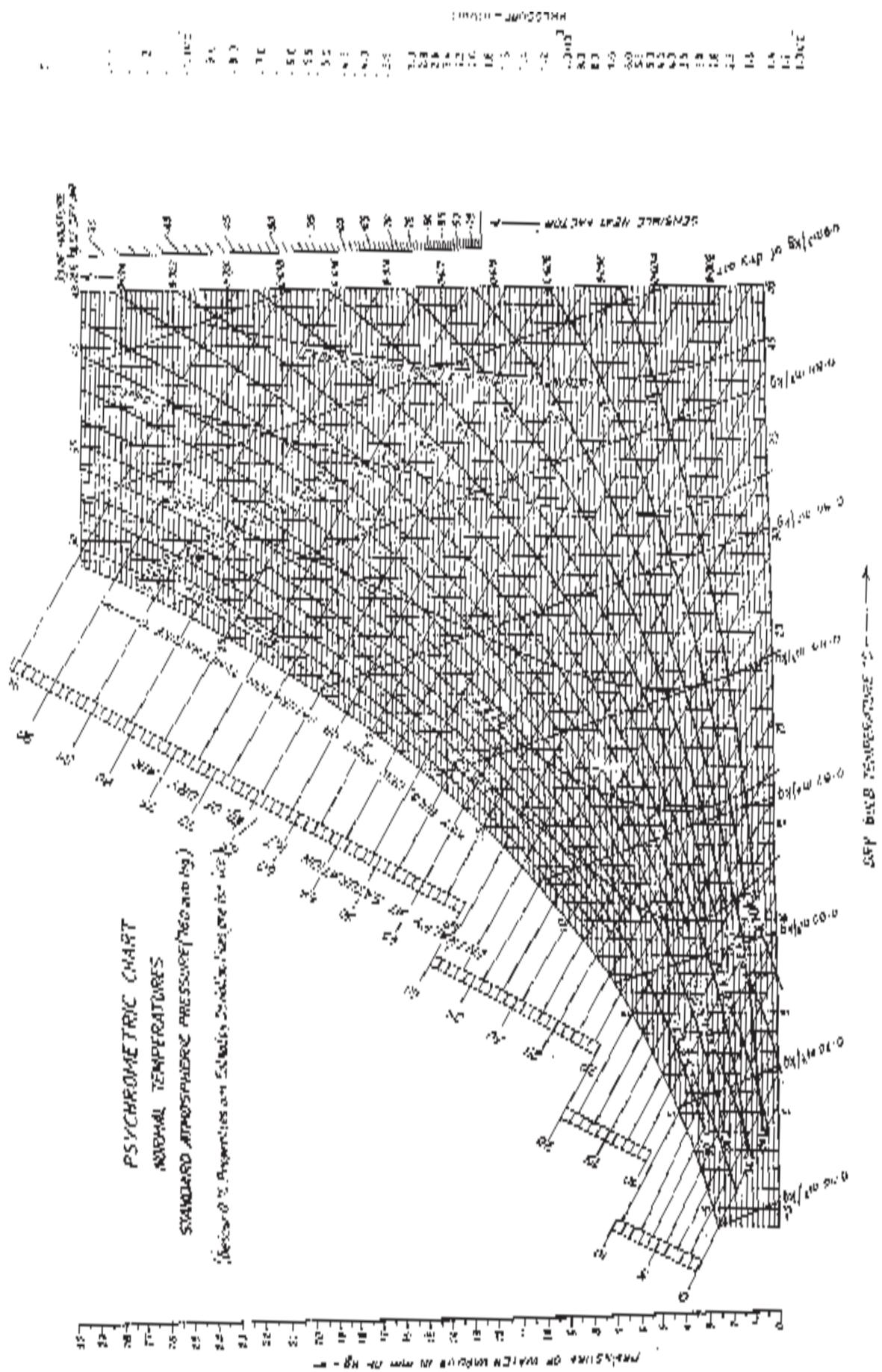
[4164] - 463

B.E. (Production)

MANUFACTURING AUTOMATION AND CONTROL

(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any three questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain primary functions and quality properties of a hydraulic fluid. **[4]**

b) What are the basic characteristics of positive displacement pumps. **[4]**

c) Explain with neat sketch the gear pump and also derive an expression for its flow. **[8]**

OR

Q2) a) Explain the procedure to design the reservoir used in hydraulic circuit. **[8]**

b) A pump has displacement of 80 cm³/rev. if delivers 77 liters/min when operated at 1000 r.p.m and 70 bar. If the input torque of the prime mover is 100 N-m, **[8]**

i) What is the overall efficiency of the pump?

ii) What is the theoretical torque required to operate the pump?

Q3) a) Draw neat sketch and explain working of hydraulic circuit for drilling machine. **[8]**

b) Explain the procedure of selecting a directional control valve in typical circuit. **[8]**

OR

P.T.O.

Q4) a) Draw neat sketch and explain working of hydraulic circuit for sequencing of two double acting cylinder. **[8]**

b) With the help of sketches explain different types of accumulators with industrial applications. **[8]**

Q5) Draw a neat sketch and explain working of (any three) : **[18]**

a) Shuttle valve.

b) Time delay valve.

c) Proportional valve.

d) FRL unit in pneumatic systems.

OR

Q6) a) Draw a pneumatic circuit to actuate the two cylinder in following sequence : **[10]**

i) Cylinder 1 extend

ii) Cylinder 2 extend

iii) Cylinder 1 retract

iv) Cylinder 2 retract

b) Explain with the help of neat sketch fluidic devices also state its advantages and disadvantages. **[8]**

SECTION - II

Q7) a) Explain i) Address bus ii) Data bus iii) Instruction set of typical microprocessor. **[8]**

b) Explain pin diagram of 8085 microprocessor. **[8]**

OR

Q8) a) Explain with neat sketch various components of PLC. **[8]**

b) Construct a ladder diagram for following boolean equations **[8]**

i) $y = (x1 + x2) . (x3 + x4)$

ii) $y = (x1.x2)$

Q9) a) What are A/D and D/A convertors? Discuss how they can be interfaced with a microprocessor. **[8]**

b) Draw a ladder diagram to actuate a motor control relay. When the motor is "ON" a red lamp glows and when the motor is "OFF" green lamp glows. Explain various logic gates used in ladder diagram. **[8]**

OR

Q10) a) What is meant by PID control? Explain with the help of a diagram the working of PID control used in machine tools. **[8]**

b) Write short notes on : **[8]**
   i) Linear feedback control system.
   ii) Optimal control system.

Q11) a) Explain various transfer mechanism used in automated system. **[6]**

b) Explain design for automated system. **[6]**

c) What factors should be considered while deciding types of transfer device to be used in automated systems. **[6]**

OR

Q12) Short notes on any three : **[18]**
   a) Indexing mechanism.
   b) Continuous transfer system.
   c) Feeders used in factory automations.
   d) Synchronous and non-synchronous material transfer.

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B.E. (Production)

OPERATIONS RESEARCH

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   *Attempt question 1 or 2; 3 or 4 and 5 or 6 from section I.*

   2)   *Attempt question 7 or 8; 9 or 10 and 11 or 12 from section II.*

   3)   *Answers to section I and Section II be written in separate answer books.*

   4)   *Use of calculators and Normal distribution probability tables is per permitted.*

SECTION - I

Unit - I

Q1) a) Solve by *Simplex* method :

Maximize : Z =	$6x_1$	+	$8x_2$	
	$5x_1$	+	$10x_2$	$\leq$ 60
	$4x_1$	+	$4x_2$	$\leq$ 40
	x_1	,	x_2	$\geq$ 0

                                                                            [11]

   b) The postal department is considering the purchase of vehicles to pick up and deliver mail from various offices. They are considering three types of vehicles. The costs of each of these are 5, 10 and 8 lakhs per vehicles. These require crew of 2, 4 and 4 persons per day considering multiple shifts respectively. They expect those to run for 60, 100 and 80 kilometers. Based on fuel economy, the operating cost per day for these vehicles are 200, 350 and 300 Rs/day respectively. They have budget restriction of Rs. 1.6 crore and have 80 people available for crew. How many vehicles of each type to be purchase so as to minimize the operating costs?

   (Only formulate LPP. Do not solve it)   **[5]**

OR

P.T.O.

Q2) a) Solve by *Dual Simplex* method : [10]

Maximize : Z =	2x$_1$	+	4x$_2$		
	2x$_1$	+	x$_2$	$\geq$	4
	x$_1$	+	2x$_2$	$\geq$	3
	2x$_1$	+	2x$_2$	$\leq$	12
	x$_1$	,	x$_2$	$\geq$	0

b) Discuss Duality and its applications. [6]

Unit - II

Q3) a) Following table represents cost of projects (lakhs) for particular bidder. Find out optimal assignment of bidders to projects so as to minimize total cost. Find also total cost of the projects. One bidder is to be given only one project. [12]

	Projects			
Bidders	I	II	III	IV
A	10	11	16	25
B	13	33	41	60
C	20	50	83	96
D	26	71	110	135

b) Discuss Travelling Salesman Problem. [6]

OR

Q4) a) How unbalanced Assignment problem is solved? How maximization Assignment problem is solved? [6]

b) A company has three factories F1, F2, and F3 and goods are supplied to 4 different cities D1, D2, D3 and D4. The table shows per unit cost of transportation. The supply capacities and demand are as shown in the table.

Factories	Consumption centers				Capacity
	D1	D2	D3	D4	
F1	3	1	7	4	300
F2	2	6	5	9	400
F3	8	3	3	2	500
Demand	250	350	400	200	

    i)   Find BFS by VAM. **[6]**

    ii)   Test if VAM solution optimal? **[6]**

Unit - III

Q5) a) Discuss Integer programming application. **[6]**

    b) How goals are set? How priority is set for different goals in Goal programming? Discuss. **[5]**

    c) Discuss Bellman principle of optimality in view to Dynamic programming. **[5]**

OR

Q6) a) What is 0-1 programming? How 0 - 1 IP problems are formulated? State applications. **[6]**

    b) The following table represents arcs and the distances. A person wants to go from city 1 to city 10. The various distances are given in a table. Find the optimal path by *Dynamic programming*. **[10]**

Arc	Distance	Arc	Distance	Arc	Distance	Arc	Distance
1-2	5	2-7	8	4-6	5	6-9	7
1-3	5	3-5	8	4-7	7	7-8	5
1-4	6	3-6	10	5-8	6	7-9	7
2-5	4	3-7	5	5-9	8	8-10	8
2-6	7	4-5	4	6-8	9	9-10	9

SECTION - II

Unit - IV

Q7) a) Electronic equipment contains 500 resisters. When any resister fails it is replaced individually and the cost is Rs. 20 per resister. If all resisters are replaced at the same time the cost is Rs 5 per resister. The % surviving rate S(i) at the end of month 'i' is given in the table. **[10]**

% Survival Rate						
Month (i)	0	1	2	3	4	5
S(i)	100	90	75	55	30	0

What is the optimum replacement plan?

   b) Discuss dominance rule in Game theory with example. **[6]**

OR

Q8) a) Discuss net present worth and future worth. **[6]**

   b) Solve the game by graphical method or sub - game method. **[10]**

		Player B		
	Strategies	b1	b2	b3
Player A	a1	3	1	4
	a2	5	8	2

Unit - V

Q9) a) Arrival rate of the customers at the banking counter follows Poisson distribution with mean 30 per hour. The service rate of the counter also follows Poisson distribution with mean of 60 per hour. Find **[10]**

   i)   Probability of having zero customers in the system.

   ii) Probability of having 2 customers in the system.

   iii) Expected customers in the system

   iv) Mean customers in queue.

   v)   Average waiting time in queue.

   b) Derive equation for Economic Production Quantity. State your assumptions. **[6]**

<div align="center">OR</div>

Q10) a) An automobile factory manufactures a particular type of gear in batches within the factory. The gear is used in the final assembly. The particulars of the gear are :

Demand rate	10 000	units/day
Production rate	25 000	units/day
Set up cost	180	Rs/set-up
Carrying cost	2	Rs per unit per year
Annual demand	3 00 00 000	per year

Find :

   i)   Economic production Quantity. **[4]**

   ii) Time between two setups. **[1]**

   iii) Production period. **[1]**

iv) Annual holding cost. **[2]**

v) Annual set up cost and **[1]**

vi) Annual total cost. **[1]**

b) Discuss minimum cost service rate. **[6]**

Unit VI

Q11) a) Network is given below with three time estimates.

Act	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
a*	5	18	26	16	15	6	7	7	3
b**	10	22	40	20	25	12	12	9	5
m***	8	20	33	18	20	9	10	8	4

a* - Optimistic time estimate, b** - Pessimistic time estimate, m*** - most likely time estimate

i) Draw AOA network. **[2]**

ii) Find expected durations and variances. **[2]**

iii) Find critical activities and critical path. **[4]**

iv) How much is expected project duration? **[1]**

v) Find probability that project takes more than 48 days. **[2]**

vi) Find probability that project is completed in 45 days. **[2]**

vii) Find the expected project duration for 95% confidence level? **[2]**

b) State different types of floats and discuss any one. **[3]**

OR

Q12) a) Network Immediate Predecessor (IP) table is given below.

Activity	A	B	C	D	E	F	G	H	I
IP	-	-	-	A,B	B	D	D,E	C,F,G	C,G
Days	4	13	10	5	11	5	2	9	8

      i)   Draw AOA or AON network. **[4]**

      ii)   Find critical activities and critical path. **[4]**

      iii)   How long is the project duration? **[1]**

      iv) Tabulate Early Start schedule and Late start schedule times. **[3]**

      v)   Tabulate Total floats, Free floats, and Independent floats for any two non - critical activities. **[3]**

   b) Compare CPM and PERT techniques. **[3]**

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[4164] - 466
B.E. (Production)
INDUSTRIAL ROBOTICS
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) Answer any three questions from each section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Assume suitable data, if necessary.

SECTION - I
Unit - I

Q1) a) Explain the following terms associated with robot :   **[8]**
   i)   Accuracy
   ii) Robot Work Envelope
   iii) Repeatability
   iv) Resolution

   b) Explain six degrees of freedom associated with the robot manipulator.
                                                                            [8]

OR

Q2) a) Define Robot & classify the robot.   **[8]**
   b) With neat sketch explain robot anatomy.   **[8]**

Unit - II

Q3) a) List the steps involved in DH convention.   **[8]**
   b) Explain the forward kinematics associated with planar 3R manipulator.
                                                                            [8]

OR

Q4) a) For the pick and place type of robot, the gripper is initially at location (60, 50, 80) and the following movements are in sequence.   **[8]**
   i)   Rotation about x-axis by 90°.
   ii) Translation along z by 30 units. Find the position of gripper with respect to the original system by using transformation matrix method.

   b) Explain the Inverse kinematics associated with planar 3R manipulator.
                                                                            [8]

P.T.O.

Unit - III

Q5) a) Classify gripper & describe with sketch magnetic gripper. **[9]**

b) Discuss the design aspects of mechanical grippers. **[9]**

OR

Q6) a) A 10 kg rectangular block is gripped in the middle and lifted vertically at a velocity 1m/s. If it accelerates at 27.5 m/s^2 and Coefficient of friction between gripping pads and block is 0.48. Calculate the minimum force that would prevent slippage. **[9]**

b) Describe i) Vacuum gripper ii)Ultrasonic gripper **[9]**

SECTION - II
Unit - IV

Q7) a) Describe machine vision system. **[8]**

b) With neat sketch explain Proximity and Range Sensors used in robot. **[8]**

OR

Q8) a) Describe Force and Torque sensors used in robot. **[8]**

b) The given data represents 8×8 arrays of pixels. Each element in the array indicates the grey level value of the pixels. **[8]**

i) Construct histogram for the array and obtain appropriate threshold value.

ii) Convert the picture into a black and white image. The data is as :

10	11	10	11	12	12	12	12
13	15	17	17	17	17	15	13
14	17	19	19	19	19	18	14
13	17	19	20	20	19	18	13
12	17	19	20	21	19	18	12
12	17	19	19	19	19	18	12
11	15	18	18	18	18	15	11
12	11	10	11	12	12	12	12

Unit - V

Q9) a) Explain various programming methods used in robots. **[8]**

b) Comment on Artificial Intelligence in robot. **[8]**

OR

Q10) a) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands with suitable example. **[8]**

b) Explain the Pneumatic system used for robot system with advantages & limitations. **[8]**

Unit - VI

Q11) a) What is handshaking? Explain hardware handshaking of robot. **[9]**

b) Write a note on : **[9]**
   i) Walking Robot.
   ii) Under water Robot.

OR

Q12) a) Describe the concept of safety in robotics. **[9]**

b) Explain the working of RS 232C interface used in Robotics system.**[9]**

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[4164] - 469

B.E. (Production Engineering)
ERGONOMICS & HUMAN FACTORS IN ENGINEERING
(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answers to the two sections should be written in separate books.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
5) Assume suitable data, if necessary.

SECTION - I
Unit - I

Q1) a) What are the objectives of "Human Factors Engineering".   **[6]**

b) Explain features of human body & explain measures of physiological functions.   **[6]**

c) Explain Design of MMH Task.   **[6]**

OR

Q2) a) What are Human Machine systems? Explain its types.   **[6]**

b) Explain performance criteria for physical activity.   **[6]**

c) Explain various types of movements of human body members.   **[6]**

Unit - II

Q3) a) Explain the considerations in designing a STANDING workplace.**[8]**

b) Explain principles of arrangement of components in various working conditions.   **[8]**

OR

Q4) a) What is Anthropometry and explain principles used in application of anthropometric data.   **[8]**

b) Explain use of anthropometric data in designing of interior of ambulance car.   **[8]**

P.T.O.

Unit - III

Q5) Write short note on (any two) : **[16]**
    a)   Hand tool design.
    b)   Functions of controls.
    c)   Concept of visibility.
    d)   Location of controls in work place.

OR

Q6) Explain arrangement of following components at work place (any four):**[16]**
    a)   Visual displays.
    b)   Control on panels.
    c)   Hand controls.
    d)   Two hand controls.
    e)   Foot controls.
    f)   Controls that require force.

SECTION - II
Unit - IV

Q7) a)   Explain the system of measurement of light. Also explain use of lamps & lumanaries. **[9]**
    b)   Explain Discomfort glare & Disability glare. **[9]**

OR

Q8) a)   What is Wet Bulb Globe Temperature? How do you calculate it? Explain its utility in hot humid conditions. **[9]**
    b)   Explain the physiological effects of heat & cold. Explain its remedies.**[9]**

Unit - V

Q9) a)   Explain in detail Requirement of rest allowances in work and corelate it with energy expenditure. **[8]**
    b)   How manual material handling capacity is determined considering various factors. **[8]**

OR

*Q10)*Explain effect of following conditions on energy expenditure **[16]**
   a)   Extreme Heat.
   b)   Extreme cold.
   c)   High humidity
   Also explain measures to overcome effects of these environmental conditions.

Unit - VI

*Q11)*a)   What are the characteristics of system design? How human factors are
       applied in system design.   **[12]**
     b)   Explain the significance of ergonomic safety.   **[4]**

<div align="center">OR</div>

*Q12)*a)   Explain the term Accident. Explain its relationship with human errors.**[8]**
     b)   Explain perception of risk & describe risk evaluation process.   **[8]**

<div align="center">❖ ❖ ❖ ❖</div>

[4164] - 471
B.E. (Production)
SIMULATION AND MODELING
(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1) Answer any three questions from each section.
  2) Answers to the two sections should be written in separate books.
  3) Neat diagrams must be drawn whenever necessary.
  4) Figures to the right indicate full marks.
  5) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is simulation? List a few advantages and disadvantages of simulation. **[8]**

     b) What do you mean by system modeling? Write difference between continuous and discrete system. **[8]**

OR

Q2) a) Explain various areas of applications of simulation in service sector.**[8]**

     b) Write event and activities are associated with the operation of your cash transaction in bank. **[8]**

Q3) a) What is queuing model? How it is useful for Simulation? Example the simulation of single queuing system. **[8]**

     b) Explain the following queuing system characteristics : **[8]**
        i) Calling population
        ii) System capacity
        iii) Arrival process
        iv) Queue behavior and discipline
        v) Service time and service mechanism

OR

Q4) a) With a suitable flow chart describe two server queue. **[8]**

     b) Explain the inventory system in simulation. **[8]**

Q5) a) Explain the different techniques of simulation output analysis. **[8]**

b) Explain the linear congruential method for generating random numbers and generate three random numbers using above method with X0 = 30, a = 15 c = 40 and m = 100. **[10]**

OR

Q6) a) Explain the various testes used for testing random numbers for their desirable properties. **[10]**

b) Define random number. Explain statistical properties of random numbers with example. **[8]**

SECTION - II

Q7) a) Explain type of simulation with respect to output analysis. Give at least two example. **[8]**

b) What is output analysis? State its purpose. Explain point estimation and interval estimation. **[8]**

OR

Q8) a) Explain chi-square goodness of fit test to accept or reject a candidate distribution. **[8]**

b) With illustrative example describe the output analysis for steady state simulations. **[8]**

Q9) a) Discuss how the performance of simulated system is measured and estimated with suitable example. **[8]**

b) Discuss about a simulation of a material handling shop. **[8]**

OR

Q10) a) What are Input parameters to be consider in flexible manufacturing systems. **[8]**

b) Discuss about a simulation of a automated warehouse system. **[8]**

Q11) a) Define simulation language. Give detailed overview of GPS. **[8]**

b) Enlist various simulation software used in simulation of discrete system manufacturing with its important features. **[10]**

OR

Q12) Write a short note : **[18]**

a) Advantages and Disadvantages and pitfalls of simulation.

b) Monte Carlo method of simulation.

c) Pseudo-Random Numbers.

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[4164] - 472

B.E. (Production)

PLANT ENGINEERING AND MAINTENANCE

(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss the classification of maintenance systems.   **[8]**

b)   Explain the pareto chart with example.   **[8]**

OR

Q2) a)   Explain the performance & productivity measurement in maintenance
Management.   **[8]**

b)   Explain the need of training in maintenance management.   **[8]**

Q3) a)   Explain importance of plant facility.   **[8]**

b)   Discuss the application of computer in optimum plant layout.   **[8]**

OR

Q4) a)   Write types of layout and selection procedure of layout?   **[8]**

b)   Explain REL chart in detail.   **[8]**

Q5) a)   What is predictive maintenance? Explain in detail.   **[10]**

b)   Explain computer application in spare part management.   **[8]**

OR

Q6) a) Write short note on, problems related maintenance management in process industries. **[10]**

b) Explain the various Quantitative decision making for selection the maintenance system. **[8]**

SECTION - II

Q7) a) Explain the procedure of preventive periodic maintenance. **[8]**

b) Explain importance of reliability in life cycle costing. **[8]**

OR

Q8) a) Explain various models for calculating life cycle cost. **[8]**

b) Discuss importance of periodic maintenance in process industries. **[8]**

Q9) a) Explain various safety measures during the maintenance for mechanical and chemical industries. **[8]**

b) Write short note on energy audit and management. **[8]**

OR

*Q10)*a) Explain safety and energy conservation in material handling equipment. **[8]**

b) Write short note on, accident preventive practice and codes. **[8]**

*Q11)*a) Explain the condition base maintenance. **[10]**

b) Write short note on ferrography & hot ferrography. **[8]**

OR

*Q12)*a) What is reliability centered maintenance? **[10]**

b) Explain Total Productive Maintenance. **[8]**

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[4164] - 473

B.E. (Production)
COMPUTER INTEGRATED DESIGN AND MANUFAC-TURING
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

  1) Answer any 3 questions from each section.
  2) Answers to the two sections should be written in separate books.
  3) Neat diagrams must be drawn wherever necessary.
  4) Figures to the right indicate full marks.
  5) Use of logarithmic tables silde rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
  6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain the different network topology in CAD/CAM system.   **[6]**

   b) A triangle ABC having coordinates A (15, 15) B(18, 12) and C(15, 20). Determine the new position if the triangle is,   **[10]**

   i)   Rotated by 90° clockwise about the vertex A.

   ii) Scaled by 0.5 times in X direction and 2 times in Y direction about vertex C.

   iii) If it is mirrored about a line $y = 4x + 12$.

OR

Q2) a) Give an example of surface modeling and write its disadvantages. How these disadvantages are overcome in solid modeling.   **[6]**

   b) For a quadrilateral ABCD whose coordinates are A(5, 5) B(10, 10) C(12, 8) and D(8, 3) find the new coordinates if   **[10]**

   i)   In is translated by 10 units in X direction and 4 units in Y direction.

   ii) It is rotated about origin by 30°.

   iii) It is reduced in size using uniform scaling factor of 0.4.

Q3) a) A briefly explain the steps to be followed in manually carrying out the finite element solution to a physical problem.   **[6]**

b) A stepped bar is as shown in the Fig. Determine the stresses and deflections in each of the sections. Assume uniform material having E = 90 GPa and axial force F as 50 kN. **[12]**

OR
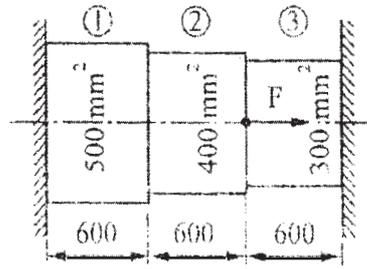
Q4) a) Explain following with sketch related to FEA. **[6]**
  i)   Node.
  ii)   Member.
  iii) Local axis.
  iv)   Global axis.
  v)   Degree of freedom.

b) A two member truss is as shown in the Fig. The cross - sectional area of each member of the truss is 100 mm^2 and the modulus of elasticity is 200 GPa. Determine the deflections, reactions and stresses in each of the members. **[12]**
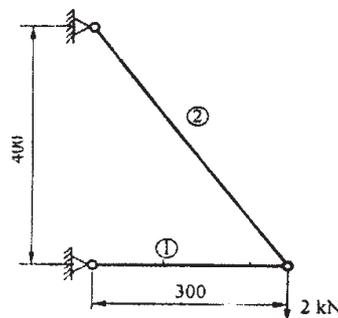
Q5) a) Explain in brief different elements of NC manufacturing system. **[6]**

b) Write a CNC program in G and M codes for drilling the three holes in part as shown in the Fig also write remark for each block. **[10]**
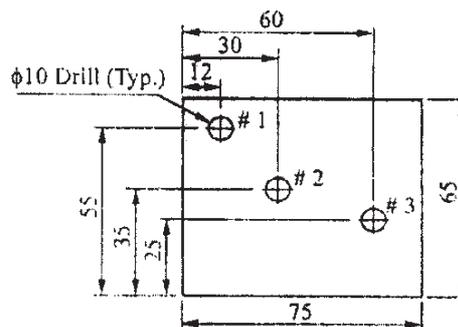
Q6) a) Compare the open loop and close loop positioning system. **[6]**

b) Write a CNC program in G and M codes for milling the sides of the part as shown in the Fig. also write remark for each block. **[10]**
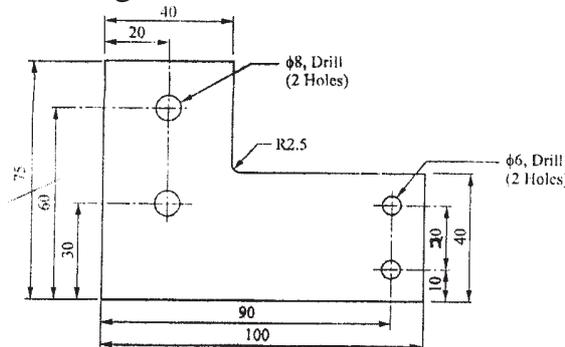
SECTION - II

Q7) a) Explain the various phases of ERP implementation. **[6]**

b) What is concurrent engineering? How it differs from sequential engineering? Explain with block diagram. **[10]**

OR

Q8) a) Explain in brief the following in relation with robot programming. **[8]**
   i) Manual method.
   ii) Walk through method.
   iii) Lead through method.

b) Discuss the following techniques of concurrent Engineering. **[8]**
   i) Quality Function Deployment.
   ii) Failure Mode & Effect Analysis.

Q9) a) With neat sketch explain different layouts used in FMS. **[6]**

b) Consider the following part machine matrix. Apply Rank Order Clustering (ROC) Algorithm to it an identify the part families and machine groups. Also find exceptional element if any in the solution and suggest methods to deal with it. **[12]**

Parts

Machines	A	B	C	D	E	F	G
1	0	1	0	1	1	1	0
2	1	0	1	0	0	0	0
3	1	0	1	0	0	1	1
4	0	1	0	1	0	1	0
5	1	0	0	0	1	0	1

Q10) a) What is production flow analysis? How does it help in cell formation in grouping of parts? **[8]**

b) Consider a CNC machining center processing raw parts one at a time in M/M/1 fashion. Let parts arrive at a rate of 20 parts/ hour and service rate of 30 parts/ hour. Find machine utilization, mean number of parts in system and in queue, mean waiting time in system and in queue. **[10]**

Q11) a) Explain with flow chart the concept of NIST - AMRF hierarchical model. **[8]**

b) Explain with neat sketch Fused Deposition Method (FDM) with its highlights. **[8]**

OR

Q12) a) Explain the different levels of integration come across IBM - CIM Model. **[8]**

b) Explain with neat sketch Laminated Object Manufacturing (LOM). **[8]**

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[4164] - 474

B.E. (Production)
PROCESS PLANNING & TOOL SELECTION
(2008 Pattern) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) List several functions performed by process engineer. **[8]**

b) Discuss the principles of DFM which are useful for designing a product. **[8]**

OR

Q2) a) Why is there so much emphasis on the integration of the design and Manufacture of the product? What is the role of product designer in it? **[8]**

b) Process engineering is the hub of the organization. Explain. **[8]**

Q3) a) What sort of information can the process planner obtain from the engineering drawings of a component? **[8]**

b) What are the three basic methods by which surface roughness is measured? Explain each of them. What is the difference between surface irregularities and profile. **[8]**

OR

Q4) a) What key points to be considered in determining the nature of work to be performed and functional surfaces on the work-piece? **[8]**

b) What is mean by geometry of form? Define **[8]**

     i) Flatness,   ii) Angularities,

     iii) Roundness,   iv) Concentricity.

P.T.O.

Q5) a) What are the design and process tolerance stacks? Explain with suitable example. **[9]**

b) What are the rules for locating long cylinder and short cylinder? Explain with neat diagram. **[9]**

OR

Q6) a) What are the causes of work-piece variations? How to achieve work-piece control? **[9]**

b) For a cube of 20 cm size, sketch six locators needed for equilibrium, and Explain why are the locators generally arranged in 3-2-1 pattern?**[9]**

SECTION - II

Q7) a) Explain the steps involved in machine selection method with a neat flow chart. **[8]**

b) What are the advantages of using commercial tooling over Regular and Special tooling? What should be the order of procurement of tools?

[8]

OR

Q8) a) What are the constrains on tool selection? Discuss the most influential factors in term of a performance of a tool. **[8]**

b) Explain the prime accuracies & producible accuracies of an equipment. How to find process capability of a lapping machine? **[8]**

Q9) a) Explain major operations, How to differ major operations from principal process operations? **[8]**

b) Discuss the role of Computer Aided Process Planning (CAPP) in modern manufacturing. **[8]**

OR

*Q10)*a) Explain the benefits of CAPP, and discuss an approach of generative CAPP System. **[8]**

b) How to identify critical areas? Explain and differentiate between product critical areas and process critical areas. **[8]**

Q11) Prepare a process sheet for the component as shown in fig.1. The required quantity : 1000/ month. Write detailed manufacturing plan, operation sequence, proper tooling and equipment selection, process parameters with sample calculations. **[18]**
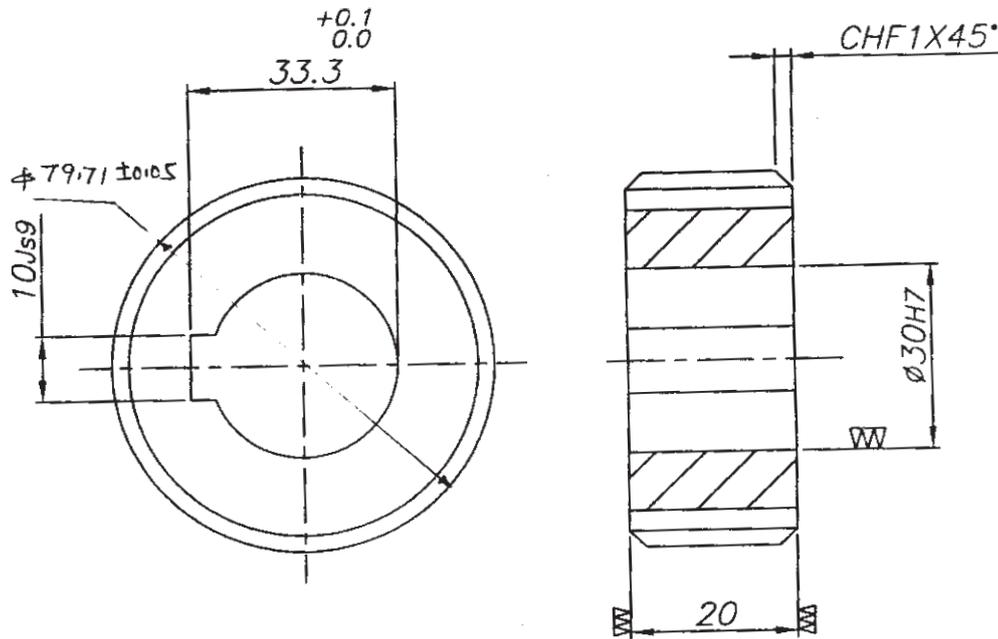

Fig. 1.

ALL DIMENSIONS ARE IN MM

OD   79.71 ± 0.05

PCD   75.71

MODULE   2.00

NO. OF TEETH   36

ROOT DIA   70.71

HELIX ANGLE   18°

PRESSURE ANGLE 20°

Title	Material	Qty	Scale	Heat Treatment
MAIN GEAR	EN-24	1000/month	1:1	TOUGHNED 40 RC

OR

*Q12)*Prepare a process sheet for a component as shown in figure 2. which is to be manufactured in batches of size 600. Analyse the part print carefully and prepare the process sheet containing manufacturing plan with operation sequence, equipments, tooling, fixtures, process parameters and sample calculation of operation time. **[18]**
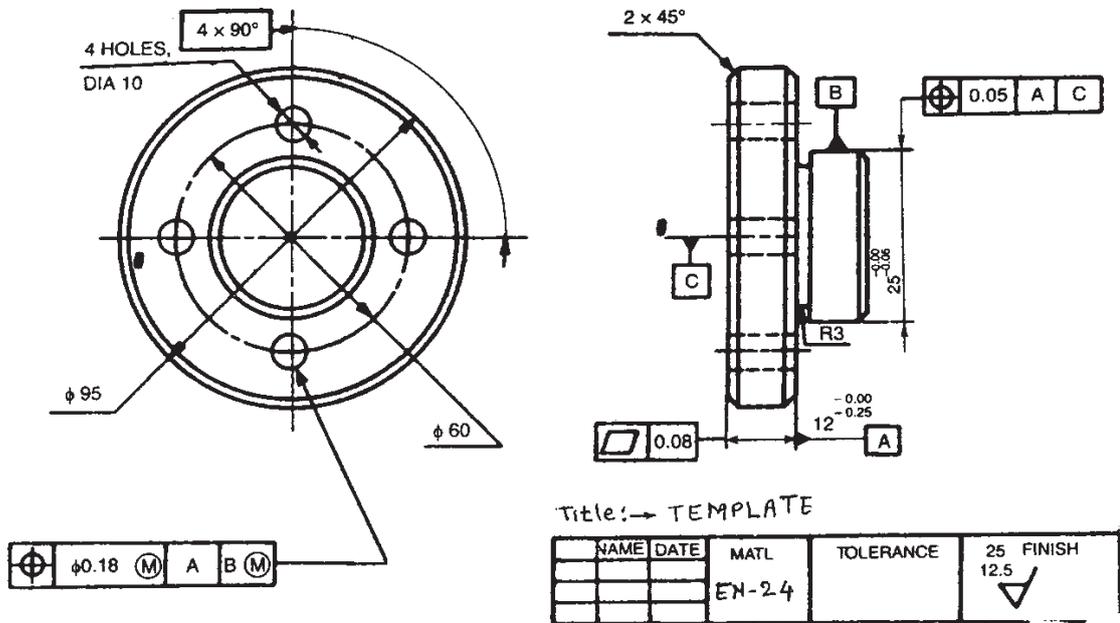
Fig. 2.

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[4164] - 475

B.E. (Production Engineering)
AUTOMOBILE ENGINEERING
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer one questions from each Unit in Section - I and Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a) Explain the working of simple carburetor. **[8]**

b) Explain the difference between Two and Four Stroke Engines. **[8]**

c) What do you mean by "Chassis" in automobile? **[2]**

OR

Q2) a) Explain the working of 4-stroke diesel engine. **[8]**

b) Describe the working of steering system mechanism. **[8]**

c) What do you mean by Articulated vehicle? **[2]**

Unit - II

Q3) a) Explain in detail the components used in water cooling system with neat diagram. **[9]**

b) Write a short note on anti-freeze solution. **[7]**

OR

Q4) a) Give Advantage and Disadvantage of Air Cooled System. **[8]**

b) What is Pump circulation system? Explain. **[8]**

P.T.O.

Unit - III

Q5) a) Explain in brief Wet sump lubrication. **[8]**

b) List out the various tests performed on lubricants. **[8]**

OR

Q6) a) Explain the requirements of ignition system. **[8]**

b) What are the different types of lubricant? **[8]**

SECTION - II
Unit - IV

Q7) a) Explain the working of clutch. **[8]**

b) Explain the working of differential with the help of Diagram. **[10]**

OR

Q8) a) Explain the components of clutch. **[12]**

b) Where are dog clutches used? **[6]**

Unit - V

Q9) a) What is the use of suspension system? What are the objectives of suspension system? **[8]**

b) Write short note on shock absorber and Torsional bar. **[8]**

OR

Q10) a) Explain different types of springs? **[8]**

b) What are the components of the steering system? **[8]**

Unit - VI

Q11) a) Explain the different types of braking system used in automobile. **[10]**

b) Write the functions of brakes in an automobile. **[6]**

OR

Q12) a) What is mean by servicing? And explain different types of servicing. **[8]**

b) Write short note on anti skid braking? **[8]**

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[4164] - 477

B.E. (Production)

METAL WORKING TRIBOLOGY

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer one question from each Unit in Section - I and Section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Figures to the right indicate full marks.*

4) *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a) What are the measurement systems of surface roughness. **[6]**

b) Define a tribo-system and how do you monitor its functions. **[10]**

OR

Q2) a) Explain the structure of a tribo-system. **[6]**

b) How do you characterize a surface. **[10]**

Unit - II

Q3) a) What are the sliding friction mechanisms? **[8]**

b) Derive a modified Bowden and Tabor friction equation. **[10]**

OR

Q4) a) Derive friction equation involving hard material. **[8]**

b) Explain 'Pin-on-Disc' method of friction measurement. **[10]**

Unit - III

Q5) a) Enumerate different types of wear. **[6]**

b) Derive wear equation for hard material over a soft material in sliding. **[10]**

OR

Q6) a) Derive 'Archard' equation of wear. **[10]**

b) Discuss the parameters affecting wear and how do you prevent them. **[6]**

SECTION - II
Unit - IV

Q7) a) Discuss different types of lubricant used in industries.　　　**[4]**

　　b) What is meant by 'Viscosity Index' of lubricant.　　　**[4]**

　　c) Describe some methods of applying lubrication to the system.　　**[8]**

OR

Q8) a) With figure explain in detail mode of lubrication.　　　**[12]**

　　b) What are the properties required in lubricants?　　　**[4]**

Unit - V

Q9) a) Derive the equation for hydrodynamic lubrication　　　**[12]**

$$\frac{dp}{dx} = 6\mu u \,[\frac{h - h^*}{h^3}]$$

　　　(all having usual symbols)

　　b) Derive 'Petroff' equation involving concentric bearing.　　**[6]**

OR

*Q10)*a) Derive an equation for circular step bearing under hydrostatic lubrication.
　　　[10]

　　b) Find out leakage in litres/min through a shaft of 25mmφ which is running concentric to sleeve of 25.03 mm φ, 25mm length using water under pressure of 5 bar.　　　**[8]**

Unit - VI

*Q11)*a) Derive an equation for two circular plates approaching each other involving squeeze film operation.　　　**[10]**

　　b) Two circular plates of 125 mm φ approaching each other with velocity of 12.5 cm/s in liquid of μ = 0.035 Pas. Find out pressure, load and time for film thickness to come down from 0.25 mm to 0.005 mm. **[6]**

OR

*Q12)*a) Derive squeeze film equation for rectangular plate approaching a rigid surface.　　　**[10]**

　　b) Write short notes on :　　　**[6]**
　　　i) Tyre-road tribology.
　　　ii) Rail-wheel tribology.

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[4164] - 479
B.E. (Production)
WORLD CLASS MANUFACTURING
(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagram must be drawn whenever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the Schonberger model of World Class Manufacturing. **[8]**

    b) Discuss the Gunn's model of World Class Manufacturing. **[8]**

OR

Q2) a) Explain the Hall's frame work of value added manufacturing. **[8]**

    b) What do understand from Manufacturing Excellence? **[8]**

Q3) a) Explain Toyota Production System. **[8]**

    b) Discuss Andon system and Bake-yoke from WCM. **[8]**

OR

Q4) a) Write best practices of WCM. **[8]**

    b) Explain value stream mapping? and how it differ from flow process chart. **[8]**

Q5) a) Explain the Just In Time Manufacturing System in detail. **[10]**

    b) What is the Total Productive Maintenance? **[8]**

P.T.O.

Q6) a) Discuss 5-S and 3-M from WCM? **[10]**

b) Explain the kanban system of Toyato in detail. **[8]**

SECTION - II

Q7) a) How the WCM team is different from traditional manufacturing team?
[8]

b) Explain organisation cultural of WCM company. **[8]**

OR

Q8) a) Discuss various motivation techniques for WCM employees. **[8]**

b) Explain how human resource management of WCM organization is different from traditional organization. **[8]**

Q9) a) What are the features of modern performance measurement? **[8]**

b) Explain the PO-P system. **[8]**

OR

Q10) a) What is the AMBITE system of performance? Explain in detail. **[8]**

b) Discuss the TOPP system of performance measurement. **[8]**

Q11) a) Describe case study of any one of Indian company of WCM. **[10]**

b) Explain green manufacturing. **[8]**

OR

Q12) a) What do you understand from clean manufacturing? And how it affects on WCM? **[10]**

b) Explain lean and agile manufacturing. **[8]**

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[4164] - 490

B.E. (Production Sandwich)
ERGONOMICS AND HUMAN FACTORS IN ENGINEERING
(2008 Pattern) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answers to the two sections should be written in separate answer books.*

2)   *Neat diagrams must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5)   *Assume suitable data, if necessary.*

SECTION - I
UNIT - I

Q1) a)   Explain objectives of Human Factors Engineering.   **[6]**

     b)   Explain Design of MMH Task.   **[6]**

     c)   Explain features of human body & explain measures of physiological functions.   **[6]**

OR

Q2) a)   Explain various types of movements of human body members.   **[6]**

     b)   Explain performance criteria for physical activity.   **[6]**

     c)   What are Human Machine systems? Explain its types.   **[6]**

UNIT - II

Q3) a)   What is Anthropometry and explain principles used in application of anthropometric data.   **[8]**

     b)   Explain use of anthropometric data in designing of interior of Passenger car.   **[8]**

OR

P.T.O.

Q4) a) Explain the considerations in designing a seated workplace. **[8]**

b) Explain Physical space & principles of arrangement of components.

[8]

UNIT - III

Q5) Explain arrangement of following components at work place (any four) **[16]**

a) Visual displays.

b) Control on panels.

c) Hand controls.

d) Two hand controls.

e) Foot controls.

f) Controls that require force.

OR

Q6) Write short note on (any two) : **[16]**

a) Hand tool design.

b) Functions of controls.

c) Concept of visibility.

d) Location of controls in work place.

SECTION - II
UNIT - IV

Q7) a) Explain the system of measurement of light. Also explain effect of light intensity on work performance. **[9]**

b) What is Wet Bulb Globe Temperature? How do you calculate it? Explain its utility in hot humid conditions. **[9]**

OR

Q8) a) Explain Discomfort glare & Disability glare. **[9]**

b) Explain the physiological effects of heat & cold. Explain its remedies.**[9]**

UNIT - V

Q9) a) Explain the term Accident. Explain its relationship with human errors.**[8]**

b) Explain perception of risk & describe risk evaluation process. **[8]**

OR

*Q10)*a) What are the characteristics of system design? Explain its any two phases. **[12]**

b) Explain the significance of warnings in brief. **[4]**

UNIT - VI

*Q11)*Explain the following PMTS (Predetermined Motion Time Analysis) Determine the variants & stability of each. **[16]**

a) Work factor system

b) Method Time measurement.

OR

*Q12)*a) Explain MOST and its types in brief. **[8]**

b) Explain the various considerations used in MTM 1. **[8]**

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[4164] - 496

B.E. (Production S/W)

INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   5)   *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a)   What is Industrial Relation? Explain scope, objectives of industrial relations. **[9]**

     b)   Define collective Bargaining. Explain the reasons for its success and failure. **[9]**

OR

Q2) a)   Explain in detail about the impact of globalization and information technology on industrial relations. **[9]**

     b)   What is trade union? Explain the problems faced by trade union. **[9]**

Unit - II

Q3) a)   Explain Personnel Administration. State its objectives and principles.**[8]**

     b)   Describe elements of HRD systems. Also discuss their goals, elements. **[8]**

OR

P.T.O.

Q4) a) Explain role of HR manager & structure of HR department. **[8]**

b) Discuss HR strategies and organizational strategies. **[8]**

Unit - III

Q5) Write short notes (any two) : **[16]**

a) Objectives of manpower planning.

b) Succession planning.

c) Promotion.

OR

Q6) Write short notes (any two) : **[16]**

a) Recruitment resources.

b) Reward and compensation strategies.

c) Job rotation.

SECTION - II
Unit - IV

Q7) a) Discuss need & objectives of employee training. **[9]**

b) What are major procedures of training? **[9]**

OR

Q8) a) Discuss various methods of training. **[9]**

b) Explain tools & aids used for effective training. **[9]**

Unit - V

Q9) a) Discuss various methods of performance appraisal. **[8]**

b) Explain strategic importance of 360 degrees feedback. **[8]**

OR

*Q10)*a) Explain in detail competency Mapping. **[8]**

b) Explain how performance management system can be aligned with business strategies of an organization. **[8]**

Unit - VI

*Q11)*Write short notes on (any two) :   [16]

    a)   Industrial democracy.

    b)   Golden handshake.

    c)   Role of HRD in developing IR.

<div align="center">OR</div>

*Q12)*Write short notes on (any two) :   [16]

    a)   Retrenchment and layoff.

    b)   Employee Morale.

    c)   Downsizing and project based employment.

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[4164] - 505
B.E. (Electrical)
POWER QUALITY
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) In Section - I, attempt Q1 or Q2, Q3 or Q4, Q5 or Q6. In Section - II attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.

2) Answers to the two sections should be written in separate answer books.

3) Figures to the right indicate full marks.

4) Neat diagrams must be drawn wherever necessary.

5) Use of non-programmable electronic pocket calculator is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Define and explain the following terms as per IEEE Std. 1159, such as

     i) Short duration voltage variations

     ii) Voltage swells

     iii) Voltage flicker

     iv) Voltage sags and

     v) Voltage interruptions. **[10]**

    b) Explain various grounding practices as per IEEE standard. **[8]**

OR

Q2) a) Explain various definitions of power quality with reference to each stake holders and why power quality is gaining important now a day? **[10]**

    b) Define with graphical representation various RMS voltage variations as per IEEE std. 1159-1995. **[8]**

Q3) a) Explain impact of reactive power management on voltage profile. What are the causes of undervoltages? **[8]**

    b) Explain the following terms related with voltage flicker : **[8]**

     i) Short term (P_{st}) and

     ii) Long term (P_{lt}) voltage flicker.

P.T.O.

<center>OR</center>

Q4) a) What are the causes of overvoltages? Explain various mitigation measures. **[8]**

b) Explain RMS voltage variation and complex power concept in the power systems. **[8]**

Q5) a) Explain voltage sag characteristics such as magnitude, phase angle jump, point on wave initiation and point on wave recovery. **[8]**

b) Explain influence of fault location and fault level on voltage sags. **[8]**

<center>OR</center>

Q6) a) Explain various utility mitigation measures for voltage sags? **[8]**

b) Explain economic impact of voltage sag and its consequences. **[8]**

<center>**SECTION - II**</center>

Q7) a) Explain in detail stepwise procedure of IEEE 519-1992 for harmonic analysis. **[8]**

b) Explain various harmonics mitigation methods. **[10]**

<center>OR</center>

Q8) a) What is harmonic filtering? Explain various detuned filters. **[8]**

b) What are harmonic resonances? Explain consequences of harmonic resonances. **[10]**

Q9) a) Explain capacitor switching transient and magnification of capacitor switching transient. **[8]**

b) Explain basic principles of over voltage protection. Which are the devices used for over voltage protection? **[8]**

<center>OR</center>

*Q10)*a) What are transients? Explain transient velocity, surge impedance and the effect of line terminations. **[10]**

b) Explain mitigation methods of impulsive transients. **[6]**

*Q11)*a) What are the different approaches followed in power quality monitoring? **[8]**

b) Explain procedure for selection of monitoring equipments and use of various equipments required for power quality monitoring. **[8]**

OR

*Q12)*a) Explain selection procedure of transducers for power quality monitoring. **[8]**

b) What are the requirements of power quality monitor to monitor various power quality parameters and various techniques of data collection?**[8]**

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[4164] - 507

B.E. (Electrical)
PROJECT MANAGEMENT
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   Section - I and Section - II should be answered on separate answer sheets.

  2)   Figures to the right indicate maximum marks alloted for the respective question.

  3)   Use of scientific calculator is allowed.

SECTION - I

Q1) Describe with suitable examples various phases of project life cycle and explain how a project is appraised. **[16]**

OR

Q2) Define project Management. Explain its characteristics and importance.**[16]**

Q3) "Project selection is more difficult task than we may think". Explain by using criteria to select and assess project feasibility. **[16]**

OR

Q4) Project is faced with evaluation of two alternatives A and B. The company cost of capital is 10%. Use Net present value, profitability index and payback period methods to arrive at a suitable decision. **[16]**

	Immediate cash out flows (in Rs. lacs)	cash inflows (in Rs. lacs) at the end of				
		Iyr	IIyr	IIIyr	IVyr	Vyr
Project A	25	-	5	20	14	14
Project B	40	10	14	16	17	15

P.T.O.

Q5) Explain PERT and CPM. What is the significance of critical path? Explain the concept of crashing. **[18]**

OR

Q6) The following data pertains to the network given below. It is desired to compress the project to the least possible duration day by day and estimate the extra cost **[18]**

i-j	Normal Time (days)	Crash Time (days)	Cost slope (Rs. per day)
1-2	3	2	700
1-3	7	4	200
2-3	5	3	100
2-4	8	6	200
3-4	4	2	400

Network
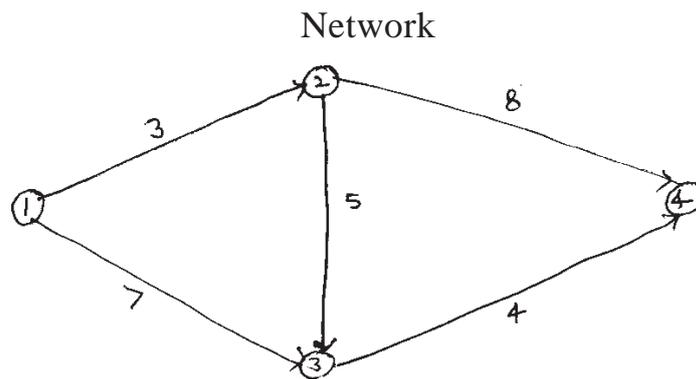
SECTION - II

Q7) Explain in detail how project cost is estimated. **[16]**

OR

Q8) Write short notes on : **[16]**
   a)   Budgetary control.
   b)   Factors of cost escalation.

Q9) Explain in detail quality planning, assurance and control. **[16]**

OR

*Q10)*Write short notes on : **[16]**

   a)   International project Management.

   b)   Quality of procured items.

*Q11)*a)   The expected cash inflows of a project are estimated as under.

Year	Cash inflow (Rs.)
1	1,50,000
2	2,50,000
3	3,50,000
4	2,50,000
5	2,00,000

      The initial investment required for the project is Rs. 7,00,000/-. The risk adjusted discount rate is 12%. Evaluate as to whether the project proposal is worthwhile. **[9]**

   b)   The expected cash inflows from a project and their probability are as under

Expected cash inflow (Rs.)	Probability
20,000	0.30
30,000	0.40
40,000	0.10
10,000	0.20

      The cash inflow acceptable for the project sponsor is Rs. 20,000. What is the certainty equivalent coefficient. **[9]**

<center>OR</center>

*Q12)*Write short notes on : **[18]**

   a)   Portfolio risks.

   b)   Diversible and Non-diversible risks.

   c)   Computer Aided Project Management.

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[4164] - 508

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer any three questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

<u>**SECTION - I**</u>

Q1) a)   Explain functions of following :   **[8]**

     i)   National Electricity Policy.

     ii)   Ministry of Power.

   b)   Explain the institutional structure of Indian power sector before and after restructuring opted.   **[8]**

OR

Q2) a)   Explain the key objectives of 'Electricity Act 2003' with reference to generation, transmission and distribution sector.   **[8]**

   b)   Explain the working of Indian Energy Exchange (IEX) for day ahead market.   **[8]**

Q3) a)   Explain following economic terms of power sector.   **[10]**

     i)   Fixed cost and variable cost.

     ii)   Capital cost.

     iii) Depreciation.

     iv)   Interest and finance charges.

     v)   Profitability indices.

   b)   Describe the desirable characteristics of tariff of electricity.   **[6]**

OR

P.T.O.

Q4) a) Explain different performance indices for generation, transmission and distribution. **[8]**

b) Explain any two method to assess the financial feasibility of any project. **[8]**

Q5) Explain following methods of regulations : **[18]**
   a) Rate of return regulation.
   b) Performance based regulation.
   c) Incentive regulation.
   d) Benchmarking or Yardstick regulation.

OR

Q6) a) Explain the role of State Electricity Regulatory Commission and Central Electricity Regulatory Commission. **[10]**

b) Explain the importance of 'public' participation in regulatory process. **[8]**

SECTION - II

Q7) Write short note on following models based on industry structure and contractual arrangements : **[16]**
   a) Wholesale Competition.   b) Retail Competition.
   c) Pool and bilateral trade.   d) Multi-lateral trade.

OR

Q8) a) Compare between 'competition for the market' and 'competition in the market'. **[8]**

b) Explain the important changes occurred in Indian power sector after electricity reform. **[8]**

Q9) Explain the concept of trading of power. Write short note on following trading models : **[16]**
   a) Integrated trading model.
   b) Wheeling trading model.
   c) Decentralized trading model.

*Q10)*a) Explain retail competition. Also explain the retail access framework.**[8]**

b) Explain the impact of reform on regulation and externalities. **[8]**

*Q11)*a) Explain the concept of open access. Also explain the concept of transmission rights and transmission pricing. **[9]**

b) State the key features of Indian Grid code. Also explain transmission congestion issues. **[9]**

OR

*Q12)*a) Explain the working of Independent System Operator (ISO) and Load Dispatch Center (LDC). **[9]**

b) Explain three parts of Availability Based Tariff. Also explain how with implementation of ABT, the grid operation is improved in Indian power sector. **[9]**

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[4164] - 510

B.E. (Electrical)

EXTRA HIGH VOLTAGE TRANSMISSION

(Elective - II) (2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any one questions from each unit of section I & section II.*
2) *Answer 3 questions from section I and 3 questions from section II.*
3) *Answers to the two sections should be written in separate books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) Explain the terms attenuation and distortion of travelling wave. Explain the causes of attenuation and distortion. **[10]**

   b) If total inductance of a transmission line is 265 MH (microhenry) and total capacitance 0.165 microfarad find velocity of surge voltage in the line.

   If this line is energized by a unit step voltage 1.0 V at the sending end and open circuited at the receiving end. Obtain the resultant voltage at the receiving end. **[6]**

OR

Q2) a) A power of 2000 MW is to be transmitted from a super thermal power station over 800 km. The alternator used is 400 kV alternator. Suggest the number of circuits required. Find the current per circuit, power loss per circuit and the total power loss. The reactance of line 0.327 ohm/km and resistance 0.031 ohm/km Take $\sin\delta = 0.5$. **[8]**

   b) Write note on types of vibrations and oscillations of transmission line.**[8]**

P.T.O.

Unit - II

Q3) a) Explain how the possibility of corona discharge is reduced if bundle conductor is used instead of one solid conductor. Also derive the expression for the equivalent radius of bundle conductor in terms r, n, R, B where B is bundle spacing, R is bundle radius, n is number of subconductors and r is radius of each sub conductor. **[8]**

b) A 3 phase 750 kV horizontal line has minimum height 12 meter, sag at midespan 12 meter, phase spacing S = 15 meter, conductors are 4×0.035 meter. with bundle spacing B = 0.4572 meter calculate per kM the inductance matrix for untransposed line. **[8]**

OR

Q4) a) Derive the expression for inductance matrix of three bundle conductors of 3 phase line. Hence write the expression for capacitance matrix. Indicate the self and mutual capacitances. Assume untransposed line. **[8]**

b) Explain how to find out the inductance matrix for transposed line from inductance matrix of untransposed line. Also how sequence inductances are found out? **[8]**

Unit - III

Q5) a) A sphere gap with spheres having radius R = 0.5 m and gap of 0.5 m between their surfaces. **[10]**

Calculate the required charges and their locations to make the potentials 100 and 0. Do the calculations upto two charges located in each sphere.

b) Two conductors of charges q_1 and q_2 Coulomb are located H_1 meter and Hz meter above the ground surface. The horizontal distance between two conductors is denoted as A_{12} Derive the expressions for potentials V_1 and V_2 to ground of these conductors considering the charge of other conductor and image charges also. **[8]**

OR

Q6) a) Two conductors of two phases are very far from each other. Each conductor consists of two subconductors of bundle spacing B and bundle radius R, and radius of subconductor "r" Neglecting image charges and charge of other phase conductor derive expression for maximum and minimum potential gradient on the surface of each sub conductor. With neat diagram show the locations of maximum and minimum potential gradient. Also find expression for average potential gradient. **[10]**

b) A 420 kV 3 Phase line, have conductors 13 meter above the ground phase spacing is S = 11 meter, Bundle spacing is B = 0.45 meter, radius of each subconductor is 0.0159 meter calculate maximum surface voltage gradient on center and outer conductors using Mangolt formula. **[8]**

SECTION - II

UNIT - IV

Q7) a) Explain the procedure for finding out electrostatically induced voltage in any conductor of unenergized three phase circuit of a double circuit line. **[8]**

b) Write note on effects of magnetic fields on human health. **[6]**

c) Now a days how is insulated ground wire utilized. **[2]**

OR

Q8) a) Explain the procedure for finding out the electrostatic field of 3-phase line. **[8]**

b) Explain the terms

i) Threshold current and

ii) Let go current.

Write expression for tolerable current in miliampere in terms of duration of current. State the effects of shock currents of different magnitude on humans. **[8]**

Unit - V

Q9) a) For three phase full wave bridge rectifier circuit derive expression for output dc voltage and dc current at ignition delay angle α. **[8]**

b) Draw the equivalent circuit of bridge rectifier to indicate the effect of commutation overlap on dc voltage magnitude write expression for equivalent commutating resistance. **[4]**

c) It is required to obtain dc voltage of 100 kV from a three phase bridge rectifier operating with ignition delay angle 30° and commutation overlap 15°. Calculate the necessary line voltage of rectifier transformer. **[4]**

OR

Q10) a) Explain the terms commutation and commutation delay time. State the reason for commutation delay. Derive expression for commutation voltage. **[8]**

b) Derive the expression for transient value of ignition delay angle α_t beyond which inversion takes place, when commutation overlap is absent. Also derive α_t when commutation overlap angle μ is present and hence state the effect of μ on the transient value α_t.

Explain how the reversal of power takes place. Why it is necessary have presence of alternating voltage on primary side of inverter transformer?**[8]**

Unit - VI

Q11) a) Write note on ideal & actual V- I characteristic of converter of HVDC.**[10]**

  b) State & explain the important requirement for satisfactory operation of HVDC link, for selection of control characteristic.   **[8]**

OR

Q12) a) Write note on individual phase control system of firing angle control.**[10]**

  b) Discuss the problems associated with weak ac system in operation of dc system.   **[8]**

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[4164] - 511
B.E. (Electrical Engineering)
SMART GRID
(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Solve Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Assume suitable additional data, if necessary.*

SECTION - I

Q1) a) Define smart grid and give its functions.   **[8]**

b) Give present development and international policies in smart grid.**[10]**

OR

Q2) a) Difference between conventional grid and smart grid.   **[8]**

b) Explain the Resilient and self healing grid.   **[10]**

Q3) a) Write a note on, "Real time prizing".   **[8]**

b) Write a note on, "Vehicle to Grid".   **[8]**

OR

Q4) a) Explain how automatic meter reading can make the system smarter.**[8]**

b) Explain, phase shifting transformer.   **[8]**

Q5) a) Highlight on role of geographic information system in smart grid, and also give its function.   **[8]**

b) Write a note on, "IED".   **[8]**

OR

Q6) a) Explain, the "Feeder Automation". **[8]**

b) Explain phase measurement unit and its importance in smart grid. **[8]**

SECTION - II

Q7) a) Explain concept of microgrid, and its need and application. **[10]**

b) Write a note on, "Thin film solar cells". **[8]**

OR

Q8) a) Explain about protection and control of microgrid. **[10]**

b) Write a note on, "plastic and organic solar cells. **[8]**

Q9) a) Explain EMC and its importance in smart grid. **[8]**

b) Explain Web based power quality monitoring. **[8]**

OR

*Q10)*a) High light the issues related to power quality in smart grid. **[8]**

b) Explain power quality conditioners for smart grid. **[8]**

*Q11)*a) Give importance of HAN in smart grid. **[8]**

b) Write a note on, "IP based protocols". **[8]**

OR

*Q12)*a) How GPS can prove to be helpful for smart grid. **[8]**

b) Explain cloud computing and its need. **[8]**

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[4164] - 514
B.E. (Electrical)
VLSI DESIGN
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Draw state diagram to detect 1011 sequence using mealy and moore model. **[8]**

     b) Draw the timing diagram of MOD 6 Asynchronous counter and MOD 6 Synchronous counter. **[10]**

OR

Q2) a) Implement AND, OR, NAND, NOR gate using 4 : 1 multiplexer. **[8]**

     b) Draw state transition table for MOD 11 counter using T flip-flop. Also implement its Design diagram. **[10]**

Q3) a) Explain EDA tool Design flow. **[8]**

     b) Define the terms : **[8]**

         i)   Entity   ii)   Architecture

         iii)   Component   iv)   Configuration

OR

Q4) a) State and explain any 4 types of data types & data objects used in VHDL. **[8]**

     b) Write VHDL code for 8 : 1 multiplexer & also draw its internal circuit diagram. **[8]**

P.T.O.

Q5) a) What do you mean by sub-program overloading? Explain with example using VHDL code. **[8]**

b) Write VHDL code for R-S flip-flop using process statement. **[8]**

OR

Q6) a) Which are the nine different values of std-logic? Also write entity to create an array of 8 × 8 with data type as std-logic vector. **[8]**

b) What do you mean by configuration? Explain with an example in VHDL code. **[8]**

SECTION - II

Q7) a) Explain voltage transfer characteristics of CMOS invertor. **[8]**

b) Explain the construction of MOSFET device. **[8]**

OR

Q8) a) Define the concept of FAN-IN, FAN-OUT figure of merit and Noise margin w.r.t. CMOS. Also state its standard values. **[8]**

b) State standard device specifications of MOSFET. **[8]**

Q9) a) Draw and explain Architecture of FPGA. **[8]**

b) Write a note on simulation and Synthesis. **[8]**

OR

Q10) a) Differentiate PAL and PLA. **[8]**

b) Draw and explain standard Architecture of CPLD. **[8]**

Q11) a) Write VHDL code for 4 bit Adder. **[8]**

b) Write VHDL code for 8 × 8 RAM. **[10]**

OR

Q12) a) Draw block diagram of ALU & also write its VHDL code. **[8]**

b) Write VHDL code for 4 bit shift register with parallel load and serial right shift output. **[10]**

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[4164] - 515

B.E. (Electrical)
HIGH VOLTAGE ENGINEERING
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*
  2)   *Answers to the two sections should be written in separate books.*
  3)   *Neat diagrams must be drawn wherever necessary.*
  4)   *Figures to the right indicate full marks.*
  5)   *You are advised to attempt not more than 6 questions.*
  6)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and   steam tables is allowed.*
  7)   *Assume suitable data, if necessary.*

<u>SECTION - I</u>

Q1) a)   Describe in detail Townsend's theory of breakdown in gaseous medium. What are its limitations.   **[12]**

   b)   What is time lag? Why it occurs? What are the different factors which affect on it?   **[6]**

<div align="center">OR</div>

Q2) a)   Differentiate between positive and negative corona discharge.   **[10]**

   b)   A steady current of 400 micro ampere flows through flat electrodes separated by distance of 5mm when voltage of 10kV is applied. Determine Townsend's first ionization coefficient. If current of 50 micro ampere flows when distance of separation reduces to 1mm and field is kept constant to previous find Townsend's secondary ionization coefficient.   **[8]**

Q3) a)   Differentiate between treeing and tracking phenomenon.   **[8]**

   b)   Describe in detail Intrinsic breakdown in case of solid dielectric material.
                                                                          [8]

<div align="center">OR</div>

Q4) a) What are pure & commercial liquids? How breakdown occurs in Pure liquids? **[8]**

b) Find power law dependence equation from following observation obtained while testing liquid dielectric material. **[8]**

Gap Distance (cm)	4	6	8	10
Breakdown voltage (kV)	88	135	165	212

Q5) a) What are the causes for over voltages? **[4]**

b) What are the advantages of horn gap arrestor over rod gap. **[4]**

c) Describe any gap type Lightening arrestor. **[8]**

OR

Q6) a) Write a short note on insulation co-ordination. **[8]**

b) Describe in detail Lightening phenomenon. **[8]**

SECTION - II

Q7) a) With a neat sketch explain Van DeGraff Generator. **[8]**

b) Explain principle of operation of multistage impulse generator and Describe any one tripping method. **[8]**

OR

Q8) a) Describe cascading transformer. What is its use? State its advantages & Disadvantages over other method. **[8]**

b) A 12 stage impulse generator has capacitor each rated at 0.3 micro farad, 150 kV. The capacitance of the test specimen is 400 pf. Determine the wave front & wave tail resistances to produce a 1.2/50 micro second impulse wave. Also determine the maximum output voltage if the charging voltage is 125 kV. **[8]**

Q9) a) How sphere gap is used for measurement of high voltage? What are the different factors which affects on measurement? How correction for atmospheric temperature and pressure is applied? **[12]**

b) Describe any one method of impulse current measurement. **[6]**

OR

*Q10)*a) Describe any one method of Partial discharge measurement. **[8]**

b) What are the requirements of Cathode Ray Oscilloscopes which are used for measuring impulse voltage and current? **[5]**

c) A Schering bridge when used to measure the capacitance and loss angle of the bushing, following observations are obtained

Standard condenser = 200 pf, R3 = 4000 Ohm, C3 = 0.00125 micro farad and R4 = 500 Ohm. What are the values of Capacitance and loss factor. **[5]**

*Q11)*a) Describe any three tests conducted on insulators. **[8]**

b) Write a short note on Design, layout and grounding of HV laboratory.
[8]

OR

*Q12)*a) Describe any three tests conducted on Bushings. **[8]**

b) How power transformer is tested? Which type and Routine tests are conducted on it? **[8]**

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[4164] - 516

B.E. (Electrical)

DIGITAL SIGNAL PROCESSING

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Use of logarithmic tables, slide rule, Moillier charts, electronic pocket calculator and steam tables is allowed.*
4) *Assume suitable data, if necessary.*
5) *Solve Q.1 or 2, Q.3 or 4, Q.5 or 6 from Section I and Q.7 or 8, Q.9 or 10, Q.11 or 12 from Section II.*

SECTION - I

Q1) a) Few discrete time systems are given below :   **[10]**

   i) $y(n) = x^2(n)$

   ii) $y(n) = x(2n)$

   Check whether systems are

   1)   Static or dynamic.

   2)   Linear or Non - linear.

   3)   Shift variant or invariant.

   b) Explain classification of Discrete Time Signal.   **[8]**

                               OR

Q2) a) Find linear convolution of following sequences using matrix or tabular method.   **[10]**

   i) $x(n) = 1$ *for* $n = -2,0,1$

            $= 2$ *for* $n = -1$

            $= 0$ *otherwise*

         $h(n) = \delta(n) - \delta(n - 1) + \delta(n - 2) - \delta(n - 3)$

   ii) $x(n) = \{1,1,0,1,1\}$ *for* $-2 \leq n \leq 2$

         $h(n) = \{1,-2,-3,4\}$ *for* $-3 \leq n \leq 0$

   b) Explain sampling theorem and anti - aliasing filter in A to D conversion.**[8]**

                                                              P.T.O.

Q3) a) State and prove following properties of z- transform. **[6]**

     i) Linearity.

     ii) Time shifting.

     iii) Scaling.

   b) Find the inverse z-transform using partial fraction method **[10]**

$$x(z) = \frac{1 + 3z^{-1}}{1 + 3z^{-1} + 2z^{-2}}$$

For

     i) ROC $|z| > 2$

     ii) ROC $|z| < 1$

<div align="center">OR</div>

Q4) a) Explain following properties of Discrete Time Fourier Transform (DTFT)**[6]**

     i) Linearity.

     ii) Time shifting.

     iii) Frequency shifting.

   b) Determine the z-transform and the ROC of the signal **[10]**

     i) $x(n) = [3.(4)^n - 4.(2)^n]u(n)$

     ii) $x(n) = \{1, -2, 1, 3, 4\}\, for - 2 \leq n \leq 2$

Q5) a) Explain Generalized Linear Phase System (GLPS) along with its four types. **[8]**

   b) Explain frequency response of rational systems. **[8]**

<div align="center">OR</div>

Q6) a) A discrete time system has a unit sample response $h(n)$ given by

$$h(n) = \frac{1}{2}\delta(n) + \delta(n-1) + \frac{1}{2}\delta(n-2)$$

Find the system frequency response $H(e^{j\omega})$ for $-\pi \leq \omega \leq \pi$ in steps of

$\frac{\pi}{4}$. Plot magnitude and phase response. **[10]**

   b) Explain the concept of phase distortion and group delay. **[6]**

SECTION - II

Q7) a) Compute 4-point DFT of the sequence $x(n) = \{0, 1, 2, 3\}$ **[8]**

b) Explain 8-point Radix -2 DIT - FFT algorithm. **[8]**

OR

Q8) a) Compute circular convolution of following sequence using matrix approach **[10]**

i) $x(n) = \{0,1,2,3,0,1,2,3\}$ and $h(n) = \{1,1,1,1\}$.

ii) $x(n) = \{3,2,1,0\}$ and $h(n) = \{1,0,1,0\}$.

b) State and explain following properties of DFT. **[6]**
i) Periodicity.
ii) Linearity.

Q9) a) Give difference between analog and digital filters. **[6]**

b) Design the band - pass filter whose frequency response is given by

$$H(e^{jw}) = 1 \, for \, \frac{\pi}{6} \leq |\omega| \leq \frac{\pi}{3}$$
$$= 0 \, other \, wise$$

Using rectangular window for length $M = 5$ **[12]**

OR

Q10) a) Give difference between FIR and IIR filter. **[8]**

b) The system function of the analog filter is given by

$$H(s) = \frac{s+0.1}{(s+0.1)^2 + 16}$$

Obtain system function of the digital filter using bilinear transformation

which is resonant at $\omega_r = \frac{\pi}{2}$. **[10]**

Q11) a) Draw Direct form - II structure of following systems. **[10]**

i) $y(n) + y(n-1) - 4yn(n-3) = x(n) + 3x(n-2)$

ii) $y(n) = \frac{3}{4} y(n-1) - \frac{1}{8} y(n-2) + x(n) + \frac{1}{2} x(n-1)$

b) Explain cascade form structure of IIR system. **[6]**

OR

Q12) a) Explain with block diagram application of DSP in power factor correction. **[8]**

b) Explain with block diagram application of DSP in harmonic analysis. **[8]**

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[4164] - 519

B.E. (Electrical Engineering)
RENEWABLE ENERGY SYSTEM
(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate answer books.*

   2)   *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Solve Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*

   3)   *Figures to the right indicate full marks.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Assume suitable additional data, if necessary.*

SECTION - I

Q1) a) Explain distributed generation with fossil fuels and describe any one emerging technologies for distributed generation. **[8]**

    b) List different types of fuel cells, and explain any one. **[8]**

OR

Q2) a) Write a note on, "concentrating solar power technologies". **[8]**

    b) Explain combined heat and power, also its energy efficiency measures. **[8]**

Q3) a) Write a note on, types of wind turbines. **[8]**

    b) Give simple estimates of wind turbines energy. **[10]**

OR

Q4) a) List the methods and explain how maximum power can be achieved by controling speed. **[10]**

    b) Write a note on, environmental impacts of wind turbines. **[8]**

P.T.O.

Q5) a) Explain the solar spectrum. **[8]**

b) Write a note on, "Total clear sky insolation on a collecting surface".**[8]**

OR

Q6) a) Write a note on "Altitude angle of the sun at solar noon" **[8]**

b) Explain the, solar radiation measurement. **[8]**

SECTION - II

Q7) a) Explain the generic photovoltaic cell and the simplest equivalent circuit for a photovoltaic cell. **[8]**

b) How does shading impacts on I-V curves of a PV module, and role of by pass diode and blocking diode. **[8]**

OR

Q8) a) Explain, from cells to a module, and from module to arrays. **[8]**

b) Explain single-crystal czochralski silicon technology. **[8]**

Q9) a) Explain the grid-connected PV systems and its interfacing with the utility. **[10]**

b) Explain the stand alone PV systems, with example. **[8]**

OR

Q10) a) Explain the capacity factors for PV grid-connected systems and grid-connected system sizing. **[10]**

b) Explain the, Bi-directional metering and list its advantages. **[8]**

Q11) a) Explain, Microturbine Generation. **[8]**

b) Write a note on, Global warming and climate change. **[8]**

OR

Q12) a) Explain, wave energy conversion systems. **[8]**

b) Write a note on, "Nuclear waste disposal". **[8]**

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[4164] - 544

B.E. (E & TC)

VLSI DESIGN AND TECHNOLOGY

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With I-V characteristics explain MOSFET as current source and current sink. **[12]**

b) Write note on source follower. **[4]**

OR

Q2) a) Draw and explain Standard cascode and High swing cascode. **[10]**

b) Draw and explain CMOS differential amplifier using NMOS **[6]**

Q3) a) Draw voltage transfer characteristics of CMOS inverter and explain different regions of operation of NMOS and PMOS transistor. **[10]**

b) What is the dynamic power dissipation? Explain the significance of power delay product. **[6]**

OR

Q4) a) What is Technology scaling? Explain different design rule check in terms of λ parameters. **[10]**

b) Write short note on body effect. **[6]**

Q5) a) What is Test Bench? Describe Synthesizable and Non-Synthesizable test bench. **[8]**

b) What is Function and Procedure? Describe it with VHDL example. **[10]**

<div align="center">OR</div>

Q6) a) Draw state diagram and write VHDL code for Traffic Light Controller. **[14]**

b) Write a short note on Metastability. **[4]**

<div align="center">

SECTION - II

</div>

Q7) Draw and explain the detail Architecture of CPLD. **[16]**

<div align="center">OR</div>

Q8) Differentiate between CPLD and FPGA; also write 4 specification of each. Device. **[16]**

Q9) a) What is the need of DFT? Explain different types of faults. **[12]**

b) What is Controllability and Predictability? **[6]**

<div align="center">OR</div>

Q10) Write short note on BIST, JTAG and TAP controller. **[18]**

Q11) a) What is clock skew and clock jitter? Explain different techniques of clock distribution. **[10]**

b) Write short note on wire parasitics. **[6]**

<div align="center">OR</div>

Q12) a) Write note on Power Distribution and Power Optimization. **[10]**

b) Explain different EMI design consideration. **[6]**

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[4164] - 545

B.E. (E & TC)

COMPUTER NETWORK

(2008 Pattern) (Sem. - I)

Time :3 Hours]   **[Max. Marks :100**

Instructions to the candidates:-

1) *Answer any three questions from each section.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Draw the neat diagram of OSI model and explain in brief the function of each layer in it.   **[10]**

b) Explain UTP cable with reference to following.   **[8]**

   i)   Categories   ii)   Connecters

   iii) Performance   iv)   Applications

OR

Q2) a) State & explain four basic network topologies and write advantages of each type.   **[6]**

b) Compare between circuit switching and packet switching.   **[6]**

c) State & explain the basic service primitives used in client-server model.   **[6]**

Q3) a) Draw the HDLC frame format & explain in detail the control field used in HDLC protocol for different frame types. . **[8]**

b) State & explain multiple access protocols in brief. **[8]**

OR

Q4) a) State & explain in brief the functions associated with Data Link Layers in OSI model. **[8]**

b) What are the common standard Ethernet implementations? Explain. **[8]**

Q5) a) What is backbone network? What are its types? Explain in brief. **[8]**

b) Write short note on Application Adaptation Layer (AAL) in ATM. **[8]**

OR

Q6) a) Draw and explain A TM Reference model. **[10]**

b) Explain the difference between Switch & Hub. **[6]**

SECTION - II

Q7) a) For a given Classless IP address, how will you extract network address & host address? Explain with suitable example. **[8]**

b) Compare between IPv4 and IPv6. **[8]**

OR

Q8) a) Write short notes on: **[9]**

    i) ARP

    ii) RARP

    iii) BOOTP

b) Explain different forwarding techniques used in computer network. **[7]**

Q9) a) What are the duties of Transport layer? List the services provided by Transport Layer to upper layers. Also explain how QoS is improved by Transport Layer. **[8]**

b) Compare between TCP and UDP. Under what circumstances you will use them? **[8]**

Q10) a) Draw the TCP segment format. Explain its various fields and their use.

[8]

b) Write a short note on congestion control. **[8]**

Q11) a) What are the main responsibilities of Application Layer? Explain in brief.

[10]

b) Explain : FTP and Telnet protocol. **[8]**

<div align="center">OR</div>

Q12) a) Write short notes on : **[12]**

i) DNS

ii) Email System

iii) www & internet.

b) Write short note on Firewall. **[6]**

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[4164] - 546

B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain briefly.   **[8]**
   i)   Weber ratio   ii)   Mach band effect
   iii) Contrast sensitivity   iv)   Semultaneous contrast

   b) Explain spatial resolution & gray level resolution in case of digital image. **[8]**

                                            OR

Q2) a) Explain 4 connectivity, 8 connectivity, m connectivity with reference to relation between pixels? Where is the concept of connectivity used in I.P.?   **[8]**

   b) Explain in detail MTF for human vision.   **[8]**

Q3) a) Briefly explain following image enhancement method indicating their typical applecation area.   **[9]**
   i)   contrast stretching
   ii) medium filtering
   iii) unsharp marking

   b) What is color model? Explain HSI to RGB conversion.   **[9]**

                                            OR

Q4) a) Discuss image enhancement in - frequency domain. **[9]**

b) Discuss various pseudocoloring techniques used for image enhancement. Give their application. **[9]**

Q5) a) What is KL transform? Discuss its properties & application. **[8]**

b) Compare DFT & DCT **[8]**

OR

Q6) a) What is DCT? Explain the different properties of DCT. **[8]**

b) With reference to 2D transform explain **[8]**

i) Basis image   ii) Symmetry

iii) Separability   iv) Energy compaction

SECTION - II

Q7) a) Draw & explain image compression model block diagram in detail. **[8]**

b) Compare predective coding & transform coding for image compression. **[8]**

OR

Q8) a) Discuss redundancies observed in an image. How we can exploit these redundancies for image compression. **[8]**

b) With a suitable example. Explain Arithmetic coding. **[8]**

Q9) a) Explain Laplacian edge detector. Explain why LOG mark is preferred over Laplacian for edge detection. **[8]**

b) What is image thresholding explain local global and adaptive thresholding. **[8]**

OR

Q10) a) Write a note on dilation & erosion? State applecation for both. **[8]**

b) Write a short note on chain code. **[8]**

Q11) a) Write a note on Gaussian low pass filtering for images. **[9]**

b) Discuss applecation of image processing for biometric security system. **[9]**

OR

Q12) Write short notes on : **[18]**

a) Image Degradative model.

b) Restoration in image processing

c) Fingerprint Recognition.

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[4164] - 547

B.E. (E & TC)

EMBEDDED SYSTEMS & RTOS

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   **[Max. Marks :100**

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What do you mean by design metric? Explain the following design metrics. **[8]**

   i) Power   ii) Time to market

   iii) Safety   iv) NRE cost

   b) Explain the features of CAN. Compare CAN with LIN & flexray. **[10]**

OR

Q2) a) Explain IEEE 802.11 and compare with Bluetooth. **[10]**

   b) What are the applications of WINCE. **[4]**

   c) What are the important building blocks of an embedded system. **[4]**

Q3) a) Explain the architecture of LPC 2148 with a block diagram. **[8]**

   b) Explain the interfacing of LED bank to LPC 2148 with a block diagram. Also write embedded C code to blink the LEDS. Comment the program. **[8]**

OR

Q4) a) Compare ARM7, ARM9, ARM11 and ARM cortex. List the applications of these processors. **[8]**

   b) Explain the interfacing of 4 × 4 Hex keypad to LPC 2148 with a diagram. Also write embedded C program to display the key pressed. Comment the program. **[8]**

Q5) a) Explain any three scheduling algorithms. **[8]**

b) Write C code for implementing a scheduler for Mucos II RTOS. **[8]**

OR

Q6) a) Explain the concept of context switch. List and explain the different states of a task. **[8]**

b) Write C code for implementing a semaphore for Mucos II RTOS. **[8]**

SECTION - II

Q7) a) State and explain the various development tools required for embedded Linux applications. **[10]**

b) What are the different steps in developing & testing of Linux device driver. **[8]**

OR

Q8) a) What is linux kernel configuration. Explain the steps in Linux kernel configuration. **[8]**

b) Explain the different file system used in embedded Linux. **[10]**

Q9) a) Compare QNX with Nucleus. **[4]**

b) Explain the features of Android OS used in smart mobile phones. **[4]**

c) Explain V model for software development life cycle. **[8]**

OR

Q10) a) Compare Vxworks with symbian. **[4]**

b) Explain the features of Linux OS used in smart mobile phones. **[4]**

c) Explain spiral model for software development life cycle. **[8]**

Q11) a) Explain the features of processor, memory and I/O device required for implementation of mobile phone. **[8]**

b) Explain the different tasks and IPCs required for developing points of sales terminals. **[8]**

OR

Q12) a) Explain the features of processor, memory and I/O device required for implementation of ECG machine. **[8]**

b) Explain the different tasks and IPCs required for developing ATM. **[8]**

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[4164] - 548

B.E. (E & TC)

INDUSTRIAL DRIVES & CONTROL

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *All questions carry equal marks.*
6) *Your answers will be valued as a whole.*
7) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
8) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are phase controlled converters? Explain with circuit diagram & waveforms working of 3ϕ, full controlled converter with level food. Comment on p.f.   **[10]**

b) A 3 phase converter operating from a 3ϕ, 415v, 50Hz supply is feeding a inductive load. The current is continuous & ripple free equal to 100A. Find the thyrister ratings.   **[8]**

OR

Q2) a) What are dual converters? Explain with circuit diagram & waveform working of 1ϕ dual converter with suitable load. Deduce equation for circulating current.   **[10]**

b) What is DC to DC converter? Explain Buck converter with circuit diagram & waveform.   **[8]**

Q3) a) What are inverters? Explain with circuit diagram & waveform working 3φ (transistorized) voltage source inverter in 180° conduction mode. (star load). **[10]**

b) What are different types of Harmonic reduction techniques? Explain any one type. **[6]**

OR

Q4) a) What are resonant converters? Explain with circuit diagrams & waveforms, working of zero voltage switching. **[10]**

b) What is cycloconverter? Explain with principle of operation, working of 1φ to 1φ cycloconverter. Draw suitable waveforms. **[6]**

Q5) a) What are DC Motor performance parameters? Explain in brief. **[4]**

b) What is Soft start? Explain. **[3]**

c) What is series motor? Explain with circuit diagram & waveform working of 1φ series motor using highly inductive load. Comment on Torque speed c_hs. **[9]**

OR

Q6) a) What is the need of reversible drives? Explain with diagram & waveforms, working of 4 quadrant chopper drive with suitable load. Comment on p.f. **[10]**

b) What is dynamic braking technique? Explain. **[6]**

SECTION - II

Q7) a) What is the need of AC drives? Explain with block diagram, speed control techniques of 1φ, Induction motor by using $\left[\dfrac{v}{f} \ technique\right]$. **[10]**

b) What are different types of protection circuits? Explain. **[6]**

OR

Q8) a) What is slip power recovery in I.M.? Explain with circuit diagram working of static krammer system. Comment on Tq, speed c_hs. **[10]**

b) What is acceleration & decelleration? Explain. **[6]**

Q9) a) What are stepper motors? State the advantages of hybrid stepper motor over variable reluctance & permenent magnet stepper motor. List the drive requirement of stepper motor. **[10]**

b) What is Load commutated inverter? Explain. **[6]**

OR

Q10) a) What are synchronous Motor? Explain with diagram, working & speed control technique of synchronous motor. Comment on Tq, speed characteristics. **[10]**

b) What is CSI? Explain. **[6]**

Q11) a) What are traction drives? Explain with block diagram. Comment on its Tq & speed characteristics. **[8]**

b) What is power quality? Explain different types of powerline disturbances. State its preventive & nullifying techniques. **[10]**

OR

Q12) Write short notes on any Three: **[18]**

a) Brushless DC motor.

b) Z-source inverter

c) Energy audit

d) Dual mode Dual converter.

e) Solid state relays (AC or DC)

f) Fuzzy logic based Im speed control.

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[4164] - 549

B.E. (E & TC)

MICROWAVE COMMUNICATION & RADAR

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the following waveguide parameters.   **[10]**

   i)   Cut off wavelength   ii)   Guide wavelength

   iii) Phase velocity   iv)   Wave impedance

   v)   Dominant mode

   b) Explain the different power losses takes place in a rectangular waveguide. **[4]**

   c) State the assumptions while calculating power in waveguide.   **[4]**

                                              OR

Q2) a) What is re-entrant cavity? Explain where it is used?   **[4]**

   b) Draw different field patterns for TE mode.   **[6]**

   c) Explain the need of coupling probes & loops along with diagrams.   **[8]**

Q3) a) Determine the scattering parameters for 10dB directional coupler. The directivity D = 30dB. Assume that it is lossless and VSWR at each port is 1.0 under matched conditions. Designate the ports in the main guide as 1 or 2 and ports in the auxillary guide as 3 and 4.   **[8]**

   b) Explain in brief the following   **[8]**

   i)   Waveguide transitions

   ii) Matched termination.

<div align="center">OR</div>

Q4) a) State and explain the properties of S parameters. **[8]**

b) Explain the construction, working and application of isolator based on Faraday's rotation. **[8]**

Q5) a) i) A reflex klystron operates under the following conditions. **[4]**

$V_o = 600$ v $L = 1$ mm $f_r = 9$ GHz

$e/m = 11.759 \times 10^{11}$

The tube is operating at f_r at the peak of $n = 2$ mode. Find the value of repeller voltage.

ii) What is a slow wave structure? What are their types? Which one is most practical? **[4]**

b) Compare two cavity klystron and reflex klystron with relevant sketches. **[8]**

<div align="center">OR</div>

Q6) a) What are cross field devices? Explain the π mode of oscillation in magnetron. **[8]**

b) i) Explain how mode jumping is avoided in magnetron. **[4]**

ii) What are the limitations of conventional tubes at microwave frequencies. **[4]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain principle of operation, I-V characteristic and equivalent circuit of microwave Tunnel diode. **[8]**

b) Discuss the amplification mechanism of parametric amplifier with the help of its equivalent circuit. **[8]**

<div align="center">OR</div>

Q8) a) Explain the various modes of operation of Gunn diode. **[8]**

b) Explain in brief any one of the transit time devices. **[8]**

Q9) a) Explain how VSWR, impedance and frequency can be measured using a slotted waveguide. **[8]**

b) Explain in brief network analyser. **[8]**

Q10) a) Write a short note on measurement of noise factor. **[6]**

b) Describe the setup for the measurement of Q of a cavity resonator. **[8]**

c) Sketch a general setup of microwave bench. **[2]**

Q11) a) A marine radar operating at 10 GHz has a maximum range of 50 km with an antenna gain of 4000. If the transmitter has a power of 250kw and minimum 250 kw also minimum detectable signal of 10^{-11} W. Determine the cross section of the target the radar can sight. **[6]**

b) Explain A scope and PPI displays with reference to radars. What are their limitations. **[6]**

c) Explain the action of **[6]**

   i) CW doppler radar

   ii) FMCW doppler radar

<div align="center">OR</div>

Q12) a) Explain the following terms: **[10]**

   i) Blind Speed   ii) PRF

   iii) Monopulse tracking   iv) Duplexer

   v) Line pulse modulator

b) Explain the principle and working of an MTI radar. **[8]**

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[4164] - 550
B.E. (E & TC)
ENTREPRENEURSHIP DEVELOPMENT
## (2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain characteristics of a successful entrepreneur. **[8]**

b) State Financial & Non Financial goals an entrepreneur may have. **[5]**

c) How are entrepreneurs different from employees. **[5]**

OR

Q2) a) Explain four types of sales transactions. **[9]**

b) What are advantages and disadvantages of entrepreneurship. **[9]**

Q3) a) Explain advantages and disadvantages of owning a franchisee. **[8]**

b) State the Role of Government in market economy. **[8]**

OR

Q4) a) State advantages and disadvantages of a family business. **[6]**

b) Explain : fixed cost and variable cost. **[5]**

c) Explain : marginal Benefit and marginal cost. **[5]**

Q5) a) Explain any four basic elements of a Business plan. **[8]**

b) Explain briefly types of loans. State some reasons a bank may reject loan applications. **[8]**

OR

Q6) a) Explain all the types of insurance you can purchase for your Business.**[8]**

b) Short note : short term, mediom term and long term goals. **[8]**

SECTION - II

Q7) a) Explain steps involved in hiring employees. **[8]**

b) State advantages and disadvantages of computerized Record keeping.**[6]**

c) State any four Leadership characteristics. **[4]**

OR

Q8) a) What are different training techniques. **[6]**

b) How can you motivate employees? Why should you delegate and listen to your employees. **[6]**

c) List types of nonsalary benefits your business might offer. Also explain them in brief. **[6]**

Q9) a) Explain Break even analysis with a suitable graph. **[8]**

b) Explain types of professionals that provide financial management services. Also state how to choose a financial Advisor. **[8]**

OR

Q10) a) What are advantages of using e-mail & world wide web? **[8]**

b) Explain technological items that you may use in a business. **[8]**

Q11) a) Explain the laws that protect the rights of employees. **[8]**

b) Short note : Business Ethics. **[8]**

OR

Q12) a) What are risks and benefits of competing globally. **[8]**

b) What is an international Business plan? Also state what it should include.**[8]**

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[4164] - 551

B.E. (E & TC)

JOINT TIME FREQUENCY ANALYSIS

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) For a given Harr wavelet function $\psi(t)$ shown in Fig. 1

Fig 1
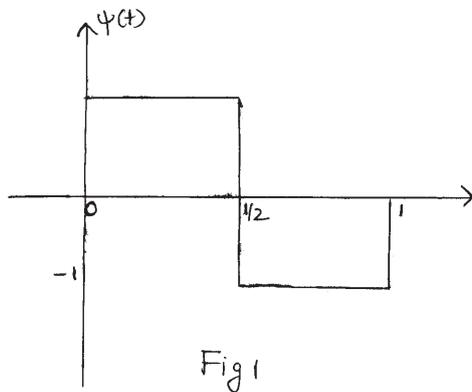
a) Plot the magnitude response. **[8]**

b) Plot $\psi(2t)$ and its magnitude response. **[4]**

c) Find $< \psi(t) . \psi(t) >$ **[2]**

d) Find the orthogonal projection of $\psi(t)$ on subspace W_1. **[2]**

e) Find the subspace of $\psi(t)$. Give the reasons for the same. **[2]**

OR

Q2) Write notes on :   **[18]**

   a) Hilbert spaces

   b) Parrevals theorem and uncertainity principle.

   c) Analytic signal and its use.

Q3) Write notes on :   **[16]**

   a) Wavelet transform

   b) Real and Analytic wavelets

   c) Instantaneous frequency.

   d) Dyadic wavelet transform.

<div align="center">OR</div>

Q4) Signal $x[n]$ = {1, 2, –3, 2, 1, 1, 1, 2} belongs to subspace V_3. Decompose $x[n]$ + ill V_0 subspace using Harr wavelet packets. Clearly show the reconstruction of the signal by drawing the waveforms of the wavelet packets used in the subspace V_0.   **[16]**

Q5) a) Explain the role of nested subspaces in MRA.   **[6]**

   b) Verify Harr wavelet function graphically using wavelet dilation equation. **[4]**

   c) Prove for Harr 2-band filter bank synthesis filters are power complementary.   **[6]**

<div align="center">OR</div>

Q6) For a signal x(t) shown in Fig. 2

Fig2
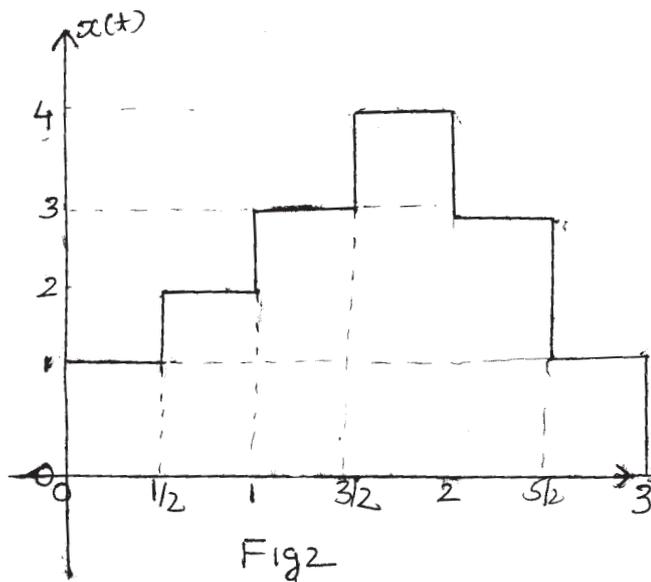
a) State which V subspace x(t) belongs to and why. **[2]**

b) Calculate the piecewise constants such that x(t) belongs to V_0 and W_0 subspace. **[4]**

c) Plot $\rightarrow$ $X(t) \in V_0$

   $X(t) \in W_0$ **[4]**

d) Reconstruct the original signal. Show that $V_1 = V_0 \oplus W_0$. **[4]**

e) Plot the magnitude & phase response of LPF used in the analysis section. **[2]**

SECTION - II

Q7) Using prefect reconstruction condition of conjugate quadrature filter banks, determine analysis low pass filter coefficients of Daub-4. Using the alias concellation condition also find out the analysis HP and synthesis LP and HP. Coefficients of Daub-4. **[16]**

OR

Q8) a) Explain the concept of vanishing moments. **[10]**

b) Explain meyer wavelets. **[6]**

Q9) Given $x[n] = \{1, 1, 3, 1, 4, 5, 6, 7\} \in V_3$. Develop wavelet lifting scheme using MRA framework decompose the signal till Vo subspace. Show perfect reconstruction. Clearly show 'split', 'Update' and 'Predict' stages and their outputs. Show how the computations take place in place. **[18]**

OR

Q10) a) Explain Inverse lifting scheme with block diagram. Give the advantages of lifting scheme. **[10]**

b) Explain wavelet packet analysis. **[8]**

Q11) Write notes on: **[16]**

    a) Speech compression.

    b) Signal denoising

    c) Riesz bases

<div align="center">OR</div>

Q12) Write notes on: **[16]**

    a) Video compression

    b) Time frequency distributions

    c) Need for joint time frequency analysis.

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Total No. of Questions : 12]

P1412

[Total No. of Pages : 3

[4164] - 552

B.E. (Electronics & Telecommunication)

MICROELECTROMECHANICAL SYSTEM AND SYSTEMS ON CHIP

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Attempt three questions from each section.*

2) *Attempt from section I : Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from section II : Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain basic working principal of microaccelerometers and micro inertial sensor? **[8]**

b) What do you mean by scaling in electromagnetic force? Justify: electromagnetic force $F \propto l^4$ cross section area of conductor. **[8]**

OR

Q2) a) What are the performance parameters of Gyroscope? **[8]**

b) Explain in detail necessary ingredients that will be involved in microsystem design. **[8]**

Q3) a) Compare GaAs Vs Silicon. **[8]**

b) Explain working principal of silicon piezoresistors? **[8]**

OR

Q4) a) Justify, Why silicon is ideal substrate for Micro-MEMS? **[8]**

b) Explain the concept of **[8]**

   i) Mobility

   ii) Resistivity in context to Piezo crystal.

Q5) a) Explain working principal magnetic transducer. Discuss its advantages and disadvantages. **[9]**

b) Explain various technological aspects of sensors. **[9]**

<div align="center">OR</div>

Q6) a) Explain how biosensor is used for glucose concentration? **[9]**

b) Explain working principal of RF transducer. Where these transducers are used? **[9]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain SoC design flow. **[8]**

b) Explain in detail schematic of an MPEG2 encoder for terrestrial transmission. **[8]**

<div align="center">OR</div>

Q8) a) What are the important parameters which define wafer level bonding? Also give its significance. **[8]**

b) Explain main characteristics of VLSI technology that are leading to overall organization of microprocessors. **[8]**

Q9) a) What are the goals of layout synthesis tool? Which technical issues, CMOS layout tool handles? Differentiate horizontal versus vertical routing. **[8]**

b) Explain working of CVD? Which new CVD processes is used to overcome drawbacks of CVD process? **[8]**

<div align="center">OR</div>

Q10) a) Explain advantages and disadvantages of SCCGS. **[8]**

b) What reliability issues are crop up in packaging? Which factors leads failures in packaging? **[8]**

Q11) a) Explain the terms **[9]**

    i) Defects and fault method.

    ii) Fault simulation.

b) What are the requirements of packaging? **[9]**

OR

Q12) a) Which features are inculcated in co-design tool? Explain design steps for co-design. **[9]**

b) Explain GDC algorithm with reference to behavioral VHDL and hybrid behavioral- RTL VHDL. **[9]**

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[4164] - 553

B.E. (E & TC)

MOBILE COMMUNICATION

(2008 Pattern) (Sem. - I) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain frequency reuse concept in cellular networks and State formula for N (cells per cluster). **[8]**

b) Discuss evolution of modern wireless communication system from 2G to 3G networks. **[9]**

OR

Q2) a) Explain the following terms in detail. **[9]**

   i) Cell splitting

   ii) Sectoring

b) Explain handoff mechanism in detail and call dropping conditions while handoff. **[8]**

Q3) a) Discuss Reflection and Diffraction basic propogation mechanism in wireless communication. **[8]**

b) Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 900 MHz, free space propogation is assumed, Gt = 1, and Gr = 2, find. **[9]**

   i) the power at the receiver,

   ii) the magnitude of the E-field at the receiver antenna,

   iii) the rms voltage applied to the receiver input assuming that the receiver antenna has a purely real impendance of 50 Ω and is matched to the receiver.

OR

Q4) a) Explain free space propogation model with formulae. **[9]**

b) Explain Direct RF channel impulse response measurement system. **[8]**

Q5) a) What is concept of equalization and state why adaptive equalizers are used for mobile communication. **[8]**

b) Explain BPSK and DPSK and compare performance of both. **[8]**

OR

Q6) a) Explain Minimum Shift Keying (MSK). **[8]**

b) Explain types of Frequency Hopping Spread Spectrum (FHSS) techniques in detail with block diagrams. **[8]**

SECTION - II

Q7) a) Explain important features of FDMA. **[8]**

b) Which are the important characteristics of speech signal? **[9]**

OR

Q8) a) Explain different types of CSMA protocols and reservation protocol. **[8]**

b) Discuss GSM Codec in detail. **[9]**

Q9) a) Explain GSM Services in detail. **[9]**

b) Explain steps involved in call setup by a mobile phone. **[8]**

OR

Q10) a) What are the types of GSM Logical channels, explain in brief. **[8]**

b) Describe GSM Reference model with block diagram. **[9]**

Q11) a) Explain IS 95 CDMA air interface. **[8]**

b) Explain CDMA Handoff paramaters in detail. **[8]**

OR

Q12) a) Describe different types of Handoffs in CDMA. **[8]**

b) Describe evolution of CDMA 2000 from IS95. **[8]**

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Total No. of Questions : 12]

SEAT No. : ☐

P1414

[Total No. of Pages : 4

[4164] - 555

B.E. (E & TC)

OPTICAL FIBER COMMUNICATION

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

　　1)   Answer any Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section I I.

　　2)   Answers to the two sections should be written in separate books.

　　3)   Neat diagrams must be drawn wherever necessary.

　　4)   Figures to the right indicate full marks.

　　5)   Assume suitable data, if necessary.

SECTION - I

Q1) a) An engineer selects a fiber with a 25 μm core radius, a core index $n_1 = 1.48$ and $\Delta = 0.01$. **[6]**

　　　i)   If $\lambda = 1310$ nm, what is the value of normalized frequency V and how many modes propagate in the fiber?

　　　ii) What percent of optical power flows in the cladding?

　　　iii) If the core - cladding difference is reduced to $\Delta = 0.003$, how many modes does the fiber support and what fraction of the optical power flows in the cladding?

　　b) A 1310 nm optical transmitter is used to obtain a digital bit stream at a bit rate of 2Gb/s. Calculate the number of photons contained in a single 1 bit when the average power emitted by the transmitter is 5mW. Assume that the 0 bits carry no energy. **[6]**

　　c) The International Telecommunications Union (ITU) has designated six spectral bands for use in optical fiber communication. State the name, designation and spectrum of each band. **[6]**

OR

Q2) a) An installed fiber has following specifications :-

Core diameter = 62.5 μm; NA = 0.275 and its operating wavelength is 1310 nm. **[6]**

Calculate, the V number, the number of modes if the fiber is graded index and has a parabolic refractive index profile. What number of modes would be supported if instead, The fiber is of step index type.

P.T.O

b) Draw neat characteristics and show the operating ranges of the four key optical fiber link components on it. Comment precisely on these characteristics. **[6]**

c) What are the two major stages of the fiber fabrication process? Briefly describe each. **[6]**

Q3) a) For experimentation, two step index fibers that exhibit following parameters are chosen: **[8]**

    i) A multimode fiber with $n_1 = 1.5$ & $\Delta = 3\%$ and an operating wavelength of 820 nm.

    ii) An 8 μm core diameter single mode fiber with $n_1 = 1.5$ & $\Delta = 0.3\%$ and an operating wavelength of 1550nm.

    Estimate the critical radius of curvature at which large bending losses occur in both cases.

b) A MMSI fiber gives a total pulse broadening of 95 ns over a 5 km length. Estimate the Bandwidth - length product for the fiber when a non return to zero digital code is used. An engineer, not satisfied with this product, plans to use a SMSI fiber that could give a bandwidth - length product of 10 GHz. km. Estimate the rms pulse broadening of this fiber over a 40 km digital optical link (without repeaters) that uses RZ code. **[8]**

<div align="center">OR</div>

Q4) a) Explain in brief polarization maintaining fibers. **[8]**

    A 4 km length, of two - polarization mode PM fiber has a polarization crosstalk of –27dB at its output end. Calculate the mode coupling parameter for the fiber.

b) Write a note on the non linear effects: **[8]**

    i) Scattering and

    ii) Kerr effects in optical fibers.

Q5) a) An optical transmitter uses a DH structure InGaAsP LED operating at a wavelength of 1550nm and $\tau_r = 25$ nsec; $\tau_{nr} = 90$ nsec. **[8]**

    If the LED is driven with a current of 35 mA,

    i) Find internal quantum efficiency & the power generated internally.

    ii) If n = 3.5 of the light source material, find the power emitted from the device.

b) State and explain the requirements of a good optical source from link design point of view. **[8]**

<div align="center">OR</div>

Q6) Write brief notes on: **[16]**
   a) LED drive circuits for Digital transmission.
   b) Fiber splicing.
   c) Modulation of LED & LD.
   d) Line Coding.

SECTION - II

Q7) a) Consider a 870nm receiver with a silicon p-i-n photodiode. Assume 20MHz bandwidth, 65% quantum efficiency, 1nA dark current, 8pF junction capacitance, and 3dB amplifier noise figure. The receiver is illuminated with a 5μw of optical power. Determine the RMS noise currents due to shot noise, thermal noise and amplifier noise. Also calculate the SNR. **[10]**

   b) A laboratory setup uses an In GaAsP hetrojunction photo transistor which has a common emitter current gain of 170, when operating at a $\lambda = 1300$ nm with an incident optical power of 80 μw. The base - collector quantum efficiency at this wavelength is 65%. Estimate the collector current in the device. **[8]**

OR

Q8) a) Answer the following : **[10]**
   i) The responsivity of a PD is 0.9A/w and its saturation power is 2mw. What is the photocurrent if the received power is 1mw?
   ii) What is the responsivity of an InGaAs photodiode if its quantum efficiency is 95%?
   iii) Draw a neat responsivity curve of a PD and explain precisely the reasons that explain the curve.
   iv) What factors restrict the bandwidth of a p-n photodiode?
   v) List four advantages of using reverse bias in a PD.

   b) A high - impedance integrating front-end amplifier is used in an optical fiber receiver in parallel with a detector bias resistor of 10MΩ. The effective input resistance of the amplifier is 6MΩ and the total capacitance (detector & amplifier) is 2pF. **[8]**
   i) Determine the maximum bandwidth without equalization.
   ii) Determine the mean square thermal noise assuming an operating temperature of 290 K.
   iii) It is found that the detector bias resistor may be omitted when a transimpedance front end design is used with a 270 kΩ feedback resistor and an open loop gain of 100.
   Compare the bandwidth and thermal noise implications with high impedance receiver structure.

Q9) a) An engineer has the following components available: **[8]**

  i) GaA/AS laser diode operating at 850nm and capable of coupling 1mw into a fiber.

  ii) 10 sections of cable each of which is 500 m long, has a 4dB/km attenuation, and has connectors on both ends.

  iii) Connector loss of 2dB/connector.

  iv) A pin photodiode receiver (– 45 dBm sensitivity).

  v) An avalanche photodiode receiver (– 56 dBm sensitivity).

  Using these components, the engineer wishes to construct a 5-km link operating at 20 Mb/s. perform optical budget and state which receiver should be used if a 6-dB system operating margin is required?

  b) State the key system requirements needed in analyzing a link. **[8]**

  To fulfill these requirements explain the choice of components and their associated characteristics in a point-to-point optical link.

<center>OR</center>

Q10) a) Draw a neat block diagram representing the basic elements of an analog link and state the major noise contributors. How can we analyse the performance of analog systems. Explain. **[8]**

  b) What is Multi channel transmission in optical links? Explain any one method to achieve multi channel transmission. **[8]**

Q11) a) For the experimentation work, an under graduate engineering student selects an EDFA power amplifier that produces $P_{s,out}$ = 27 dBm for an input level of 2dBm at 1542nm. **[8]**

  i) Find the amplifier gain theoretically.

  ii) What is the minimum pump power required for this setup?

  b) A 2 × 2 biconical tapered fiber coupler data sheet with a 40/60 splitting ratio states that the insertion losses are 2.7 dB for the 60% channel and 4.7 dB for the 40% channel. **[8]**

  i) If input power is 200μw, find the output levels P_1, & P_2.

  ii) Find the excess loss of the coupler.

  iii) Verify that the splitting ratio is 40/60.

<center>OR</center>

Q12) Write short notes on : **[16]**

  a) Principle of operation of SOA.

  b) Noise in EDFA.

  c) Applications of optical amplifiers

  d) WDM standards.

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[4164] - 557

B.E. (E & TC)

SPEECH PROCESSING

(2008 Pattern) (Sem. - II) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12.*

  2)   *Answers to the two Section- I and Section - II should be written in separate books.*

  3)   *Neat diagrams must be drawn wherever necessary.*

  4)   *Figures to the right indicate full marks.*

  5)   *Use of non-programmable calculator is allowed.*

  6)   *Assume suitable data, if necessary.*

SECTION - I

Q1)   a)   Explain Linear Time Varying Model for speech.   **[4]**

     b)   Explain the following classes of sound: **[10]**

        i)   Vowels

        ii)   Consonants

        iii)   Stop

        iv)   Fricatives

        v)   Diphthongs

     c)   Write note on Articulatory phonetics.   **[4]**

<div align="center">OR</div>

Q2) a) How V/UV decision making is done with the help of following methods. **[12]**

      i)   ZCR

      ii)   Normalized autocorrelation coefficients

      iii) Pre-emphasized energy ratio

  b) Name the articulating organs. **[2]**

  c) Describe the nature of speech. **[2]**

  d) Explain .WAV file. **[2]**

Q3) a) Define pitch. Explain autocorrelation method for finding pitch period. **[4]**

  b) Which type of window is generally used for speech processing? Why? **[4]**

  c) With the help of neat block schematic, explain formant measurement using cepstrum. **[8]**

<p align="center">OR</p>

Q4) a) What are the goals achieved by Dynamic Time Warping algorithm? **[3]**

  b) What are the limitations of DTW approach **[3]**

  c) Give the equation to find cost function of DTW algorithm. **[2]**

  d) Apply DTW algorithm to the following example and find minimum cost path. **[8]**

Speech symbols

$\downarrow$ $\rightarrow$	1	5	4	2
1	0	4	3	1
2	1	3	2	0
4	3	1	0	2
1	0	4	3	1

Q5) a) Explain Homomorphic processing with reference to speech processing. **[6]**

b) Write a note of Mel scale and Bark scale. **[4]**

c) How MFCCs for speech are calculated. **[6]**

OR

Q6) a) What do we mean by short time spectral analysis of speech? **[5]**

b) What does constant-Q property of the WT means? **[2]**

c) List restrictions on Mother wavelets. **[3]**

d) Compare MFCC with PLP. **[6]**

SECTION - II

Q7) a) For derivation of normal equations, what are the assumptions made. **[3]**

b) Give the mathematical expression for prediction error. **[3]**

c) Derive the normal equations for auto-correlation method starting from prediction error. **[10]**

OR

Q8) a) Explain two stage lattice structures. Show how the filter coefficients (a_1, a_2) are related to the reflection coefficients (K_1, K_2). **[8]**

b) What should be the value of reflection coefficients for a filter to be stable. **[2]**

c) If the value of reflection coefficients are $K_1 = 5/7$ and $K_2 = 1/6$ then answer the following

i) What is the order of filter? **[2]**

ii) What are the values of filter coefficients? **[2]**

iii) Write the equation of filter. **[2]**

Q9) a) What is granular noise and slope overload distortion? In context with speech processing when they occur? **[4]**

b) Write short note on :

i) Forward Adaptive Quantizer **[4]**

ii) Backward Adaptive Quantizer **[4]**

c) State G.726 standard for ADPCM. **[6]**

OR

Q10) a) Explain A-law and μ-Iaw. **[6]**

b) Samples of a signal have values given by 0.2, 0.4, 0.55, 0.7, 0.75, 0.85, 0.9 and 1 V. If the data is to be four bit coded find: **[6]**

   i)   Step size   ii) Variance of signal

   iii) Quantization noise power iv) SNR in dB.

c) Let the high frequency sampled signal have values given as 1.1, 1.2, 1.27, 1.35, 1.3, 1.31, 1.25, 1.3 and 1.34 V. Find the LDM code for the signal. **[6]**

Q11) a) What is the need for speech enhancement? **[2]**

b) What are the major hurdles in designing or building ASR systems? **[3]**

c) Name modes of operation of ASR system. Explain in detail. **[8]**

d) List different features of speech which are considered for speaker recognition. **[3]**

<p style="text-align:center">OR</p>

Q12) a) List the salient features of HMM model. **[3]**

b) What is the condition on row of transition matrix of HMM? Why? **[2]**

c) Write down the transition matrix from the given state diagram for an HMM. **[8]**
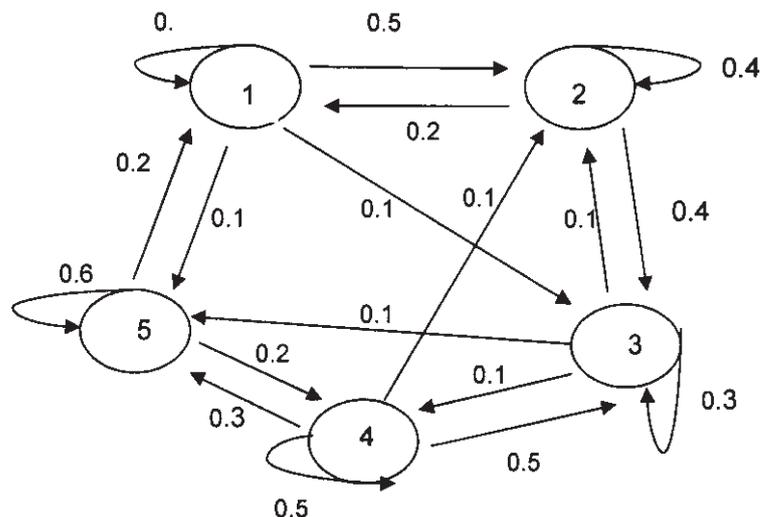
d) Distinguished clearly between speaker identification and speaker verification. **[3]**

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[4164] - 558

B.E. (E & TC)

TELEVISION & VIDEO ENGINEERING

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

  1)   *Answer any three questions from each section.*

  2)   *Answers to the two sections should be written in separate books.*

  3)   *Neat diagrams must be drawn wherever necessary.*

  4)   *Figures to the right indicate full marks.*

  5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define :   **[10]**

  i)   HUE   ii)   Saturation

  iii) Luminance   iv)   Kell factor

  v)   Aspect Ratio

  b) Why is the (G - Y) difference signal not chosen for transmission? How this signal is obtained at the Receiver?   **[8]**

OR

Q2) a) Sketch a well label diagram of composite video signal and Explain it in detail.   **[10]**

  b) Explain with neat sketch Colour T.V. Camera.   **[8]**

Q3) a) Compare PAL, NTSC and SECAM colour T.V. System.   **[8]**

  b) Draw the block diagram of Colour T.V. receiver, and explain its operation in brief.   **[8]**

OR

P.T.O

Q4) a) Explain with block schematic operation of NTSC colour Receiver. **[8]**

b) Explain the operation of wobbuloscope with suitable diagram. **[8]**

Q5) a) Draw block diagram of Digital T.V. receiver. Explain the functions of each block. **[8]**

b) Explain Advanced MAC signal transmission technique. **[8]**

OR

Q6) a) Write short notes on **[8]**

i) MPEG – 2

ii) MPEG – 4

b) i) Enlist video compression ITU standards (H).

ii) What are the advantages of Digital T.V. **[8]**

SECTION - II

Q7) a) What are the features of HDTV? Discuss compatibility problems in HDTV. Also state the standards. **[8]**

b) With suitable schematic explain CCTV. Also explain applications of CCTV. **[8]**

OR

Q8) a) Write short notes on: **[8]**

i) Video on demand.

ii) Conditional Access System (CAS)

b) Draw and explain Direct to Home T.V. System (DTH). Also enlist the advantages for the same. **[8]**

Q9) a) What is IPTV? Explain characteristics and advantages for IPTV. **[8]**

b) i) Compare the 2G and 3G Technology. **[4]**

ii) What is Mobile T.V.? **[4]**

OR

Q10) a) Explain WiFi system in detail.   **[8]**

   b) Explain Video Intercom System. Give the advantages.   **[8]**

Q11) Write short notes on   **[18]**

   a) Camcoder

   b) MP3 player

   c) Blue-ray Disc

<div align="center">OR</div>

Q12) a) Explain with neat diagram plasma Display. Give the advantages and disadvantages of it.   **[10]**

   b) Compare Camcoder, Handicam and Digicam.   **[8]**

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[4164] - 560

B.E. (Electronics & Telecommunication)

ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the various definitions of Artificial Intelligence (AI). List the applications of Artificial Intelligence. **[8]**

b) Compare the different uninformed searching strategies. **[5]**

c) Explain the significance of PEAS in AI. **[5]**

OR

Q2) a) Explain the architecture of a typical agent. What is a rational agent? **[8]**

b) List the different properties of task environment. Give the suitable example for each. **[6]**

c) Define the following terms: **[4]**

i) State

ii) Search Tree

iii) Successor function

iv) Branching factor

Q3) a) Explain the A * algorithm with its c pseudo code. **[8]**

b) Apply constraint satisfaction to solve following crypatarithmic problem to assign unique single digit number 0 to 9 each alphabet,

CROSS + ROADS = DANGER. **[8]**

OR

Q4) a) Explain the Minimax algorithm with suitable example. **[8]**

b) Define the term Heuristic function. Explain its significance in the informed search with suitable example. **[8]**

Q5) a) Explain following first order logic symbols with suitable example. **[8]**

$\forall, \exists, \Rightarrow, \wedge, \vee, \Leftrightarrow, \neg, =$

b) State the rules and steps for converting a given well predicate logic statements to clausal form. **[8]**

OR

Q6) a) Explain the Resolution in the predicate logic with suitable example. **[8]**

b) Explain the concept of forward chaining and backward chaining in the knowledge Representation. **[8]**

SECTION - II

Q7) a) Explain the decision tree algorithm with suitable example. **[8]**

b) What are the advantages of Artificial Neural Networks? With suitable example explain the applications of ANN. **[8]**

OR

Q8) a) Explain the current Best hypothesis search algorithm in learning with suitable example. **[8]**

b) Explain the different learning methods & give their merits and demerits. **[8]**

Q9) a) Give detailed architecture of Expert System and explain its components. **[10]**

b) Explain the Waltz's Algorithm in detail. **[8]**

OR

Q10) a) What is the perception? Give typical structure of it. **[8]**

b) Write a case study of expert system for "Medical diagnoses system". **[10]**

Q11) a) What are the issues involved in the natural language processing? Explain the steps involved in this process. **[8]**

b) Explain the concept of Semantic Analysis with suitable example. **[8]**

OR

Q12) a) Explain the significance of Morphological Analysis and Pragmatic analysis in the Natural language processing with suitable example. **[8]**

b) Explain the concept of Syntactic Analysis with suitable example. **[8]**

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[4164] - 561

B.E. (E & TC)

AUTOMOTIVE ELECTRONICS

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain with diagram, four stroke engine operation based upon following actions?   **[8]**

     i) Inlet   ii) Compression

     iii) Power   iv) Exhaust

     b) With the help of schematic diagram, explain battery charging and its application in automotive system.   **[8]**

OR

Q2) a) Compare manual and automotive transmission system.   **[4]**

     b) Explain working principle conventional starter motor.   **[8]**

     c) Write a short note on ignition system.   **[4]**

Q3) a) Draw and explain how vibration sensor(airbag) works.   **[8]**

     b) Explain operation of fuel injection system.   **[8]**

OR

Q4) a) Suggest suitable sensor for sensing coolant temperature ,Explain in brief. **[6]**

b) Explain in detail operation of position sensing using throttle plate. **[6]**

c) Explain in brief selection criterion for OPAMP in automotive applications. **[4]**

Q5) a) Explain the concept of antilock braking system **[8]**

b) Write a short note on **[10]**

    i) Adaptive cruise control system

    ii) Steering control system

<div align="center">OR</div>

Q6) a) Explain different strategies for engine management system and its implementation. **[10]**

b) Write a short note on **[8]**

    i) Air conditioning/heating   ii) Anti- theft system

<div align="center">

SECTION - II

</div>

Q7) a) An RPM sensor is connected to pin no 3 of port B and buzzer is connected to pin no 3 of port C of a 40 pin PIC microcontroller. Write an algorithm and C program to sound the buzzer if RPM goes above certain limit. **[8]**

b) State and explain use of interrupt and watch dog timers. **[8]**

<div align="center">OR</div>

Q8) a) Draw and explain architecture of 8 bit typical PIC microcontroller. **[8]**

b) Write an algorithm and C program to generate delay of 200 ms with reference to PIC microcontroller. **[4]**

c) Comment upon software testing and debugging. **[4]**

Q9) a) What is GPS and GPRS? How GPS and GPRS services are useful in automotive environment. **[8]**

b) Explain use of CAN and LIN buses. **[4]**

c) Compare ARM 9 and ARM 11. **[4]**

Q10) a) Comment on Bluetooth and IEEE 802.11 standards. **[8]**

b) Write a short note on: **[8]**

i) TCP/IP protocol.

ii) Recent trends in automotive buses.

Q11) a) Write sequential diagnostic procedure in automotive context. **[6]**

b) What are the preliminary checks in automotive system and what are the possible adjustments in it? **[6]**

c) Explain in detail passenger comfort and security system. **[6]**

OR

Q12) Write a short note on: **[18]**

a) Automotive EMC standards.

b) On board and off board diagnostic in automotive system

c) Basic & Multiplex wiring system in automobile.

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[4164] - 562

B.E. (E & TC)

NANOTECHNOLOGY

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   *Answer any three questions from each section.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a) What is Nano? Explain the concept in detail. **[6]**

    b) What are tools for measuring Nano-structure? Explain. **[6]**

    c) List out the limitations of semi-conductor materials. **[6]**

OR

Q2) a) What are the challenges in Nano-Technology? Explain. **[6]**

    b) Explain the founding speech of Nanotechnology written at Nano-scale. **[6]**

    c) Write short notes on (Any Two) **[6]**

       i)   Scanning Probe Instrument.

       ii) Dip Pen Nano - lithography.

       iii) Nano crystal Growth.

       iv) Nano sphere lift of lithography.

Q3) a) Draw & Explain the process flow for integrating a Nano Crystal memory with standard CMOS technology. **[8]**

    b) Explain the principle of single electron transistor device. **[8]**

Q4) a) Explain Silicon Nano Crystal Non-volatile memory bit cell. **[8]**

b) Explain scanning probe micro-scopy. **[8]**

Q5) a) Explain the properties of semi-conductor and metal Nano-particle. **[8]**

b) Write short notes on: **[8]**

     i) Carbon Molecule

     ii) Cluster.

<div align="center">OR</div>

Q6) a) Explain the properties of carbon Nanotubes & it's applications. **[8]**

b) What are types of carbon Nanotubes? Explain in detail. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain the fabrication Technique used for MEMS / NEMS. **[6]**

b) Explain MEMS device used in automobile. **[6]**

c) Write short notes on **[6]**

     i) Nano imprint lithography.

     ii) Electron-beam lithography.

<div align="center">OR</div>

Q8) a) Explain Nano Electromechanical system with example. **[6]**

b) With the help of schematic representation explain the process of molecular switch and switching of Azobenzine molecule. **[6]**

c) Explain switching process of circularly polarized light. **[6]**

Q9) a) Write short notes on (any two): **[8]**

     i) Fuzzy system.

     ii) Evolutionary Algorithm

     iii) Distributed and fault tolerance system.

     iv) Local processing.

b) What are the different tools for fabrication of Micro and Nano structure. **[8]**

Q10) a) Explain the physical fundamental of Nanoelectronics   **[8]**

   b) Explain characteristics of Neural Network in Nanoelectronics.   **[8]**

Q11) a) Explain any three applications of Nanoelectronics in Bio-medical.   **[8]**

   b) List out application of Nano-Technology in optics & explain it.   **[8]**

OR

Q12) a) Explain application of sensors.   **[8]**

   b) Explain application of Nano-electronics as a smart material with suitable example.   **[8]**

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[4164] - 563

B.E. (E & TC)

PLC & INDUSTRIAL PROCESS AUTOMATION

(2008 Pattern) (Sem. - II) (Elective - IV)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answer any three questions from each section.

2) Answer three questions from section I and three questions from section II.

3) Answers to the two sections should be written in separate books.

4) Neat diagrams must be drawn wherever necessary.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain with example followings types of control systems?   **[8]**

     i) Regulatory control   ii) Servo mechanisms

   b) Draw and Explain the block diagram of process control & following terms with example,   **[8]**

     i) Process variable   ii) Set point

     iii) Measured variable   iv) Manipulated variable

<div align="center">OR</div>

Q2) a) Explain various signal standards used in process industries with their advantages and limitations? What is P&I diagrams? Explain what information it contains & its use for system engineer?   **[8]**

   b) List various types of control systems? Explain DDC & DCS? Draw block diagram of typical SCADA systems & list components used in SCADA?   **[8]**

Q3) a) What is process transmitter explain with block diagrams? List commonly used transmitters used in process industries? What are intelligent transmitter and their features?   **[8]**

   b) What are the various types of pressure transmitters? Explain the DPT with block diagram? List various sensing cells used and explain capacitive cell? Explain how DPT can be used for process tank level measurement?   **[8]**

<div align="center">OR</div>

Q4) a) In a digitally conditioned temperature measurement system, a temperature between $100°C$ to $300°C$ is converted in to 0 to 5 V signal with 8 bit ADC with 5V reference. What is the actual measurement range of the system? **[8]**

   i) What is the resolution?

   ii) What is the output result from $160°C$?

   iii) What is the temperature does the hex value C2 represent?

b) Explain the following terms concern to process measurement: (any three) **[8]**

   i) Accuracy and ways to express it

   ii) Span and range

   iii) Linearity and linearization

   iv) repeatability

Q5) a) Following figure -1 shows manufacturing process diagram. In this process, the following independent control requirement must be satisfied? **[6]**

   i) Control the level at L_{sp}

   ii) Control temperature at T_{sp}

   iii) Control the flow rate at Q_{sp}

   Draw the complete diagram showing control loops using block diagram with necessary signal converters.
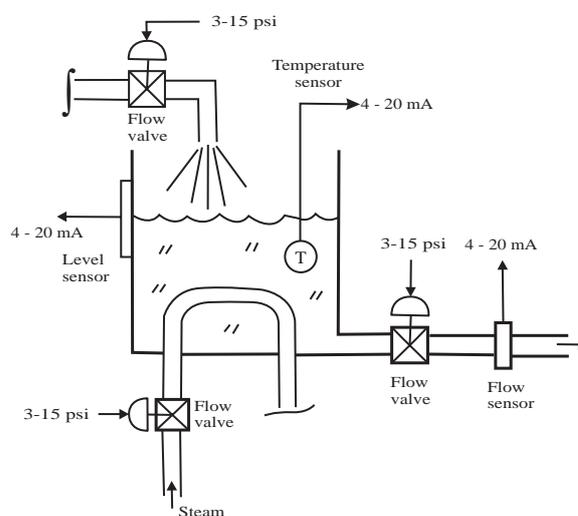
Figure - 1

b) List various temperature sensors used in process automation? Draw and explain the temperature measurement using RTD with appropriate signal conditioning system? Explain various RTD connection configurations used in temperature measurement? Explain lead compensation in relation to RTD ? **[8]**

c) Explain field bus concept with advantages and limitations and explore Foundation field bus? **[4]**

Q6) a) What is linearization of the sensor? What are the various methods used for linearization? **[6]**

b) The sensor output range of 2 mV to 20m V as the variable varies over the range. Develop the signal conditioning so that this becomes 0 –5V. The circuit must have very high input impedance? **[6]**

c) RTD has, α_0 = 0.005/°C, R = 500Ω and Dissipation Constant P_D = 30mW/°C at 20°C. The RTD is connected in Bridge, with R_1 = R_2 = 500Ω and R_3 is a Variable resistance used to balacne bridge If the supply V_s = 10 V and RTD is in a bath placed at 0 °C, Find Value of R_3 to null the bridge. **[6]**
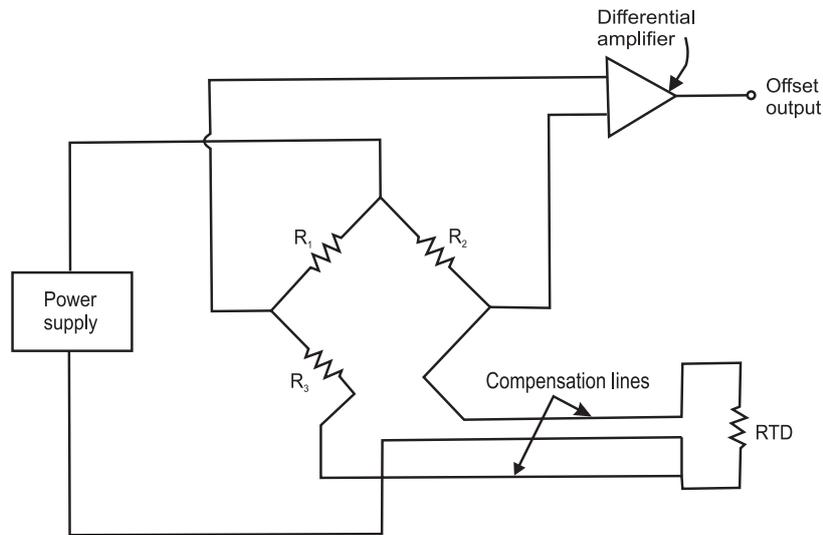
Figure - 2

SECTION - II

Q7) a) List various principles used for flow measurement? How DP flow measurement works? Explain control loop diagram for fluid flow control? **[8]**

b) Pressure (p) from 50 to 400 psi is converted to voltage by relation
$$V = 0.385 \, [p]^{1/2} - 2.722$$
It is converted by 8 bit ADC to digital value DVwith 5V reference to (0-255 range), Develop the linearization equation to give quantity p in terms of D V. **[8]**

OR

Q8) a) List the various types of converters used in process control loop? Explain I to P Converters? **[8]**

b) Explain the principle and the various flow control characteristics available for flow control valves? Draw & explain working of flow control valve with forward and reverse action of pneumatic actuator? What is failsafe? **[8]**

Q9) a) Explain what is PLCs in following regards **[8]**

    i)   Elements Of PLCs

    ii)   Operation of PLC

    iii) Scan Cycle and Scan time

    iv) PLC Programming

   b) Draw diagram with appropriate sensing elements for Level control process automation for pumping the water from Ground tank T1 to overhead tank T2, The following operation is required. **[8]**

    i)   Pump the water in T2 only when there is low level in T2 and no low level in T1

    ii)   Pumping should stop on High level of T2

    iii) T1 inlet valve should close automatically on High level of T1

    Write appropriate Programming rungs?

<div align="center">OR</div>

Q10) a) Explain various parts of PLC? Draw the block diagram of I/O Cards of PLC? Explain various network topologies used for networking of PLCs?**[8]**

   b) Explain how PLC can be used to for automation of lifts used in at least 4 storey building? Lists various sensors and I/Os needed? Write PLC Ladder for basic functionality? **[8]**

Q11) a) An equal percentage valve has maximum flow of 60 cm³/sec and minimum flow of 5 cm³/ sec. If the full travel is of 3 cm, find the flow at 1.5 cm opening? Suppose 400 N must be applied to open the valve find the minimum actuator diaphragm area if the control gauge pressure is 70kPa (~ 10 psi) is used as pneumatic air supply to it? **[8]**

   b) Explain types of discrete controllers? Explain the various PID Implementations with diagram? Discuss the effect of the P, I & D action on system response? **[10]**

<div align="center">OR</div>

Q12) a) What is integral windup? Explain various method of controller tuning?**[8]**

   b) Write short notes on (any two) **[10]**

    i)   Fuzzy logic systems and controllers

    ii)   ANN based controllers

    iii) PID algorithm for Digital implementation.

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[4164] - 565

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   *Answer three questions from section I and three questions from section II.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of electronic pocket calculator is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Clarify the following terms: **[8]**

      i)   Linear & Non linear processes

      ii)   Self regulating processes

  b) With the help of suitable examples explain why Dead Time processes are difficult to control?   **[8]**

OR

Q2) a) Explain in brief effects of resistance and capacitance with suitable example. **[8]**

  b) Clarify the following terms: **[8]**

      i)   Process variables

      ii)   Quarter Amplitude Damping

Q3) a) Elaborate analysis of Pressure control system.   **[10]**

  b) Compare SLPC and MLPC.   **[8]**

OR

Q4) a) What is the role of Scaling in process control? Explain the various steps involved for scaling in a Flow Ratio Control application.   **[10]**

  b) Explain in brief necessity to linearize the equal percentage valve.   **[8]**

Q5) Explain the following terms: **[16]**
- a) Valve Gain(Kv) b) Process Gain(Kp)
- c) Transmitter Gain(Kt) d) Controller Gain(Kc)

  Also, discuss relationship between Kp, Kv and Kc.

<div align="center">OR</div>

Q6) a) Explain in brief procedure to determine Good Tuning Constants that satisfy the control performance goals. **[8]**

b) Discuss the desired features of a feedback control algorithm. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) List various non-linear elements in a control loop and explain any two in detail. **[8]**

b) Explain the use of Ratio Control with suitable example. **[8]**

<div align="center">OR</div>

Q8) a) Explain the working of a Feedforward control with suitable application. State its limitations. **[8]**

b) Explain in detail tuning of cascade control. **[8]**

Q9) a) What is the need of Relative Gain Analysis? Elaborate the techniques used for reducing interaction. **[10]**

b) Comment on 'Effect of interaction on stability'. **[8]**

<div align="center">OR</div>

Q10) Write notes on: **[18]**
- a) Characteristics of Multivariable processes.
- b) Decouplers.

Q11) a) What is DMC? Explain its importance in process control. **[8]**

b) Explain the terms 'Fuzzifier' and 'Defuzzifier' w.r.t to Fuzzy controller. **[8]**

<div align="center">OR</div>

Q12) a) With the help of a neat block diagram, explain the working of a Model Reference Adaptive Controller. **[8]**

b) Explain with suitable block schematic smith predictor. **[8]**

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[4164] - 566

B.E. (Instrumentation & Control)
DIGITAL CONTROL
(2008 Pattern) (Sem. - I)

Time :3 Hours]
[Max. Marks :100

Instructions to the candidates:-

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*
5) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Derive the mathematical model for the sampled data Control system. **[8]**

b) Consider the discrete time system, **[8]**

$$y(k+2) + \frac{1}{4}y(k+1) - \frac{1}{8}y(k) = 3r(k+1) - r(k),\text{ with the input}$$

$r(k) = (-1)^k \mu(k)$ and the initial conditions,
$y(-1) = 5, y(-2) = -6.$ Find the output $y(k)$

OR

Q2) a) Explain in detail the building blocks of discrete time control system. **[8]**

b) Determine the initial and final values of the following, **[8]**

$$X(z) = \frac{z^{-1}}{(1 - z^{-1})(1 + 1.3z^{-1} + 0.4z^{-2})}$$

Q3) a) Define Pulse Transfer Function. Derive the transfer function for digital PID controller. **[10]**

b) What are the advantages of velocity form over positional form? **[6]**

OR

Q4) a) Explain the concept of ringing of Poles? How it can be eliminated? Explain the concept by using one example. **[8]**

b) Obtain the closed loop transfer function for the system shown in the figure. **[8]**
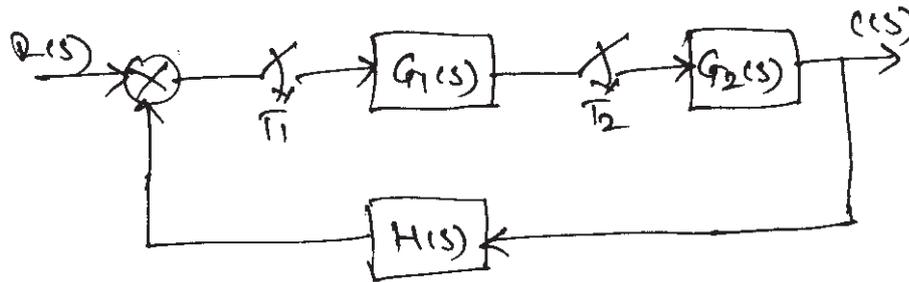
Q5) a) Write short note on bilinear transformation. **[9]**

b) Using Jury's stability test find the limits of k such that the system will be stable. It has a unity feedback with the sampling period T = 1 sec and has the open loop transfer function. **[9]**

$$G(z) = \frac{k(0.3679z + 0.2642)}{(z - 0.3679)(z - 1)}$$

OR

Q6) Determine the range of k for the system shown in the figure to be stable. Also determine the range of k if the sampler and zero order hold is removed. **[18]**
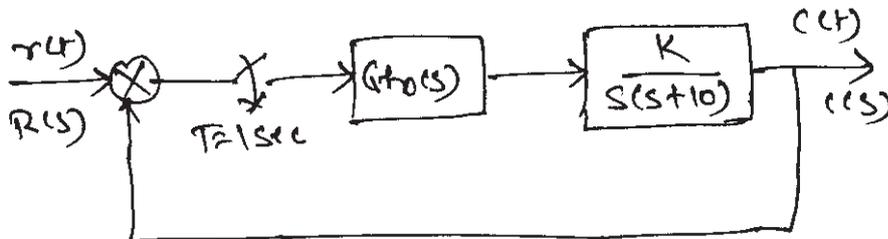
SECTION - II

Q7) a) Derive the expression for the Pulse Transfer Matrix. **[8]**

b) Find the state transition matrix for the system with the state equation as, **[8]**

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -0.32 & -1.2 \end{bmatrix} x(k)$$

OR

Q8) a) Transform the following state model into controllable canonical form, **[12]**

$$x(k+1) = \begin{bmatrix} 0 & 0 & -0.25 \\ 1 & 0 & 0 \\ 0 & 1 & 0.5 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u(k)$$

$$y(k) = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} x(k)$$

b) Define the following terms: **[4]**

i) State.

ii) State Variable.

iii) State Space.

iv) State Vector.

Q9) A linear continuous system has the following state model, **[16]**

$$x(t) = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

$$y(t) = \begin{bmatrix} 1 & 0 \end{bmatrix} x(t)$$

Discretise this system and obtain the state feedback gain matrix such that the response to an arbitrary initial condition is deadbeat.

OR

Q10) a) Investigate for complete state controllability and complete state observability of the system, **[12]**

$$x(k+1) = \begin{bmatrix} 1 & -2 \\ 1 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} u(k)$$

$$y(k) = \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix} x(k)$$

b) Define the following: **[4]**

i) State Controllability.

ii) State Observability.

iii) Output Controllability.

Q11) For a linear discrete time system having the state equation as, **[18]**

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k)$$

$$x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

Find the optimal control sequence such that the following performance index minimized.

$$J = \frac{1}{2} x_1^2(3) + \frac{1}{2} \sum_{k=0}^{2} [x_1^2(k) + u^2(k)]$$

Find the minimum performance index also.

OR

Q12) What is performance index? Obtain the Riccati equations for the Optimal State Regulator. **[18]**

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[4164] - 567

B.E. (Instrumentation & Control)

PROJECT ENGINEERING AND MANAGEMENT

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any three questions from each section.*

2) *Figures to the right indicate full marks.*

3) *Assume suitable data, if necessary.*

SECTION - I

Q1) Attempt following

a) With neat sketch of tree diagram explain organizational structure. **[8]**

b) Describe interorganisational and multi agency interaction involved in Project in detail. **[8]**

OR

Q2) Attempt following

a) Explain different types of Project. **[8]**

b) What is degree of Automation? Explain interdepartmental interaction involved in Project. **[8]**

Q3) Attempt following

a) Explain life cycle phases of the project in details. **[8]**

b) Define Project and explain its scope in detail. **[8]**

OR

Q4) Attempt following

   a) Explain terms Planning and Scheduling related to project management.

                                                  [8]

   b) Discuss PERT and CPM. Also write a comparison between these. **[8]**

Q5) Attempt following

   a) Explain P & I diagram with a suitable example and summaries the information getting from the same. **[10]**

   b) Explain instrumentation index sheet with any suitable example. **[8]**

<div align="center">OR</div>

Q6) Attempt following

   a) Draw simple P & I diagram for feedback flow loop control system. Also prepare a loop wiring diagram for the same. **[10]**

   b) Explain method of tagging and nomenclature scheme based on ISA standard with suitable examples and symbols. **[8]**

<div align="center">

SECTION - II

</div>

Q7) Attempt following

   a) What are the steps involved in installing a cable? Explain in brief. **[8]**

   b) Draw the installation sketch for DP transmitter used for liquid flow application. **[8]**

<div align="center">OR</div>

Q8) Attempt following

   a) Relate hazardous area with cable engineering. **[8]**

   b) List different types of cables and give their specifications. **[8]**

Q9) Attempt following

   a) Discuss Bid evaluation process. **[8]**

   b) Write short notes on **[8]**

      i) Tender

      ii) Purchase order

<div align="center">OR</div>

Q10) Attempt following

    a) Explain commissioning? List the documents required for commissioning.
       [8]

    b) Explain the role of Procurement department in project design. **[8]**

Q11) Attempt following

    a) List different types of control panels. Explain anyone type in detail. **[8]**

    b) What is SAT and FAT? Explain in detail. **[10]**

<div align="center">OR</div>

Q12) Attempt following

    a) Give panel testing procedure **[8]**

    b) Explain cold commissioning and hot commissioning. **[10]**

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B.E. (Instrumentation & Control)
BUILDING AUTOMATION-I
(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

    1)   *Answer three questions from section I and three questions from section II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of electronic calculator is allowed.*

SECTION - I

Q1) a) How fire detection systems are classified. Explain fire suppression systems. **[10]**

      b) Explain different Fire Stages and Detector used for each stage in detail. **[8]**

OR

Q2) a) What is difference between Automatic FAS and Conventional FAS? Explain with suitable example? **[10]**

      b) What do you mean SLC devices, Explain their addressing methods. **[8]**

Q3) a) Explain SLC interface card, Class A IDC and Class B IDC. **[12]**

      b) What do you mean NAC and IDC? Give two Example of each. **[4]**

OR

Q4) a) Explain any three types of Automatic fire detector with Principle of operation, Construction and Applications. **[12]**

      b) Explain automatic and manual pull station. **[4]**

Q5) a) Explain Intelligent system with networks and different devices involved in it. What are benefits of Intelligent system? **[10]**

      b) Explain audible and visual devices with specifications and applications. **[6]**

OR

Q6) a) What are Fire standards? How NFPA standards helps you for selection and installation of initiating and notification devices, justify with examples. **[12]**

b) Explain Cause Effect Matrix. **[4]**

SECTION - II

Q7) a) What is Authentication? How Authentication is done in Access Control Systems? **[8]**

b) Explain Access Control Model and Access Matrix in detail. **[8]**

OR

Q8) a) Explain biometrics used in Access Control Systems. Explain types of Biometrics. **[8]**

b) Suggest the suitable Access Control System for business Application.**[8]**

Q9) a) Suggest Types of camera, Lens, video process, monitor and recorder with specification for following buildings applications, Hotels, Departmental Stores, Jewellery shop, Banks, Hospitals, Manufacturing units, Government buildings and offices. **[12]**

b) Explain Automatic sequential switching devices with applications. **[6]**

OR

Q10) a) Explain different video broadcast standards. Explain MPEG-4 type data compression. **[12]**

b) Write short note on IP and PTZ dome camera. **[6]**

Q11) a) What is Intrusion Detection system? Explain its importance with Types. **[8]**

b) Explain video streamers in detail. **[8]**

OR

Q12) a) Why CCTV control room is called as Hub of CCTV surveillance system explains with control room activities. **[8]**

b) Explain one Application of perimeter security in details with devices and their use in system. **[8]**

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[4164] - 572

B.E. (Instrumentation & Control)

ENVIRONMENTAL INSTRUMENTATION

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Neat diagrams must be drawn wherever necessary.*

2) *Figures to the right indicate full marks.*

3) *Your answers will be valued as a whole.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain, how sensors are used in Environment Analysis and monitoring purpose. **[8]**

b) Explain Ultraviolet analyzer used for environmental analysis. **[10]**

OR

Q2) a) Elaborate role of Instrumentation Engineer in Environmental analysis with example. **[8]**

b) Explain working of total hydrocarbon analyzer using flame ionization detector. **[10]**

Q3) a) Which are various sources of water? Enlist & discuss in brief about water quality parameters. **[8]**

b) Discuss about the water quality standards for raw & treated water. **[8]**

OR

Q4) a) Explain thermal conductivity detectors and their role in environmental analysis. **[8]**

b) Explain about requirements of water treatment facilities. **[8]**

Q5) a) What are necessities of sedimentation in waste water treatment, Explain the effect of temperature & viscosity on settling velocities of particles. **[8]**

b) Explain about instrumentation involved on ground water monitoring. **[8]**

OR

Q6) a) What is difference between coagulation and sedimentation? Briefly discuss about design criteria of settling tank . **[8]**

b) Write a note on Level measurement in Ground water monitoring wells. **[8]**

SECTION - II

Q7) a) What is the concept of waste water monitoring? Discuss in brief about automatic waste water sampling. **[8]**

b) Give types of waste water treatment plants. Explain necessary Instrumentation setup & working of any one. **[10]**

OR

Q8) a) Write a note on selection criteria for waste water sampling location. **[8]**

b) Enlist parameters to be monitored in waste water monitoring. Explain any one level measurement technique used in waste water monitoring in detail. **[10]**

Q9) a) Enlist various analytical methods used in air pollution studies. Explain any one in detail. **[8]**

b) Write a note on air pollution from Thermal Power Plant in detail. **[8]**

OR

Q10) a) Explain the working of opacity monitor in detail, also give its applications. **[8]**

b) What is air pollution? Explain importance of air pollution control. **[8]**

Q11) a) Compare between Open channel & Non open channel flow measurement. **[8]**

b) Discuss about various devices used in air flow monitoring. **[8]**

OR

Q12) a) Write a note on rain water harvesting. State & explain its various methods. **[8]**

b) Explain in detail about measurement of ambient air quality. **[8]**

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[4164] - 573

B.E. (Instrumentation & Control)
NANO INSTRUMENTATION
(2008 Pattern) (Elective - II) (Sem. - I)

*Time :3 Hours]*   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Write short notes on the following:

a) Influence of quantum effects on physical properties of nanoscale structures.   **[6]**

b) Energy subband structure of a quantum well.   **[6]**

c) Nanolithography.   **[6]**

OR

Q2) Write short notes on the following:

a) Electronic structure of metal nanoparticles.   **[6]**

b) The scope of nanotechnology.   **[6]**

c) Electrostatic self assembly.   **[6]**

Q3) a) With the help of a diagram explain briefly the working of an Atomic Force Microscope.   **[8]**

b) Discuss various modes of operation of a Scanning Tunneling Microscope.
                                                                          [8]

OR

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Q4) a) Describe working of a Scanning Near-field Optical Microscope. **[8]**

b) State and explain the main types of interatomic forces involved in the tip-sample interaction of an atomic force microscope. **[8]**

Q5) a) Examine the physical properties of carbon nanotubes. **[8]**

b) Explain the working of a CNT transistor. **[8]**

<div align="center">OR</div>

Q6) a) How can we tailor the material properties of carbon nanotubes? Explain how is it related to the chirality and the chiral angle θ and subsequently to the CNT diameter? **[8]**

b) Enlist the unique characteristics of carbon nanotubes that make them ideal candidates for electronic device applications. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) What are the classes of spintronic devices and what is the difference between them? **[8]**

b) What is a 'Spin Transistor'? Describe its advantages over regular transistor. **[8]**

<div align="center">OR</div>

Q8) a) By using the Bloch sphere representation of quantum states of a spin ½ particle, explain how spin-based computers are different from computers based on regular transistors. **[8]**

b) Explain the physical principles of spintronic devices. **[8]**

Q9) a) Describe qualitatively the working of an FET as a genuine switch. How does the downscaling of MOSFETs affect their functioning? **[8]**

b) What are mesoscopic devices? Explain the working of a ballistic rectifier. **[8]**

<div align="center">OR</div>

Q10) a) Describe single electron resonant tunneling by using a circuit involving a quantum dot coupled to source and drain leads. **[8]**

b) Draw a schematic diagram of a single electron transistor and explain its basic structure. **[8]**

Q11) Write short notes on the following:

    a)   Single photon source based on a quantum dot.   **[6]**

    b)   Semiconducting nano-wires in LEDs and nano-lasers.   **[6]**

    c)   Nanotransducers with examples.   **[6]**

<div align="center">OR</div>

Q12) Write short notes on the following:

    a)   Molecular switches.   **[6]**

    b)   Chemical sensors.   **[6]**

    c)   Multi-walled carbon nano-tube film as an optical antenna.   **[6]**

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[4164] - 574

B.E. (Instrumentation & Control)
ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) The interconnection of expander with LTI system is generally as shown in following figure.

$x(n)$ → $G(z)$ → $\uparrow L$ → $y_1(n)$
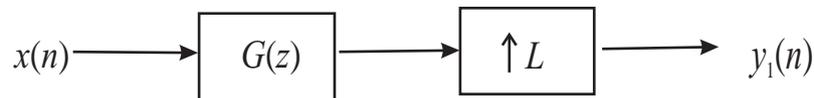
Now if we interchange the blocks as follows

$x(n)$ → $\uparrow L$ → $H(z)$ → $y_2(n)$
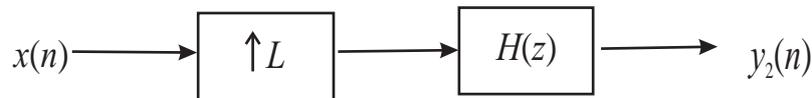
Derive the relationship between H(z) and G(z) to get $y_1(n) = y_2(n)$.   **[8]**

b) Show that the decimators and expander is a linear and time varying system. **[8]**

OR

Q2) a) Explain the different steps in sampling rate conversion by a rational factor I/D.   **[8]**

b) For M-fold Decimator, show that

$$Y(z) = \frac{1}{M} \sum_{k=0}^{M-1} X(z^{\frac{1}{M}} W_M^k)$$

Where, $W_M = e^{-j\frac{2\pi}{M}}$, $y(n)$ – is output and $x(n)$ – is input to the Decimator.

[8]

Q3) a) Use the Levinson-Durbin algorithm to solve the autocorrelation normal equations and find a third order all-pole model for a signal having autocorrelation values. [9]

$$r_x(0) = 1, r_x(1) = 0.5, r_x(2) = 0.5, r_x(3) = 0.25,$$

b) Write a short note on 'Levinson-Durbin algorithm'. [9]

OR

Q4) a) Determine the lattice coefficients corresponding to the FIR filter with system function. [9]

$$H(z) = A_3(z) = 1 + \frac{13}{24} z^{-1} + \frac{5}{8} z^{-2} + \frac{1}{3} z^{-3}$$

b) Derive the relation of autocorrelation sequence and filter coefficients for AR process i.e. Yule Walker equations or normal equations. [9]

Q5) a) What are the non-parametric methods in power spectrum estimation? Explain any one in detail. [8]

b) Define periodogram. Explain the estimation of power density spectrum of random signals. [8]

OR

Q6) a) What are the parametric methods in power spectrum estimation? Explain any one in detail. [8]

b) Explain how the averaging of periodogram is used in Bartlet method. [8]

SECTION - II

Q7) a) What is adaptive filtering? Explain anyone application of adaptive filtering.
[8]

b) Describe the LMS algorithm for adaptive filtering. **[8]**

OR

Q8) a) What are the main advantages of adaptive filters over fixed filters? **[8]**

b) Explain in brief any three medical applications of adaptive filtering. **[8]**

Q9) a) What are the different DSP processors available in the market? List out the important features of the DSP. **[9]**

b) Draw and explain in detail the architecture of DSP processor. **[9]**

OR

Q10) a) Compare fixed point & floating point data format in DSP processor. **[9]**

b) Write the assembly language program for implementation of sum of product. **[9]**

Q11) a) What is the necessity of time-frequency analysis? State the advantages of STFT over FT. **[8]**

b) State the definition of CWT and its properties. **[8]**

OR

Q12) a) Compare FT, STFT and CWT. **[8]**

b) Describe the steps in computation of CWT. **[8]**

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[4164] - 576

B.E. (Instrumentation & Control)

PROCESS DYNAMICS & CONTROL

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section I and three questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Your answer will be valued as a whole.*

SECTION - I

Q1) a) Explain typical steps of formulation of Dynamic Model of processes based on fundamental balances.   **[10]**

b) Derive mathematical model of interacting Multi-capacity process as Second order system.   **[6]**

OR

Q2) a) Consider a Tank-Heater as shown in fig. 1. Assume that flowrate and Temperature of inlet stream can vary. Fi, F are inlet and outlet flowrates respectively. Ti, T are inlet and outlet temperatures, V is volumetric holdup and Q is rate of heat addition.   **[12]**

Develop a Model to find out tank temperature. State your assumptions.
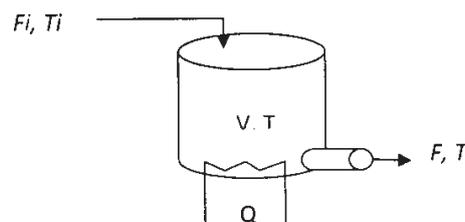
Fig. 1

b) Discuss on first-order-with-time-delay model approximations of Higher order processes. **[4]**

Q3) a) Explain typical cascade control scheme for Heat Exchangers. **[8]**

b) Explain Feed-Forward control of Heat Exchangers with Dynamic Compensation. **[8]**

OR

Q4) a) What is the effect of Measurement lag in Heat Exchangers? How to compensate it using Control scheme. **[8]**

b) What is decoupling control? Explain Multivariable control scheme used in Heat Exchangers. **[8]**

Q5) a) What is an Interlock? Explain typical safety interlocks used in Boilers. **[10]**

b) Explain the methods of steam temperature control in Boilers. **[8]**

OR

Q6) a) Explain Three Element Drum level control. **[8]**

b) Enlist goals of Boiler Optimization. Explain any one method in detail. **[10]**

SECTION - II

Q7) a) Differentiate between controls of Batch and Continuous Reactors. **[8]**

b) Explain Batch Production Management. **[8]**

OR

Q8) a) Explain pressure compensated temperature control scheme for a chemical reactors. **[8]**

b) Explain End point control method in Batch Reactors. Enlist parameters used for indication of end of reaction. **[8]**

Q9) Draw a typical decentralized control scheme for Distillation column for top and bottom compositions and explain. **[16]**

a) Interaction and Decoupling

b) Relative Gain Array

c) Static Decouplers

Q10) a) Explain Back-Propagation Neural Network algorithm used in Continuous fractionating column. **[8]**

b) What are the goals of distillation column controls? Enlist dynamic difficulties in column controls. **[8]**

Q11) a) Enlist different types of Compressors and their controls. Explain any one control method in detail. **[10]**

b) Explain flow control scheme in centrifugal pump. **[8]**

<p style="text-align:center">OR</p>

Q12) a) Explain anti-Surge Control scheme for compressors. **[6]**

b) Enlist types of control systems used in waste water treatment plant. Explain any one in detail. **[12]**

<p style="text-align:center">❄ ❄ ❄</p>

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B.E. (Instrumentation & Control)
MICRO ELECTRO MECHANICAL SYSTEMS
(2008 Pattern) (Sem. - II) (Elective - IV)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and   steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is MEMS? Give advantages of MEMS Technology.   **[8]**

b) Draw general block diagram of SMART system and explain each element in detail.   **[8]**

OR

Q2) a) What are different applications of smart system in various areas?   **[8]**

b) Explain working of any one Micro actuator with neat diagram.   **[8]**

Q3) a) What are the applications of portable blood analyzer? Give its advantages.   **[8]**

b) Explain working of magnetic micro relay with diagram. What are applications of micro relay?   **[8]**

OR

Q4) a) Explain working of Piezoresistive pressure sensor with neat diagram.**[8]**

b) Explain working principle of Piezoelectric Inkjet actuator with neat diagram.   **[8]**

Q5) Explain following micromachining techniques with neat diagram.   **[18]**

a) Thermal Evaporation.

b) Sputtering.

P.T.O.

Q6) a) Write short note on photolithography. **[9]**

b) What are the process-steps used in the fabrication of micro system?**[9]**

SECTION - II

Q7) a) What is stress & strain. Derive formula for young's modulus. **[8]**

b) For a cantilever beam loaded at two locations as shown in fig. 7.b, Draw shear force and bending moment diagrams. **[8]**
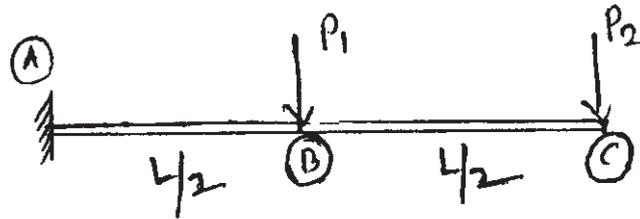
fig. 7.b

OR

Q8) a) Derive the equation. $\dfrac{\sigma_b}{y} = \dfrac{E}{R}$ For a beam in pure bending. **[8]**

b) List the assumption in the theory of torsion. **[8]**

Q9) a) List advantages of Finite element Method over analytical method. **[8]**

b) Describe in detail the steps involved in solving structural problem using Finite Element Method. **[8]**

OR

*Q10)*a) Enlist various fields of engineering, where finite element method can be implemented. **[6]**

b) For the bar, shown in figure 10.b, with length L = 1m, modulus of elasticity E = 210 GPa, mass density $\rho = 7860 \, Kg/m^3$, and cross sectional area A = 10cm², Determine the first two natural frequencies. Use two elements each of length L.

Use lumped Mass matrix approach. **[10]**

Fig. 10.b

*Q11)*a) Explain working of PN junction diode with diagram. **[9]**

b) What are different types of rectifier. Draw and explain any one of them.

[9]

OR

*Q12)*a) Draw and explain Instrumentation amplifier as a differential voltage amplifier. **[9]**

b) Draw and explain Wheatstone Bridge for measurement of change in Resistance. **[9]**

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[4164] - 584

B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING
(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answers to the two sections should be written in separate books.*

2)   *Neat diagrams must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What are the fundamental steps involved in image processing.   **[8]**

     b)   List out the characteristics of Image digitizer and explain any one in detail.   **[8]**

OR

Q2) Write a short note on :   **[16]**

     a)   Solid state cameras.

     b)   Electronic image tube cameras.

Q3) a)   Explain the concept of sampling and quantization.   **[8]**

     b)   What is image sensing and acquisition? Explain different methods for image acquisition.   **[8]**

OR

P.T.O.

Q4) a) Define luminance, brightness, intensity, and contrast. **[8]**

b) Explain the image formation model. **[8]**

Q5) a) Explain with reference to the 2-D transform : **[8]**

i) Basis image ii) Separability

iii) Symmetry iv) Energy compaction

b) Explain what do you mean by DFT and DCT. Explain how DCT used in digital image processing. **[10]**

OR

Q6) Write a short note on : **[18]**

a) Radon transform.

b) Short time Fourier transform.

SECTION - II

Q7) a) Explain in detail homographic filtering. **[8]**

b) Discuss image enhancement in frequency domain. **[8]**

OR

Q8) a) What is histogram equalization and explain it with the help of example.
[8]

b) Explain in detail image sharpening filters. **[8]**

Q9) a) What do you mean by image restoration? Explain the necessity of image restoration. **[8]**

b) Explain how Weiner filter used for image restoration. **[8]**

OR

*Q10)*a) Explain the concept of inverse filtering in image restoration. **[8]**

b) Write a short note on degradation model. **[8]**

*Q11)*Write a short notes on : **[18]**

    a)   Sobel operator.

    b)   Prewitt operator.

<div align="center">OR</div>

*Q12)*a)   Which are the different methods used for segmentation. Explain any one in detail. **[10]**

    b)   Which are the different problems associated with edge detection? How they can be overcome? **[8]**

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[4164] - 604
B.E. (Chemical Engineering)
CHEMICAL REACTION ENGINEERING - II
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss in detail with help of figure, steps occurring in succession during reaction for unreacted core model for sperical particles of unchanging size. **[8]**

b) What are the various factors responsible for determination of the rate controlling step in fluid-particle reaction? Explain each factor in detail.

[10]

OR

Q2) a) A feed consisting of 30% of 50-μ-radius particles, 40% of 100-μ-radius particles and 30% of 200-μ-radius particles is to be fed continuously in a thin layer onto a moving grate crosscurrent to a flow of reactant gas. For the planned operating conditions the time required for complete conversion is 5, 10 and 20 min for the three sizes of particles. Find the conversion of solids for a residence time of 8 min in the reactor. **[8]**

P.T.O.

b) Derive an controlling equations for all resistances of mixed flow of particles of a single unchanging size and uniform gas composition.**[10]**

Q3) a) Discuss in detail kinetics regimes of mass transfer and reaction with interface behaviour. **[8]**

b) Derive an equation for calculation of tower height for fast reaction when straight mass transfer without reaction takes place. **[8]**

OR

Q4) Benzene is to be chlorinated in a tower by countercurrent contacting with a stream of pure gaseous chlorine. The reaction is slow, elementary, and irreversible.

C_6H_6 (liquid) + Cl_2(gas) $\rightarrow$ C_6H_5Cl (liquid) + HCl (gas)
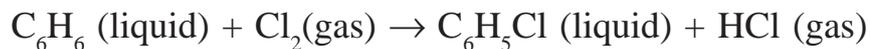
The reaction occurs in the liquid between dissolved chlorine and benzene. The required assumptions are :

Constant molar density of liquid, C_T = constant; Constant pressure in gas phase, π = constant; Plug flow of both streams; Small amount of dissolved and unreacted chlorine in liquid; Low solubility of HCl in liquid; The reaction of Cl_2 with C_6H_5Cl to be neglected.

Derive the expression for the height of tower as a function of the system variables. **[16]**

Q5) a) Explain the BET method for determination of surface area of catalyst. **[8]**

b) What is void volume and pore density in case of solid catalyst? Explain with suitable equations. **[8]**

OR

Q6) a) What is catalyst Poisoning explain with various types of poisons. **[8]**

b) The following data were obtained at 70°C for the equilibrium adsorption of n-hexane on silica gel particles.

Partial pressure of C_6H_{14} in gas, atm	C_6H_{14} adsorbed, g mol/(g gel)
0.0020	10.5×10^{-5}
0.0040	16.0×10^{-5}
0.0080	27.2×10^{-5}
0.0113	34.6×10^{-5}
0.0156	43.0×10^{-5}
0.0206	47.3×10^{-5}

Determine the values of constants $\overline{C}_m$ and K_c for Langmuir isotherm by least-square-analysis. **[8]**

SECTION - II

Q7) a) Derive an expression for diffusion in liquid of porous catalyst. **[8]**

b) Explain and derive an expression for experimental and calculated effectiveness factor. **[8]**

OR

Q8) a) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. **[8]**

b) Explain Diffusion in porous catalysts with the help of suitable sketch. **[8]**

Q9) The catalytic reaction $A \rightarrow 4R$ is studied in a plug flow reactor using various amounts of catalyst and 20 lit/hr of pure A feed at 3.2 atm and 117°C. The concentration of A in the effluent stream is recorded for the various runs as follows : **[16]**

Run	1	2	3	4	5
Catalyst Used, kg	0.020	0.040	0.080	0.120	0.160
$C_{A, out}$, mol/lit	0.074	0.060	0.044	0.035	0.029

Find a rate equation for this reaction, using the integral method of analysis.

OR

*Q10)*Explain the experimental method for finding rates in case of mixed and recycle reactors. **[16]**

*Q11)*Write a short note on : **[18]**
   a)   Staged adiabatic reactor.
   b)   Fluidised bed reactor.
   c)   Slurry reactor.

OR

*Q12)*a)   Explain in detail design of enzyme catalysed reactor. **[10]**
   b)   Explain Michaelis-Menton Kinetics with its model parameters.   **[8]**

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[4164] - 615

B.E. (Chemical)

PETROLEUM REFINING

(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any three questions from each section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Your answers will be valued as a whole.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a)   Discuss refining of Crude Oil?   **[4]**

b)   Discuss various specifications of following petroleum products   **[12]**

i)   LPG   ii)   Gasoline   iii)   Diesel Oil

OR

Q2) Discuss in details : Vaccum distillation.   **[18]**

Q3) Describe hydrocracking with neat diagrams.   **[16]**

OR

Q4) Explain with sketches : Reforming.   **[16]**

Q5) Explain in details : Atmospheric distillation.   **[16]**

OR

Q6) What are worldwide opportunities in petroleum refining.   **[16]**

SECTION - II

Q7) a) Explain in details-Acid Refining.   **[12]**

b) Explain : Hydro-desulphurization.   **[4]**

OR

Q8) a) Write down safety norms in refining.   **[10]**

b) Explain settling and moisture removal in pre-refining.   **[6]**

Q9) a) Discuss transportation methodologies of petroleum products.   **[8]**

b) Discuss in details : HDM.   **[10]**

OR

Q10) What is FCC? Discuss about FCC with regenator with neat sketches. **[18]**

Q11) a) Write note on different catalysts used in refining.   **[10]**

b) Write note on various additives in petroleum processes.   **[6]**

OR

Q12) What are various steps used in pre-refining? Explain in details any two operations.   **[16]**

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[4164] - 616

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is Model and what is process modeling?

     b) Why develop a process model?

     c) How to determine the form of the model? Give the typical form of the model?

                                                                 [18]

OR

Q2) a) What are the phases involved in Model building? Explain.

     b) What is the difference between the lumped parameter system & distributed parameter system? Explain with examples.

                                                                   [18]

Q3) Consider the conical water tank shown below. Write the dynamic material balance equation for the tank. The flow rate out of the tank is proportional to the square root of the height of water in the tank, i.e. $F_0 = \beta\sqrt{h}$. Consider the height of water in the tank as the state variable.   **[16]**
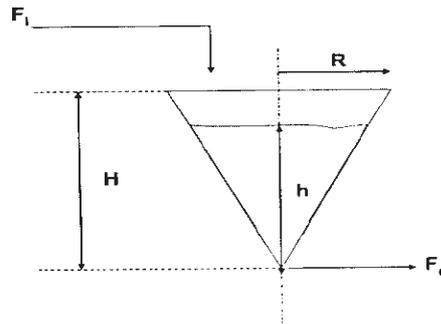
Q4) Consider a process that consists of two tanks in series. The feed stream to the first tank has volumetric flow rate *qi* and temperature *Ti*. The first tank has temperature *T1* and constant volume *V1*. This tank receives a heating input with rate $Q = UA1(Ts - T1)$, where *Ts* is the temperature of the steam used for heating and *A1* is the surface area available for heat transfer. The outlet stream from the first tank is used as the inlet stream for the second tank. The second tank has temperature *T2* and variable volume V*2*. The outlet flow from this tank is described by $q2 = Cv\sqrt{h}$ 2, where *h2* is the level in the second tank. Denote *A2* as the cross - sectional area of the second tank. Assuming that *V2/q1* $<<$ 1, derive the dynamic model equations describing the second reactor level *h2* and temperature *T2*. **[16]**

Q5) Develop a model for direct heated counter current rotary dryer in which simultaneous heat & mass transfer takes place between gas phase & solid phase. There are three zones exits in the dryer. **[16]**

OR

Q6) The following diagram shows the scenario of an evaporating pool of volatile liquid. **[16]**
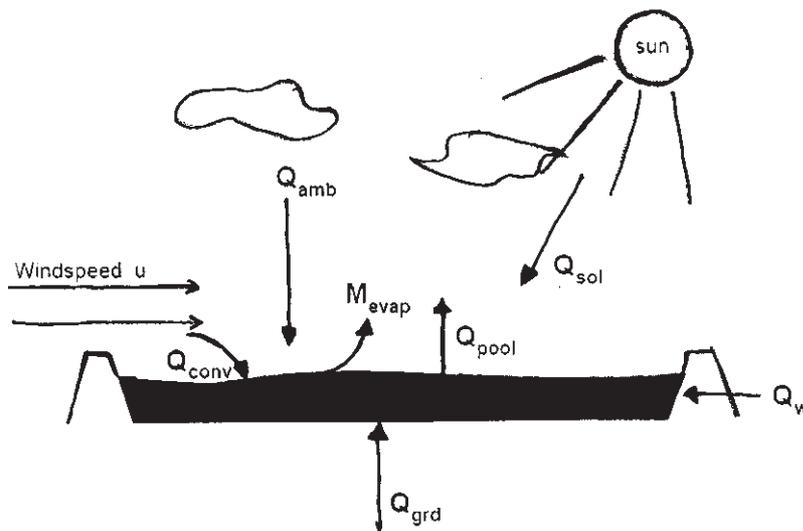
This typical of an accidental spill from storage facility. Develop the problem description. You should consider the key issues of

a) The modeling definition.

b) Assumptions.

c) Principle balance volume of the system.

d) The key data might be needed.

SECTION - II

Q7) Develop a dynamic model for binary system using continuous distillation column. **[18]**

OR

Q8) Develop a model for multicomponent distillation column. **[18]**

Q9) Consider an adiabatic (insulated) CSTR shown in the Figure below. The reacting mixture can be considered to be liquid of constant density and constant heat capacity. The reactor converts a species A into products. The reaction is exothermic with a heat of reaction equal to - ΔH. The rate of consumption is described by the following 2nd - order reaction kinetics:

$$(r_A) = k\, C_A^{\,2}$$

F_0, C_{A0}, T_0

Insulating Jacket

V

F, C_A, T
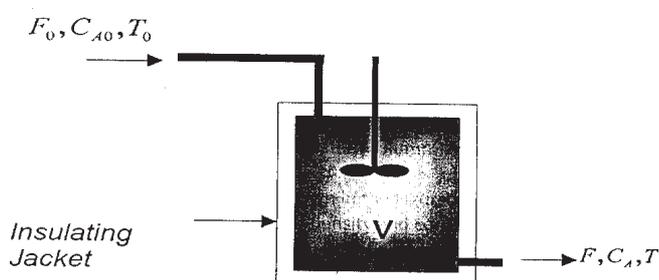
Write down the dynamic mass, mole and energy balance for the adiabatic CSTR. **[16]**

$$A + B \xrightarrow{k_1} X$$
$$B + X \xrightarrow{k_2} Y$$
OR
$$B + Y \xrightarrow{k_3} Z$$
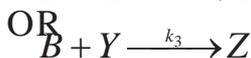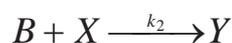
Q10) The dynamics of a continuous stirred tank reactor (CSTR) with constant volume and the following series - parallel reactions in presented below :

F, CA0, CB0,T0

A

P

FCB, TCB

S

T$_c$

SP

T$_m$

T

T

CA, CB, CX, CY, CZ
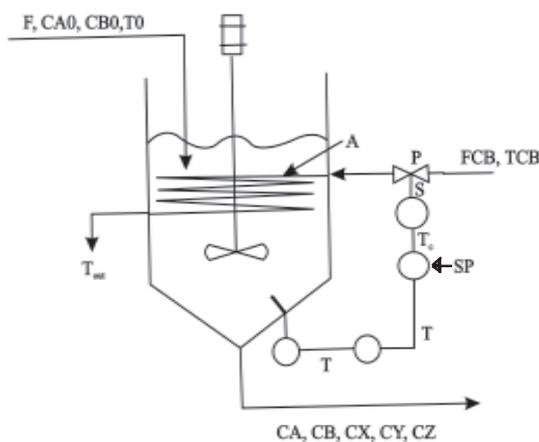
Analyse the degrees of freedom and choose a natural set of specifications. Develop the model. Consider the non - isothermal case and the case of a cooling system for the reactor which helps to maintain a constant temperature.

[16]

Q11) What is process simulation? Write approaches for simulation. Explain each with suitable example. **[16]**

<div align="center">OR</div>

Q12) a) What are the limitations of mathematical models?

b) List out the softwares available for simulation of process plant. Explain any one in detail.

[16]

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Total No. of Questions : 12]

P1438

SEAT No. :

[Total No. of Pages : 3

[4164] - 619
B.E. (Chemical)
ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer three questions from Section - I and three questions from Section - II.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Define the following terms with three examples of each.   **[10]**

 i) Commercial and non commercial energy.

 ii) Primary and secondary energy.

 iii) Renewable and non renewable energy.

 b) What is energy conservation and state its importance.   **[8]**

OR

Q2) a) Explain the role of energy manager in the process industries.   **[6]**

 b) State second law of thermodynamics and explain.   **[6]**

 c) Classify the types of energy available on earth.   **[6]**

Q3) a) Enlist three basic types of steam traps. Explain thermo static trap in detail.   **[8]**

 b) Discuss the selection of steam traps and its effect on energy consumption.   **[8]**

OR

P.T.O.

Q4) a) Discuss the functions of insulation in detail. **[6]**

b) What is co-generation? Explain the importance co-generation in sugar industries. **[10]**

Q5) a) How and where the energy losses can be minimised in a distillation column? **[8]**

b) State the practical applications for the use of thermodynamic analysis to improve energy efficiency. **[8]**

OR

Q6) a) Draw a mixing equipment and explain in detail the ways to reduce the energy losses. **[8]**

b) Explain the procedure of thermodynamic analysis of any process equipment. **[8]**

SECTION - II

Q7) a) Explain significance of pinch. **[6]**

b) Explain the checklist for energy conservation in furnaces and boilers. **[10]**

OR

Q8) a) Explain advantages of pinch technology. **[6]**

b) Enlist the checklist for energy conservation in heat exchangers. **[10]**

Q9) a) Draw the figure of tripple effect evaporator and explain opportunities for energy conservation. **[8]**

b) Explain the role of equipment manufacturer. Take an example of an yourself and explain with suitable example. **[8]**

OR

*Q10)*a) Explain the importance of good housekeeping in an industry as a measure of energy conservation. Explain it in detail. **[8]**

b) Define the term energy audit along with its types. Differentiate between its types. **[8]**

[4164]-619   **2**

Q11)a)   Distinguish between batch and continuous process with suitable examples.   **[6]**

b)   Write short note on waste heat utilisation for energy conservation in process industries. Give suitable examples.   **[12]**

OR

Q12)a)   Explain the importance of automation in the process industries. Explain how it plays a important role in energy conservation.   **[8]**

b)   Write short note on following :   **[10]**
i)   Future energy saving.
ii)   Process design for energy conservation.

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[4164] - 620

B.E. (Chemical)
CHEMICAL PROCESS SAFETY
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate answer books.*

   2)   *Draw neat sketches wherever necessary.*

   3)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain the importance of safety in chemical process industry.   **[8]**

      b)   What are the ingredients of successful safety program. Draw a neat sketch and explain.   **[8]**

OR

Q2) Explain the three types of Chemical Plant Accidents. Discuss one of the significant disasters.   **[16]**

Q3) a)   Explain the importance of industrial hygiene. What are the government regulations related to industrial hygiene?   **[8]**

      b)   How will you estimate worker exposures to toxic vapors.   **[8]**

OR

Q4) Discuss the identification and evaluation of industrial hygiene.   **[16]**

Q5) a)   Distinguish between fire and explosion. Explain fire triangle.   **[10]**

      b)   Define Ignition and Autoignition temperature, Fire Point.   **[8]**

OR

P.T.O.

Q6) a) Discuss in detail Flammability Characteristics of Liquids and Vapours.

[10]

b) What is confined explosion and unconfined explosion? **[8]**

SECTION - II

Q7) a) Discuss how flammable and toxic chemicals are stored and handled.**[8]**

b) What are various types of reliefs? **[8]**

OR

Q8) Discuss in detail "Concepts to Prevent Fires and Explosions". **[16]**

Q9) a) Explain the procedure of Hazards and Operability Studies. **[8]**

b) Give the details of Review of probability theory for Risk assessment.

[8]

OR

*Q10)*Explain briefly : **[16]**

a) Process Hazards Checklists.

b) Revealed and unrevealed failure.

*Q11)*Write short notes on : **[18]**

a) Role of computers in safety.

b) Hazard models and risk data.

OR

*Q12)*a) Discuss the Emergency shutdown systems. **[8]**

b) How are disasters tackled? Explain the plan for emergency. **[10]**

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SEAT No. :

[Total No. of Pages : 2

[4164] - 621
B.E. (Chemical Engineering)
FOOD TECHNOLOGY
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours] [*Max. Marks :100*

Instructions to the candidates:
1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn whenever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Discuss in detail current status of food products from vegetables and beverages in India. **[8]**

b) Define and explain in detail different characteristics of foods. **[10]**

OR

Q2) a) What is the effect of food processing on nutritional properties? **[8]**

b) What is the role of dairy industry in Indian food industry? Explain with examples. **[10]**

Q3) a) What is cleaning of food? Give the types with advantages and disadvantages. **[8]**

b) What is the difference between sorting and grading? Explain the various methods. **[8]**

OR

Q4) a) Explain the principles involved in degradation and prevention of foods. **[8]**

b) Discuss in detail control atmosphere storage for food grains and vegetables. **[8]**

Q5) a) Why is pasteurisation carried out on milk? What effect does it have on nutritive value, flavour, micro-organisms and on enzymes present in milk? **[8]**

b) What is sterilization? What are different methods of sterilization? **[8]**

OR

Q6) a) Explain the various methods of filtration of oil. **[8]**

b) Explain free fatty acids removal from oils. **[8]**

SECTION - II

Q7) a) Explain manufacturing of beverage with flow chart. **[8]**

b) What are the various operations and equipments involved in fruit process industry? **[8]**

OR

Q8) a) Give the classification of beverages and explain in detail the manufacturing process of non-carbonated beverages. **[8]**

b) Explain manufacturing of squash with flow diagram. **[8]**

Q9) a) Explain in detail size reduction equipments generally used in food industries and effect of size reduction on food quality. **[8]**

b) What is hot air dehydration? Why it is important in food processing? **[8]**

OR

Q10) a) Describe Extrusion with effect on foods. **[8]**

b) Explain the theory of hot oil frying. **[8]**

Q11) Write a short note on : **[18]**

a) Enrobing operation.
b) Food Packaging.
c) Coating.

OR

Q12) a) Discuss desirable properties of packing materials. **[10]**

b) Discuss in detail what are the various materials required for handling food materials in food industry. **[8]**

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[4164] - 624
B.E. (Chemical Engg.)
FUEL CELL TECHNOLOGY
(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer 3 questions from section - I and 3 questions from Section - II.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

   7)   *Draw schematics wherever necessary.*

   8)   *Write the chemical reactions wherever necessary.*

SECTION - I

Q1) a)   Describe Mobile Electrolyte Alkaline Fuel Cell and Static Electrolyte Alkaline Fuel Cell. **[12]**

      b)   Compare between Battery Electric Vehicles and Fuel Cell Electric Vehicles. **[6]**

OR

Q2) a)   What does fuel cell indicates? Compare among PEM fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell and solid oxide fuel cell, on the basis of electrode, electrolyte, operating temperature, efficiency. Draw a neat figure in each case. **[14]**

      b)   Give advantages and disadvantages of Fuel Cell Technology. **[4]**

Q3) Gibbs free energy for the formation of water vapor is – 54.635 cal/mole at STP condition. In the typical SOFC, the partial pressures of hydrogen, oxygen and water vapor are 0.8, 0.21 and 0.3 atm. Assume that activities of the components are proportional to their partial pressures. The cell is operated at 900 deg C. Calculate : **[16]**

      a)   Standard open circuit potential.

      b)   Open circuit potential at the operating conditions.

Faraday's constant is 96487 J/V.mol.

Q4) a) A current density of 12 A/m² is obtained when pure hydrogen in fed to SOFC at the pressure of 1.7 atm. Total pressure of gases on anodic side is observed to be 2.4 atm. Air is supplied at 1.7 atm. The cell is operated at 1000°C. The diffusion factors for hydrogen, oxygen, water vapour are 95,70 and 55 C/sm². atm respectively. Calculate concentration overpotential across cathode and anode. **[8]**

b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using following data **[8]**

Average current density : 14 A/m²

Active anode surface area : 0.2 m²

Fuel Flow rate : 25 mol/h

Fuel Composition : H_2 85% and CO 15%

Air Flow rate : 20 mol/h

Output Potential : 230 V

Lower Heating Value of fuel : 30000 kcal/kg

Q5) What is the importance of Nernst equation? Derive Nernst equation for calculating open circuit potential of SOFC using H_2 as a fuel and O_2 as an oxidize. **[16]**

OR

Q6) a) Explain various methods for production of Hydrogen. **[8]**

b) Explain schematically the working principle of SOFC and give advantages and drawbacks of SOFC. **[8]**

SECTION - II

Q7) a) Explain the mechanism of oxidative reforming of methane. **[9]**

b) What are the advantages and limitations of direct oxidation of hydrocarbons? How these limitations can be removed? **[9]**

OR

Q8) a) Illustrate and compare between planar and tubular design of SOFC.**[9]**

b) Explain different types defect structure in solids and Kroger Vink notations. **[9]**

Q9) a) Design a tubular SOFC to generate 250 kW power from methane as a fuel. Single tube has a anodic diameter 20mm and active length of 1.8m. **[8]**

b) Calculate mole fraction of defect at 200 and 1100°C. Defect energy is 75 kJ/mol. Comment on the significance of results. **[8]**

OR

*Q10)*a) Design a planner SOFC to generate 250 kW power for ethanol as a fuel. **[8]**

b) What is steam reforming? What are the advantages of internal steam reforming? **[8]**

*Q11)*a) What is three phase boundary (TPB)? Explain the mechanism of charge transfer in TPB. **[8]**

b) What are the recent advancements in the materials of anode, cathode, and electrolyte and interconnect? **[8]**

OR

*Q12)*Explain the design of typical direct ethanol SOFC considering following aspects : **[16]**

a) Catalyst,   b) Structure,

c) Reactions and   d) Exit gas characteristics.

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[4164] - 635

B.E. (Petroleum)

ADVANCED INSTRUMENTATION AND PROCESS CONTROL IN PETROLEUM INDUSTRY

(2008 Pattern) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe the components of analog instruments. **[8]**

    b) How is communication and networking implemented in digital control systems? **[8]**

OR

Q2) a) What are the various methods of starting a d.c motor? **[8]**

    b) Write a short note on Ward Leonard method of speed control. **[8]**

Q3) a) Explain in detail the principle, construction and working of a Resistance Temperature Detector (RTD). **[8]**

    b) Write a note on LVDT for pressure measurement. **[8]**

OR

Q4) a) Explain the construction and working of an ultrasonic level gauge. **[8]**

    b) How will you measure the pH of a solution using pH meter? Give the working of the same. **[8]**

P.T.O.

Q5) a) What do you understand by process control? Explain the various lags involved in a system. **[6]**

b) Explain feedback control system with the help of a neat diagram. **[6]**

c) With help of neat sketch explain the proportional, derivative and integral modes of a PID controller. **[6]**

OR

Q6) a) What are Servo and Regulatory control problems? **[6]**

b) Find the overall transfer function of the following system : **[6]**
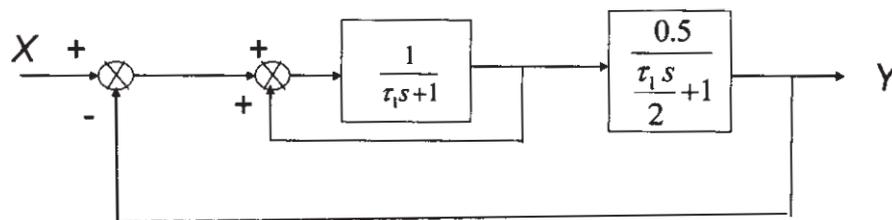
c) Define following with help of neat diagrams : Decay Ratio, Rise Time, Response Time. **[6]**

SECTION - II

Q7) a) Discuss the need of Automation and Process Control in Custody Transfer- Provide suitable example as well. **[6]**

b) Develop the mathematical expressions of two non-interacting tanks placed in series. Discuss the dynamics of the system. **[8]**

c) Write a short note on Controller Tuning. **[4]**

OR

Q8) a) Describe with proper sketch the feed-back control scheme for a binary distillation column. **[6]**

b) Crude and water are to be separated based on their differences in density. Develop a programmable logic control (PLC) algorithm for this important process. **[6]**

c) Discuss the merits and usefulness of Feed-forward and Feed-back Control loops. **[6]**

Q9) a) Explain Cascade Control Scheme with help of a suitable example. **[8]**

b) With help of neat sketch explain the principle of operation of Turbine Flow Meter. Discuss its applicability and limitations. **[8]**

OR

Q10) a) With help of block diagram explain dynamic positioning of Floating Vessels in deep sea operations. **[10]**

b) Discuss the type of Controllers to be used for following : **[6]**

i) Pressure control.

ii) Flow control.

iii) Level control.

Q11) a) With help of field examples give overview of current methods for intervention on subsea production, flow and process control. **[8]**

b) Write short notes on : **[8]**

i) Sub-Sea Valves and Actuators.

ii) Emergency Shutdown System.

OR

Q12) a) Discuss the working principle of Multiphase flow meter. Highlight important characteristics of ideal Multiphase flow meter. Name any four commercial variants. **[10]**

b) Discuss in brief direct hydraulic, piloted hydraulic and electro-hydraulic multiplex control system. **[6]**

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[4164] - 638

B.E. (Petroleum)

PETROLEUM REFINING TECHNOLOGY

(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours] [*Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Draw a neat labeled diagram of the overall refinery flow. **[4]**

b) Write a note on the composition of crude oil. **[8]**

c) Explain the terms : **[6]**
   i) Octane number.
   ii) Conradson Carbon Residue.
   iii) Flash point.

OR

Q2) a) Write a note on the middle distillate fuels. **[8]**

b) What do you understand by True Boiling Point distillation (TBP)? Explain. **[6]**

c) Give the significance and the uses of butane which is obtained as a low boiling product in the refinery. **[4]**

Q3) a) Give the need for desalting of crude oil. Draw a neat labeled diagram of a single stage desalting process. **[8]**

b) Explain in brief the process of distillation in Atmospheric Topping Unit (ATU). **[8]**

P.T.O.

<center>OR</center>

Q4) a) Explain how vacuum is maintained in the vacuum distillation unit. **[8]**

b) Write a note on the auxiliary equipment used in ATU and VDU. **[8]**

Q5) a) Write a note on the various methods of decoking. **[8]**

b) With the help of a neat labeled diagram, explain the working of a fluid catalytic cracking (FCC) unit. **[8]**

<center>OR</center>

Q6) a) Write a note on the expanded bed hydrocracking process. **[8]**

b) Write a note on the hydrocracking catalysts. **[8]**

<center>**SECTION - II**</center>

Q7) a) Compare the hydrofluoric acid process and the sulphuric acid process for alkylation. **[8]**

b) Explain the important reactions that take place in a catalytic reformer. **[8]**

<center>OR</center>

Q8) a) Explain and give the significance of isomerization process. **[8]**

b) Write a note on the alkylation catalysts. **[8]**

Q9) a) Discuss the process of phenol extraction used in treating of lubes. **[8]**

b) What is dewaxing? Discuss any one of the commercial dewaxing processes. **[8]**

<center>OR</center>

*Q10)*a) Explain in brief the various processes that enhance the characteristics of lube oil. **[8]**

b) Discuss the typical propane deasphalting unit. **[8]**

*Q11)*a) Discuss the various reactions that take place during the production of hydrogen by steam reforming. **[10]**

b) Discuss the recovery of hydrogen by adsorption process. **[4]**

c) Draw a neat labeled diagram of the once-through Claus process for sulphur recovery. **[4]**

OR

*Q12)*a) How is atmospheric pollution in refineries controlled? **[6]**

b) Give the necessity of product blending. Explain in brief about the parameters to be considered in the octane number blending process. **[8]**

c) Draw a neat diagram of line blending process. **[4]**

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[4164] - 656

B.E. (Petrochemical Engg.)
NOVEL SEPARATION PROCESSES
(Sem. - I)(2008 Pattern) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
1) *Answer any 03 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Discuss in detail the selection criteria for separation processes by giving suitable examples. **[8]**

     b) Discuss in detail the energy requirements for separation processes by giving suitable examples. **[10]**

<center>OR</center>

Q2) Attempt *Any Three* of the following : **[18]**

     a) Explain in brief the basic process principles involved in Reverse Osmosis. State the industrial applications.

     b) Compare and contrast on Macroemulsions and Microemulsions with suitable examples.

     c) Discuss the process principles involved in Ultrafiltration and Nanofiltration.

     d) Draw concentration profiles for membrane processes for following cases:

         i) Two liquid films and a solid and,

         ii) Two gas films and a solid

     Write down the final flux equations for above cases?

Q3) Derive the model equation for Complete mixing model for gas separation by membranes. Discuss the solution strategy for the model equations. **[16]**

<center>OR</center>

Q4) a) A 9 - micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.025 and 0.0045 kmol/m³, with mass transfer coefficients of 3.75 10⁻⁵ and 2.5×10^{-5} m/s respectively. The distribution coefficient is 0.85 and the diffusivity of A in the mambrane is 275×10^{-11} m²/s. **[10]**

   i) Calculate the percentage of total resistance to mass transfer contributed by the membrane.

   ii) Calculate the membrane area needed to allow recovery at 0.015 kmol/hr.

   Flow inside the tube is turbulent and mass transfer follows the Gilliland, Sherwood & Linton correlation. If the velocities of both solutions are doubled, what will the membrane resistance now be

   b) Reverse osmosis of salt solution at 25°C is tested with a 5. × 10⁻³ m² cellulose acetate membrane. On one side of the membrane is 1 mol NaCl/kg H_2O solution at 60 atmospheres (abs.) pressure, on the other is 0.01 mol NaCl/kg H_2O at atmospheric pressure. The permeation rate is 96.12 ml/hour. Find the solvent permeability and the rejection rate. **[6]**

Q5) Discuss in detail various membrane modules with neat sketches. State its applications in different types of membrane separation processes. **[16]**

OR

Q6) A liquid containing dilute solute A at a concentration 3.3×10^{-2} kgmol/m³ is flowing rapidly by a membrane of thickness, 3×10^{-5} m. The solute diffuses through the membrane and its concentration on the other side is 0.55×10^{-2} kgmol/m³. The mass transfer coefficient k_{c1} is large and can be considered as infinite and $k_{c2} = 2.22 \times 10^{-5}$ m/s.

Data : Distribution coefficient = $K' = 1.5$ and Diffusivity, $D_{AB} = 6 \times 10^{-11}$ m²/sec in the membrane.

   a) Derive the equation to calculate the steady state flux, NA and make a sketch.

   b) Calculate the flux and concentration at the membrane interfaces. **[16]**

SECTION - II

Q7) Discuss in detail the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications.**[18]**

OR

Q8) Nitrogen gas contaminated with water at 975 mg per kg of N_2 is continuously fed to a pilot - scale adsorption column that contains a 0.250 m high bed packed with molecular sieve. Outlet data were as follows :

Time (hours)	0	9	9.2	9.6	10.0	10.4	10.8	11.25	11.5	12.0	12.5	12.8
Water Conc. (mg/kg N_2)	0	0.6	2.6	21	91	235	418	630	717	855	906	926

If break - through is defined here as being when c/c_0 reaches 0.02, find the following : **[18]**

a) Break throughtime.

b) Height of "zone" of unspent (but not unused) bed in column

c) Fraction of total sieve capacity used by breakthrough time.

d) Break through time if an industrial column were to be built of the same cross - section, but with a bed height of 0.6m

Q9) a) From Darcy's Law, the velocity through a packed bed for a given pressure drop (P) is given by : $u = \dfrac{\varphi P d^2 p}{l\eta}$

Where,

φ = Darcy's constant

P = Pressure drop

d_p = Particle diameter

l = Length of column

η = Viscosity of the mobile phase

Also, from the analysis of the Van Deemter equation, for a well packed column and for a highly retained solute, it is found that :

$H_{min} = 2.48 d_p$

and the velocity at H_{min} is equal to

$1.62 D_m \Big/ d_p$

Where D_m is the diffusivity of the solute in the mobile phase.

From the above informations, derive an analytical expression for the maximum efficiency obtainable for a column in terms of these parameters, if the maximum allowable pressure drop is P. **[8]**

b) In gas chromatography, a plot of HETP as a function of the mobile phase velocity is described by the Van Deemter equation :

$$HETP = A + B/u + Cu$$

Physically, what do the terms A, B and C represent? Calculate the optimum value of the mobile phase velocity and the plate height in terms of these parameters. **[8]**

Q10) a) The retention ratio in chromatography is defined as :

$R = t_M/t_R$

Show that R is related to the capacity factor, given by equation :

$R = 1/ k + 1$ **[8]**

b) Discuss the process principles involved in elution chromatography and derive the retention equation. **[8]**

Q11) Write short notes on **[16]**

a) Parametric Pumping.

b) Reactive Separations.

c) Isoelectric Focusing.

d) Bioseparation.

Q12) Define the following terms in connection with chromatographic separations and give appropriate equations : **[16]**

a) Partition coefficient (K)

b) Retention Volume (V_R)

c) Retention Ratio (R)

d) Capacity factor (K)

e) Separation factor (α)

f) Resolution (R_s)

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[4164] - 657

B.E. (Petrochemical)
ELEMENTS OF FLUIDIZATION ENGINEERING
(2008 Course) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With help of neat sketches explain the Fluidization process. **[6]**

   b) Explain the liquid like behavior of fluidized bed with help of neat diagram. **[6]**

   c) Write a short note on Quality of Fluidization. **[4]**

OR

Q2) a) Write the mathematical expression of flow through packed bed. From the base model derive the formula to obtain minimum fluidization velocity in case of a Fluidized Bed. **[8]**

   b) Discuss the effects of Temperature and Pressure on Fluidized Bed. **[8]**

Q3) Calculate the minimum fluidizing velocity u_{mf} for a bed of microspherical catalyst of wide size distribution ranging from 0 to 260 μm. Compare the calculated value with the experimentally obtained value of u_{mf} = 2.6 cm/s.
Data : **[18]**
Solids : ρ_s = 1.83 g/cm³, ε_{mf} = 0.45
Gas : ρ_g = 1 × 10⁻³ g/cm³, μ = 1.7 × 10⁻⁴ g/cm.s.
Size frequency distribution :

d_p (mm)	5	8	10	12	14	15	16	17	18	20	22	24	9.5
p(cm⁻¹)	5	13	23	45	95	135	145	115	88	50	22	12	1

P.T.O.

Q4) a) Write a short note on Geldart's classification of particles and their important characteristics. Provides suitable examples as well. **[10]**

b) Explain the need for providing distributor in fluidized bed. Name four different types of distributors often used in industrial scale. **[8]**

Q5) a) Discuss important characteristics of Multiphase Meters. Name five industrially important multiphase meters and explain operating principle of any one of them with help of suitable example. Provide neat sketches.

[8]

b) Discuss important assumptions of Kunii Levenspiel model. Explain the model with help of suitable example. **[8]**

OR

Q6) Write short notes on : **[16]**

a) Davidson Bubble.

b) Coalescence and Splitting of Bubbles in a Densed Bed.

c) Circulating Bed Fluidized bed.

d) Disadvantages of Fluidized Bed.

SECTION - II

Q7) a) Discuss the information needed for designing a fluidized bed. Explain all of them. **[8]**

b) With help of mathematical expressions explain gas interchange between bubble and emulsion phase. **[8]**

OR

Q8) a) What are different variables affecting heat transfer rate in fluidized bed-Explain in brief. **[8]**

b) With help of neat sketches explain operations of various types of Fluidized Bed Dryers. **[8]**

Q9) a) Discuss the Reactor model for Fine Particle Bubbling Bed. **[9]**

b) In a fluidized bed, mixing is combined effort of plug flow and mixed flow mode- Explain with help of neat diagram. **[9]**

OR

*Q10)*a) Write a short note on conversion of gas in Catalytic Reaction in a Fluidized Bed Reactor. In this context highlight measures of reaction rate and reactor performance. **[6]**

b) Write short notes on Sintering and Agglomeration. **[6]**

c) Write a short note on Slugging fluidized bed. **[6]**

*Q11)*a) With help of neat sketches explain operation of a Fluidized Bed Reactor for Polymerization. **[8]**

b) Discuss Fluidized bed operation for Combustion of Coal, provide suitable sketches. **[8]**

OR

*Q12)*Write short notes on : **[16]**

a) Ranz-Marshal Correlation.

b) Fluidized bed Catalytic Cracking.

c) Scale up of fluidized bed reactors.

d) Free board Region and its usefulness.

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[4164] - 659

B.E. (Petrochemical)

OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Optimization. With help of relevant examples explain its utility in modern chemical industries. **[8]**

b) With help of neat sketch elaborate the construction of constrant surface. **[8]**

OR

Q2) a) A manufacturer produces x_1 units in first week and x_2 units in second week. No. of units produced to be at least 200 and 400 respectively. The initial inventory is zero and the manufacturer ceases to produce product at end of second week. Production cost of a unit is given by $4x_i^2$ where x_i is the no. of units produced in week. There is inventory of Rs. 1200 per unit of each unit produced in first week and not sold be end of first week. Formulate the problem of minimizing the total cost and find its solution using a graphical optimization method. **[10]**

b) State the necessary conditions for the minimum of a function $g(x)$. **[6]**

Q3) a) Using Secant method minimize the function. **[8]**

$$f(x) = x^3 - 2x + 86.5$$

b) Write a short note on Region Elimination Method and its applicability in real life problems. **[8]**

OR

P.T.O.

Q4) a) With help of neat diagram and mathematical expression discuss the necessary and sufficient condition of single variable optimization. **[8]**

b) Use two iterations of Fibonacci search method to minimize the function
$$f(x) = x^2 + (54/x)$$
in the interval (0, 5). **[8]**

Q5) a) Write a note on Powell's Conjugate direction method. Explain the methodology with help of suitable example. **[8]**

b) Solve the following equation by any suitable optimization technique **[10]**
$$\text{Min } f = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$$

OR

Q6) a) Provide stepwise procedure of steepest Descent Method. Provide mathematical formulae for computing gradients using numerical techniques. **[6]**

b) Solve the following linear programming problem : **[12]**

Maximize $f = x_1 - 8x_2$

Subject to,
$$3x_1 + 2x_2 \geq 6$$
$$9x_1 + 7x_2 \leq 108$$
$$2x_1 - 5x_2 \geq -35$$

where x_1 and x_2 are unrestricted in sign.

SECTION - II

Q7) A design and fabrication firm has entered into contract to supply 50 storage tanks at the end of first year, 50 at end of second year and 50 at the end of the third. The cost of producing x storage tanks at any year is given by $\$(x^2 + 1000)$. The firm can produce more tanks in any year and carry them to the subsequent year. However, it costs \$20 per unit for any tanks carried over from one year to the next. Assuming no initial inventory; determine number of tanks to be produced in each year to minimize the total cost. **[16]**

OR

Q8) Solve using Simplex method : **[16]**

Maximize $F = 240x_1 + 104x_2 + 60x_3 + 19x_4$

Sub. to, $20x_1 + 9x_2 + 6x_3 + x_4 \leq 20$
$$10x_1 + 4x_2 + 2x_3 + x_4 \leq 10$$
$$x_1, x_2, x_3, x_4 \geq 0$$

Q9) a) Consider the constrained integer nonlinear programming : **[10]**

$$\text{Minimize } f(x) = (x_1^2 + x_2 - 9)^2 + (x_1 + x_2^2 - 7)^2$$

$$\text{Sub. to, } g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$$

$$g_2(x) = 20 - 4x_1 - x_2 \geq 0$$

x_1 and $x_2 \geq 0$ and x_1 and x_2 are integers.

b) Write a short note on Geometric Programming. **[6]**

OR

Q10) a) With help of suitable example explain dynamic programming. Cite its usefulness. **[6]**

b) Perform two iterations of the branch - and - bound method to minimize the following integer nonlinear programming problem :

$$\text{Minimize } 0.1 \ (x_1^4 + x_2^4) - x_1^2 x_2$$

$$\text{Sub. to, } x_1^2 + 2x_2^2 \leq 100 \text{ and } x_1 \text{ and } x_2 \text{ are integers.} \quad \textbf{[10]}$$

Q11) a) Write a short note on Genetic Algorithm and its usefulness. **[6]**

b) What is Pareto optimization - explain with help of suitable real world problem. **[6]**

c) With help of example explain particle swarm optimization. **[6]**

OR

Q12) a) Write a short note on multiobjective optimization. **[6]**

b) Discuss Simulated Annealing methodology for solving optimization problems. **[6]**

c) Compare between GA and Gradient based Optimizers. **[6]**

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[4164] - 661

B.E. (Petrochemical Engineering)
NATURAL GAS TECHNOLOGY
(2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer Q.No.1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Assume suitable data, if necessary.*

    5)   *Figures to the right indicate full marks.*

    6)   *Use of logarithmic table slide rule and electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Discuss the oil reserves and gas reserves with respect to production and utilization. **[8]**

    b) Describe the origin of natural gas. **[8]**

OR

Q2) a) Discuss bacterial gas reservoirs. **[8]**

    b) Give the Indian Scenario of natural gas and refining. **[8]**

Q3) a) Explain in detail analysis of composition of natural gas. **[8]**

    b) Discuss well selection, conditioning and sampling of condensate gas.**[6]**

    c) Elaborate on heating value of natural gas. **[4]**

OR

Q4) a) Discuss the phase diagram of a reservoir fluid. **[8]**

    b) Elaborate on estimation of surface tension of liquid hydrocarbon in the natural gas. **[6]**

    c) Draw phase diagrams of a dry gas and a wet gas showing conditions in the reservoir as well as at the surface and describe the same in brief.**[4]**

P.T.O.

Q5) a) Elaborate on hydrate structures (diagrams are not necessary). **[6]**

b) Explain in detail predicting hydrate formation equilibria chart method.
[6]

c) Write a short note on water content of natural gas. **[4]**

OR

Q6) a) Discuss kinetics of hydrate formation. **[6]**

b) Explain in detail hydrate prevention. **[6]**

c) Write a short note on hydrate formation during drilling. **[4]**

SECTION - II

Q7) a) Explain in detail dehydration of natural gas by absorption. **[8]**

b) Give different properties of a suitable solvent. **[8]**

OR

Q8) a) Describe with flow sheet refrigeration cycle by expansion turbine for natural gas. **[8]**

b) Explain in detail removal of nitrogen, helium and mercury from natural gas. **[8]**

Q9) a) Discuss LNG transport chains. **[6]**

b) Explain with flow sheet natural gas liquefaction using TEALARC process with one pressure level. **[6]**

c) Write a short note on pipeline transport systems. **[6]**

OR

*Q10)*a) Explain in detail construction and working of centrifugal compressor.**[6]**

b) Elaborate on existing LNG terminal in India. **[6]**

c) Discuss safety precautions for natural gas pipeline. **[6]**

Q11)a) Describe with flow sheet Fisher-Tropsch synthesis process. **[8]**

b) Write a short note on : **[8]**

    i)   Thermal coupling process.

    ii)   Oxidative coupling process.

<div align="center">OR</div>

Q12)a) Describe with flow sheet routes for the chemical conversion of methane.

[8]

b) Write a short note on natural gas storage. **[8]**

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[4164] - 668

B.E. (Petrochemical Engg.)
RENEWABLE ENERGY SOURCES
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer any 3 questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and   steam table is allowed.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) What are the current problems related to Energy in India and world?**[6]**

b) Discuss the potential of different forms of Renewable energy and which renewable energy is more prominent and why?   **[6]**

c) Discuss advantages and disadvantages of Non-Conventional Energy sources.   **[4]**

OR

Q2) a) Discuss the current availability of non conventional energy resources in India.   **[8]**

b) What are different difficulties in getting energy from different Renewable Energy sources?   **[8]**

Q3) a) Discuss in details about four different types of solar collectors (Concentrator) with neat sketches.   **[8]**

b) Write in details about the process of Solar Desalination with neat sketch.

[8]

OR

P.T.O.

Q4) a) Discuss with principle and working with neat sketch about solar space heating and cooling. (Minimum two diagrams). **[10]**

b) Write in details about the Solar Industrial heating systems with neat sketch. **[6]**

Q5) Composition of soybean oil is given below : **[18]**

C16 : 0 = 10.5%, C18:0 = 4.1%, C18:1 9 = 22.5%, C18:1 11 =1.6%,

C18:2 9, 12 = 53.6% and C 18:3 9, 12, 15 = 7.7%

C18: 1 9 signifies an 18 carbon fatty acid chain with one double bond located at carbon 9.

Calculate amount of methanol required for trans-esterification of 1.2 lit of this soybean oil, if 80% excess methnaol based on soichometric requirement needs to be used for complete conversion.

Assume density of soybean oil to be 0.913 and that of methanol be 0.8 kg/lit. If overall 92% conversion be achieveable, calculate mass of biodiesel and glycerol produced. Consider 8% of vegetable oil used undergoes saponification in presence of homogeneous NaOH catalyst.

OR

Q6) a) Name various types of biomasses avaialable in India. **[4]**

b) With help of schematic diagram explain the concept of biorefinery with special emphasis on the thermal and chemical processes involved. Also point out the different products achievable. **[10]**

c) Write a short note on alcoholic fermentation. **[4]**

SECTION - II

Q7) a) Name the major locations in India where wind energy is utilized. **[4]**

b) With help of neat diagram explain various parts of wind turbine generator units. **[10]**

c) Compare advantages and disadvantages of wind energy. **[4]**

OR

Q8) a) How energy of waves can be captured - in this context discuss the design feature of helical turbine. **[6]**

b) What is OTEC? Discuss the priciple of operation of any OTEC cycle.**[6]**

c) Discuss the major challenges faced by OTEC technology. Highlight how the commercial feasibilty of OTEC can be increased. **[6]**

Q9) a) What do you understand by Geothermal energy? What are geothermal fields? **[6]**

b) Describe various energy extraction technologies used with hydrothermal (geothermal) resources. **[10]**

OR

*Q10)*a) Comment on origin and distribution of geothermal energy. **[6]**

b) Explain the process of liquid dominated (wet steam) system of geothermal energy extraction with neat sketch. **[10]**

*Q11)*a) Discuss the importance of storage of electrical energy. Name different types of cells can be utilized. Discuss operation of any one of the cell.**[8]**

b) With help of schematic diagram explain the principle of operation of Fuel Cells. Comment on Cathode, Anode and the type of Electrolytes. **[8]**

OR

*Q12)*a) Discuss the advantages and disadvantages of fuel cells. Cite the applicability of the Fuel Cells. **[8]**

b) Name various types of fuel cells often used and compare between them based on types of electrolytes employed, operating ranges, fuel types and the oxidants utlized. **[8]**

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[4164] - 670

B.E. (Petrochemical)

CATALYST SCIENCE AND TECHNOLOGY

(2008 Course) (Elective - IV) (Sem. - II)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

*1) Answer three questions from each section.*
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is adsorption isotherm? Write down important assumptions of Langmuir Adsorption Isotherm and obtain its mathematical expression.

[6]

b) With the help of neat sketch explain how catalyst changes reaction pathways. **[6]**

c) Write a short note on homogeneous catalysis. **[4]**

OR

Q2) a) Discuss the important characteristics of Industrial Catalyst. **[4]**

b) Differentiate between Physical Adsorption and Chemisorption. **[6]**

c) Define: Active Site, Functionality, Turnover Frequency. **[6]**

Q3) a) Name various means and ways by which a catalyst can be deactivated - discuss all of them. **[6]**

b) For the dual functional catalyst, following gas phase reaction : **[10]**

$$A + B \rightarrow Products$$
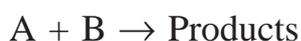
P.T.O.

where, A and B are adsorbed independently on different sites (i.e. dual functionality) and the reaction is between adsorbed A with adsorbed B molecules. Derive the rate expression considering Langmuir-Hinshelwood mechanism in terms of partial pressure of the respective components.

Consider products are not adsorbed appreciably. If some inert gas Helium is also present, this is also strongly adsorbed on the surface, write down the modified rate expression.

OR

Q4) a) Differentiate between Langmuir - Hinshelwood Model and Rideal Model of Catalytic reaction. **[6]**

b) Discuss the stepwise procedure of Catalytic reaction. Highlight the importance of rate limiting step in this context. **[6]**

c) Write a short note on Poisoning of Metallic Catalysts. **[4]**

Q5) a) What are catalyst support? Discuss their important characteristics. With help of neat diagram explain the Monolith Support. **[6]**

b) Name four different methods of Catalyst Synthesis. Explain any of the method in details. **[8]**

c) Write a short note on Promoters. **[4]**

OR

Q6) a) An 15.7 gm of imported hydrogenation catalyst when studied with N_2 adsorption reveals the following information : **[12]**

Pressure (mm Hg)	6	70	110	240	380	452
Vol. ads. (cm^3)	68	147	172	215	267	318

The volumes obtained at 0°C and 1 atm pressure. Estimate the surface area of the catalyst.

Data: Density of liquid N_2 at -195.8°C is 0.808 g/cm³

b) With a specially designed catalyst of 201.75 gm following data obtained : **[6]**

Vol. of Hg displaced by the sample = 113.8 cm^3

Vol. of Helium displaced by the sample = 98.5 cm^3

Calculate the pore volume and porosity of the catalyst particle from these information.

SECTION - II

Q7) a) What are Zeolites? Highlight their important characteristics. Discuss the shape selectivity of Zeolites and their industrial applications in details. **[8]**

b) Explain Fouling, Coking and Carbon Deposition in Catalyst, also discuss various methods of Regeneration. **[8]**

OR

Q8) a) What are the sources of acidity in catalyst surface? Discuss the method of determination of acid strength. **[8]**

b) Discuss with help of suitable diagram Sintering, Mobility and Redispersion in case of supported metal catalysts. **[8]**

Q9) a) With help of neat diagram discuss Fluidized Catalytic Cracking with proper emphasis on the catalyst used, operating condition, reaction time and regeneration of catalyst. **[8]**

b) Discuss the industrial process of hydrodesulfurization operation. Give schematic diagram of the reactor. Highlight the operating condition as well. **[8]**

OR

*Q10)*a) Write a short note on multiphase catalysis for processing of hydrocarbons. In this context highlight the reaction engineering aspects as well. Name various types of reactors often employed. **[10]**

b) Why vegetable oil need to be hydrogenated? With help of neat diagram explain the operation as done industrially. **[6]**

*Q11)*a) Describe the process on manufacture of phthalic anhydride. Provide the detailed kinetics and Thermodynamics of the process. What are the by-products of the process, how can these be minimized. Discuss reactor configuration along with neat diagram. **[10]**

b) Draw a schematic diagram of ammonia reactor, discuss all technical aspects associated with the design of the reactor. **[8]**

OR

*Q12)*Write Short Notes on (any four) : **[18]**

a) Multitubular Catalytic Reactor

b) Catalytic Reformer

c) Fischer - Tropsch Synthesis

d) Methanol Synthesis Reactor

e) Styrene Manufacture from Ethylbenzene

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[4164] - 678

B.E. (Polymer)

FIBER TECHNOLOGY

(2008 Pattern) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to Section - I and Section - II should be written in separate answer book.*

2) *Solve 3 questions from Section - I and 3 questions from Section - II.*

3) *Neat diagrams should be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Briefly explain the unique properties of Synthetic compared to Natural Fibers? **[9]**

b) What is the significance of polymerization step in fiber manufacture?**[3]**

c) Enlist the important points to be considered in production of PET by continuous process. **[6]**

OR

Q2) a) With suitable flow diagram explain the important operations in the production of polyester filament yarn. **[6]**

b) What are the molecular requirements the given polymer should possess in order to convert it into fiber? **[6]**

c) Define the following terms - fiber, tenacity, denier, filament, yarn, staple fiber **[6]**

Q3) a) Explain the effect of high speed spinning on the fiber morphology.**[6]**

b) What are the functions of pre-filtration device that has been placed between static mixer and manifold in case of melt spinning operation.

[5]

c) Briefly explain the role of spin pack and spinneret in fiber forming operation. **[5]**

OR

Q4) a) Explain in brief H4S and FDY spinning processes of Spin Draw technique. **[8]**

b) What are various techniques of Solution Spinning? Explain any one in detail. **[8]**

Q5) a) Enlist various post-spinning operations in fiber formation. **[4]**

b) What are the various factors affecting friction generated during manufacturing fiber? Explain any one in detail. **[8]**

c) Explain the importance of stretching/drawing stage in fibers. **[4]**

OR

Q6) a) What are the major constituents of spin finish used in fiber? Briefly explain their significance. **[8]**

b) What do you understand by Draw Warping? What are its advantages?

[8]

SECTION - II

Q7) a) Write a short note on Crystal Defect model in fibers. **[6]**

b) Compare between Crush Cutting and Stretch Breaking Converters used for converting polyester tow into tops. **[6]**

c) Explain the Heat setting step and its effect of staple fiber. **[6]**

OR

Q8) a) Write a short note on Transitions in Fiber Structure. **[6]**

b) Explain in detail One step continuous plant for melt spun staple fiber production. **[7]**

c) Comment on Chain folding and Fiber annealing. **[5]**

Q9) a) What are the various methods of Mass Colouration of Polyester? Explain any one in detail. **[10]**

b) Why is it difficult to dye PP fibers? What are the various modifications carried out to make dyeable PP? **[6]**

OR

*Q10)*a) Explain Chips Dyeing technique used for Mass colouration of Nylon. **[6]**

b) What are the factors those make polyester fibers difficult to dye? **[4]**

c) Write a short note on Carrier dyeing technique used for polyesters. **[6]**

*Q11)*a) Explain the necessity of modifying synthetic fibers. **[6]**

b) Write a short note on Hydrophilic Polyester. **[7]**

c) Enlist applications of flame retardant synthetic fibers. **[3]**

OR

*Q12)*a) Enlist the important tests performed for checking quality of filament yarns and staple fibers. Explain any one in detail. **[8]**

b) Write a short note on Hydrophilic Acrylic fibers. **[8]**

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[4164] - 680

B.E. (Polymer)

POLYMER REACTION ENGINEERING

(2008 Pattern) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   *Answers to the two sections should be written in separate books.*

  2)   *Draw neat diagrams wherever necessary.*

  3)   *Numbers to the right indicate full marks.*

  4)   *Assume suitable data, if necessary.*

  5)   *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a)   Explain the distinctive features of Polymerization Reaction Engineering.

[8]

  b)   Explain the role of residence time distribution and the concentration history in Polymerization reaction. **[8]**

OR

Q2) a)   Explain the following quantities to be used in the Characterization of Long Chain Molecules : **[12]**

  i)   Weight Fraction,

  ii)   First moment of Pj's

  iii)   Number Average Degree of Polymerization

  iv)   Weight Average Degree of Polymerization

  v)   Number Average Molecular Weight

  vi)   Weight Average Molecular Weight

  b)   Explain the role of change in viscosity in Polymer reaction Engineering.

[4]

P.T.O.

Q3) a) Discuss all the mechanism steps to be used in Free radical polymerization with one suitable example. **[6]**

b) Derive the necessary equation of the rate of Initiation (ri) in terms of Initiator concentration [I]. **[6]**

c) Discuss and Derive the necessary relationship giving the effect of Perfectly Mixed Flow Reactor on Instantaneous Number Degree of Polymerization for carrying out Free-radical Polymerization. **[6]**

OR

Q4) a) Derive the necessary expression for Instantaneous Fractional Degree of Polymerization and Instantaneous weight Degree of Polymerization by using Ionic polymerization. **[12]**

b) Discuss in detail all technical conclusions from Free Radical Kinetics Studies. **[6]**

Q5) a) Discuss the advantages of Emulsion polymerization and give at least four polymer names to be produced via emulsion techniques. Explain the role of Critical Micelles Concentration in Emulsion Polymerization techniques. **[12]**

b) Write a note on Aqueous Emulsifier Solutions. **[4]**

OR

Q6) Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. Discuss kinetics of Emulsion polymerization and give at least two polymer names to be produced via emulsion techniques. **[16]**

SECTION - II

Q7) a) Draw process flow sheet for the production of PET and explain the process in detail. **[9]**

b) Describe in detail VK Tube Reactor for the synthesis of Nylon6. **[9]**

OR

Q8) Describe with neat process sheet the reactor systems used for PVC, HDPE polymers. **[18]**

Q9) a) Write a note on gel effect in step growth polymerization. **[8]**

b) Discuss the effect of reaction conditions on the viscosity build up in free radical polymerization. **[8]**

OR

Q10) Discuss in detail the Chiu's Model to explain the effect of diffusion at high conversion on the rate constant in Step Growth polymerization. **[16]**

Q11) a) Write a short note on Reactor Selection for carrying out polymerization reaction. **[8]**

b) Explain the reactor design in terms of following factors Polymerization Mechanism, Stoichiometric Factors, Thermodynamics Factors, and Transport Limitations. **[8]**

OR

Q12) a) Write in detail about the process control strategies in Continuous polymerization process. **[8]**

b) Discuss the choice between batch and continuous reactor for polymerization process. **[8]**

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[4164] - 682

B.E. (Polymer)

SURFACE COATINGS AND ADHESIVES

(2008 Pattern) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answers to Section - I and Section - II should be written on separate answer book.*

2)   *Solve 3 questions from Section - I and 3 questions from Section - II.*

3)   *Neat diagrams should be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Assume suitable data, if necessary.*

6)   *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a)   What are the various ingredients present in paint formulation? Explain their significance in formulation. Give atleast one example of each ingredient.   **[12]**

b)   Explain in detail the film formation phenomena in case of paint.   **[6]**

OR

Q2) a)   Explain the following terms - Varnish, Enamel, Lacquer.   **[6]**

b)   Write a short note on classification of oils used in surface coatings.**[5]**

c)   What are the molecular features those are necessary in surface coatings to achieve Exterior durability, Adhesion and Corrosion resistance.**[7]**

Q3) a)   Differentiate between Decorative paints and Industrial paints.   **[8]**

b)   Write short note on Water-based paints and Alkyd resins.   **[8]**

OR

Q4) a) What are the various methods of application of paint? Explain them in brief. **[8]**

b) Write a short note on Polyurethanes Paints and Acrylic Paints. **[8]**

Q5) a) Comment in detail on health and safety aspects related to paint industry. **[8]**

b) Write short notes on testing of paint for Density, Consistency, and Viscosity. **[8]**

OR

Q6) a) Write short note on testing of paint for mechanical properties and optical properties. **[10]**

b) Explain in detail how paints are manufactured. **[6]**

SECTION - II

Q7) a) Explain in detail Mechanical Interlocking theory in adhesives. **[9]**

b) Write a short note on Work of Adhesion, and explain its significance. **[9]**

OR

Q8) a) Explain in detail Wettability theory of adhesion. **[10]**

b) Briefly explain several steps involved in adhesive bonding process.**[8]**

Q9) a) Explain in detail the Classification of Adhesives. **[8]**

b) Write a short note on Epoxy based adhesives. **[8]**

OR

*Q10)*a) Write a short note on Solvent and Emulsion based adhesives. **[8]**

b) Explain in detail various adhesives formulations based on Polyurethane. **[8]**

*Q11)*a) With neat sketches briefly explain Shear and Tensile stresses in adhesive joint. **[5]**

b) Enlist the factors on which adhesive joint depends. **[5]**

c) Explain in detail the importance of surface preparation in adhesive joint. **[6]**

OR

*Q12)*a) What is the role of cleavage and peel stresses in adhesive joint design? **[6]**

b) What are the various tests carried out for evaluation of adhesive performance? Explain any one in detail? **[10]**

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SEAT No. :

[4164] - 695

B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a)   Define asymptotic notations. Explain their significance in analyzing algorithms. **[5]**

b)   Write the recurrence relation for quick sort. Compare its time complexity with brute force sorts. **[3]**

c)   Explain general strategy of Greedy Method with the help of its control abstraction for the subset paradigm. Write an algorithm which uses this strategy for solving the Knapsack problem. **[10]**

OR

Q2) a)   Write a note on Mathematical Induction and how it can be used to prove that an algorithm is correct. **[5]**

b)   What is divide and conquer strategy? Write an algorithm for Merge Sort. State its time complexity. **[6]**

c)   Explain the Greedy Kruskal's minimum spanning tree. Compare this with Greedy Prim's method. **[7]**

Q3) a)   A problem of allocating n units of resources to r projects is given. The net profit N(i, j) is obtained when j, $0 < = j < = n$, units of the resource are allocated to project i. For a maximum total net profit the resources must be optimally distributed to the r projects. Formulate this problem as an r + 1 stage graph problem. **[6]**

P.T.O.

b) What is the Optimal Binary Search Tree problem? Explain how principal of optimality holds for this problem. Also explain how it is solved using dynamic programming. **[10]**

OR

Q4) a) For a directed graph the edge length matrix is given below. Solve the Travelling Salesperson Problem for this 4 city graph using Dynamic Programming method. What will be the time complexity for an n city TSP problem solved using this method? **[7]**

$$\begin{bmatrix} 0 & 9 & 8 & 8 \\ 12 & 0 & 13 & 6 \\ 10 & 9 & 0 & 5 \\ 20 & 15 & 10 & 0 \end{bmatrix}$$

b) What is the Flow Shop Scheduling problem? Explain how principal of optimality holds for this problem. Also explain how it is solved using dynamic programming. **[9]**

Q5) a) Explain the difference between FIFO and LC Branch and Bound solution to 0/1 Knapsack. **[10]**

b) Write a backtracking algorithm for m Graph coloring. **[6]**

OR

Q6) a) Compare the Backtracking method with a depth first search technique. How is Hamiltonian Cycles problem solved using Backtracking? **[8]**

b) Write the control abstraction for LC-Search. Explain how Traveling Salesperson problem is solved using LCBB. **[8]**

SECTION - II

Q7) a) Differentiate between "polynomial" and "nondeterministically polynomial". **[2]**

b) What is meant by a problem "reducing to" another problem? Prove that the clique decision problem reduces to node cover decision problem. **[8]**

c) Show that the sum of subsets problem is NP-Hard, given that Exact cover problem is NP-Hard. **[7]**

Q8) a) State Cook's Theorem after explaining what is meant by P, NP and SAT problem. **[4]**

b) Prove that Satisfiability (with at most three literals per clause) reduces to chromatic number decision problem (CNDP). State what more is required to prove that CNDP is NP-Complete? **[8]**

c) Show that the Partition problem reduces to minimum finish time nonpreemptive schedule. **[5]**

Q9) a) Write in brief about a parallel computational model. **[4]**

b) Explain the prefix computation problem encountered in parallel solutions to problems. **[6]**

c) Write the Odd-even Merge algorithm and explain it with an example. **[7]**

OR

Q10) a) Explain how graph problems can be solved on parallel processors. **[10]**

b) Write and explain the Pointer Doubling algorithm. **[7]**

Q11) a) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. **[8]**

b) Explain how Huffman's technique is used for data coding. **[8]**

OR

Q12) a) Construct an optimal binary prefix code for the letters given below using Huffman's algorithm. **[4]**

Letter :	D	E	G	J	O	X	Z
Frequency :	10	12	9	7	18	5	2

b) Explain an image edge detection algorithm. **[8]**

c) How can resources allocation be done to avoid deadlock? **[4]**

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[4164] - 696

B.E. (Computer)

PRINCIPLES OF COMPILER DESIGN

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   Answer three questions from Section - I and three questions from Section - II.

   2)   Answers to the two sections should be written in separate books.

   3)   Neat diagrams must be drawn wherever necessary.

   4)   Figures to the right indicate full marks.

   5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Define passes and phases of compiler. Explain different phases of compiler in detail.   **[10]**

   b)   Differentiate between top down parser and bottom up parser.   **[8]**

OR

Q2) a)   Discuss the term 'ambiguity of grammar'. Consider following example grammar. $S \rightarrow S + S \,|\, S * S \,|\, a \,|\, b$

   Determine weather the grammar is ambigious? If yes, show resultant parse trees for one example string.   **[10]**

   b)   How lexical analysis detect the errors? Explain with suitable example.**[8]**

Q3) a)   What is mean by 'syntax directed definitions'? Give syntax directed definition for any example arithmetic expression?   **[8]**

   b)   Differentiate between L-attributed definitions and S-attributed definitions.
                                                                                               [8]

OR

Q4) Write short notes on   **[16]**

   a)   Semantic Analyser.

   b)   Syntax trees.

   c)   Translation Schemes.

   d)   Type system and Type expressions.

Q5) a) List the commonly used intermediate representation. Give one example of each one. **[8]**

   b) What is three address code? Construct the parse tree for following expression and generate three address code. a : = b + c + d. **[8]**

<center>OR</center>

Q6) a) How intermediate code generation is achieved using YACC. Explain in detail. **[8]**

   b) What is Backpatching? How translation of boolean expression is done using batchpatching. **[8]**

SECTION - II

Q7) a) Explain the significance and Design of symbol table in the context of compiler. **[6]**

   b) What is printed by the following program assuming **[12]**
      i)   call - by - value
      ii) call - by - reference
      iii) copy - restore
      iv) call - by - name

```
Program main (input,output);
   Procedure p(x,y,z);
      begin
            y : = y + 1;
            z : = z + x;
      end
begin
   a : = 2;
   b : = 3;
   p(a+b, a, a,);
   Print a;
end
```

<center>OR</center>

Q8) a) For the following code show the snapshots of activation record **[10]**
```
int x = 2
void f (int n)
   {
      static int x = 1;
      g(n);
      x--;
   }
```

```
void g (int m)
    {
       int y = m – 1;
       if (y > 0)
       {
              f(y);
              x--;
       }
    }
main ()
{
       g(x);
       return 0;
}
```

b) Explain briefly : Run - time Storage.   **[8]**

Q9) a) What is loop transformation? What are its types?   **[8]**

b) Give the sequence of three address instructions corresponding to each of the following arithmetic expressions :   **[8]**

   i)   2 + 3 + 4 + 5

   ii)   2 + (3 + (4 + 5))

   iii) a*b + a*b*c

   iv)   –a * – b* – c + a*b.

<div align="center">OR</div>

Q10) a) With proper examples explain following optimizations :   **[8]**
   i)   Constant propagation.
   ii)   Variable propagation.
   iii) Strength reduction.
   iv)   Dead code elimination.

b) Write short note on : Global data flow analysis.   **[8]**

Q11) For the machine that contains three registers R1, R2, R3 and following instructions.   **[16]**
MOV MEM, REG
MOV REG, MEM
SUB REG1, REG2
SUB MEM, REG
MOV REG1, REG2
Use optimal code generation algorithm for following expression tree and generate target code.

(((a – b) – (c – d)) – (e – (f – (g – h))))

Q12) For following piece of code show, three address code, AST, DAG and
target code. **[16]**

```
repeat {
        p = p + x[i]/y[i]
}
 until i > 100
```

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[4164] - 697

B.E. (Computer Engineering)
OBJECT ORIENTED MODELING & DESIGN
(2008 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the 4+1 view architecture with corresponding UML diagrams associated with each view. **[8]**

b) Define the following UML concepts with an example. **[8]**

    i) Constraints.   ii) Association.

    iii) Behavioral thing.   iv) Collaboration.

OR

Q2) a) What do you mean by MDA? How UML supports the concept of MDA? **[6]**

b) Give the OCL expression syntax with an example. **[6]**

c) What is the importance of modeling in software development? **[4]**

Q3) a) Explain the requirements metamodel with a neat diagram. **[6]**

b) Write the specification of the scenario 'searching a book' with alternate flows, in the library management system, using the usecase template. **[6]**

c) How do you model an exception in an activity diagram? **[4]**

OR

P.T.O.

Q4) a) Write the scope of the system for 'Online Book shopping' system and draw the usecase diagram. **[6]**

b) What are the types of analysis classes? Explain with an example each.**[6]**

c) How do you refine usecases into sub usecases? **[4]**

Q5) a) Draw the class diagram for a banking system with two classes, Account and Customer. Customer can open a saving or a current account and can do 'deposit' and 'withdraw' transactions. Identify suitable attributes and operations for the classes. **[8]**

b) Explain any 3 dependency stereotypes used in a class diagram. **[6]**

c) What is a package? How do you model a subsystem using a package? **[4]**

<div align="center">OR</div>

Q6) a) A 'personal diary' mobile application manages the daily to-do tasks, appointments and contacts for a user. Give design model for this system with the class diagram by making suitable assumptions about the scope of the system. **[8]**

b) What is an object diagram? Give the application of object diagram with a suitable example. **[6]**

c) Give the types of inheritance with UML diagram. **[4]**

<div align="center">

SECTION - II

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Q7) a) What is an interaction? Draw the sequence diagram for the 'Issue book' sequence for a Library Management System showing the actor and sequence of messages. **[8]**

b) Explain the timing diagram with its importance in an embedded application. **[6]**

c) Differentiate between sequence and communication diagram. **[4]**

<div align="center">OR</div>

Q8) a) Draw the state diagram with composite states for ATM card reading and authentication system. **[8]**

b) Draw the sequence diagram for 'Login with username and password' showing alternate sequences. **[6]**

c) What is the purpose and need of interaction overview diagram? **[4]**

Q9) a) What is a component? What are the different types of components? How do you model the source code using components? **[8]**

b) Give the different types of systems which can be modeled using deployment diagram? Draw the deployment diagram for an email system. **[8]**

OR

*Q10)*a) What do you mean by two tier and three tier architecture? Draw the deployment diagram for a 2 tier web application. **[8]**

b) Explain the following in brief in the context of component diagram.**[8]**
   i) provided and required interfaces.
   ii) ports and connectors.

*Q11)*a) What is a design pattern? How do you categorize design pattern? Give an example for each category. **[6]**

b) Explain the solution of facade pattern using UML diagram. **[6]**

c) What do you understand by forward and reverse engineering? **[4]**

OR

*Q12)*a) Explain the iterator pattern with intent, application and solution. **[8]**

b) Why there is a loss of information in reverse engineering? How do you forward and reverse engineer a class diagram? **[8]**

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[4164] - 698

B.E. (Computer Engineering)
IMAGE PROCESSING
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1) *Answer any three questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Digital Image. Explain different types of image. Explain application of Image processing.   **[8]**

  b) Explain fundamental steps in Digital Image processing.   **[8]**

OR

Q2) a) Explain Human Visual System.   **[8]**

  b) Write a note on Digital Imaging Hardware and Software.   **[8]**

Q3) a) What is digital image processing? Explain sampling and quantization.
                                                                 [8]

  b) What is the need of transform? Explain Hadamard transform.   **[8]**

OR

Q4) a) What is mean by image enhancement? List and explain image enhancement techniques in spatial domain.   **[8]**

  b) List and explain different image enhancement filters used in frequency domain.   **[8]**

P.T.O.

Q5) a) What is Hough Transform? What determines the accuracy of Hough transform? **[10]**

b) Apply Region based split and merge technique to segment the following image. **[8]**

OR

Q6) a) What is image segmentation? Explain image segmentation based on thresholding. **[10]**

b) What is texture? Explain statistical and spectral descriptor. **[8]**

SECTION - II

Q7) a) Explain wiener filter. When will wiener filter reduce to an inverse filter? **[8]**

b) What is the difference between image restoration and image enhancement? What do they have in common. **[8]**

OR

Q8) a) Explain Image degradation and restoration model. **[8]**

b) What do you mean by Image denoising? Explain different noise model in image. **[8]**

Q9) a) What are the limitations of Huffman code? How arithmetic coding is overcome these limitation? **[10]**

b) Write a note on dictionary-based compression. **[6]**

OR

*Q10)*a) Distinguish between Scalar and vector quantization. **[6]**

b) What is object recognition? In brief state and explain classification of object recognition approaches. **[10]**

*Q11)*a) What is sub-band coding? Explain image pyramids.   **[8]**

b) Define WAVELET with their properties.   **[6]**

c) Why is Zig-Zag scanning preferred in JPEG standard.   **[4]**

OR

*Q12)*a) Explain the need of dimension reduction. Explain local and Principal Component Analysis for dimension reduction.   **[10]**

b) Write a short note on :   **[8]**

i) Face detection.

ii) Need for JPEG2000 Standard.

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[4164] - 699

B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF COMPUTER NETWORKS
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any 3 questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and   steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is arrival statistics and service statistics in M/M/1 system. Explain Markov chain formulation. **[10]**

b) A athletic facility has five tennis courts. Players arrive at the court at a poisson rate of one pair per 10 min. and use a court for an exponentially distributed time with mean 40 min. **[8]**

i) Suppose that a pair of players arrives and finds all courts busy and K other pairs waiting in queue. How long will they have to wait to get a court on the average?

ii) What is the average waiting time in queue for players who find all courts busy on arrival?

OR

Q2) a) Person arrive at a xerox machine according to a poisson process with rate one per minute. The number of copies to be made by each person in uniformly distributed between 1 to 10. Each copy requires 3 sec. Find the average waiting time in queue when : **[10]**

i) Each person uses the machine on first come first serve basis.

ii) Persons with no more than 2 copies to make are given preemptive priority over other persons.

b) Explain Jackson's Theorem for closed Networks. **[8]**

P.T.O.

Q3) a) List and explain common resources. Used in system design with their metrics. **[8]**

b) What is switch fabrics? Why does a third generation switch fabrics provides more band width than second generation switch. **[8]**

OR

Q4) a) Explain modeling and simulation techniques of system design with suitable example. **[8]**

b) Explain physical and logical designing issues of Network Backbone. **[8]**

Q5) a) Explain the rate-controlled scheduling for guaranteed-service connection. **[8]**

b) Explain, why do we prefer WFQ to WRR even in networks with fixed size packets. **[8]**

OR

Q6) a) Explain in details ATM forum end-to-end rate controlled scheme and credit based schemes of closed loop flow control. **[8]**

b) If a token is 200 bytes long, the token bucket is 1 kbyte, and token arrive at the rate of 1 every second, what is the least and most delay suffered by a packet of size 800 bytes if it arrives when the token bucket has 100 bytes in it. **[8]**

SECTION - II

Q7) a) Explain leaky-bucket regulator with help of diagram. **[6]**

b) Enlist and explain important properties of traffic descriptor. **[6]**

c) Explain different techniques used for capacity planning of network.**[6]**

OR

Q8) a) What is peak-load pricing. Explain if peak-rate allocation is reasonable for data traffic. **[10]**

b) What is QoS? Explain different approaches to improve QoS. **[8]**

Q9) a) Explain router architecture with suitable diagram. **[8]**

b) Explain expanded tries scheme in details. **[8]**

OR

Q10) a) What is IP trace back? What are IP trace-back evaluation schemes? Explain its implications and challenges. **[8]**

b) Enlist and explain various packet scheduling algorithms. **[8]**

Q11) a) Divide a network 192. 168.4.0/24 into two sub networks having host size of 50. Find subnetwork address, subnet mask and IP address range for the sub network? **[8]**

b) Explain which points are considered while planning and implementing network. **[8]**

OR

Q12) a) What is subnetting? You have been allocated a 130.16.0.0 IP address for your network. You have to subnet this into 13 subnets and allow for the expansion in the near future. Devise an IP subnet plan, giving the network, first host, last host and broadcast IP addresses for each subnet. Also specify the subnet mask you would use. **[8]**

b) Discuss tools available for bandwidth and security management. **[8]**

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[4164] - 722

B.E. (Information Technology)

OBJECT ORIENTED MODELING & DESIGN

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and*
     Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.
2)   *Answers to the two sections should be written in separate books.*
3)   *Figures to the right indicate full marks.*
4)   *Neat diagrams must be drawn wherever necessary.*
5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain in detail new features added in UML 2.0.   **[6]**

   b)   OMG standard CORBA is a standard for middleware to develop
        distributed networked applications. Explain the following concepts in
        the context of distributed applications and CORBA :   **[6]**

   i)   Distributed Objects/Components.

   ii)   Stubs and Skeletons.

   iii) Interfaces.

   c)   Discuss by giving appropriate example when will you model a entity
        such as 'bank account' as.   **[4]**

   i)   Attribute

   ii)   Class

OR

Q2) a)   What is RUP? How it is different from waterfall model?   **[6]**

   b)   What is association? Model the associations that a 'Programmer' can
        work on at most one 'Project' at a time but a Manager can work on more
        than one projects at the same time.   **[4]**

   c)   Show how Stereotype, Tagged Values, and Constraints can be used to
        extend UML. Explain the concepts by taking the example of modeling a
        'Library Database Management System'.   **[6]**

Q3) a) Explain with example following types of Stereotypes : **[8]**

     i)   Instanceof   ii)   Refine

     iii) Friend   iv) Become

b) State common uses of class diagram. Draw a class diagram for the system explained below : **[9]**

The system is for a marketing company. We have the country divided into marketing regions. salespersons work for regions. Salespersons make sale that are described in terms of the day of sale, the products sold with quantity and rate. The products are categorized into two categories: indian products and imported products. Use aggregation, inheritance, association, and dependency and realization relationships to model above system.

OR

Q4) a) Differentiate with example : **[8]**

     i)   Aggregation and Composition.

     ii)   Collaboration and Usecase.

b) How are use cases useful at analysis, testing phases of software development? **[5]**

c) What kind of projects will best benefit by UML modeling and which kind of projects will not benefit significantly? **[4]**

Q5) a) Draw a use case diagram using advanced notations for a 'College BE Project Management System'. System will help department to manage college projects approval, monitoring project progress, project exam scheduling and scheduling of mock presentations for projects. Students will use system to report to department and guide, view project deadlines, communicate (problem, reports) with guide (two way). Students may also co-ordinate with each other through the system. HOD can use the system to generate various departmental and university related reports for BE projects. **[8]**

b) In the context of composite structure diagram, explain following terms with example : **[9]**

     i)   Port

     ii)   Connector

     iii) Part

Draw a composite structure diagram for banking system.

OR

Q6) a) Give notation for an interface (in two different ways) and show how it relates to components and classes. **[6]**

b) What is OCL? Give the example of Pre-condition, Post-condition in OCL. **[6]**

c) Draw a package diagram for "Railway Reservation System" showing packages, elements owned, package relationships. **[5]**

SECTION - II

Q7) a) Draw a sequence diagram for the use case 'Connect a call to a certain extension number' in a telephone EPABX at your college. EPABX has multiple incoming lines. Incoming call is forwarded to extension number directly if known. In case caller does only know name of employee, extension number is first searched then extension is connected. Call can be kept on hold till extension if busy is available again or a local conversation (between two extensions) can be interrupted for outside call. **[8]**

b) What is the purpose of interaction overview diagram? Draw a interaction overview diagram to represent 'discharge formalities' that are required to be done in hospital. **[8]**

OR

Q8) a) Give notation for following concepts in Sequence diagram and also explain the need for the concept with suitable example from the domain of buying computers online. Make suitable assumptions about the working of your hypothetical Online Computer Shop. **[10]**

i) Create   ii) Return values

iii) Self call   iv) Destroy

b) Explain the need of timing diagram. Draw timing diagram for any real time applications. **[6]**

Q9) a) Consider a typical day that one may spend shopping for items at the local shopping mall as a visitor. Make further relevant and meaningful assumptions about the working of the mall and what you may do as part of shopping to fill the gaps in the above description. For above example draw activity diagram. Make use of : **[8]**

i) Fork and Join   ii) Swim lanes

iii) Object flow   iv) Guard condition

b) Define the term artifact. How does one model parallel message flow in sequence diagram? Explain. **[8]**

Q10) a) State in Embedded applications why are state diagrams one of the most important diagrams. Explain with example. **[8]**

b) Explain following terms with example : **[8]**

i) Loop and break in sequence diagram.

ii) Activity states and action states.

Q11) a) Draw a deployment diagram for the following application. A full-fledged website is to be hosted for your college. Make suitable assumptions.**[6]**

b) Define the term component. Explain the concept of provided and required interface that a component supports. Model a component 'Product' that can give us the details of the product such as description, price, and available quantity. The product component provides various services into one or more interfaces. Product Brower component needs above services to display product information. Draw component diagram using class for above system. **[8]**

c) How you will model Distributed system using UML? Explain with example. **[4]**

OR

Q12) a) Differentiate Synchronous and Asynchronous Message with example.**[4]**

b) Compare Collaboration and Sequence diagram. Draw a Collaboration diagram for the uses case 'Registration of New Student at School'. **[8]**

c) Model a software system for controlling a water purifier which can be either ON or OFF. In the ON state it can be in ARO or UV mode. There are buttons to change from one mode to other or this mode can change automatically based on the hardness of water cutoff (Aro when pH value < 1.5 and UV when pH value > 1.5). User can manually override any nodes through by pressing appropriate buttons. Draw state machine diagram for given system. **[6]**

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[4164] - 723

B.E. (IT)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer question 1 or 2, 3 or 4 and 5 or 6 from Section I and question 7 or 8, 9 or 10 and 11 or 12 from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain following terms : **[12]**

     i)   Unit testing

     ii)   Regression testing

     iii)   Integration testing

     iv)   System testing

   b) What are difference between errors, faults and defects. **[3]**

   c) Explain the term "Test bed". **[3]**

<div align="center">OR</div>

Q2) a) Explain "Testing Life cycle" with a neat diagram. **[6]**

   b) List different components of Test Plan. Explain any 3 of them. **[6]**

   c) What is boundary value analysis? Explain the same. **[6]**

Q3) a) What is white box testing? Explain any one of the white box testing approach in detail. **[8]**

   b) What is test management? Explain in detail. **[8]**

<div align="center">OR</div>

Q4) a) Explain defect life cycle. **[6]**

b) What are different types of defect analysis procedures? **[6]**

c) Explain defect prevention process. **[4]**

Q5) a) Explain representational theory, scales and meaningfulness in measurement. **[8]**

b) What are different metrics for software maintenance? **[8]**

OR

Q6) a) Explain in-process quality metric. **[7]**

b) Explain terms : **[9]**

i) MTTF

ii) Defect Density

iii) Function point.

SECTION - II

Q7) a) Define Software Quality and Software Quality Assurance. List the various objectives of Software Quality Assurance (SQA). **[8]**

b) Classify software quality factors with respect to Product operation and Product revision. Explain correctness and maintainability quality attributes with proper examples. **[8]**

OR

Q8) a) Explain defect amplification and removal process in brief. Compare this process when review conducted and when no reviews are conducted.**[8]**

b) Compare the following : **[8]**

i) Quality Control and Quality Assurance.

ii) Prevention cost of quality and Appraisal cost of quality.

Q9) a) Explain the benefits of using SQA standards. Also describe the contributions made by the use of standards in SQA. **[6]**

b) What is SEI's Capability Maturity Model (CMM)? Explain briefly each level with their Key Process Area (KPA). **[10]**

OR

Q10) a) Differentiate between CMM and CMMI quality models. **[8]**

b) Describe the general principles underlying quality management according to ISO 9000. Also describe the ISO 9000 certification process. **[8]**

Q11) Write short notes on any three : **[3 × 6 = 18]**

a) Six Sigma measure of software quality.

b) Software Configuration Management (SCM).

c) Goals and Activities performed in Organization Process Definition (OPD).

d) Process Change Management (KPA for Level 5).

OR

Q12) a) Write in detail the actors and their roles in a typical software quality assurance Organizational framework. **[6]**

b) Compare between Inspection, Walkthrough and Review. **[4]**

c) Write a note on : **[2 × 4 = 8]**

i) Pareto Chart.

ii) Fishbone Diagram.

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[4164] - 724

B.E. (IT)

ADVANCED DATABASE MANAGEMENT SYSTEM

(Elective - I) (2008 Pattern) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) Answer three questions from each Section.

2) Answers to the two sections should be written in separate books.

3) Figures to the right indicate full marks.

4) Neat diagrams must be drawn wherever necessary.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Draw PL/SQL block structure and execution environment. Explain each block. **[8]**

b) Which control structures are allowed in PL/SQL? **[8]**

OR

Q2) What are cursors in PL/SQL? Write a cursor to calculate a bill in cake shop for a customer. **[16]**

Q3) a) What are transactional workflows? **[8]**

b) What are two-phase locks? Give an example. **[8]**

OR

Q4) a) Specify the need of concurrency control mechanisms. State the mechanisms. **[8]**

b) What are compensating transactions? **[8]**

Q5) a) What are the limitations of RDBMSes? **[10]**

b) What is XML DTD? Explain with example. **[8]**

OR

Q6) a) How is inheritance implemented in SQL? **[8]**

b) How is querying and transformation done in XML? **[10]**

SECTION - II

Q7) a) Write a short note on classes of schemas that are popularly used for modeling data warehouse. **[9]**

b) What is preprocessing? What is the need of this step while building data warehouse? **[9]**

OR

Q8) a) Explain how Oracle implements data warehouse. **[9]**

b) What does ETL mean? Explain any ETL tool in short. **[9]**

Q9) a) What is k-means algorithm used for? Explain with help of example. **[8]**

b) What is data mining? Mention any five algorithms. **[8]**

OR

Q10) Write short notes on : (any two) **[16]**

a) Categories of OLAP tools

b) Supervised and unsupervised learning

c) Classification algorithm

Q11) a) What are locks? Why do we need them? What are the disadvantages of locks? **[8]**

b) Write a note on Database threats. **[8]**

OR

Q12) a) Explain statistical database auditing. **[8]**

b) What is the need of granting and revoking privileges? **[8]**

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[4164] - 729

B.E. (IT)

MOBILE COMPUTING

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

    1)   *Answers to the two sections should be written in separate books.*

    2)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is handoff mechanism? Explain the concept of soft handoff and hard handoff.   **[8]**

      b)   Explain the architecture of basic cellular system.   **[8]**

<div align="center">OR</div>

Q2) a)   Explain how a small frequency spectrum is used in cellular system. **[8]**

      b)   What is cell splitting? Explain why is it necessary to split the cell. **[8]**

Q3) Explain GSM architecture, entities in detail along with its security issues.**[18]**

<div align="center">OR</div>

Q4) Write short notes on :   **[18]**

      a)   USSD

      b)   GSM TDMA frame

      c)   VLR overflow problem

Q5) a)   Explain the SMS architecture along with its features.   **[8]**

      b)   What is number portability? Explain its various types.   **[8]**

<div align="center">OR</div>

Q6) a)   Explain the service node approach and hot billing approach used in mobile prepaid service.   **[8]**

      b)   Explain in detail 'International roaming in GSM'.   **[8]**

SECTION - II

Q7) a) Explain features, advantages and limitations of GPRS. **[8]**

b) Explain WAP model in detail. **[8]**

OR

Q8) a) Explain GPRS architecture in detail. **[8]**

b) Differentiate 2G and 3G mobile services and hardware features. **[8]**

Q9) a) What is the importance of home agent and foreign agent in mobile IP? **[8]**

b) Explain various features and header format of IPv6. **[8]**

OR

Q10) a) Write a detailed note on MANET. **[8]**

b) Explain DSDV and DSR in brief. **[8]**

Q11) Write short notes on : **[18]**

a) Bluetooth technical features.

b) WLL

c) RFiD

OR

Q12) Write short notes on : **[18]**

a) WLAN

b) FHSS and DSSS

c) UMTS

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[4164] - 731

B.E. (Information Technology)
DISTRIBUTED SYSTEMS
(Sem. - II) (2008 Pattern)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer question 1 or 2, 3 or 4 and 5 or 6 from Section - I and question 7 or 8, 9 or 10 and 11 or 12 from Section - II.*
2) *Answers to the two sections should be written in separate answer sheet.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Following are the classical set of assumptions made by developers in distributed systems. **[8]**

     i) The network is reliable.

     ii) Latency is zero.

     iii) Bandwidth is infinite.

     iv) The network is secure.

     Discuss why these assumptions maybe wrong. Justify these assumptions may not always true while designing the real distributed systems.

     b) List the main software components that may fail when a client process invokes a method in a server object. Suggest how the components can be made to tolerate one another's failures? **[8]**

OR

Q2) a) What is marshaling? List out the different approaches of external data representation and discuss each approach in detail. **[8]**

     b) The Internet enables users to access services and run application over a heterogeneous collection of computers and networks. How to apply heterogeneity for networks, computer hardware, operating systems and programming languages in distributed systems. **[8]**

Q3) a) Write a C function for adding two integers and call it using RPC and identify the contents generated by stub. **[6]**

b) Explain the purpose of following with respect to RMI. **[6]**
   i) Dispatcher
   ii) Reflection and
   iii) Registry in RMI

c) State and explain the Invocation models supported in CORBA. **[6]**

OR

Q4) a) List and explain the steps involved in doing remote computation through RPC. **[6]**

b) Compare static and dynamic remote method invocation with the help of suitable example. **[6]**

c) Explain Message Queuing model with suitable example. **[6]**

Q5) a) Discuss following with an examples : **[8]**
   i) Logical Clock
   ii) Physical Clock and
   iii) Clock Skew

b) Write Lamport's time stamp algorithm in pseudo C and explain it with suitable example. **[8]**

OR

Q6) a) Write Bully algorithm for electing a coordinator in pseudo C and explain it with suitable example. **[8]**

b) List and compare various algorithms used to achieve Mutual exclusion in a Distributed Systems with respect to. **[8]**
   i) Messages per entry/exit   ii) Delay before entry
   iii) Time complexity   iv) Problems

SECTION - II

Q7) a) List and explain the forms of transparency which have been partially or wholly addressed by current distributed file systems. **[5]**

b) Describe basic NFS architecture for Unix system with the help of neat diagram. **[8]**

c) What is naming service X.500? **[5]**

OR

Q8) a) How does the CODA file system used for replication strategy? **[5]**

b) What are different requirements and pitfalls in the design of distributed file system? Explain any four requirements. **[8]**

c) How does mounting of a remote file system take place in NFS? Describe the functionality of an auto-mounter in NFS. **[5]**

Q9) a) Consider the following set of concurrently executing processes

P1	P2	P3

----

x=1;	y=1;	z=1;
print (y, z);	print (x, z);	print (x, y);

Is 001110 a legal output for a sequentially consistent memory? Explain your answer. **[5]**

b) Explain following consistency models with suitable examples :
   i) Causal   ii) FIFO   **[6]**

c) Describe object replication and scaling technique in distributed shared memory systems. **[5]**

OR

Q10) a) How does granularity affect DSM system performance? **[5]**

b) Explain following consistency models with suitable examples : **[6]**
   i) Strict   ii) Entry

c) What kind of consistency would you use to implement an electronic stock market? Justify your answer. **[5]**

Q11) a) Describe at-least-once and at-most once semantics in detail. For each of the following applications do you think at-least-once semantics or at-most once semantics is best? Discuss. **[8]**
   i)   Reading and writing files from a file server.
   ii) Compiling a program.

b) What is recovery line? Draw and explain domino effect in detail. **[8]**

OR

Q12) a) In a fault tolerant distributed system how check-pointing is used. Describe following check-pointing : **[8]**
   i)   Independent check-pointing
   ii) Coordinated check-pointing

b) Consider a Web browser that returns an outdated cached page instead of a more recent one that had been updated at the server. Is this a failure, and if so, what kind of failure? **[4]**

c) Draw and explain triple modular redundancy. **[4]**

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[4164] - 732

B.E. (Information Technology)
INFORMATION RETRIEVAL
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*
Instructions to the candidates:-
  1) *Answers to the two sections should be written in separate books.*
  2) *Neat diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*
  4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With the help of block diagram explain typical Information Retrieval System. **[8]**

b) Explain Measures of Association in detail. **[4]**

c) What do you mean by Cluster. State and Explain Cluster Hypothesis.**[6]**

OR

Q2) a) What do you mean by Cluster. State and explain Cluster Hypothesis.**[4]**

b) State Zipf's Law, Explain Luhn's Idea. **[6]**

c) Explain Graph Theoretic approach for clustering and draw the cluster derived from the given similarity matrix where Threshold = 0.89 and **[8]**

1	.6				
2	.6				
3	.9	.8			
4	.9	.7	.7		
5	.9	.6	.6	.9	
6	.5	.5	.5	.9	.5
	1	2	3	4	5	6

Q3) a) Explain Inverted Index file. How it can be used in Information Retrieval. **[8]**

b) Explain Vector Model in detail. **[8]**

OR

Q4) a) Explain with an example organization of records in Multi-lists, state its Advantages over Inverted Files. **[8]**

b) Explain the different kinds of Search strategies. **[8]**

Q5) a) Discuss the five key abstractions used to design or model Digital Libraries. **[10]**

b) Explain Harmonic Mean and E measure. **[6]**

OR

Q6) a) Explain need for Single Value Summaries and various strategies in detail. **[10]**

b) Write short note on TREC. **[6]**

SECTION - II

Q7) a) Describe MIMD architecture with respect to Parallel IR. How inverted file is used for MIMD. **[10]**

b) Define Ontology? Explain in detail reasons to develop Ontology? **[8]**

OR

Q8) a) Explain Collection Partitioning, source selection and query processing with respect to Distributed IR. **[10]**

b) What is parallel computing? Discuss performance measures of parallel computing. **[8]**

Q9) a) How image analysis and image access accomplished in MULTOS Data Model. **[8]**

b) Explain the Generic Multimedia Indexing Approach. **[8]**

OR

Q10) a) Discuss the application of the GEMINI approach for Two- dimentional Color Images. **[8]**

b) Discuss Uncertainty, Proximity, and Weights in Query Expressions. **[8]**

Q11) a) Discuss different forms of searching the web. Explain with proper example. **[8]**

b) Explain the crawler-indexer architecture. **[8]**

OR

Q12) a) Write short notes on: Web Data Mining. **[8]**

b) What is Collaborative Filtering. Discuss its Advantages and Disadvantages. **[8]**

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[4164] - 733

B.E. (Information Technology)

REAL TIME SYSTEM

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate sheet.*
2) *Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicates full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Give definition of Real time system. Classify following systems as hard or soft with brief justification. **[8]**

     i) Electronic pacemaker.

     ii) Digital watch

     iii) Electronic breaking system in automobile.

     b) List any four important issues in the design of Real time System with their significance with respect to RTS. **[8]**

<div align="center">OR</div>

Q2) a) Explain following terms in brief : **[8]**

     i) Periodic and aperiodic tasks.

     ii) Time constraints in hard and soft RTS.

     b) What are the requirements of real time databases and how they are handled in real time system design? **[8]**

Q3) a) What is runtime anomaly? State the conditions to cause such anomaly.**[8]**

     b) What happens when the actual computation time of a task exceeds its worst case computation time? Suggest a mechanism to overcome this problem. **[8]**

<div align="center">OR</div>

Q4) a) List assumption for uni-processor scheduling algorithms. What are necessary and specific conditions for RM schedule-ability. **[8]**

b) Run a RM schedule-ability check for the set of following tasks and show the schedulable tasks. **[8]**

Ti	Ei	Pi
1	20	100
2	30	150
3	80	210
4	100	400

Q5) a) State the requirements of real time system programming language. **[8]**

b) Explain in brief Real time vs. General purpose data bases. **[10]**

OR

Q6) a) What are real time system language features that support task concurrency and security? **[8]**

b) What is serialization consistency? What are the parameters required for maintaining transaction order? **[10]**

SECTION - II

Q7) a) Discuss the limitations of real time LAN protocols with respect to guaranteed transmission, priority inversion avoidance, and low run time overhead. **[10]**

b) Describe Real time LAN protocol strategies for providing service guarantee. **[8]**

OR

Q8) a) Discuss anyone controlled access protocol for Real time LAN protocol. **[8]**

b) Best effort protocols offer better performance than guarantee based protocols justify. **[10]**

Q9) a) List the minimum set of operations that a real time OS kernel needs to support. **[8]**

b) Compare and contrast static and dynamic priorities **[8]**

OR

Q10) a) Differentiate between Real Time Multi-user and Multi-Tasking Operating systems. **[8]**

b) Write features of commercial RTOS. **[8]**

Q11) a) Discuss the causes of failures and describe the type of faults in Real Time Systems. **[8]**

b) Describe anyone fault detection measures in Real Time System. **[8]**

<div align="center">OR</div>

Q12) a) How redundancy is used in Real Time system for fault tolerance. **[8]**

b) Explain following terms with respect to failures in Real Time Systems.**[8]**

    i)   Hardware and software fault.

    ii)   Error recovery

    iii)   Fault latency

    iv)   Error latency

<div align="center">✪✫✪✫</div>

[4164] - 734

B.E. (IT)

SOFTWARE ARCHITECTURE

(Sem. - II) (2008 Pattern) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Figures to the right indicate full marks.

2)   Answers to the two sections should be written in separate answer books.

3)   From Section - I, Answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).

4)   From Section - II, Answer (Q7 or Q8) and (Q9 or Q10) and Q11.

5)   Make suitable assumptions wherever relevant and appropriate.

SECTION - I

Q1) a) Explain Architecture Business Cycle.   **[8]**

b) What is software architecture? Explain with example. How do the architectures affect the nature of the organization?   **[10]**

OR

Q2) a) What documentation would you need to do performance analysis of an architecture?   **[4]**

b) Explain with suitable example :   **[8]**

   i)   Architecture is high-level design.

   ii)   Architecture is the overall structure of the system.

   iii) Behavior of each software element is part of the architecture.

   iv)   Architecture has components & connectors.

c) Explain : Architecture is the vehicle for stakeholder communication. **[6]**

Q3) Explain and illustrate the following concepts (in context of quality attributes) with examples :   **[16]**

a) Following concern in context of modifiability : "When is a change made and who makes it"

b) Any one quality attribute scenario for performance.

c) Measuring and specifying performance for a web site.

d) Usability aspects observed by you in a typical MS WINDOWS desktop software. (Hint: MS WORD/ IE7)

<div align="center">OR</div>

Q4) Explain and illustrate the following concepts (in context of quality attribute) with examples, in brief. **[16]**

a) Maintaining data confidentially.

b) Quality attribute scenario.

c) Performance bottlenecks.

d) Non functional requirements.

Q5) a) Give the definition, uses and structure of "Proxy" pattern. **[8]**

b) What are design patterns and anti-patterns? Explain significance of each with reference to software quality. **[8]**

<div align="center">OR</div>

Q6) a) What can a Mediator pattern do for us,. illustrate with an example. **[4]**

b) Which design pattern will you choose to "Ensure a single instance of a class in memory for the application ", How can one achieve/ implement this in C++. **[6]**

c) Write short note on concept of delegation. **[6]**

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SECTION - II

</div>

Q7) a) Compare different architecture styles. **[10]**

b) Write short note on : **[8]**

   i) Coupling in XML

   ii) Structure of XML

<div align="center">OR</div>

Q8) a) Explain three tier architecture with reference to presentation, business and persistence layers. **[10]**

b) Explain the concept of : **[8]**

   i) loose coupling

   ii) Addressing quality attributes through multi tier architecture.

Q9) a) What kind of responsibilities does a Server side have in a web application? **[4]**

b) Explain following web concepts through simple examples : **[12]**

   i) Entity Beans

   ii) Session Beans

   iii) http

   iv) Message Beans

<div align="center">OR</div>

Q10) a) What kind of responsibilities does a web client have? How can one make web client more dynamic. **[4]**

b) Explain with example : **[12]**

   i) CGI

   ii) Application Server

   iii) Legacy Application

   iv) Web Server

Q11) Write short note (Any four) : **[16]**

   a) Components and Interfaces.

   b) DLL

   c) .NET assemblies

   d) .NET remoting

   e) .NET web services

   f) IUNKNOWN

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[4164] - 735

B.E. (Information Technology)
ADVANCED GRAPHICS
(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1) Answer Q1 or Q2, Q3 or Q4 and Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10 and Q11 or Q12 from section II.

   2) Answers to the two sections to be written separately.

   3) Neat diagrams must be drawn wherever necessary.

   4) Assume suitable data, if required.

   5) Figures to the right indicate full marks.

SECTION - I

Q1) a) Explain anyone method for 3D display along with necessary mathematical equations. **[6]**

    b) Explain with data structures, how polygon tables are used for representing polygon surfaces. **[6]**

    c) Explain with mathematical treatment following quadric surfaces. **[6]**

        i)   Sphere

        ii)   Ellipsoid

<div align="center">OR</div>

Q2) a) Explain with example Zero order, First order and Second order parametric continuity. **[6]**

    b) Explain how one can specify the particular spline representation with the help of boundary conditions. **[6]**

    c) Give properties of B-Spline curves and also give the blending functions for the same. **[6]**

Q3) a) Explain conventional method for animation. **[4]**

    b) Give features of Diagrammatic Animation Language. **[4]**

    c) Explain any two methods for controlling animation. **[8]**

<div align="center">OR</div>

Q4) a) Give features for animation language ASAS. Give its merits over Linear list notations. **[8]**

b) State basic rules for generating animation. **[4]**

c) Explain frame by frame animation technique with an example. **[4]**

Q5) a) Explain with example primitive instancing method for solid modeling.**[8]**

b) Define translational sweep and rotational sweep. **[8]**

OR

Q6) a) Explain with example how Octrees are used for representing solids using spatial partitioning representation. **[8]**

b) Compare various solid modeling methods on following points. **[8]**
   i) Accuracy
   ii) Domain
   iii) Validity
   iv) Closure

SECTION - II

Q7) a) Explain RGB, HSV Color Models. **[8]**

b) Explain basic ray tracing algorithm. **[8]**

OR

Q8) a) Explain distributed ray tracing method. **[8]**

b) Write short notes on following illumination methods. **[8]**
   i) Diffuse Reflection
   ii) Specular Reflection

Q9) a) Explain with neat diagrams and mathematical treatment Gauraud shading method. **[8]**

b) Explain ray tracing from - cone and beam **[8]**

OR

Q10) a) Explain with diagram and mathematical treatment Phong shading method. **[8]**

b) Write short notes on following illumination models. **[8]**
   i) Z Buffer Transparency
   ii) Shadows

Q11) a) Define the term Virtual Reality. **[2]**

b) Explain virtual reality Languages **[8]**

c) Discuss the devices used in virtual reality. **[8]**

OR

Q12) Discuss any application in detail in virtual reality with respect to following points. **[18]**

a) Language and method used

b) Devices used

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[4164] - 736

B.E. (Information Technology)

ADVANCED COMPUTER NETWORKS

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in detail how today's network evolved from telephone network.**[8]**

     b) What are the network elements?   **[4]**

     c) Draw a neat diagram of network architecture.   **[4]**

OR

Q2) a) Explain four principles of communication network.   **[8]**

     b) How packets are transported in datagram and virtual circuit network.**[8]**

Q3) a) Describe different types of delays in ATM networks.   **[10]**

     b) Explain addressing scheme in ATM networks.   **[4]**

     c) Explain wave-division multiplexers system in brief.   **[4]**

OR

Q4) a) Explain in short basic architecture of wireless networks.   **[4]**

     b) Draw a neat diagram of ATM header. Explain the structure of header.**[6]**

     c) Explain in detail ATM Adaptation layer.   **[8]**

Q5) a) How control decisions are taken in circuit switched, datagram, and virtual circuit network. **[8]**

b) Explain Markov chain model for circuit-switched network. **[8]**

<center>OR</center>

Q6) a) What are the parameters specified in the Quality of Service? Explain in detail. **[8]**

b) How dynamic routing optimization is carried out with different algorithms? **[8]**

<center>

SECTION - II

</center>

Q7) a) Explain the importance of KEEPALIVE message in BGP. **[6]**

b) Describe two-crossing problem in mobile IP routing. **[6]**

c) Explain the label switching router. **[4]**

<center>OR</center>

Q8) a) Explain the label swapping in IP switching. **[6]**

b) Describe in detail concept of NAT and its variants. **[6]**

c) State the BGP notification messages. **[4]**

Q9) a) Explain in detail mobile IP addressing along with their formats. **[8]**

b) Explain various features of IPv6. **[8]**

<center>OR</center>

Q10) a) What is autoconfiguration and renumbering in IPv6. **[8]**

b) Explain in brief a protocol suit, H.323 for IP telephony. **[8]**

Q11) a) Explain various phases of Destination-Sequenced Distance-Vector protocol used in MANET. **[9]**

b) Describe DSR protocol for ad hoc networks. **[9]**

<center>OR</center>

Q12) Write short notes on : **[18]**

a) Link-clustered architecture for a network.

b) Applications of Ad hoc networking.

c) Comparison of various Routing Methods.

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[4164] - 737

B.E. (Information Technology)
BIOINFORMATICS
(2008 Pattern) (Elective - IV) (Sem. -II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, and Q11 or Q12 from Section - II.*

2) *Answer 3 questions from Section - I and 3 questions from Section - II.*

3) *Answers to the two sections should be written in separate answer books.*

4) *Neat diagrams must be drawn wherever necessary.*

5) *Figures to the right indicate full marks.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define bioinformatics. Explain bioinformatic applications related to the following areas : **[10]**

     i) Phylogenetic Analysis.

     ii) Genome Annotation.

     iii) Proteomics.

     iv) Drug Discovery.

   b) Classify and explain major databases in bioinformatics giving examples of each database. **[8]**

OR

Q2) a) Explain central dogma of molecular biology with neat diagram. Explain how is it an information science. **[8]**

   b) State and explain various data retrieval tools in bioinformatics. Explain the steps for data mining and knowledge discovery of biological databases. **[10]**

Q3) a) What is structure visualization? Explain the various rendering tools in structure visualization. **[8]**

b) Explain microarray spotting process flow in detail. How is microarray result analysis done? **[8]**

<div align="center">OR</div>

Q4) a) Explain in detail the various methods of data mining for extracting patterns from data. **[8]**

b) Differentiate between clustering and classification. Explain hierarchical and k-means clustering in brief. **[8]**

Q5) a) Explain the basic machine learning process with neat diagram. Describe following machine learning processes in brief : **[8]**

i) Neural networks.

ii) Decision Trees.

b) What is text mining? Explain NLP approach of text mining in detail, giving significance of each stage. **[8]**

<div align="center">OR</div>

Q6) a) Explain major steps in pattern recognition and discovery process. **[8]**

b) Explain following methods of computational sequence alignment : **[8]**

i) Dot Matrix Analysis.

ii) Word - based Method.

<div align="center">

SECTION - II

</div>

Q7) a) Explain modeling and simulation process alongwith the components involved in detail. **[8]**

b) Differentiate between Ab-Initio and Heuristic methods of protein structure prediction. Explain the general ab-initio prediction process in detail with neat diagram. **[10]**

<div align="center">OR</div>

Q8) a) Draw the collaboration - communication model. Explain collaboration and communication hierarchy in detail with neat diagram and appropriate examples. **[10]**

b) Explain synchronous and asynchronous collaboration. **[8]**

Q9) a) Explain similarities and differences between BLAST and FASTA tools for sequence alignment. **[8]**

b) Explain FASTA algorithm in detail with recommended steps for similarity searching. **[8]**

OR

Q10) a) Explain BLAST algorithm. State the major refirements included in gapped BLAST. **[8]**

b) Explain the significance of E( ) value with example. What is filtering in BLAST? **[8]**

Q11) a) Discuss various factors responsible for degradation in the ecosystem.**[8]**

b) Explain how interchange and transformation of pollutants take place in atmosphere, hydrosphere and lithosphere. **[8]**

OR

Q12) a) Define genetic engineering. Explain any two techniques of genetic engineering in detail. **[8]**

b) Write short notes on : **[8]**

    i)   Significance of Biotechnology.

    ii) Applications of genetic engineering.

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[4164] - 750
B.E. (Biotechnology)
BIO PROCESS MODELLING AND SIMULATION
(2008 Pattern) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Figures to the right indicate full marks.

2) Use of programmable calculator is not allowed.

3) Draw a neat sketch wherever necessary.

4) Make necessary assumptions wherever required.

5) Answer any three questions from Section - I & any three questions from Section - II.

SECTION - I

Q1) a) Define and explain :   **[8]**

     i)   Process Model.   ii)   Mathematical Modeling.

     iii)   Simulation of a model.   iv)   Linear Model.

   b)   What is Model building? Explain the four phases of model building with a neat sketch.   **[8]**

OR

Q2) Write short notes on :   **[16]**

   a)   Equation of state.   b)   Chemical Equilibrium.

   c)   Activity coefficient.   d)   Law of mass action.

Q3) Develop the model for a batch reactor where the following reactions take place. $A \rightarrow B \rightarrow C$, $A \rightarrow D$ with rate constants k_1, k_3 and k_2 respectively. All the reactions are endothermic and have first order kinetics. The reacting mixture is heated by steam which flows through a jacket around the reactor with a rate of Q (Kg/min).   **[18]**

OR

P.T.O.

Q4) Consider a CSTR shown below. Stream 1 is a mixture of A and B with composition C_{A1} and C_{B1} and has a volumetric flow rate F_1 and temperature T_1. Stream 2 is pure R. Reactions taking place are Reaction 1 : $A + R \rightarrow P_1$, Reaction 2: $B + 2R \rightarrow P_2$ with rate of reaction k_1 and k_2. Both reactions are endothermic and have second order kinetics for reaction 1 and third order reaction for reaction 2. Heat is supplied to the reaction mixture by steam which flows through a coil, immersed in the reactors content with a heat transfer area A_t. Develop a model for the system. **[18]**
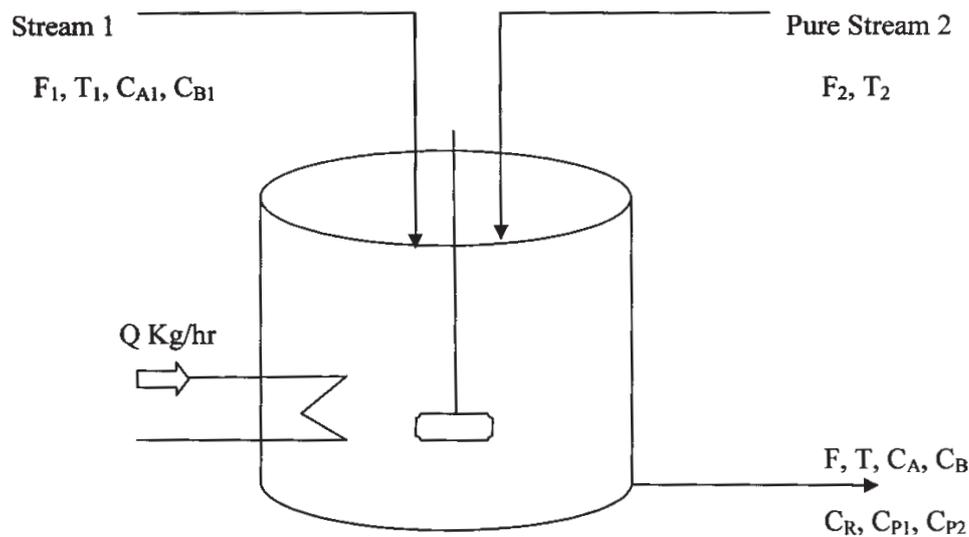
Q5) Write short notes on : **[16]**

a) Rigid Process.

b) Stochastic Process.

OR

Q6) Briefly explain with suitable examples the classification of mathematical models based on : **[16]**

a) State of the Process.

b) Variation of independent variables.

SECTION - II

Q7) Define Chemostat? How recycle stream effects the yield of bio product in chemostat? Model a chemostat with proper assumptions and neat sketch?**[18]**

OR

Q8) In a Chemostat with cell recycle, the feed flow rate and culture volumes are F = 100ml/hr and V = 1000ml respectively. The system is operated under glucose limitation and the yield coefficient Y^M is 0.5gdw cells/g substrate. Glucose X/S concentration in the feed is S_0 = 10g glucose/lit. The kinetic constants of organisms are μ_m = 0.2h^{-1}, k_s = 1g glucose/lit. The value of c is 1.5 and the recycle ratio is α = 0.7. The system is at steady state.   **[18]**

a)   Find the substrate concentration in recycle stream.

b)   Find the specific growth rate μ_{net} of organisms.

c)   Find the biomass cell concentration in recycle stream.

Q9) Explain in detail the Biological treatment of waste water by using Biological film systems.   **[16]**

OR

Q10) Model Activated sludge system by taking necessary assumptions and with a neat sketch.   **[16]**

Q11) Explain in detail Reactor with Mass transfer. Model Reactor with mass transfer with necessary assumptions.   **[16]**

OR

Q12) Model Ideal Binary distillation column with necessary assumptions and neat sketch. Prove that the system is critically specified.   **[16]**

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[4164] - 752

B.E. (Biotechnology)
FOOD BIOTECHNOLOGY
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from Section - I and three questions from Section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams should be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Discuss in detail the various intrinsic factors affecting food spoilage by micro-organisms. **[10]**

b) What is meant by sensory characteristics of a food component? How does food spoilage affect these sensory characteristics? **[6]**

OR

Q2) a) Discuss in brief the different factors which affect water activity requirement of micro-organisms. **[8]**

b) Describe the growth conditions suitable for the survival of different types of spoilage micro-organisms. **[8]**

Q3) a) Describe in detail the process of pasteurization. **[8]**

b) Write notes on the following : **[10]**

i) Microwave based treatment of food.

ii) Freeze drying.

OR

Q4) Write notes on the following : **[18]**

a) Drying of food.

b) Hydrostatic pressure cooking.

c) Preservation using food additives.

P.T.O.

Q5) a) In an incidence of spoilage, the isolated spoilage organism was found to have a D_0 value of 1.35 minutes. It is desired that the probability of spoilage from this organism be 1 in 100,000. Initial spore loads were generally of the order 10/can. Calculate the required F_0 for this process to achieve the desired probability of spoilage. **[6]**

b) Lettuce was vacuum-cooled and then loaded into a refrigerated car for shipment to a market. The trip will last 48 h. Calculate the total amount of heat removed and the peak refrigeration load (maximum heat removal rate) if the amount of lettuce loaded is 3000 kg, the temperature in the truck is 2°C, the temperature of lettuce when loaded is 5°C and will drop to 2°C in 2h, the heat capacity of lettuce is 4.02 kJ/kg°C, the area of the walls of the truck is 80 m², the overall heat transfer coefficient for the walls is 0.3 W/m²°C, the outside air temperature is 20°C, and the heat of respiration of lettuce in the temperature range of 2 to 5°C is 35×10^{-3} W/kg. **[10]**

OR

Q6) a) A liquid food (specific heat 4.0 kJ/kg°C) flows in the inner pipe of a double pipe heat exchanger. The liquid food enters the heat exchanger at 20°C and exits at 60°C. The flow rate of the liquid food is 0.5 kg/s. In the annular section, hot water at 90°C enters the heat exchanger and flows counter currently at a flow rate of 1kg/s. The average specific heat of water is 4.18 kJ/kg°C. Assume steady-state conditions. Calculate :
   i) Exit temperature of water.
   ii) Log-mean temperature difference.
   iii) If the average overall heat transfer coefficient is 2000 W/m²°C and the diameter of the inner pipe is 5 cm, calculate the length of the heat exchanger. **[10]**

b) Freshly harvested berries measuring 2 cm in diameter are chilled from 18°C to 7°C in a chiller at –2°C with a surface heat transfer coefficient of 16 W/m²K. Calculate the time required to cool the berries in the chiller. The thermal conductivity for the berries is 0.127 W/mK, specific heat capacity is 3778 J/kg K and density of the berries is 1050 kg/m³. Take $F_o = Bi^{-1}/2$. **[6]**

SECTION - II

Q7) a) Describe the industrial process for the production of agar derived from algae. Also enlist its food based applications. **[9]**

b) What is solid state bioprocessing? Discuss any one application of solid state bioprocessing for functional food production. **[9]**

OR

Q8) a) What is solid state fermentation? Explain in detail the process for mushroom production using SSF. **[9]**

b) Write a note on milk based fermented products of the Indian subcontinent. **[9]**

Q9) a) Discuss in detail the role of enzymes in fruit juice processing. **[8]**

b) Discuss the application of enzymes in meat processing. **[8]**

OR

Q10) Elaborate on the methods of production of pectinases and describe their various applications pertaining to the food industry. **[16]**

Q11) With the help of neat sketches, describe the various anaerobic processes for treatment of food processing wastes. **[16]**

OR

Q12) Write notes on the following : **[16]**

a) Different types of wastes generated from the food industry.

b) Chemical methods of treating food wastes.

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[4164] - 757

B.E. (Biotechnology)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer three questions from Section - I and Section - II.*
    2)   *Answers to the two sections should be written in separate books.*
    3)   *Neat diagrams must be drawn whenever necessary.*
    4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a)   What is Joint Stock Company? Compare Partnership firm and Joint stock company. **[10]**

      b)   Explain Management by Objectives. **[8]**

OR

Q2) a)   Explain the characteristics of Co-operative organizations with its advantages and disadvantages. **[9]**

      b)   Explain the following principles of management : **[9]**
         i)   Division of Labour.
         ii)   Authority and responsibility.
         iii)   Unity of command.

Q3) a)   Explain the process of recruitment and types of recruitment. **[8]**

      b)   Discuss the objectives and functions of wage and salary administration. **[8]**

OR

Q4) a)   Explain the steps in selection procedure and types of tests in selection procedure. **[8]**

      b)   Discuss the role of trade union in maintaining industrial peace. **[8]**

Q5) a)   Discuss various types of costs associated with inventory and store management. **[8]**

      b)   Explain the importance of inspection and quality control in pharmaceutical industry. **[8]**

OR

P.T.O.

Q6) a) "Quality control practices has gain importance in today's industries". Comment. **[8]**

b) Write a short note on : **[8]**
   i) Concept of Quotation.
   ii) Functions of store keeper.

SECTION - II

Q7) a) Explain the difference between Selling and Marketing. **[9]**

b) Differentiate between penetration prices and skimming prices with example. **[9]**

OR

Q8) Define market research? How to market Bio-Chemical products in competitive market. **[18]**

Q9) a) Explain the importance of Total Quality circles and Total Quality Management in growth of business organizations. **[8]**

b) Explain the following : **[8]**
   i) Patent and Patent right.
   ii) Government aids for export promotion.

OR

Q10) a) State and explain the concept of antidumping duties and how it affects imports. **[8]**

b) Write short notes on : **[8]**
   i) Cost involved in exporting a product.
   ii) ISO system.

Q11) a) State and explain the concept of contract act and types of contract act. **[8]**

b) Write a short note on : **[8]**
   i) Work Measurement.
   ii) Flow Process Chart.

OR

Q12) a) Explain in brief MRTP and FERA. **[8]**

b) Explain the following : **[8]**
   i) Sio chart.
   ii) Therblings.

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[4164] - 419

B.E. (Civil)

ADVANCED ENVIRONMENTAL MANAGEMENT

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the importance of ISO 14000 series. **[8]**

     b) Explain the principles and elements of Environmental Management Systems (EMS). **[8]**

OR

Q2) a) Explain the ISO 14001 - Environmental management systems standard. **[8]**

     b) Discuss the salient features of Water act, 1974, **[8]**

Q3) a) Explain the salient features of Air act 1981. **[8]**

     b) Discuss Environment Protection Act - 1986 as an umbrella act **[8]**

OR

Q4) a) Explain in brief Hazardous waste management handling rules 1989. **[8]**

     b) Discuss the site selection criteria for disposal of municipal solid waste. **[8]**

Q5) a) Explain how process changes can be adopted in a thermal power plant to reduce the problem of air pollution. **[9]**

     b) Discuss the economic aspects of various control equipment for particulate removal. **[9]**

OR

P.T.O.

Q6) a) What are the meteorological measurements required to correlate the results obtained in an air pollution survey. **[9]**

b) Explain the role of meteorological elements in the dispersion of air pollutants in the atmosphere. **[9]**

SECTION - II

Q7) a) Discuss the Bio - composting method for distillery waste. Is land application of spent wash is suitable method, discuss. **[8]**

b) Explain Industrial water pollution control technologies. **[8]**

OR

Q8) a) Explain anaerobic treatment of industrial process wastewaters. **[8]**

b) Discuss the treatment options for Industrial wastewater treatment. **[8]**

Q9) a) Differentiate between refuse and garbage. Mention the most significant property of the city refuse which guides the adoption of each of the following methods of refuse disposal. **[8]**

    i) incineration

    ii) Sanitary landfill.

    iii) Composting.

b) How do you classify the wastes generated from the following sources : **[8]**

    i) Hospitals.

    ii) Electroplating plant.

    iii) Schools and

    iv) Restaurants.

OR

Q10) a) Discuss Hazardous as well as Biomedical wastes and their Hazards on Health and Environment. **[8]**

b) Explain colour coding of biomedical wastes and their collection in different colored Bins or Bags. **[8]**

Q11) a) Explain the significance of Environmental audit report related to air, water pollution industry. **[9]**

b) Explain the Environmental Impact Assessment of Thermal Power plants. **[9]**

OR

Q12) a) Explain the methodology for preparing Environmental Impact Assessment. **[9]**

b) Discuss how would carry out the Environmental Impact Assessment of water Resource project. **[9]**

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[4164] - 425

B.E. (Civil)
GEOINFORMATICS
(2008 Pattern) (Open Elective) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1)   *Answer any 3 questions from each section.*
  2)   *Answers to the two sections should be written in separate books.*
  3)   *Neat diagrams must be drawn wherever necessary.*
  4)   *Figures to the right indicate full marks.*
  5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is remote sensing? What are the stages of Remote Sensing?   **[9]**

     b)   Explain interaction of EMR with Earth's Surface.   **[9]**

OR

Q2) a)   What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them.   **[10]**

     b)   Explain EMS. State the characteristics of different frequencies.   **[8]**

Q3) a)   Explain in detail, characteristics of LANDSAT.   **[8]**

     b)   What are the elements of Remote Sensing? Explain these in brief.   **[8]**

OR

Q4) a)   What is FCC? What is the significance of FCC in recognizing terrain features.   **[8]**

     b)   Short Notes on :   **[8]**
        i)   Relief Displacement.
        ii)   Drainage Pattern.

Q5) a)   Explain in detail use of remote sensing in terrain analysis.   **[8]**

     b)   Write in brief importance of remote sensing in water resources.   **[8]**

OR

Q6) a) Describe with flow chart application of remote sensing in ground water assessment. **[8]**

b) How remote sensing is used for the exploration of minerals. **[8]**

SECTION - II

Q7) a) What is GIS? Explain in detail its components. **[9]**

b) Write notes on :

i) Map Features.

ii) Map scale and its importance. **[9]**

OR

Q8) a) Explain in brief history of GIS and its development. **[9]**

b) Write notes on :

i) Hardware and Software for GIS.

ii) Map Resolutions. **[9]**

Q9) a) What is a Map? Explain different types of Map Projection systems and its need? **[12]**

b) What are the components of DBMS? **[4]**

OR

Q10) a) What is Geospatial Data Model? Explain in brief RDBMS. **[12]**

b) Write a note on Primary Key and Foreign Key. **[4]**

Q11) a) Explain the term "Histogram Equalization". Elaborate the contrast stretch enhancement. **[10]**

b) Explain Unsupervised Classification. **[6]**

OR

Q12) a) What is GPS? Explain its importance in RS and GIS. **[8]**

b) Explain in brief : **[8]**

i) Digital Image Processing.

ii) Vector Model.

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[4164] - 451

B.E. (Mechanical Sandwich)
MACHINE AND COMPUTER AIDED DESIGN
(2008 Pattern) (Sem. - I)

Time :4 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from section - I and 3 questions from section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a) Explain the procedure to design the worm gear pair as per IS 7443. **[4]**

b) Give comparative analysis of spiral bevel, hypoid and straight bevel gears regarding construction, performance and applications. **[6]**

c) A triple start worm rotating at 1440 r.p.m. transmits 6 kW power to a worm gear rotating at 72 r.p.m. The pitch circle diameter of worm is 60 mm and axial module is 6 mm. The tooth system is 20° stub involute while the coefficient of friction between worm and worm gear tooth is 0.08. If the worm is left hand type, determine. **[8]**

   i) The components of tooth forces acting on the worm and worm gear.

   ii) The efficiency of the worm pair.

OR

Q2) a) Derive the expression for the formative number of teeth for straight tooth bevel gears. **[5]**

P.T.O.

b) A pair of straight bevel gears consists of 18 teeth pinion rotating at 1500 r.p.m. meshing with a bevel gear rotating at 600 r.p.m. The axes of pinion and gear intersect at right angles. The module is 4 mm and the face width is 35 mm. The tooth system is 20° full depth involute. The gear pair is made of plain carbon steel 55C8 (Sut = 700 MPa) and is heat treated to 400 BHN. The service factor and factor of safety are 1.75 and 1.5 respectively. Assuming that velocity factor accounts for dynamic load, determine, **[10]**

   i) The beam strength.

   ii) The wear strength.

   iii) The maximum static load that the gear pair can transmit.

   iv) The rated power that the gear pair can transmit.
   Table for Lewis form factor :

No. of teeth	17	18	19	20	21	75	100	150	300
Y'	0.3016	0.3079	0.3142	0.3204	0.3267	0.4335	0.4461	0.4587	0.4712

c) Discuss worm and worm wheel materials. **[3]**

Unit - II

Q3) a) How are pressure vessels classified according to IS 2825? **[5]**

b) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15 MPa. The inner and outer diameters of the cylinder are 240 mm and 300 mm respectively. The cylinder is made of Cast Iron FG300. Determine the factor of safety in the design. If the cylinder pressure is increased by 25%, what will be the factor of safety? **[8]**

c) What is the importance of preload determination in gasketed joints in pressure vessels? **[3]**

OR

Q4) a) Derive the expression for the thickness of thick cylinder subjected to internal pressure on the basis of maximum shear stress theory. **[6]**

b) Following is the data given for a vertical pressure vessel :
Inside diameter of shell : 3000 mm   Shell height : 6500 mm
Shell material : Carbon steel with yield strength 230 MPa.
Factor of safety : 1.5   Working pressure : 1 MPa
Design pressure : 10% extra   Corrosion allowance : 0.04 mm per month

Minimum expected life : 10 Years.
Double welded butt joints spot radiographed.
End closures : Torispherical with standard proportions.
Design the shell and end closure thickness and draw the sketch.   **[10]**

Unit - III

Q5) a) Explain the basic considerations in design of displays and controls. **[4]**

b) What is Green Engineering? **[4]**

c) The tensile strengths of a population of 1200 bars are normally distributed with a mean of 450 MPa and a standard deviation of 50 MPa. Find

  i)   The no. of bars with strengths less than 400 MPa and

  ii) The no. of bars having strengths between 400 MPa and 590 MPa.**[8]**

OR

Q6) a) Discuss the features in designing for appearance. Give three examples of engineering products in which design for appearance is to be considered.**[4]**

b) State the guidelines to be followed in the design of castings. **[4]**

c) The bolt sizes of a population of 1200 bolts are normally distributed with a mean of 20.05 mm and a standard deviation of 0.016 mm; whereas the tolerance specified by the designer is 20 ±0.035 mm. Find the no. of bolts that are likely to be rejected.
Area under the curve from 0 to Z. **[8]**

Z	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772	0.4861	0.4912	0.4953	0.4974	0.4980

SECTION - II
UNIT - IV

Q7) The following data refers to a horizontal belt conveyor used for carrying a coal in a thermal power station. **[16]**

- Capacity of the conveyor   =   300 mt/hr

- Density of the coal   =   800 kg/m^3

- Belt speed   =   2.0 m/s

- Surcharge factor for polyamide belt   =   0.0725

- Number of plies for polyamide belt = 3
- Material factor for plies = 2.0
- Belt tension and arc of contact factor for belt = 80
- Material conveying horizontal length = 260 m
- Centre distance between drive pulley and tail pulley = 260 m
- Centre distance between snub pulleys = 255 m
- Ratio of tail pulley to drive pulley diameters = 1.0
- Mass of each carrying run idler = 25 kg
- Mass of each return pulley idlers = 20 kg
- Pitch of carrying run idlers = 1 m
- Pitch of return run idlers = 2.5 m
- Friction factor for idlers = 0.02
- Snub factor for snub pulleys = 0.03
- Snub factor for drive and tail pulleys = 0.06
- Material velocity component along belt line = 1 m/s
- Frictional resistance due to belt cleaner near drive pulley (where B is width of the belt in m) = 100B
- Angle of lap on drive pulley = 210°
- Coefficient of friction between belt and drive pulley = 0.4
- Ultimate tensile strength for belt per unit width of ply = 60 N/mm
- Drive efficiency = 93%
- Electric motor speed = 1440 RPM
- Standard belt widths :

Belt width, mm	500	600	750	800	900	1000	1200	1400	1600
Mass per unit length of belt, kg/m	7.75	9.3	11.6	12.4	14.0	15.5	18.6	21.7	24.8

Standard Electric motor ratings : 5, 5.5, 7.5, 10, 11, 12.5, 15, 20, 22, 25 kW

Determine the following parameters for the belt conveyor :

a)   The standard belt width.

b)   The reduction ratio of gear reducer.

c)   The power required to drive the belt conveyor.

d)   The power rating of the standard motor; and
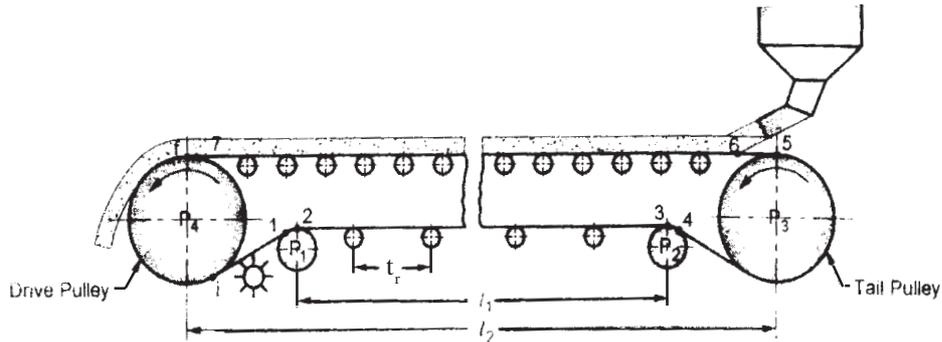
e)   The available factor of safety.

Figure - 7.1

OR

Q8) a) Explain in detail adequate design and optimum design.   **[6]**

b) A shaft is to be used to transmit a torque of 1500 Nm. The required torsional stiffness of the shaft is 100 N-m/degree, while the factor of safety based on the yield strength is shear is 2.0. Using the maximum shear stress theory, design the shaft with the objective of minimizing the weight out of the following materials :   **[10]**

Material	Weight density w, N/m³	Tensile Yield Strength, S_{yt} N/mm²	Modulus of Rigidity, G N/mm²
Chromium Steel	77×10^3	420	84×10^3
Plain Carbon Steel	76.5×10^3	230	84×10^3
Titanium alloy	44×10^3	900	84×10^3
Magnesium Alloy	17.5×10^3	225	84×10^3

UNIT - V

Q9) a) A system of springs is as shown in fig 9.1. Determine the overall stiffness matrix and the deflections of each of the springs. **[8]**
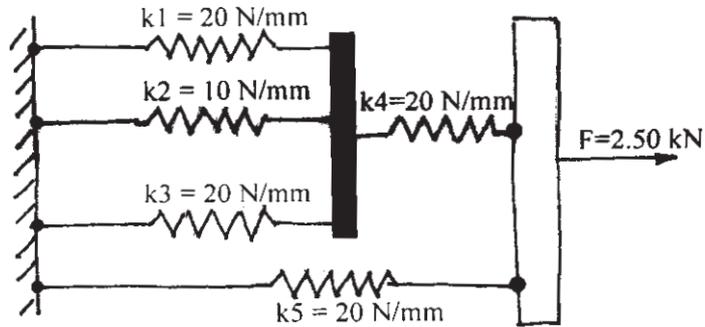

Fig 9.1

b) Write short notes on any **TWO** of the following : **[8]**

i) Penalty approach.

ii) Galerkin method of weighted residuals.

iii) Rayleigh - Ritz Method.

OR

Q10) a) For the two bar truss as shown in fig. 10.1, determine the displacement and stresses in the bars. Assume E = 70 GPa and A = 200 mm² for both members. **[8]**
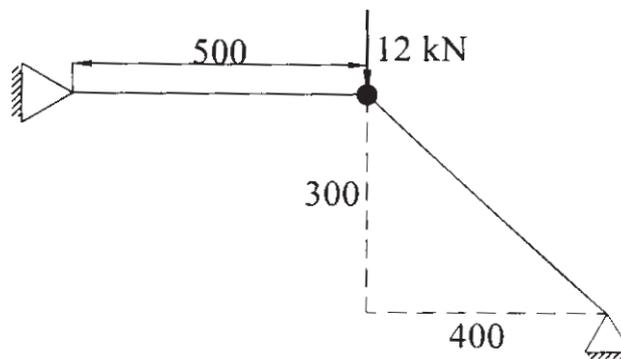

Fig.10.1

b) A CST element is defined by nodes at I (30, 40), J (140, 70) and K(80, 140). The displacement at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3). Determine the displacement, the natural coordinates and the shape functions at point P(77, 96) within the element. **[8]**

UNIT - VI

Q11) a) Define Automation. What are different strategies in Automation. **[8]**

b) Explain canned cycle for drilling with the help of example. **[4]**

c) Explain what are the new trends in CNC and DNC. **[6]**

OR

Q12) a) What is CIM? What are different elements of CIM? **[6]**

b) What are the merits and demerits of FMS? **[6]**

c) Explain the concept of machine cell in detail. **[6]**

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[4164] - 455

B.E. (Mechanical S/W)
FINITE ELEMENT METHOD
(Elective - II) (2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1)   *Answer any three questions from each section.*
  2)   *Answers to the two sections should be written in separate books.*
  3)   *Figures to the right indicate full marks.*
  4)   *Use of electronic calculator is allowed.*
  5)   *Assume suitable data, if necessary.*

<u>SECTION - I</u>

Q1) a)   Explain in brief the steps involved in Finite Element Method.   **[6]**

     b)   Derive and plot shape functions,

        $N_1 = 1 - \dfrac{X}{L}$ and $N_2 = \dfrac{X}{L}$ for a linear spring element of length 'L'. Use direct equilibrium approach.   **[6]**

     c)   Explain the principle of minimum potential energy used in deriving element stiffness matrix and equations.   **[6]**

<p align="center">OR</p>

Q2) a)   Define the term FEM. Explain in brief it's general applications.   **[6]**

     b)   Write short note on (Any 2)   **[6]**
        i)   The Rayleigh - Ritz method.
        ii)   Plane stress and plane strain problem.
        iii)   The Galerkin Method.
        iv)   Sources of errors in FEM.

     c)   Determine the displacements of nodes of the spring system as shown in Fig. Q. No. 2(c). Use principle of minimum potential energy.   **[6]**
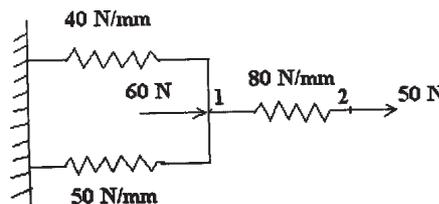

Fig.Q.No.2(c)

Q3) a) For a one - dimensional bar element with two nodes 'i' and 'j' along x - direction, assuming linear behavior of bar element, derive bar element stiffness equation based on Potential Energy approach. Use the shape functions Ni and Nj as,

$$Ni = \frac{xj - x}{L} \text{ at node 'i' and } Nj = \frac{x - xi}{L} \text{ at node 'j'.}$$

'L' be the length of the bar element. **[6]**

b) A bar consists of two steps as shown in Fig. Q.No. 3(b) below. An axial load F= 200 kN is applied as shown. Model the bar with two finite elements. Determine, **[10]**
   i) Element stiffness matrix.
   ii) Global stiffness matrix.
   iii) Global load vector.
   iv) Nodal displacements.
   v) Stresses in each bar.

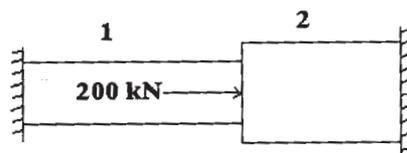| Sr.No.	Items	Elements	
		1	2
1	Length (mm)	200	100
2	Area (mm²)	1000	2000
3	Modulus of Elasticity (GPa)	200	83

(Use Elimination Approach.)

Fig.Q.No.3 (b)

OR

Q4) a) Explain the following terms in brief (Any 2) **[6]**
   i) Elimination Approach.
   ii) Penalty Approach.
   iii) Quadratic shape functions.
   iv) Characteristics of Global Stiffness matrix.

b) For the truss element, write an equation for element stiffness matrix in global coordinate system and element stress equation. Find the element stiffness matrix for the two bar truss as shown in Fig. Q.No. 4(b) below. **[10]**
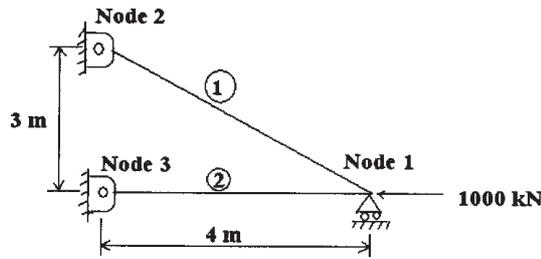
Fig.Q.No.4 (b)

Q5) a) What is CST element? Explain natural coordinates and shape functions for CST element. Write an equation for element strain vector in terms of element strain nodal displacement matrix and element nodal displacement vector for CST element. **[6]**

b) Draw four noded quadrilateral element both in Cartesian coordinates and in natural coordinates for a quadrilateral plate with following data.

Vertices	Cartesian coordinates (mm)	Displacements (mm)
1	10, 10	0.2
2	50, 20	0.7
3	60, 50	0.9
4	30, 70	0.6

The point 'M' within the element has Cartesian coordinates (30, 40). For this point 'M', determine. **[10]**

i) The nodal coordinates.

ii) The shape functions.

iii) The displacements.

OR

Q6) a) Draw eight noded quadrilateral in Cartesian and in natural coordinates.**[2]**

b) Model the triangular plate of thickness 10 mm as a CST element. The coordinates of three vertices of the plate are as shown in table below. Take $E = 2.1 \times 10^5$ N/mm², and Poisson's ratio = 0.25 for the plate material. **[14]**

Vertices	Cartesian Coordinates (mm)	Deflections (mm)	
		u (mm)	v (mm)
1	10, 10	$u_1 = 0.01$	$v_1 = -0.04$
2	70, 35	$u_2 = 0.03$	$v_2 = 0.02$
3	25, 75	$u_3 = -0.02$	$v_3 = 0.05$

Determine,

     i)   The deflections at the point N(40, 30) within the element.

    ii)   Element stress - strain matrix.

   iii)   Element strain nodal displacement matrix.

   iv)   Element strains.

    v)   Element stresses.

SECTION - II

Q7) a) Drive stiffness matrix for beam element. **[8]**

    b) Write a short note on Hermite shape functions of Beam Element. **[8]**

OR

Q8) a) The beam of 4.5 m length is fixed at each end. A downward force of 12 kN and moment of 10 kN - m (ccw) act at the center of the beam. Let E = 200 GPa and $I = 4 \times 10^{-4}$ m⁴ through out the beam. Determine the displacement and rotation under applied loads. **[10]**

    b) Explain how to convert distributed load on frame into nodal loads. **[6]**

Q9) a) An insulated circular fin has cross sectional area A = 0.15 m² and length L = 0.5 m. The left end has a constant temperature of 120 °C. A positive heat flux of q = 4500 W/mm² acts on the right end. Let Kxx = 7.5 W/(m-°C). Determine the temperature at L/4, L/2, 3L/4 and L. **[10]**

    b) Write a short note on elements used for heat transfer problem. **[6]**

OR

Q10) a) Write a short note on Point Sources in heat transfer problems. **[8]**

    b) Formulate the one - dimensional heat transfer equations. **[8]**

Q11) a) Write a short note on modal analysis. **[6]**

    b) What are the advantages of NVH analysis? **[6]**

    c) Write a short note on time domain and frequency domain? **[6]**

Q12) a) How to perform vibration and acoustic analysis? **[6]**

    b) Explain how mashing is important while performing different analysis.**[6]**

    c) Write a short note on dynamic and fatigue analysis. **[6]**

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[4164] - 465

B.E. (Production)
PLASTIC ENGINEERING
(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   *Answer any three questions from each section.*
   2)   *Answers to the two sections should be written in separate books.*
   3)   *Neat diagrams must be drawn wherever necessary.*
   4)   *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1)   a)   Discuss commonly used thermoplastic materials.   **[9]**

      b)   Discuss commonly used additives in plastic.   **[9]**

OR

Q2)   a)   Explain the types of polymerization.   **[9]**

      b)   Discuss classification of Plastic.   **[9]**

Unit - II

Q3)   a)   Explain injection moulding cycle.   **[8]**

      b)   Discuss injection moulding consideration.   **[8]**

OR

Q4)   a)   Explain cooling methods used in injection moulding and methods of ejection.   **[8]**

      b)   Explain importance of register ring, sprue bush, cavity & core inserts.**[8]**

Unit - III

Q5)   a)   Explain extruders with suitable sketches.   **[8]**

      b)   Discuss special features of extrusion dies.   **[8]**

OR

Q6)   a)   Discuss extrusion costing & lamination with suitable sketches.   **[8]**

      b)   Discuss extrusion problems & extruder performance.   **[8]**

SECTION - II

Unit - IV

Q7) a) Discuss types of blow moulding. **[9]**

b) Explain rotary injection blow moulding. **[9]**

OR

Q8) a) Compare injection & extrusion blow moulding. **[9]**

b) Discuss basic design considerations in blow moulding. **[9]**

Unit - V

Q9) a) Explain Thermoforming processes with suitable sketches. **[8]**

b) Explain vaccum forming with suitable sketches. **[8]**

OR

Q10) a) Discuss process factors in thermoforming. **[8]**

b) Discuss problems in thermoforming. **[8]**

Unit - VI

Q11) a) Explain filling, tumbling, ashing of thermosetting & thermoplastic. **[8]**

b) Discuss buffing & polishing of thermosetting & thermoplastic. **[8]**

OR

Q12) a) Discuss machining of plastic. **[8]**

b) Discuss guidelines for tool geometry. **[8]**

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Total No. of Questions : 12]

SEAT No. : ☐

P1632

[Total No. of Pages : 2

[4164] - 480

B.E. (Production Engineering)

INTELLIGENT MANUFACTURING SYSTEM

(2008 Pattern) (Elective - IV) (Semester - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1) Answer any three questions from each section.
  2) Answers to the two sections should be written in separate books.
  3) Neat diagrams must be drawn wherever necessary.
  4) Figures to the right indicate full marks.
  5) Use of electronic pocket calculator is allowed.
  6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain with neat sketch the structure and functional areas of CIM system **[8]**

   b) What are the major functions of each of the following? **[10]**
      i)   Computer aided design system.
      ii)   Computer aided manufacturing system.
      iii) Computer aided quality control system.
      iv)   Automated storage and retrieval system.

OR

Q2) a) Explain the role of CIM in manufacturing industries? **[8]**

   b) Explain in brief the nature and role of the elements of CIM system. **[10]**

Q3) a) Distinguish between 'Artificial Intelligence' and 'Artificial Technique'? Explain in brief different AI Techniques. **[8]**

   b) What is an intelligent manufacturing system? Explain the structure and components of an intelligent manufacturing system? **[8]**

OR

Q4) a) Develop the taxonomy of pioneering works in AI? **[8]**

   b) What is intelligence? Explain its characteristics? **[8]**

Q5) a) Explain in detail the basic architecture of an expert system? **[8]**

   b) Discuss various approaches and issues in knowledge representation along with various problems in representing knowledge. **[8]**

OR

P.T.O.

Q6) a) Explain forward and backward chaining search strategy with an example.**[8]**

b) Explain the importance of expert systems in modern automated manufacturing environment along with limitations? **[8]**

SECTION - II

Q7) a) What is machine learning? Explain in brief the applications of machine learning in manufacturing? **[8]**

b) Distinguish between artificial neural network and biological neural network? What are its applications in manufacturing? **[8]**

OR

Q8) a) What are various ANN Learning Approaches? Explain any two of them?**[8]**

b) Explain in brief the back propagation technique? **[8]**

Q9) a) Explain the concept of group technology with an example? **[8]**

b) Discuss the classification approach used in group technology. **[8]**

OR

Q10) Consider the following matrix formulation of the group technology problem.**[16]**

Part Number

Machine Number	1	2	3	4	5	6	7	8
1	1		1			1		1
2	1					1		
3		1			1			1
4	1		1			1		
5							1	
6		1			1			1
7					1			1
8	1					1		
9			1				1	
10		1					1	

Solve the problem by :

a) Single linkage cluster analysis approach.

b) Rank order cluster algorithm.

Q11) Explain with an example the steps involved in design of a knowledge based system for :

a) Stamping die. **[10]**

b) Material selection. **[8]**

OR

Q12) Write a short note on any **Two** of the following : **[18]**

a) Knowledge based system for group technology.

b) Group technology algorithms.

c) Industrial applications of AI.

◆◆◆◆

[4164] - 483

B.E. (Production S/W)

OPERATIONS RESEARCH & MANAGEMENT

(2008 Pattern) (Sem. - I) (Theory)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Your are advised to attempt not more than 3 questions.*

6) *Your answers will be valued as a whole.*

7) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

8) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define the following terms in relation to LPP: **[4]**

i)   Basic Solution

ii)   Basic Feasible Solution

iii) Degenerate Solution

iv)   Non-degenerate Solution

b) A security dealer recommends two types of investments A and B to his client. Investment A returns 6% and B 8%. The client has almost Rs. 1, 00,000 to invest. The client wants the total annual return to be Rs. 7000 and at least 2/5th of the amount to be invested in investment B. The security dealer gets 5% of the income from investment A and 4% of the income from investment B. Formulate LPP to maximize the total fee of the security dealer.   **[4]**

c) Solve using simplex method. **[8]**

  Maximize $Z = 2x_1 + 5x_2$,

  $x_1 + 4x_2 \le 24$,

  Subject to $3x_1 + x_2 \le 21$,

  $x_1 + x_2 \le 9$,

  $x_1, x_2 \ge 0$.

OR

Q2) a) Reduce the following LPP to the standard form. **[4]**

  Minimize $A = 5x_1 + 3x_2 + 4x_3$,

  $2x_1 - 5x_2 \le 6$,

  Subject to $2x_1 + 3x_2 + x_3 \ge 5$,

  $3x_1 + 4x_3 \le 3$,

  $x_1, x_2, x_3 \ge 0$.

b) An Air Force is experimenting with three types of bombs P, Q and R in which three kinds of explosives, viz. A, B and C will be used. Taking the various factors into account, it has been decided to use the maximum 600 kg of explosive A, at least 480 kg of explosive B and exactly 540 kg of explosive C. Bomb P requires 3, 2, 2 kg, bomb Q requires 1, 4, 3 kg and bomb R requires 4, 2, 3 kg of explosives A, B and C respectively. Bomb P is expected to give the equivalent of a 2 ton explosion, bomb Q a 3 ton and bomb R a 4 ton explosion respectively. Under what production schedule can the Air Force make the biggest bang? **[12]**

Q3) a) What is degeneracy in Transportation Problem? How is it resolved? **[4]**

b) What do you understand by a balanced and an unbalanced transportation problem? How is an unbalanced problem tackled? **[4]**

c) Gopinath iron and steel company has three furnaces and five rolling mills. Transportation cost (Rs. per quintal) for transporting steel from furnaces to rolling mills is shown in the table below. **[10]**

Rolling Mills

		M1	M2	M3	M4	M5	Capacity↓
	F1	4	2	3	2	6	8
Furnaces	F2	5	4	5	2	1	12
	F3	6	5	4	7	3	14
Requirement →		4	4	6	8	8	

What is the optimum schedule?

OR

Q4) a) What is the unbalanced assignment problem? How is it solved? **[6]**

b) Five employees of a company are to be assigned to five jobs, which can be done by any one of them. The workers get different wages per hour. These are Rs. 5 per hour for A, Band C each and Rs. 3 per hour for D and E each. The amount of time in hours taken by each employee to do a given job is given in the table below. Determine the assignment pattern that **[4 + 8]**

i) minimizes the total time taken and

ii) minimizes the total cost of getting the five jobs done.

Employee

		A	B	C	D	E
	1	7	9	3	3	2
	2	6	1	6	6	5
Job	3	3	4	9	10	7
	4	1	5	2	2	4
	5	6	6	9	4	2

Q5) a) What is Goal Programming? When is it applicable? **[4]**

b) Write a short note on Integer Programming model. **[6]**

c) Explain Gomory's cutting plane method. **[6]**

OR

Q6) a) Mention the distinguishing characteristics of dynamic-programming and explain Bellman's optimality principle. **[6]**

b) Solve the following LPP by Dynamic Programming. **[10]**

Maximize $Z = 50x_1 + 100x_2$,

Subject to $10x_1 + 5x_2 \leq 2500$,

$4x_1 + 10x_2 \leq 2000$,

$x_1 + \dfrac{3}{2}x_2 \leq 450$,

$x, x_2 \geq 0$.

SECTION - II

Q7) a) A duplicating machine maintained for office use is used and operated by people in the office who need to make copies, mostly secretaries. Since the work to be copied varies in the length (number of pages of the original) and copies required, the service rate is randomly distributed but it does approximate a Poisson having a mean service rate of 10 jobs per hour. Generally, the requirements for use are random over the entire 8 hours working day but arrive at a rate of 5 per hour. Several people have noted that a waiting line develops occasionally and have questioned the policy of maintaining only one unit. If the time of a secretary is valued at Rs. 3.50 per hour, make an analysis to find **[8]**

   1) Equipment utilization

   2) The percent time an arrival has to wait

   3) The average system line

   4) The average cost of waiting and operating the machines.

b) The research department of M/s. Hindustan Lever has recommended to the marketing department to launch a shampoo of three different types. The marketing manager has to decide one of the types of shampoo to be launched under the following estimated payoff for various levels of sales : **[8]**

Type of shampoo	Estimated levels of sales		
	15,000	10,000	5,000
1. Egg shampoo	30	10	10
2. Clinic shampoo	40	15	5
3. Delux shampoo	55	20	3

What will be the marketing manager's decision if

(1)   maximin   (2)   minimax   (3)   maximax

   1) Saddle Point;

   2) Maximin and Minimax principle;

   3) Value of the Game;

   4) Two person zero sum game.

<div align="center">OR</div>

Q8) a) A repair shop attended by a single mechanic has an average of 4 customers per hour who bring small appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him 6 minutes on the average. Arrivals are Poisson and service time has the exponential distribution. You are required to **[8]**

     i) Find the proportion of time during which the shop is empty

     ii) Find the probability of finding at least one customer in the shop

     iii) The average number of customers in the system

     iv) The average time, including service, spent by a customer.

  b) Dr. Thomas has been thinking about starting his own independent nursing home. The problem is to decide how large the nursing home should be. The annual returns will depends on both the size of nursing home and a number of marketing factors. After a careful analysis, **[8]**

Dr. Thomas developed the following table:

Size of Nursing Home	Good Market (Rs.)	Fair Market (Rs.)	Poor Market (Rs.)
Small (S)	50,000	20,000	–10,000
Medium (M)	70,000	35,000	–25,000
Large (L)	90,000	35,000	–45,000
Very Large (VL)	2,00,000	25,000	–1,20,000

     i) What is the maximax decision?

     ii) What is the maximin decision?

     iii) What is equally likely decision?

     iv) What is the criterion of realism? Use $\alpha = 0.8$

Q9) a) A truck is priced at Rs. 60,000/- and running costs are estimated at Rs. 6,000 for each of the first four years, increasing by Rs.2,000/- per year in the fifth and subsequent years. If money is worth 10% per year, When should the truck be replaced? Assume that the truck will eventually be sold for scrap at a negligible price. **[8]**

  b) What is Simulation? When it is used? **[8]**

OR

Q10) a) Two person X and Y work on a two station assembly line. The distribution of activity times at their station are **[8]**

Time in Seconds	Time frequency for X	Time frequency for Y
10	3	2
20	7	3
30	10	6
40	15	8
50	35	12
60	18	9
70	8	7
80	4	3

i) Simulate operation of the line for eight item

ii) Assuming Y must wait until X completes the first item before starting work, will he have to process any of the other eight items.

b) A firm is thinking of replacing a particular machine whose cost price is Rs. 12,200/-. The scrap price of this machine is only Rs.200/-. The maintenance costs are found to be as follows **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	220	500	800	1200	1800	2500	3200	4000

Determine when the firm should get the machine replaced?

Q11) a) Consider the following project: **[10]**

Activity	Predecessors	to	tm	tp
A	--	3	6	9
B	--	2	5	8
C	A	2	4	6
D	B	2	3	10
E	B	1	3	11
F	C, D	4	6	8
G	E	1	5	15

i) Draw the network diagram for the project.

ii) Determine the critical path.

iii) Calculate variance and standard deviation.

What is the probability that the project will be completed by 18 weeks?

Z	0	0.5	1	1.5	2
Probability	0.5	0.692	0.841	0.933	0.977

b) Define the physical meaning of the terms following **[4]**

   i) Total float

   ii) Free float

   iii) Independent float in CPM computations

c) For a certain activity the total float is 12 weeks and the head event slack is 3 weeks. **[4]**

Compute the free float for this activity.

<div align="center">OR</div>

Q12) a) Define the terms **[6]**

   i) Dummy Activity   ii) Looping

   iii) Activity on Node (AON) diagram

b) The utility data for a network is given below. Crash the network to minimum project duration and determine the project cost for that duration. **[12]**

Activity	Normal		Crash	
	Duration (weeks)	Cost (Rs.)	Duration (weeks)	Cost (Rs.)
0-1	1	5,000	1	5,000
1-2	3	5,000	2	12,000
1-3	7	11,000	4	17,000
2-3	5	10,000	3	12,000
2-4	8	8,500	6	12,500
3-4	4	8,500	2	16,500
4-5	1	5,000	1	5,000

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Total No. of Questions : 12]

SEAT No. :

P1634

[Total No. of Pages : 2

[4164] - 488

B.E. (Production S/W)

COMPUTER INTEGRATED MANUFACTURING AND INDUS-TRIAL ROBOTICS

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answer any three questions from Section I and any three questions from Section II.
2) Answers to the two sections should be written in separate answer books.
3) Use of calculator is allowed.
4) Figures to the right indicate full marks.
5) Answer one question from 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12.

SECTION - I

Q1) a) List out the different models used in CIM? Draw the neat sketch of Simens Models and compare with various Models? **[12]**

    b) Explain need of Models in CIM. **[4]**

OR

Q2) a) List out the different methods of Rapid Prototyping. Explain any one Method in detail. **[8]**

    b) Explain the following in detail. **[8]**

       i) Concept of Solid ground Curing.

      ii) Application Rapid tooling methods to Press tool Manufacturer.

Q3) a) Explain the Basic Structure of Robotics. **[8]**

    b) Derive the equation of Kinematics using Homogeneous Transformation. **[8]**

OR

Q4) a) Explain the Principle of Dennavati - Hartenbergs convention for dynamics Analysis of Joints along with suitable example. **[12]**

    b) Explain the Concept of Spatial mechanism. **[4]**

Q5) a) Explain the different types of drives used in Robotics. **[6]**

    b) Using a schematics diagram represent a hydraulic circuit to explain the Drives system of bang - bang robot having waist motion. Shoulder and Arm expansion respectively. **[12]**

P.T.O.

OR

Q6) a) Explain different types of Actuators used in typical Robot along with sketch. **[10]**

b) Write a short note on Power transmission system in Robotics. **[4]**

c) Explain the concept of basics motion conversion system. **[4]**

SECTION - II

Q7) a) Classify the various types Grippers used in Robotics. **[8]**

b) A 5 kg rectangular block is gripped in the middle and lifted vertically at velocity 1 m/s. If it accelerates to this velocity at 27.5 m/s^2 and the Coefficient of friction between the gripping pad and block is 0.48 Calculate minimum force that would prevent slippage. **[8]**

OR

Q8) a) Explain concept finite element analysis in grippers designs for pressure Foragile. **[8]**

b) Write a short note on design consideration for gripper design. **[8]**

Q9) a) What are the different types of Sensors used in Robotics? Classify. **[8]**

b) Distinguish between tactile sensor and non Tactile Sensors. **[4]**

c) What do you mean by range sensors and proximity sensors? **[4]**

OR

Q10) a) What is robot vision? What are the types of vision sensors used to take the Image of an object? **[8]**

b) Explain Important technique use in robot Vision System. **[8]**
   i) Thresholding.
   ii) Region growing.
   iii) Edge detection.
   iv) Template Matching.

Q11) a) Explain along with sketch the application Robot in the following Area.**[12]**
   i) Spray Painting.
   ii) Spot Welding.
   iii) In medical field.

b) Explain the application of CLIMBING Robot in detail. **[6]**

OR

Q12) Write a short note on following. **[18]**
   a) Interfacing of robotics with PC.
   b) Obstacles avoidance technique in robotics.
   c) Languages used for programming in robot.

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[4164] - 407

B.E. (Civil)

ARCHITECTURE & TOWN PLANNING

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]
[Max. Marks :100

Instructions to the candidates :

 1) *Answers to the two sections should be written in separate answer books.*

 2) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*

 3) *Figures to the right indicate full marks.*

 4) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain the concept "Environmental Filters". **[6]**

  b) Write a note on "Principles of Architecture". **[6]**

  c) Write a note on "Garden Styles". **[6]**

OR

Q2) a) Explain how & why "User friendly Architecture" will be more popular in coming days. **[6]**

  b) Write a note on "Hard Landscaping". **[6]**

  c) Explain the importance of water body conservation. **[6]**

Q3) a) Explain the "support" provided through byelaws for benefitting the concept of "Built Environment". **[8]**

  b) Explain in Detail the concept of Quality of Life. **[8]**

OR

Q4) a) Explain the concept of "enriching the spaces". **[8]**

  b) "Proper Urban design is important for livebility" explain the hidden meaning. **[8]**

Q5) a) Explain the use of sustainable materials for benefitting the areas. **[8]**

b) What are different rating systems? Explain anyone **[8]**

OR

Q6) a) Explain <u>Any one</u> sustainable technology with sketch. **[8]**

b) What are "<u>Benefits of Green Buildings</u>". **[8]**

SECTION - II

Q7) a) Explain different theories of developments (any two). **[6]**

b) What kind of facilities are observed in new towns. **[6]**

c) Write a note on "Neighbourhood planning". **[6]**

OR

Q8) a) Write a note on "Objectives of town planning". **[6]**

b) Write a note on "Gandhinagar". **[6]**

c) Write a note on "Garden city". **[6]**

Q9) a) Write a note on purpose of D.P. **[8]**

b) Write a note on "<u>Cidco</u>". **[8]**

OR

Q10) a) Explain in detail about the surveys for D.P. **[8]**

b) Write a note on planning agencies. **[8]**

Q11) a) Write a note on SEZ. **[8]**

b) Explain the application of Remote Sensing in Planning. **[8]**

OR

Q12) a) Write a note on Land Acquisition Act. **[8]**

b) Explain the important application of GIS in planning. **[8]**

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[4164] - 506

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answer three questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Figures to the right indicate full marks.

4)   Use of logarithmic tables slide rule, Mollier charts, electronic pocket calclator and steam tables is allowed.

5)   Assume suitable data, if necessary.

SECTION - I

Q1) a) With a suitable diagram describe optical system of human eye.   **[6]**

b) Describe different methods of controlling natural light.   **[6]**

c) State and elaborate properties of light.   **[6]**

OR

Q2) a) Describe the dependance of human activities on light.   **[6]**

b) Discuss good and bad effects of lighting.   **[6]**

c) What is photometer? Explain any one type of photometer with suitable diagram.   **[6]**

Q3) a) With a suitable diagram explain construction and working of compact flourocent lamp (CFL).   **[8]**

b) Describe different materials used for lamps.   **[8]**

OR

Q4) a) With a suitable diagram explain construction and working of LASERS. State the applications of LASERS.   **[8]**

b) Draw circuit diagram of flourocent tube operating on single phase AC supply. State advantages of gas discharge lamps over incandescent lamps.   **[8]**

Q5) a) Discuss the importance of reflectors and refractors with reference to illumination. **[8]**

b) Briefly describe different types of lighting fixtures according to photometric usage. **[8]**

OR

Q6) a) With a suitable diagram explain working of electronic ballast used for HID lamp. **[8]**

b) Write a short note on physical protection of lighting fixtures. **[8]**

SECTION - II

Q7) a) State and explain the laws of illumination. **[8]**

b) Explain the procedure for designing illumination scheme for educational facility. **[8]**

OR

Q8) a) Explain the following terms - C.O.U., waste light factor, space to height ratio, wall reflectance factor. **[8]**

b) What is polar curve? What information is obtained from polar curve? Describe types of polar curves. **[8]**

Q9) a) With a suitable example, explain following terms - pay back calculations, life cycle costing. **[8]**

b) State the classification of roads according to BIS. **[8]**

OR

Q10) a) Compare different types of light sources. **[8]**

b) Explain the procedure of illumination scheme design for. **[8]**
    i) Street lighting
    ii) Flood lighting

Q11) a) Write a short note on photovoltic lighting. **[9]**

b) Elaborate the concept of cold lighting. Explain method of generation of cold lighting. **[9]**

OR

Q12) a) Explain central system in case of emergency lighting. **[9]**

b) In context with cold lighting explain OFC (optical fiber cable). **[9]**

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[4164] - 588

B.E. (Printing)

ADVERTISING AND MULTIMEDIA

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

    1)   *All questions are compulsory.*

    2)   *Write answers to different sections on separate answer sheets.*

SECTION - I

Q1) What is campaign planning and its necessity? What benefits are derived out of its execution? Are there any limitations or constraints? Explain in details.**[16]**

OR

Explain any case study of campaign planning along with its period, USP, theme, target audience, brand positioning, market share and other details if any. **[16]**

Q2) Explain AIDA model with any suitable example. **[18]**

OR

Write in details about types of appeals used in advertising. Justify with suitable example. **[18]**

Q3) Explain following types of advertising with suitable examples. **[16]**

    a)   Public relations advertising.

    b)   Marketing and advertising communication process.

OR

Write short notes on : **[16]**

    a)   Public Service Advertising.

    b)   Service advertising.

SECTION - II

Q4) "Marketing Research is an excellent tool for decision maker to decide on product launch" --- Justify. **[16]**

OR

What are different ways of budgeting the advertisement expenditure. Explain in details. **[16]**

Q5) Which are the various types of copy writing? Explain any 5 with suitable examples. **[18]**

OR

What is significance of following in designing of print advertisement. **[18]**

a) White space

b) Color

c) Image of product

Q6) Write down advantages, limitations and features of print media. Explain with suitable case/example. **[16]**

OR

Compare and contrast between

Outdoor Media Vs Electronic Media **[16]**

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[4164] - 677

B.E. (Polymer)

POLYMER PROCESSING OPERATIONS - II

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Your answers will be valued as a whole.*

6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is parison programming? How is it done? Discuss the process parameters which control the weight of the bottle. **[8]**

b) Explain what you understand by die shaping in blow molding. **[6]**

c) Compare single and two stage injection stretch blow molding of PET. **[4]**

OR

Q2) a) Discuss the design features and requirements of extrusion blow moulding die head assembly. Also draw a neat sketch of the accumulator type of die head assembly. **[6]**

b) Write short notes on **[6]**

i) Parison sag in extrusion blow moulding

ii) Pleating

iii) Shark skin effect.

c) Discuss the various faults and remedies for the same in blow moulding of HDPE and PVC. **[6]**

Q3) a) Discuss the different types of heating modes for thin sheet and thick sheet in thermoforming. **[4]**

b) Explain the process of drape forming and pressure forming with a neat sketch. **[6]**

c) What are the advantages of thermoforming over injection molding? State the pre-stretch variables in thermoforming process. **[6]**

OR

Q4) a) Explain the causes of wrinkling and whitening of sheets during thermoforming. **[4]**

b) Write short notes on (any two) : **[6]**

i) Diaphragm forming.

ii) Draw ratio and secondary draws.

iii) Twin sheet roll fed thermoforming.

c) Explain the significance of Biot number in case of thermoforming of thin and thick sheets. **[6]**

Q5) a) Draw a calendaring plant layout for making PVC sheet and explain all major stages involved in the plant. **[6]**

b) Discuss the different heating systems used in calendaring rolls. Discuss their merits and demerits. **[6]**

c) Discuss the various faults which occur in calendaring. **[4]**

OR

Q6) a) With neat sketches explain the different types of calendar arrangements and discuss their merits and demerits. **[6]**

b) Write a short note on hydraulic pull backs used in calendaring. **[4]**

c) Draw a neat sketch & explain the embossing and laminating line **[6]**

SECTION - II

Q7) a) Discuss in short 'rotational moulding of liquid polymers. **[6]**

b) Explain the different ways of bubble removal during rotational molding. **[6]**

c) Explain how internal air temperature can be used as a tool of process control in rotational molding. **[6]**

OR

Q8) a) Discuss the criteria for selecting a polymer material for rotational moulding. **[6]**

b) What are the advantages and limitations of rotational molding? **[6]**

c) Explain the independent arm rotational moulding machine with its advantages. **[6]**

Q9) a) Discuss the steps involved in powder metal injection moulding process. **[5]**

b) List the various types of injection foam moulding processes and explain any one of them. Summarize the pros and cons of all the injection foan molding processes. **[6]**

c) Explain the different steps involved in water injection technique. State its advantages and disadvantages. **[5]**

OR

Q10) a) Giving a suitable example, explain the structure development during injection moulding for a slow crystallising polymer. **[5]**

b) Discuss two - component micro injection molding w.r.t process details, mold and machine technology. **[5]**

c) Discuss the advantages and disadvantages of Gas assisted injection molding. Compare Water injection molding and Gas assisted injection molding. **[6]**

Q11) a) Explain the process of vacuum metallizing adopted for metal deposition on plastic moulding. **[6]**

b) Write a short note on the following w.r.t waste management. **[6]**

  i) Incineration

  ii) Landfill

c) Give the characteristics of laser machining of plastics. Explain the various applications of laser machining. **[4]**

OR

Q12) a) Write short notes on (any two): **[6]**

  i) Hot stamping

  ii) In-mould decoration

  iii) Gravure printing

b) How does the machining of metals differ from that of plastics? **[5]**

c) State the four 'R's of plastic waste management. Suggest the various methods to separate plastic solid waste. **[5]**

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[4164] - 679

B.E. (Polymer Engg.)
MECHANICS OF COMPOSITES
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Answer Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II.*

    2)   *Answers to the two sections must be written in two separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of scientific calculator, graph paper, log-log graph paper is allowed*

    5)   *Assume suitable data, if required.*

SECTION - I

Q1)   a)   Compliance matrix for generally orthotropic lamina under the condition of plane stress is given by   **[6]**

$$\begin{bmatrix} 0.02 & 0.01 & 0.03 \\ 0.01 & 0.005 & 0.05 \\ 0.03 & 0.05 & 0.001 \end{bmatrix} \times 10^{-3} \text{ Gpa}$$

        If poisson's ratio, ϑ_{12} for the lamina is found to be 0.1, find engineering constants E_{11}, E_{22} & G_{12}. Also find coefficient of mutual influence of the first kind. $\eta_{1,12}$ & $\eta_{2,12}$. Find coefficient of mutual influence of the second kind, $\eta_{12,1}$ & $\eta_{12,2}$.

    b)   Write compliance matrix for orthotropic (9 independent constants) and for transversely isotropic (5 independent constants) lamina.   **[4]**

    c)   Write in short about invariant properties of orthotropic lamina.   **[6]**

Q2) a) For an orthotropic lamina under plane stress condition, stress applied is as under. **[8]**

$$\begin{bmatrix} \sigma\,x \\ \sigma\,y \\ \tau\,xy \end{bmatrix} = \begin{bmatrix} 100 \\ 50 \\ 25 \end{bmatrix} \text{MPa}$$

If engineering constants are

E_{11} = 500 MPa

E_{22} = 300 MPa

G_{12} = 1 GPa

ν_{12} = 0.3

Calculate the strains in global co-ordinate system. Take $v = 30°$.

b) Reduced compliance matrix for a unidirectional lamina under plane stress condition is given by - **[8]**

$$[s] = \begin{bmatrix} 0.05 & 0.04 & 0 \\ 0.04 & 0.025 & 0 \\ 0 & 0 & 0.001 \end{bmatrix} \times 10^{-3} \text{ GPa}$$

Find reduced transformed compliance matrix for $\theta = 45°$. If $\sigma\,x = 200$ MPa is applied to above lamina, what would be strains in global co-ordinate system?

Q3) a) Write a note on hygrothermal stresses and strains. **[6]**

b) Discuss maximum stress theory for orthotropic material under plane stress condition. **[6]**

c) Discuss merits of Hoffman's failure criterion for orthotropic material under plane stress condition. **[6]**

Q4) a) Following data regarding uni-directional fiber reinforced lamina is known.

[6]

  i) Tensile failure strength in direction $1 = x = 100$ MPa.

  ii) Tensile failure strength in direction $2 = y = 75$ MPa.

  iii) Shear failure strength $= S = 50$ MPa.

  Calculate uniaxial off axis tensile failure strength of the lamina as per Tsai - Hill failure criteria assuming $\theta = 45°$.

b) Give limitations of maximum stress theory and maximum strain theory for biaxial failure strength of an orthotropic lamina. **[6]**

c) Biaxial failure strength, σ, for a unidirectional fiber reinforced lamina is 200 MPa. Find F_{12} ie forth order tensor term as defined in Tsai-wu tensor theory. Given. **[6]**

  2nd order strength tensor, $F_1 = 400$ Mpa.

  2nd order strength tensor, $F_2 = 200$ Mpa.

  4th order strength tensor, $F_{11} = 100$ Mpa.

  4th order strength tensor, $F_{22} = 50$ Mpa.

  Subscripts 1 & 2 refer to co-ordinate system and have usual meaning.

Q5) a) For an orthotropic material under plane stress, prove that **[8]**

$$\nu_{12} = \nu_{12f}\, V_f + \nu_m\, V_m$$

  Where f refers to fibers, m refers to matrix, V refers to volume fraction and ν refers to poisson's ratio.

b) Fibers of 0.25 inch length and diameter of 10 micrometer are reinforced with matrix at 50% fiber volume fraction. Matrix modulus is 3 GPa and fiber modulus is 70 Gpa. Assuming fibers to be oriented and using Halpin - Tsai equations, calculate **[8]**

    i)   longitudinal modulus

    ii)   Transverse modulus

Assuming lamina to be random fiber composite, calculate

    i)   Elastic modulus

    ii)   Shear modulus

    iii) Poisson's ratio

<div align="center">OR</div>

Q6) a) Write down expressions for lower bound and upper bound on apparent young's modulus of the composite material in terms of moduli and volume fractions of constituent material. **[5]**

b) If plot the graph of $\dfrac{G_{12}}{G_m}$ for various fiber volume fractions. Comment on result.

Given- **[8]**

shear strength in 1-2 plane $= G_{12} = 2\,GPa.$

shear strength of matrix $= G_m = 0.5\ GPa.$

shear strength of fiber $= G_f = 70\ Gpa.$

c) Write in short about randomly oriented short fiber composites. **[3]**

<div align="center">

SECTION - II

</div>

Q7) a) Discuss failure modes of pin bearing test. Discuss also the effect of stocking sequence on test results. **[8]**

b) Explain $10°$ off-axis test to determine in-plane shear properties. Explain how stress, strain & modulus is calculated. **[8]**

Q8) a) With a neat sketch, explain celanease test fixture to determine compressive properties. **[6]**

b) Explain ASTM D 3039 test method for tensile properties. Give specimen details. **[6]**

c) Write in short about ultrasonic non-destructive testing of composites.
[4]

Q9) a) Explain various modes of failure for **[6]**

    i) Adhesively bonded joints

    ii) Mechanically fastened joints

b) Obtain governing equations for laminated beams. Using governing equations, obtain deflection of beam having symmetric lay up and carrying uniformly distributed load and is simply supported at both ends. **[10]**

OR

Q10) a) A one meter long tension bar with round cross-section is made up of uni-directional carbon fiber reinforced with epoxy. fiber volume fraction is 60%. Maximum load on the rod is to be 440 kN. The rod is subjected to tension - tension fatigue cycling at an average cycling rate of 10 cycles/sec. for ten years. If elongation of the rod should not exceed 0.2 mm, calculate the diameter of the rod using factor of safety of 3. Given - **[8]**

σ_{fu} = 586 MPa $\qquad\qquad$ E_f = 276 GPa

Tension fatigue strength coefficient = 0.035

b) A steel beam with bending stiffness, 30kN/m is to be replaced with hybrid beam having kevlar and E glass laminates. The fibers are laid unidirectionally along beam axis. Thickness of kevlar ply is 0.15 mm and glass ply is 0.13 mm. Determine the number of plies in each laminate. Take E_{glass} = 43 GPa & E_{kevlar} = 76 GPa Refer to fig 1 for hybrid beam configuration. **[8]**
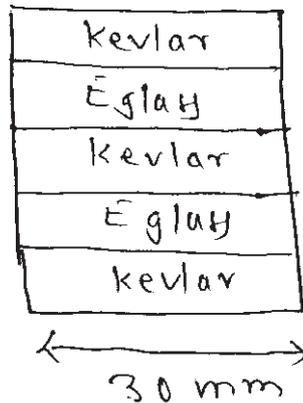

Fig 1

Q11) a) Write short notes on **[6]**

      i)   Symmetric angle ply laminate

      ii)   Antisymmetric laminate

b) A [0/90]s laminate is subjected to force Nx = 100 N/mm. Each ply is 0.125mm. Calculate stresses in the laminate. Given - **[12]**

$$[Q]_{0°} = \begin{bmatrix} 140 & 3 & 0 \\ 3 & 10 & 0 \\ 0 & 0 & 5 \end{bmatrix} \text{GPa}$$

OR

Q12) a) The stiffness matrix for + 45 & – 45 lamina are. **[12]**

$$[Q]_{+45} = \begin{bmatrix} 45 & 31 & 32 \\ 31 & 45 & 32 \\ 32 & 32 & 35 \end{bmatrix} \text{ GPa}$$

$$[Q]_{-45} = \begin{bmatrix} 45 & 31 & -32 \\ 31 & 45 & -32 \\ -32 & -32 & 35 \end{bmatrix} \text{ GPa}$$

Calculate [A], [B] & [D] matrices for the laminate configuration [– 45 / + 45 / – 45 / + 45]

b) Compute force and moment resultants for a single layer generally orthotropic laminate having 3 mm thickness and angle of orientation of $\theta = 45°$. The engineering properties are **[6]**

$E_{11} = 140$ GPa $E_{22} = 10$ GPa

$G_{12} = 5$ GPa $\nu_{12} = 0.3$

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[4164] - 411

B.E. (Civil)

TQM AND MIS IN CIVIL ENGINEERING

(Sem. - I) (2008 Pattern) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

    1)   *Answer Q.1 or Q2, Q.3 or Q4, Q.5 or Q6 from Section - I and Q.7 or Q8, Q.9 or Q10, Q.11 or Q12 from Section - II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagram must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic calculator and steam table is allowed*

    6)   *Assume suitable data, if necessary.*

<u>SECTION - I</u>

Q1) Discuss the various weaknesses existing presently in the Indian construction industry and with suitable examples, explain how TQM philosophy can offer promising solutions to overcome these weaknesses. **[18]**

OR

Q2) Explain the 8 principles of ISO 9001 : 2000 with practical examples, in detail. **[18]**

Q3) Explain in brief the different contents existing in a Quality Manual drafted for an organisation executing multistoreyed residential buildings. Also show the responsibility charts for various duties expected from the quality manual.**[16]**

OR

Q4) Explain in brief : -   **[16]**

    a) Deming's PDCA cycle, its importance.

    b) Applications of Six Sigma in construction.

    c) Project Rework Review Tool Software.

    d) Life cycle Approach in TQM.

Q5) Explain concepts of internal customers, external customers, Quality function deployment and non-conformities with appropriate examples from any construction project involving various stake-holders. **[16]**

OR

Q6) What are quality circles? How do they function? Explain how statistical tools are very useful in quality control and quality assurance on construction projects. **[4 + 4 + 8]**

SECTION - II

Q7) With a flow chart explain the various components of any MIS, their inter-relationships and their functions. **[18]**

OR

Q8) Explain the process of data acquisition, type of data required to be collected, and the coding / de-coding methodology in order to prepare an MIS for a construction organisation of a contractor, Which executes Road projects. Make necessary relevant assumptions. **[18]**

Q9) List out the various advantages and also the limitations of using MIS in construction and explain them with practical examples. **[16]**

OR

Q10) Explain in detail. **[16]**

    a) ERP software applications in construction.

    b) GIS - GPS based MIS systems developed for project management.

Q11) Discuss various limitations of presently existing MIS softwares used in construction industry and suggest a few recommendations. **[16]**

OR

Q12) Explain how the Ministry of Statistics and Program Implementation Govt. of India, keeps a centralised data base of all major, medium, minor construction projects being executed in India and how it monitors their progress through the reporting system which it has devised. **[16]**

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[4164] - 422

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2008 Pattern) (Elective - IV) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn whenever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic calculator, and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain in detail following projects :   **[18]**

    a)   JNNURM.

    b)   Pune metro.

    c)   PMGSY.

<div align="center">OR</div>

Q2) Explain in detail following projects :   **[18]**

    a)   Eastern Freeway link.

    b)   NHDP various phases.

    c)   Mumbai Mono-rail project.

Q3) a)   With a flow diagram explain the comprehensive transport planning process and explain in detail   **[6+3+3]**

        i)   Household Surveys.

        ii)   O-D surveys.

    b)   Discuss the role of traffic and transport planning consultants with examples.   **[4]**

OR

Q4) Detail out the transport planning and design process adopted for the Saswad-Hadapsar-Theur Phata bypass by the consultants, and discuss the various alternatives suggested. **[16]**

Q5) a) Explain how to use NPV as an effective tool along with the PBP in deciding various investment alternatives for transport projects with an example. **[12]**

b) What is PCU? Enlist any 3 values adopted by IRC. **[1+3]**

OR

Q6) a) Explain in detail the economic and financial feasibility studies carried out on the 4 flyovers at sion and other places in mumbai, by the consultants, giving due consideration to the various costs and benefits arising thereof. **[12]**

b) Explain zoning and its importance in traffic-transport planning with examples. **[4]**

SECTION - II

Q7) Compare and contrast between flexible pavements and rigid pavements in detail on various points. **[16]**

OR

Q8) Explain the various purposes of overlays, types of overlays and the IRC-81 method of overlay design. **[16]**

Q9) Explain with sketches any 8 types of distresses occurring in flexible pavements, their reasons and how they are measured. Explain PCR and its importance, with an example. **[12+4]**

OR

*Q10)*Explain with sketches any 8 types of distresses occurring in rigid pavements, their reasons and how they are measured. Explain PCI and its importance, with an example.   **[12+4]**

*Q11)*a)   Design a flexible pavement as per IRC - 37 for the construction of a new bypass based on following data.   **[12]**
  i)   Two lane dual carriageway.
  ii)   Initial traffic in the year of completion of construction = 1100 CVPD in both directions.
  iii)   Traffic growth rate per annum = 9%.
  iv)   Design life = 15 years.
  v)   Terrain = Rolling
  vi)   CBR = 5%
  Draw a typical cross-section showing all the basic layers.
  b)   Explain concept and importance of vehicle damage factor with an example.   **[6]**
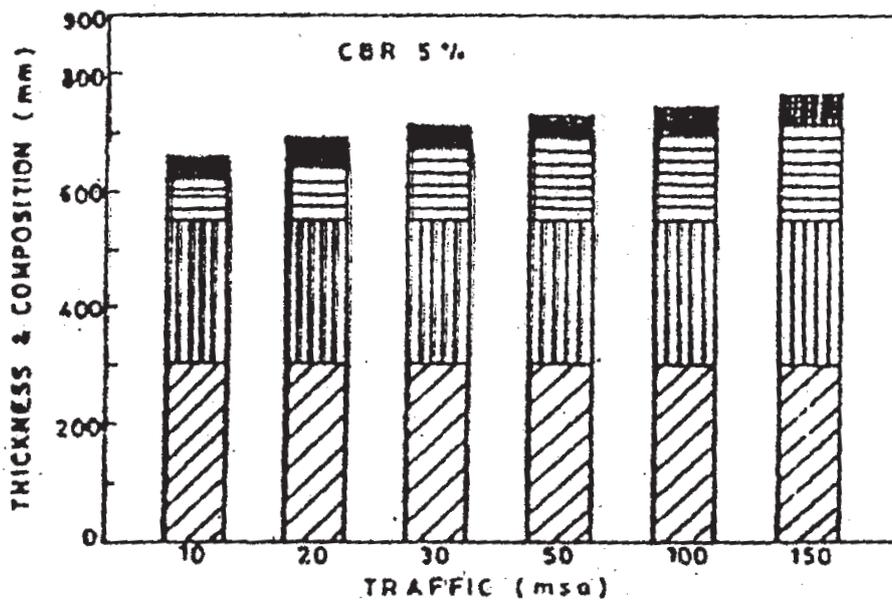
OR

*Q12)*a)   Based on the data in 11(a) design the flexible pavement if the growth rate per annum is 16%, all other parameters remain same.   **[12]**
  b)   Explain function of dowel bars in a concrete pavement with a sketch.
                                                                       [6]

PAVEMENT DESIGN CATALOGUE
PLATE 2 – RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

CBR 5%				
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	660	40	70	
20	690	40	100	
30	710	40	120	Base = 250
50	730	40	140	
100	750	50	150	Sub-base = 300
150	770	50	170	

GSB   GB   DBM   BC

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[4164] - 450

B.E. (Mechanical)

CRYOGENIC ENGINEERING

(2008 Pattern) (Open Elective) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from each section.*
2) *Answers to the two sections should be written separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, Mollier charts, electronic pocket calculator,P-h charts is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define the term "Cryogenics". Discuss the various applications of cryogenics. **[8]**

     b) Discuss the mechanical properties of materials at cryogenic temperatures. **[4]**

     c) Discuss the various properties of the following cryogenic fluids : **[4]**

        i) Oxygen,   ii) Argon,

<div align="center">OR</div>

Q2) a) Discuss the phase diagram for super fluid helium. **[8]**

     b) Explain the difference between ortho-hydrogen and para-hydrogen.**[4]**

     c) Describe Walker's chart of cryocooler classification. **[4]**

Q3) a) What are the system performance parameters for gas liquefaction system? How these parameters are related? **[6]**

     b) Explain the Ideal cycle used for liquefaction of gases with neat sketch.**[4]**

     c) An ideal J-T refrigeration system operates between 300K and 70K using Nitrogen as working fluid. The gas is compressed from 50.7kPa to 15.2 MPa. Determine the coefficient of performance and figure of merit of this system. **[6]**

<div align="center">OR</div>

Q4) a) Explain the Linde-Hampson cycle used for liquefaction of gases with neat sketch. **[6]**

b) Explain the Joule-Thompson coefficient. What do you mean by inversion temperature? Mention the inversion temperatures of few cryogenic fluids. **[4]**

c) Determine the minimum work required to provide 100 W of refrigeration at 20.4 K if the heat is rejected at (i) 77K and (ii) 300 K. **[6]**

Q5) a) Explain the working of Simon helium-liquefaction system with suitable sketch. **[6]**

b) Determine the fraction of air liquefied in a simple Linde cycle if the inlet conditions on the warm side of the two-channel heat exchanger are 310 K and 20.2 MPa while the exit conditions are 303 K and 0.101 MPa. **[6]**

c) Determine the liquid yield, the work per unit mass compressed, the work per unit mass liquefied, and the figure of merit for a simple Linde-Hampson system using Argon as the working fluid. The system operates between 101.3 kPa and 293 K at point 1 and 20.67 MPa at point 2. The system may be assumed reversible, except for the expansion through the expansion valve. Draw the neat sketch for the arrangement and represent the cycle on T-S chart. **[6]**

OR

Q6) a) Explain the working of Claude liquefaction system with suitable sketch. **[6]**

b) Air enters a Claude system at 1atm and 25°C and is compressed to 100atm at 100 atm and 240K, 50% of the main flow is diverted to the expander. The remainder flows through the heat exchangers and expanders through the expansion valve to 1 atm.

Adiabatic efficiency of expander = 80%, Mechanical efficiency of expander = 90%.

Overall efficiency of compressor = 75%, Effectiveness of heat exchangers = 98.5%

Determine :

i) Liquid yield,

ii) Expander work output per unit mass compressed,

iii) Figure of merit. **[6]**

c) Determine the fraction of flow diverted through a reversible and adiabatic expander of an ideal Claude refrigeration system operating under the following conditions : Working fluid is nitrogen compressed isothermally from 0.101 MPa and 300 K to 4.04 MPa; inlet to the expander is 4.04 MPa and 240 K; refrigeration effect is 81 kJ/kg. **[6]**

SECTION - II

Q7) a) With the help of schematic and T-S diagram, explain Philips Refrigerator. Also explain briefly the importance of refrigerator effectiveness. **[6]**

b) A Carnot refrigerator operates between 300 K and 72 K. Determine the COP of the refrigerator. Please comment if low temperature source reduces to 10 K, what is the effect on COP of the cycle. Draw T-S diagram for the same. **[4]**

c) Write short note on the G-M refrigerator. **[6]**

OR

Q8) a) A Philips refrigerator operates at 100 K with an ambient heat sink temperature of 300 K. The unit operates between a lower pressure level of 0.101 MPa and an upper pressure level of 2.02 MPa. If the working fluid is nitrogen and is assumed to behave as an ideal gas, determine the refrigeration effect per unit mass of nitrogen compressed, the coefficient of performance of the refrigerator and the figure of merit.**[6]**

b) Write short note on the Vuilleumier refrigerator. **[6]**

c) Explain briefly the importance of refrigerator effectiveness. **[4]**

Q9) a) A natural gas stream has a volumetric composition of 80% methane, 12% ethane, 3% propane, 1% butane and 4% nitrogen. Assuming that all the gases are in mixture follows the ideal gas equation of state; evaluate the ideal work of separation at 300K in kJ/kg of propane if
   i) all the gases are separated and
   ii) only the ethane and the propane are separated individually from the other gases that remain mixed. **[8]**

b) Define the Murphree efficiency and discuss the factors that affect it. **[4]**

c) Estimate the equilibrium vapour and liquid compositions for a mixture of Oxygen and Argon at a pressure and temperature of 0.101 MPa and 86 K respectively assuming that the vapor acts as an ideal gas and the liquid behaves as a perfect solution. **[6]**

OR

*Q10)*a) A mixture of nitrogen and argon exists as a two-phase mixture at 506.6 kPa. The mole fraction of nitrogen in the gaseous phase is 0.7. Determine the temperature of the mixture and the mole fraction of nitrogen in the liquid phase, using distribution coefficients for the components. **[6]**

b) Show that y = ax + b is the form of equation of the operating line in the upper part of rectification column. State the assumptions made.**[4]**

c) Determine the number of theoretical plates required to yield 96% nitrogen as top product stream and 93% of oxygen as bottom product stream. The feed composition is 79% N_2 and 21% O_2. The feed, bottom product and top product streams are saturated liquids. The desired flow rate of the bottom product is 30 kgmol/s. The heat removal at top of the column is 1150 kW. The column operates at a pressure of 1 atm.**[8]**

*Q11)*a) Discuss the importance of vacuum technology in cryogenics. **[4]**

b) Compare various cryogenic insulation methods. **[6]**

c) With the help of neat sketch explain the construction of Dewar Vessel.**[6]**

OR

*Q12)*a) With a neat sketch describe the operation of diffusion pump. Further discuss why the getters are used in cryogenics. **[6]**

b) Write short note on Cryopumping. **[6]**

c) Discuss various temperature measurement techniques used in cryogenic applications. **[4]**

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[4164] - 450A

B.E. (Mechanical)

PRODUCT LIFE CYCLE MANAGEMENT

(2008 Pattern) (Open Elective) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any three questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

SECTION - I
Unit - I

Q1) a) Explain the product life cycle in detail with suitable example.   **[8]**

b) Discuss corporate challanges in detail that demands PLM Implementation.   **[8]**

OR

Q2) a) Explain the importance of PLM with respect to life cycle problems to be resolved.   **[8]**

b) What do you mean by product lifecycle management? Discuss the concept.   **[8]**

Unit - II

Q3) a) Discuss the PLM characteristics in detail.   **[9]**

b) Compare Engineering Resource planning with product life cycle management. Elaborate differences.   **[8]**

OR

Q4) Explain in detail various threads of PLM such as CAD, EDM, PDM & CIM.   **[17]**

P.T.O.

Unit - III

Q5) Elaborate in detail the role of external factors in the implementation of PLM such as scale, complexity, cycle time, globalization & regulations. **[17]**

OR

Q6) Explain the internal drivers such as productivity, Innovation, collaboration, Quality etc. demanding implementation of PLM in detail. **[17]**

SECTION - II
Unit - IV

Q7) a) Explain the product life cycle management system. **[8]**
   b) Explain the system architecture of PLM system. **[8]**

OR

Q8) a) Discuss the various characteristics of PLM system in detail. **[8]**
   b) Explain the product information data model and product model. **[8]**

Unit - V

Q9) Discuss the product data & product workflow with reference to link between them. What are key management issues Involved in? **[17]**

OR

*Q10)*a) What is PLM strategy? Discuss the principles for PLM strategy. **[9]**
   b) Discuss the change management for PLM. **[8]**

Unit - VI

*Q11)*Explain the various phases of product life cycle with corresponding technologies, in detail. **[17]**

OR

*Q12)*a) Explain the core functions as content management, & program management. **[9]**
   b) Discuss the role of human resources in PLM. **[8]**

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[4164] - 450B

B.E. (Mechanical)

INDUSTRIAL AUTOMATION

(2008 Pattern) (Open Elective) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1) *Answer three questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Compare open loop and closed loop control systems with respect to block diagrams, stability, response and any one suitable application.**[8]**

   b) Explain types of automation in industry with only one example of each.   **[8]**

OR

Q2) a) Enumerate the list of automation tools and explain PLC in brief as automation tool.   **[8]**

   b) Comment on transmitters as control system components with respect to significance in block diagram, types, important specifications and a suitable application.   **[8]**

Q3) a) Write a short note on DCS with respect to important specifications, programming platform, communication protocols and any one advantage of DCS over PLC.   **[6]**

   b) Develop a PLC program for an elevator. Given START, UP, DOWN buttons (push-to-ON, NO), STOP button (push-to-OFF, NC), limit switches LS1 (Down, NO), LS2 (UP, NO). The objectives are   **[12]**
      i)   START button should put ON, the elevator.
      ii) STOP button should stop the elevator where it is.
      iii) When STARTed, and UP button is pushed, the elevator should start moving up, if at bottom, till UP LS1 is pushed.
      iv) When STARTed and DOWN button is pushed, the elevator should start moving down, if at top, till DOWN LS2 is pushed.

P.T.O.

OR

Q4) a) Enumerate the list of important PLC specifications referred in selection of PLC for industrial automation. **[6]**

b) Consider a water tank with inlet valve V1 (ON-OFF) at top and outlet valve V2 (ON-OFF) at bottom. The tank has two float switches 'LOW' (NO) and 'HIGH' (NO), START button (push to ON, NO) and STOP button (Push to OFF, NC) both push. Develop a PLC program for following objectives. **[12]**

i) When START button is pushed, the process starts and continues till STOP is pushed.

ii) When LOW is not pushed, V1 will be ON and tank start filling till HIGH is pushed.

iii) When HIGH is pushed, V1 will go OFF, V2 will be ON and tank shall start discharging till LOW is unpushed.

Q5) a) Write a short note on ASRS with respect to important components, automation tools, advantages and limitations over its conventional counterpart. **[8]**

b) Explain the themes of path guidance used in AGVs. **[8]**

OR

Q6) a) Compare FMS and CIMS on the basis of four major issues. **[8]**

b) What are advantages and disadvantages of AGVS. **[8]**

SECTION - II

Q7) a) Explain SCADA with respect to definition, advantages, limitations, and any one field application. **[8]**

b) Explain in brief, HMIs used in Industrial Automation. **[8]**

OR

Q8) a) Discuss in brief any four important components of SCADA systems. **[8]**

b) Compare SCADA system over networked PLCs. **[8]**

Q9) a) Explain any one suitable application of stepper motor and induction motor with respect to need, theme to control, any one advantage and limitation. **[8]**

b) Explain two applications of hydraulic circuits used in industrial automation with working and advantage over manual method of doing the same task. **[10]**

OR

*Q10)*a) Explain principle and working of VFD used to control the speed of electric motors. **[8]**

b) Write any one important feature of the following are essential in selection of (i) Hydraulic cylinder (ii) Electrical motor (iii) Pneumatic flow control valve (iv) Pressure relief valve. **[10]**

*Q11)*a) Develop a control logic to automate the conveyor such as used in bottle filling plant. Write how many inputs, outputs, timers, etc., you have assumed along with the objective statements required for programing.**[8]**

b) Discuss automation opportunity in any one machine loading and unloading application. **[8]**

OR

*Q12)*a) Discuss any two advanced sensors used in robotic applications. **[8]**

b) Develop a logic sequence to automate the drilling machine used to drill a hole on component of an assembly line moving on a conveyor. Write all your assumptions clearly. **[8]**

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[4164] - 485

B.E. (Production S/W)
ADVANCED PRODUCTION TECHNOLOGY
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
 1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
 2) *Figures to the right indicate full marks.*
 3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain with neat sketch of following regarding to HSM technology. **[8]**

  i)   Ultra high cutting speed.

  ii)   Chip formation.

  iii) Flank wear of ceramic tool.

 b) Illustrate the following :   **[8]**

  i)   Optimum cutting speed for HSM machining.

  ii)   Effects of using HSM based processes in die and mould manufacturing.

OR

Q2) a) Describe comparison of tool life for dry drilling and wet drilling on different workpiece materials.   **[5]**

 b) Explain with neat sketch regarding to dry maching operation.   **[5]**

  i)   Tool wear.

  ii)   Surface finish.

 c) Explain with neat sketch regarding to Hard part machining.   **[6]**

  i)   Mechanism of material side how during hard turning.

  ii)   Typical wear types in CBN finish hard turning.

Q3) Explain with neat sketch.   **[16]**

 a) Ultra precision lathe machine.

 b) Ultra precision milling machine.

 c) Nano precision CNC machining centre.

 d) Ultra precision grinding machine.

P.T.O.

Q4) a) Explain evolutionary of commercial nano products of following segment. **[10]**

      i)   Electronics.

      ii)   Material.

      iii)   Life sciences

      iv)   Sensor medicine.

      v)   Instrumentation.

    b) Differentiate between Non conventional machining and micromachining processes. **[6]**

Q5) a) Explain with neat sketch online / In process and online postprocesses, offline inspection methods. **[9]**

    b) What is cell design? What are the factors affecting cell design and what are the cell design criteria. **[9]**

OR

Q6) Write a short note on **[18]**

    a) Rapid prototyping.

    b) Part classification and coading.

    c) Computer integrated production management system [CIPMS]

SECTION - II

Q7) a) Explain basic framework of Toyota production system. **[10]**

    b) Describe components of FMS. **[6]**

OR

Q8) Explain with neat sketch following feeders. **[16]**

    a) Vibratory feeders.

    b) Vibratory bowl feeders.

    c) Rotory disc feeder.

    d) Centrifugal feeder.

    e) Revolving feeder.

Q9) a) The displacement of a pump operating at 1000 rpm at a pressure of 70 bar is 100 cm^3 the input torque from the prime mover is 120 Nm. If it delivers 0.0015 m^3/s of oil determine. **[9]**

      i)   Overall efficiency of the pump.

      ii)   Theoretical torque required to operate through pump.

      iii)   Volumetric efficiency.

b) Explain with neat sketch hydraulic servo mechanism. **[7]**

<center>OR</center>

Q10) a) Explain with neat sketch proportional valves. **[6]**

b) Explain with neat sketch the circuit showing the application of counter balance valve. **[5]**

c) Explain with neat sketch swash plate type axial piston pump. **[5]**

Q11) a) Sketch various types cylinder mountings. **[6]**

b) Draw a pneumatic circuit showing the application of automatic to and fro motion of a double acting centre. & explain. **[6]**

c) Explain the following terms w.r. to hydraulic motor. **[6]**
   i) Volumetric efficiency.
   ii) Mechanical efficiency.
   iii) Overall efficiency.

<center>OR</center>

Q12) a) Draw & explain motor braking circuit. **[6]**

b) Explain with neat circuit, the application of unloading valve. **[6]**

c) What size of accumulator is necessary to supply 5000 cm³ of fluid in a hydraulic system having maximum operating pressure of 200 bar which drops to minimum 105 bar. Assume adiabatic expansion and compression of gas with precharge of accumulator at 70 bar. **[6]**

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[4164] - 608

B.E. (Chemical Engineering)

BIOPROCESS ENGINEERING

(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

　　1)　Answer 3 questions from Section - I and 3 questions from Section - II.

　　2)　Answers to the two sections should be written in separate books.

　　3)　Neat diagrams must be drawn wherever necessary.

　　4)　Figures to the right indicate full marks.

　　5)　Use of electronic pocket calculator is allowed.

　　6)　Assume suitable data, if necessary.

SECTION - I

Q1) a)　Explain specific growth rate of bacteria.　　　　　　　　　　　**[8]**

　　　b)　Discuss the concept of Biorefinary.　　　　　　　　　　　　　**[8]**

OR

Q2) Write short notes on following :　　　　　　　　　　　　　　　**[16]**

　　　a)　Amino acid building blocks and polypeptides.

　　　b)　Proteins and their diverse biological applications.

Q3) Explain the manufacturing process for　　　　　　　　　　　　　**[16]**

　　　a)　Acetic acid and

　　　b)　Vinegar.

OR

Q4) Explain the manufacturing process for　　　　　　　　　　　　　**[16]**

　　　a)　Acetone and

　　　b)　Lactic Acid.

P.T.O.

Q5) a) Explain the significance of the constants in the Michaelis Menten equation and describe different ways of determining them.   **[10]**

b) Discuss the different cases of enzyme reactions in heterogeneous systems.   **[8]**

OR

Q6) a) Explain the mechanisms of catalysis of enzyme acting on two substrates. How are the kinetics determined in this case?   **[8]**

b) The following experimental data were collected during a study of the catalytic activity of an intestinal peptidase with the substrate glycylglycine.   **[10]**

Glycylglycine + $H_2O \longrightarrow$ 2 glycine

S_0 (mmol)	Product formed (μmol/min)
1.5	0.21
2.0	0.24
3.0	0.28
4.0	0.33
8.0	0.40
16.0	0.45

Use graphical analysis to determine the V_{max} and K_m for this enzyme preparation and substrate.

SECTION - II

Q7) a) What is dilution rate? Discuss the effect of dilution rate on biomass and substrate concentrations?   **[10]**

b) Write a note on simple product formation kinetics.   **[8]**

OR

Q8) a) Derive design equation for CSTR for continuous cultivation of cells and also explain Monod kinetics.   **[10]**

b) What are other environmental effects on growth of microbial biomass? Discuss each factor in detail.   **[8]**

Q9) a) Explain the fed batch mode of fermenter operation in terms of features, advantages, disadvantages, concentration time profiles, mass balances and examples. **[8]**

b) What is meant by critical oxygen concentration and its significance with respect to cell growth? **[8]**

OR

*Q10)*a) What is immobilization of enzymes? What are its advantages over free enzymes? **[8]**

b) Discuss and compare mechanically agitated contactor and bubble column reactor as fermenter. **[8]**

*Q11)*a) Describe the steps involved in the modeling and simulation of bioprocesses. **[8]**

b) Discuss solvent extraction with examples used in bioseparations. **[8]**

OR

*Q12)*Write short notes on : **[16]**

   a) Bioprocess economics.

   b) Fluidized bed bioreactor.

   c) Crystallization and drying.

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[4164] - 617
B.E. (Chemical)
PROCESS ENGINEERING COSTING & PLANT DESIGN
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer three questions from Section - I and three questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Enlist the factors required and explain them in detail for the comparison of different processes to make the same product. **[9]**

b) Illustrate the concept of material balance with reaction using suitable neat flow diagram. Take a basis of your choice. **[9]**

OR

Q2) a) Write the sample specification sheet for the shell and tube heat exchanger which show the following **[9]**

   i)   Identification.

   ii)   Function.

   iii) Operation.

   iv)   Materials handled.

   v)   Basic Design Data.

   vi)   Essential controls.

   vii) Insulation requirements.

   viii) Allowable tolerences.

   ix)   Special information such as material of construction, gaskets, supports etc.

b) What are the factors that govern the selection of plant site or location? Explain them in details. **[9]**

Q3) a) Draw and explain the tree diagram showing the cash flow for industrial operations. **[8]**

b) The original investment for an asset was Rs. 10,000 and the asset was assumed to have a service life of 12 years with Rs. 2,000 salvage value at the end of the service life. After the asset has been in use for 5 years, the remaining service life and final salvage value are reestimated at 10 years and Rs. 1,000 respectively. Under these conditions, what is the depreciation cost during the sixth year of the total life if straight - line depreciation is used? **[8]**

OR

Q4) a) Write a note on types of taxes and insurances and explain them in detail.**[8]**

b) A reactor, which will contain corrosive liquids, has been designed. If the reactor is made of mild steel, the initial installed cost will be Rs. 5,000 and the useful - life period will be 3 years. Since the stainless steel is highly resistant to the corrosive action of the liquids, it has been proposed as an alternative material to mild steel. The stainless - steel reactor would have an initial installed cost of Rs. 15,000. The scrap value at the end of the useful life would be zero for either type of reactor, and both could be replaced at a cost equal to the original price. On the basis of equal capitalized costs for both types of reactors, what should be the useful - life period for the stainless - steel reactor if money is worth 6% compounded anually? **[8]**

Q5) a) An industry is producing 3 lakhs kgs of Na_2CO_3 per annum. The total capital investment is 1 crore. The working capital is 15% of total capital. Raw material cost is 5 Rs./kg for the production. Labour cost is 4 Rs./kg, the product utilities 2.5 Rs./kg and packaging 1 Rs./kg. The product is sold at a price of 35 Rs./kg. Find manufacturing cost, total production cost and profit earned before taxes per kg of the product.**[8]**

b) Write a note on cost indexes and explain their importance while estimating equipment costs by scaling such as six - tenths - factor rule. **[8]**

OR

Q6) a) A company has 3 alternative investments, which are being considered. Because all there investments are for the same type of unit and yields same service only, one of the investment can be related. If a company incharge expects 15% rate of return on original investment, which one will be suitable? **[8]**

Item	Investment (I)	Investment (II)	Investment (III)
Initial fixed capital (Rs.)	1,00,000	1,70,000	2,10,000
Wroking capital Investment(Rs.)	10,000	10,000	15,000
Annual Cashflow (Rs.)	30,000	52,000	59,000
Annual expenditure (Rs.)	15,000	28,000	21,000

b) With neat diagrams, explain the mathematical methods for profitability evaluation. **[8]**

SECTION - II

Q7) a) With a neat diagram explain the break - even chart for production schedule and its significance for optimum analysis. **[8]**

b) A plant produces refrigerators at the rate of P units per day. The variable costs per refrigerator have been found to be Rs. $47.73 + 0.1P^{1.2}$. The total daily fixed charges are Rs. 1750, and all other expenses are constant at Rs. 7325 per day. The profit is selling price per refrigerator minus total cost per refrigerator. Total cost per refrigerator is given as,

$$C_T = 47.73 + 0.1P^{1.2} + (1750 + 7325)/P$$

If the selling price per refrigerator is Rs. 173,

determine : **[8]**

   i) The daily profit at a production schedule giving the minimum cost per refrigerator.

   ii) The daily profit at a production schedule giving the maximum daily profit.

   iii) The production schedule at the break - even point.

OR

Q8) a) The following equation shows the effect of the variables x & y on the total cost for a particular operation :

$$C_T = 2.33x + \frac{11900}{xy} + 1.86y + 10$$

Determine the values of x & y which will give the least total cost. **[8]**

b) Explain graphical and analytical general procedure for determining optimum conditions : **[8]**

Q9) a) Explain composite curves for following heat recovery system. **[8]**

Stream	Type	Supply temperature T_s, °C	Target temperature T_T, °C	ΔH MW	Heat capacity C_p MW.K^{-1}
R_1	Cold	20	180	32	0.2
R_2	Hot	250	40	−31.5	0.15
R_3	Cold	140	230	27	0.3
R_4	Hot	200	80	−30	0.25

b) What are the main factors in making the techno - economic feasibility study? Explain in detail. **[8]**

OR

Q10) a) Obtain the iterative solution of an LP problem and solve for the maximum using the simplex method.
Maximize : $f = x_1 + 3x_2$
Subject to : $-x_1 + x_2 + x_3 = 1$
$x_1 + x_3 + x_4 = 2$; $x_1 \geq 0$ $i = 1,...., 4$
Where x_3, x_4 are slack variables. **[8]**

b) Write a note on optimum flow rate of cooling water in condenser. **[8]**

Q11) a) Draw & explain the plant layout & name the parts. **[9]**

b) A pilot plant consists six activities as tabulated below. Construct a network diagram and estimate EST, LST, EFT, LFT and floats. Mark the critical path and determine project duration. **[9]**

Activity	Pre - event	Sub - event	Duration (days)
A	1	2	5
B	2	3	7
C	3	5	6
D	2	4	5
E	4	5	4
F	5	6	4

OR

Q12) A chemical plant has sequence of following (A to N) activities. Show the expected time 'T_e' and latest allowable time 'T_L' for each activity in the diagram. Estimate the schedule completion time, variance and standard deviation. Also indicate the critical path. **[18]**

Activity	Pre-event	Sub-event	Optimistic Time 'a'	Most Likely Time 'm'	Pessimistic Time 'b'
A	1	2	6	11	16
B	1	3	3	4	5
C	3	4	3	5	7
D	2,4	5	9	11	19
E	4	6	3	5	6
F	5	7	8	9	13
G	7	8	19	23	30
H	6	9	7	9	11
I	5	10	9	10	17
J	8	11	21	26	31
K	10,11	12	13	17	21
L	9,12	13	9	15	21
M	13	14	4	5	9
N	14	15	5	8	12

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[4164] - 627

B.E. (Chemical)

CATALYSIS

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use fo logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Give the classification of the catalyst and explain in detail of Homogenious catalysis. **[8]**

     b) Explain the application of catalyst to the inorganic and petrochemical industrial process. **[8]**

OR

Q2) a) Explain the reaction feasibility with respect to activation energy and temperature in catalysis. **[8]**

     b) Give the charecteristics of catalysis. **[8]**

Q3) a) Explain the mechanism of heterogenious catalysis with suitable example. **[8]**

     b) Explain the experimental methods for hiding the rate of catalytic reaction. **[8]**

OR

Q4) a) The following rate concentration data are available for the catalytic reaction, $A \rightarrow 4R$.

C_A, mol/lit	-	0.039	0.0575	0.075	0.092
$-r'_A$, molA/hr. kg cat.	-	3.4	5.4	7.6	9.1

Directly from this data, and without using a rate equation, find the size of packed bed needed to treat 2000 mol/hr of pure A at 117ºC to 35% conversion, all at 3.2 atm. **[16]**

Q5) Calculate the amount of catalyst needed in a packed bed reactor to achieve 80% conversion of 1000 m³/h of pure gaseous A (C_{Ao} = 100 mol/m³) for : **[18]**

a) $A \rightarrow R$, $-r'_A = \dfrac{50C_A}{1+0.02C_A}$, $\dfrac{mol}{hr.kg\,cat.}$

b) $A \rightarrow R$, $-r'_A = 8C_A^2$, $\dfrac{mol}{hr.kg\,cat.}$

OR

Q6) a) The catalytic reaction, $A \rightarrow 4R$ is studied in a PFR using various amounts of catalyst and 20 lit/hr of pure A feed at 3.2 atm and 117°C. The concentration of A in the effluent stream is recorded for the various runs as

follows :

Run	-	1	2	3	4
Catalyst used, kg	-	0.02	0.04	0.08	0.16
$C_{A,out}$, mol/lit	-	0.074	0.06	0.044	0.029

Find the rate equation for this reaction using the integral method of analysis. **[10]**

b) Explain the Langmuir adsorption isotherm with the necessary assumptions used. **[8]**

SECTION - II

Q7) a) Give the major steps involved in the preperation of the catalyst. **[8]**

b) Explain BET method for determination of surface area of the catalyst. **[8]**

OR

Q8) a) Explain in detail 'void volume' and 'Solid density'. **[4]**

b) Explain the pore volume distribution in the catalysis. **[8]**

c) Write short note on 'catalyst deactivation'. **[4]**

Q9) Write short notes on the following : **[16]**

a) Structure of zeolite.

b) Molecular sieves.

OR

Q10) Write short notes on the following : **[16]**

    a) Catalyst cracking.

    b) Application of Zeolites.

Q11) a) Derive the M-M kinetic equation of the reaction using an enzyme as a catalyst. **[9]**

    b) Explain inhibition in biocatalyst. **[9]**

<div align="center">OR</div>

Q12) A sucrose is hydrolysed at ambient temperature by the enzyme sucrose as : sucrose $\xrightarrow{\text{sucrose}}$ product stanting with a sucrose concentrution, C_{Ao} = 1 mol/m³ & a sucrose (enzyme) corcentration, $C_{\varepsilon o}$ = 0.01 mol/m³,

The following data are obtained in a batch reactor.

t, hr	-	2	6	10
C_A, mol/m³	-	0.68	0.16	0.006

Find a rate equation to represent the kinetics of this hydrolysis reaction. **[18]**

<div align="center">✪✰✪✰</div>

[4164] - 649

B.E. (Petroleum Engineering)

PETROLEUM PRODUCTION ENHANCEMENT AND OPTIMIZATION

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*
Instructions to the candidates:-
  1) *Answer 3 questions from Section I and 3 questions from Section II.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write the various methods for production enhancement. Explain any one in brief. **[9]**

   b) Write the data needed for the design of a successful stimulation job. Also explain how will you evaluate the gain or improvement in productivity before and after fracturing of a well. **[9]**

OR

Q2) a) Draw the following graphs / sketches. **[9]**
   i) Surface read-out of fracturing job.
   ii) Typical fracture geometry.
   iii) IPR before and after fracturing.

   b) Explain any one mathematical model of well fracturing. **[9]**

Q3) a) Write the primary reactions involved in matrix acidization job for sandstone and carbonate formation. Explain dissolving power of a acid and also give typical formulation of acidic system and their concentration for above formation. **[10]**

   b) What is formation damage? How it occurs? State and explain any two equations to calculate pressure drop because of formation damage. **[6]**

<div align="center">OR</div>

Q4) a) State and explain the equations to calculate surface pressure required in fracturing and acidization job. **[10]**

   b) Write a note on well conditioning and clean-up before and after stimulation job. **[6]**

Q5) a) List the various equipments and machinery that is required at the time of fracturing operation and explain the function of each of them in brief.**[8]**

   b) Write a short note on : **[8]**

   i) fracturing proppants.

   ii) fracturing fluids.

<div align="center">OR</div>

Q6) a) Describe in detail various components and steps involved in fracturing treatment design. **[10]**

   b) Write a short note on : **[6]**

   i) Data frac process.

   ii) Post fracturing job analysis.

<div align="center">**SECTION - II**</div>

Q7) a) What is production optimization? Explain various methods of production optimization for self flowing well, in brief. **[9]**

   b) Write the functions of production choke. Draw generic graph and indicate operating point for a typical tubing and choke size on an inflow performance curve. Explain the basis for selection of tubing size and choke size from the point of optimization. **[9]**

<div align="center">OR</div>

Q8) a) Draw the graph and explain. **[12]**

   i) Critical and subcritical flow through a choke.

   ii) Role of optimum GLR.

   iii) Choke performance curves for various choke sizes.

   iv) Production rate Vs tubing diameter.

   b) Discuss the general pipeline. Design considerations in brief. **[6]**

Q9) a) Describe in brief various techniques to boost oil production from the given reservoir. **[6]**

b) What are different methods to unload a liquid loaded gas well? Explain the flow regimes and plunger lift mechanism used in it. **[10]**

OR

Q10) Explain any one case study and describe production optimization techniques that were used in it. Discuss the case from the point of objectives, challenges involved, kown data, method that were adopted and merits as well as demerits. **[16]**

Q11) Describe in detail the well planning required for optimization in following jobs. **[16]**

a) Water and gas shut off

b) Reperforation

c) Recompletion of a well bore

d) Well stimulation.

OR

Q12) Discuss in detail short medium and long term methods to optimize field production. Also write general bottlenecking problems and discuss in brief to achieve highest recovery factor with maximum efficiency. **[16]**

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[4164] - 685

B.E. (Polymer)

MOLD AND DIE DESIGN - II

(2008 Pattern) (Sem. - II)

Time :4 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1) Answer question number 1 or 2, 3 or 4, 5 or 6 from Section - I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section - II.
  2) Answers to the two sections must be written in separate answer books.
  3) Figures to the right indicate full marks.
  4) Neat diagrams must be drawn wherever necessary.
  5) Use of calculator, graph paper is allowed.

SECTION - I

Q1) a) For ejection of a threaded component by unscreening, explain the principle of operation for any two of the following with neat sketch. **[9]**
  i) Axially fixed rotating core
  ii) Rotating withdrawing core.
  iii) Rotating core alongwith extractor plate.

  b) With the help of a neat sketch, explain how loose threaded cores are used for ejection for internally threaded components for small production runs. **[9]**

OR

Q2) a) Explain the construction and working of collapsible core used for ejection of internally threaded components. **[9]**

  b) With a neat sketch, explain how a rock & pinnion arrangement can be used for unscreening internally threaded components for multicavity layout. **[9]**

Q3) a) With a neat figure, explain working of extended nozzle. **[6]**

  b) Write a short note on cartridge heaters. **[4]**

  c) Explain the construction of circular hot runner mold with a neat figure.**[6]**

OR

Q4) a) Discuss in details following methods of heating manifold. **[5]**
  i) Standard voltage resistance heating.
  ii) Low voltage resistance heating.

b) Explain with a neat sketch expansion problems associated with secondary nozzles with multicavity hot runner molds. **[7]**

c) A manifold of size $300 \times 500 \times 55$ mm is to be heated by six cartridge heaters. Assuming suitable leading value, calculate wattage of single cartridge heater. **[4]**

Q5) a) Write a note on mold materials used for fabrication of thermoforming molds. **[4]**

b) With a neat sketch, explain design of positive compression molds. **[4]**

c) Explain the various factors considered while designing transfer molds. **[4]**

d) Write a note on design features of extrusion blow mold. **[4]**

OR

Q6) a) Write in details about the various factors taken into consideration while designing thermoforming molds. **[8]**

b) Write a note on design features of an injection mold used for making Parisons used for injection stretch blow molding. **[5]**

c) Write a note on design considerations of a parison die. **[3]**

SECTION - II

Q7) Design a 2 cavity mold for the component shown in figure. 1 Draw 2 views with one sectional view to bring out the details of feed, ejection and cooling system material : ABS.

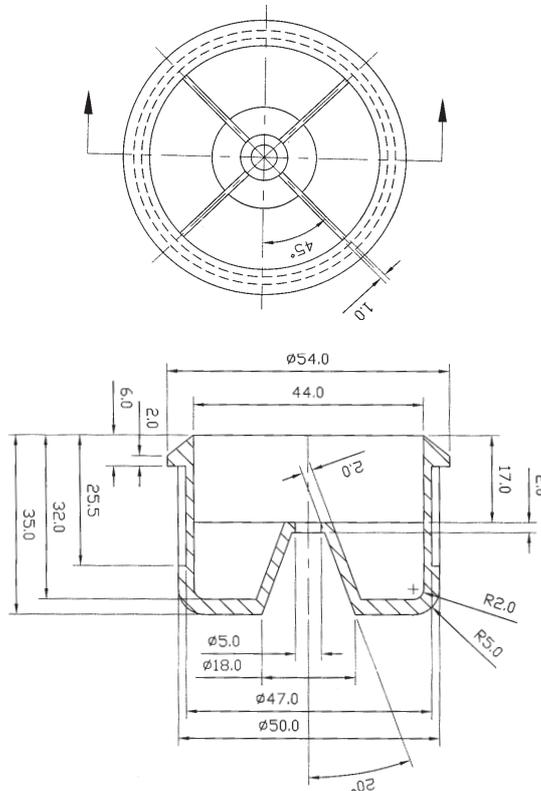Cavity pressure : 200 kg/cm² **[30]**

Fig. - 1

OR

Q8) Design a Z cavity mold for the component shown in fig. 2. Draw at least 2 views with one sectional view to bring out details of feed, ejection and cooling system. Matl : PP; cavity
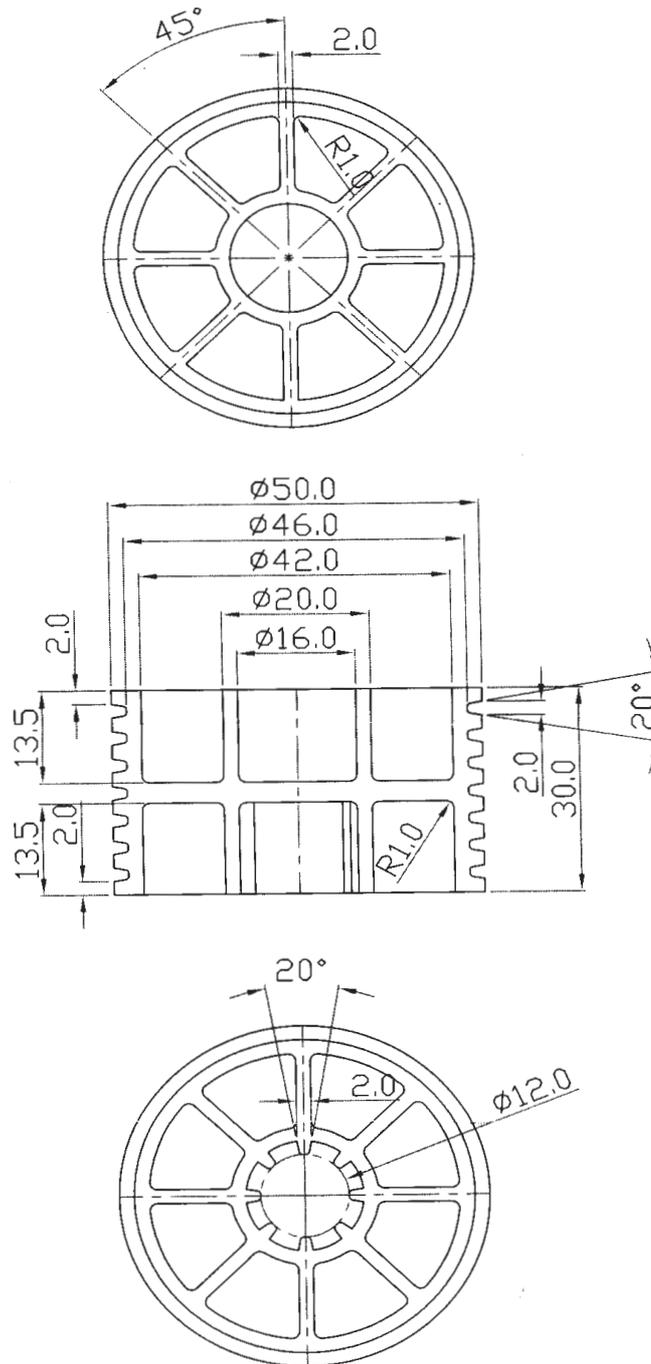Pressure : 140 kg/cm² **[30]**

Fig. - 2

Q9) With a neat sketch of the geometry of a heat - hanger film die, write down all the relevant design formulae to find pressure drop through the die. **[10]**

Q10) How are sheet dies classified? Explain constructional features of a T manifold die. **[10]**

Q11) a) Explain the importance of packing phase with a neat sketch, explain any two packing profiles. **[5]**

b) Mention the various 3 parameter and 4 parameter rheological models used in flow analysis, explain any one in detail. **[5]**

OR

Q12) a) Obtain model constants for carrean model for the shear stress - shear rate data obtained below. **[7]**

Shear stress (MPa)	Shear rate (S^{-1})
22,200	6.4
36,800	13.4
55,700	28.9
91,100	87.9
1,18,000	204.0
1,46,000	471.0
1,75,000	1280.0
2,07,000	2720.0
2,34,000	5510.0

b) Explain meld lines & weld lines with neat sketches. **[3]**

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[4164] - 690

B.E. (Polymer)

RUBBER TECHNOLOGY

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*
Instructions to the candidates:-
1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use fo logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the molecular-structural requirements for a material to act as a rubber? **[6]**

b) Explain the thermodynamic theory of rubber elasticity. **[6]**

c) Discuss the various stages involved in raw rubber technology. **[6]**

OR

Q2) a) Discuss the stress strain relationship for vulcanized and unvulcanized rubbers. **[6]**

b) Explain the following terms. **[6]**
     i) Rebound resilience
     ii) Storage hardening and crystallization of Natural rubber.

c) Discuss the plysics of raw and vulcanized rubber. **[6]**

Q3) a) State the different types of C-blacks and differentiate between then. **[4]**

b) What is the need for addition of vulcanising agents? State the different types of vulcanising agents with examples. Also explain the need and mechanism of functioning of activators and accelerators with two examples of each. **[6]**

c) Explain the need for addition, mechanism of functioning and two examples of each of the following additives w.r.t. rubbers. **[6]**

   i)   Peptizers

   ii) Tackifiers

   iii) Blowing agent

<div align="center">OR</div>

Q4) a) Discuss the basic principles used in compounding of rubber. List the various ingredients used in rubber compounding. Give the role of each ingredients with suitable examples. **[6]**

b) Write a short note on 'fillers' used in a rubber compound and their effect on the properties of the compound. **[6]**

c) What is mastication of rubbers? How is it carried out? Discuss w.r.t. Natural rubber. **[4]**

Q5) a) What is vulcanisation? Explain the process of vulcanising giving chemical reactions for at least three commercial elastomers. **[4]**

b) Discuss the factors affecting the process of vulcanisation. State & discuss various techniques of vulcanisation. **[6]**

c) Draw and explain the rheometer cure curve. Explain its significance. **[6]**

<div align="center">OR</div>

Q6) a) Write a short note on the Mooney viscometer & plastometer w.r.t. rubbers. **[6]**

b) List & discuss the different types of vulcanising agents used with rubbers. **[4]**

c) Discuss the kinetics of vulcanisation. **[6]**

<div align="center">**SECTION - II**</div>

Q7) a) List the different types of roll arrangements used in calendaring. Explain roll chambering. **[6]**

b) What is roll bending in calendaring? What are the remedies to overcome the same? **[8]**

c) Discuss compression molding process w.r.t rubbers. **[4]**

<div align="center">OR</div>

Q8) a) Explain the process of injection molding of rubbers. **[8]**

b) List the different types of extruders used with rubbers. **[4]**

c) What are the advantages and disadvantages of injection Molding as compared to compression molding of rubbers. **[6]**

Q9) a) List the various components forming a tyre structure and explain the function of each component. List the rubbers used in tyre manufacture.**[6]**

b) Define "Cellular rubber". What are the 3 main classes of cellular rubber? Differentiate between them. **[6]**

c) With the help of a neat sketch list the various constructional elements of a cable stating the function of each element. **[4]**

OR

Q10) a) Explain the process for manufacture of rubber conveyor belts. State the applications of rubber conveyor belts. **[6]**

b) Explain the straight dipping process for manufacture of latex gloves.**[6]**

c) Discuss the construction of a rubber hose. State the materials used for making rubber hoses. **[4]**

Q11) a) Write a short note on tests carried out on raw rubbers. **[6]**

b) State 2 applications in which the rubber product is tested for abrasion. Explain the procedure to carry out the test. **[6]**

c) Define the term "resilience" and explain the test used to measure rebound resilience. **[4]**

OR

Q12) a) Define "fatigue". Discuss the test procedure, specimen size used to carry out the test for fatigue. **[6]**

b) Discuss the test procedure to determine low temperature properties in case of rubbers. **[6]**

c) How is ash content and moisture content determined in case of rubbers?**[4]**

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[4164] - 727
B.E. (IT)
ADVANCED OPERATING SYSTEMS
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) An operating system could implement a memory I/O device. I/O operations to the device cause the corresponding memory location to be read or written. What is the disadvantage of providing such a device? Should it be accessible to users or just to system administrators? **[4]**

b) Indicate how mutual exclusion could be implemented using mailboxes with nonblocking send_mailbox and blocking receive_mailbox primitives. Assume the primitives are executed as indivisible operations. **[4]**

c) Explain commonly used process scheduling criteria. **[8]**

OR

Q2) a) Explain the following UNIX commands with example. **[10]**
     i)   chgrp   ii)   wall
     iii) ftp   iv)   chown
     v)   chmod

b) An operating system using simple segmentation, compute the physical address for each of the logical addresses, given the following segment table. If the address generates a segment fault, indicate so. **[6]**

Segment	Base	Length
1	330	124
2	876	211
3	111	99
4	498	302

    i)   0,99   ii)   2,78   iii) 1,265
    iv) 3,222   v)   0,111   vi) 1,212

P.T.O.

Q3) a) Give functional specifications of KMOSSTART and KMOSCLOCK. **[8]**

b) Explain procedure call and supervisor call used to invoke OS services. **[8]**

OR

Q4) a) Explain interrupt management in KMOS. **[10]**

b) What is process dispatch? Write functional specification for process DISPATCH in KMOS. **[6]**

Q5) a) Explain different multiprocessor interconnection types. **[12]**

b) Explain FORK and JOIN primitives in multiprocessor OS. **[6]**

OR

Q6) a) What is thread? Explain multithreading with example. **[8]**

b) Write advantages of using multiprocessor. **[6]**

c) Classify multiprocessor OS based on how machine related its instructions to the data processing. **[4]**

SECTION - II

Q7) a) Describe zoned page frame allocator in detail. **[10]**

b) Explain management of heap area by UNIX OS. **[6]**

OR

Q8) a) Explain allocation and deallocation of a slab to a cache. **[8]**

b) Write a note on slab coloring. **[8]**

Q9) a) Explain different general purpose I/O interfaces. **[6]**

b) Describe components of the device driver model in detail. **[10]**

OR

*Q10)*a) Explain polling and interrupt mode to monitor I/O. **[8]**

b) Explain buffering strategies for character devices. **[8]**

*Q11)*a) Write UNIX file system security mechanisms. **[4]**

b) Write the structure of UNIX Inode. Calculate the maximum size of a file if the block size is 1K and size of index entry requires 4 bytes. **[8]**

c) Write a short note on file hole. **[6]**

OR

*Q12)*a) What do you mean by a dirty pages? When are they written to disk? **[4]**

b) Explain how journaling works. **[6]**

c) Write data structures for file memory mapping. **[8]**

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[4164] - 739

B.E. (IT)

GEO INFORMATICS SYSTEMS

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answers to the two sections should be written in separate answer books.*
2) *From section - I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from Section - II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) What are the basic characteristics of a digital image? **[2]**

b) What is an image registration? **[4]**

c) What are the elements of visual interpretation of the satellite images? Explain the importance of each element in brief **[12]**

OR

Q2) a) What are the different image corrections which are required before data analysis and extraction of information from the image? Explain in brief.**[12]**

b) What is image enhancement? Explain in brief. **[6]**

Q3) a) Draw a block diagram of remote sensing process and explain it in brief. **[10]**

b) What is IRS? What are the applications of IRS? **[6]**

OR

Q4) a) What is microwave remote sensing? Explain in brief. **[4]**

b) Answer the following :

i) In the context of remote sensing what is a band? **[4]**

ii) What is an active and passive remote sensing? **[4]**

iii) What is a satellite swath? **[4]**

Q5) a) Define GIS. What are the components of GIS? What is the concept of layers in GIS? **[6]**

b) What is a map projection? What is conic map projection? Explain with the help of a neat diagram. **[2 + 8]**

OR

Q6) a) Answer the following :

i) What is a map? **[1]**

ii) What is a large scale map and a small scale map? **[3]**

iii) What is the way in which a map scale is represented? **[2]**

iv) What is map legend? **[2]**

b) Write a short note on all types of cylindrical map projections. **[8]**

SECTION - II

Q7) a) What are the various ways and means to collect new data for a GIS application? Explain in brief **[8]**

b) Elaborate various reason for the data errors in GIS. **[8]**

OR

Q8) a) What is Data cleaning process in GIS? Explain in brief **[8]**

b) What are map to map and image to map transformations? Explain in brief. **[8]**

Q9) a) What is point, line and polygon in the context of GIS? Explain with suitable example. **[6]**

b) What is the raster data representation in GIS? Explain in brief. **[6]**

c) What is buffering and overlay? Explain with the context of vector data analysis. **[6]**

OR

Q10) a) What is vector data representation in GIS? Explain in brief. **[6]**

b) What are the types of queries in GIS? Explain in brief. **[6]**

c) What are neighborhood operations and zonal operations in the context of raster data? Explain with the context of raster data analysis. **[6]**

Q11) a) What is the role of GIS in urban management? Explain in brief. **[8]**

b) Take an application of transport network planning and explain how GIS can be useful for that. **[8]**

<div align="center">OR</div>

Q12) a) What is the role of GIS in municipal management? Explain in brief. **[8]**

b) Take an application of enhancing mobile telecommunication and explain how GIS can be useful for that. **[8]**

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[4164] - 744

B.E. (Biotechnology)

ENVIRONMENTAL BIOTECHNOLOGY

(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.No.1 or Q.No.2, Answer Q.No.3 or Q.No.4, Answer Q.No.5 or Q.No.6 from Section - I & Answer Q.No.7 or Q.No.8, Answer Q.No.9 or Q.No.10, Answer Q.No.11 or Q.No.12 from Section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams should be drawn wherever necessary.*

SECTION - I

Q1) Answer the following :

a) A grit particle of diameter 0.2mm and density, $1500kg/m^3$ is to be captured in a horizontal grit chamber of length 18m and width 1.0m. The wastewater approach velocity carrying the grit particle is 0.3m/s and the flow rate is $0.15m^3/s$. Write down whether the particle will be settled in the grit chamber or not. The density of the wastewater = $1000kg/m^3$ and its viscosity is 0.001kg/m-s. **[10]**

b) Write in short about sedimentation and types of sedimentation tanks.**[8]**

OR

Q2) Explain in detail about the following parameters which are been used for the analysis of waste water. **[2 × 9 = 18]**

a) Suspended solids.

b) Colour and odour.

Q3) Answer the following : **[2 × 8 = 16]**

a) Compare trickling filters with activated sludge systems.

b) What is packed bed reactor? Which control scheme is applicable to packed bed reactor? Can a packed bed reactor used for liquid phase reaction.

OR

P.T.O.

Q4) How is waste water treated using an oxidation ditch? How does an oxidation ditch system differ from a packaged plant system? **[16]**

Q5) What does industrial effluent mean? What is the impact of industrial effluents on human life? How industrial effluents influence another pollution? How do effluent treatment plants work? **[16]**

OR

Q6) Describe in short about treatment strategies and disposal standards for following sugar and textile industrial waste water. **[16]**

SECTION - II

Q7) Answer the following :

a) The following table shows the size distribution of a dust sample and the fraction efficiency of removal in a gas cleaning equipment. Calculate the overall collector efficiency. **[10]**

Dust size	Weight per 100g of dust (g)	Fractional efficiency $\eta_i (\%)$
< 5	2	1
5-10	2	7
10-15	4	16
15-20	7	44
20-25	10	67
25-30	8	81
30-35	7	88
35-40	10	92
40-50	15	93
50-60	20	95
60-70	10	98
> 70	5	100

b) Write in short about effects of air pollution on human health and on vegetation. **[8]**

OR

Q8) Describe in detail about stack sampling and particulate sampling of gas pollutant. **[18]**

Q9) Write notes on the following : **[2 × 8 = 16]**
   a) Role of methanogens in xenobiotic degradation.
   b) Biological detoxification.

OR

Q10) Explain the necessity of treating hazardous waste? Discuss biotechnological applications for hazardous waste management. **[16]**

Q11) Write short notes on the following : **[4 × 4 = 16]**
   a) Land farming.   b) Bioventing
   c) Biosparging   d) Biostimulation

OR

Q12) What is bioremediation and what are the different types of bioremediation? What are the limitations to bioremediation? **[16]**

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[4164] - 756

B.E. (Biotechnology)

IPR, BIOETHICS AND REGULATIONS

(2008 Pattern) (Elective - IV) (Sem. -II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) *From section I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from section II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams should be drawn wherever necessary.*

SECTION - I

Q1) What is ICMR code? What does it consist of? Explain in short about 12 principles laid down under statement on general principles? **[18]**

OR

Q2) What are ethics and how do they relate to business conduct? What is a code of ethics? What are the essential elements of a code of ethics? What is the difference between ethics and compliance? **[18]**

Q3) Read carefully following case and answer the questions. **[16]**

Confirmed fish kills in North Carolina were observed in 1994 in the Pamlico and Neuse Estuaries. Fish losses were reported to be in the millions. Reports of dead fish found floating in North Carolina tidal waters caused a great deal of concern. In the summer of 1997, thousands of fish were killed in the Pocomoke River on Maryland's Eastern Shore. Consequently, the public was banned from a five-mile stretch of the scenic waterway. Local watermen had begun reporting gaping red sores on fish almost a year previously but the fish kills and public ban brought this issue to national attention.

Research has shown that Pfiesteria piscicida, a single-cell microorganism, is responsible for the fish kills in North Carolina, and is suspected to be the cause of fish kills in Maryland as well. Pfiesteria piscicida has a complex life cycle that may include 24 flagellated, amoeboid, and encysted stages or forms. Pfiesteria may live for years in tiny, cyst-like shells buried in river bottom sediment, then hatch when conditions are right. Conditions supporting and/or encouraging Pfiesteria are a combination of warm water temperatures (70F); increased levels of phosphorous, ammonium, and suspended solids;

P.T.O

moderate to low salinity levels; and increased rainfall or runoff. When large numbers of fish swim into an area where Pfiesteria are present their excreta triggers encysted cells to emerge and become toxic. Other stages of Pfiesteria can also become toxic in the presence of fish excreta (amoeboid and flagellated cells). The small cells swim toward the fish prey and give off potent toxins which make the fish lethargic and often cause bleeding sores and hemorrhaging. Once fish are "incapacitated, Pfiesteria feeds on the sloughed epidermal tissue, blood, and other substances that leak from the sores. When the fish are dead, flagellataed stages transform to amoeboid stages and feed on the fish remains or, if *conditions* become unfavorable for the Pfiesteria, the Pfiesteria cells make *protective* outer *coverings* and sink to the bottom of the river as dormant cyst stages. All of these changes can take place in a matter of hours.

Pfiesteria outbreaks in North Carolina were shown to occur in waters that were heavily nutrient enriched. Possible sources of nutrients flowing into the water include sewage treatment plants, fertilizer runoff, chicken and hog manure, phosphate mines, and municipal wastewater treatment plants where effluents are rich in phosphorus and nitrogen.

The primary contributor to the problem in North Carolina, however, seems to be the state's large confinement hog-farming operations. After the outbreak in Maryland, a leading environmental group called for reforms in the handling of manure from the Eastern Shore's millions of chickens. Chicken waste *is* often applied to fields as fertilizer. Rain washes the nitrogen and other nutrients in the manure into the surrounding waters. The Pocomoke River, at its headwaters, drains the largest chicken-producing country in the nation. Maryland's Delmarva Peninsula houses some 625 million chickens. Governor Glendening of Maryland has announced that farmers may soon be subject to regulations on animal waste disposal.

Maryland's top farm official has been quoted as saying that poultry farmers have been responsible in their handling of chicken waste. A spokesman for the poultry industry rejects the suggestion that chicken manure is responsible for the Pfiesteria outbreak, saying bird waste is well-managed. Farming advocates also note that if regulatory measures target only one *possible* source, the *regulations might* unfairly cause producers to go out of business. Farmers work on small profit margins under current management practices.

Questions :

1. Do you think that news reports, researchers, and politicians unfairly blame farmers without looking at other possible causes?

2. If large poultry or hog operations are shown to be the primary cause of the Pfiesteria outbreaks, should the producers be required to get rid of

these animals? or reduce them to a certain number that will produce less waste?

3. The chicken industry spokesman said that "bird waste is well-managed", implying that there is no cause for concern. Do you believe this statement? Can you think of. assurances from another industry that were later proven false? How much of the public perception is formed by what we read and see and how much is formed by previous experiences?

Should large, corporate, farms be allowed only *in* less populated states? Does a land owner have the right to use their land as they wish?

OR

Q4) Read the following case and answer the questions on the basis of ethics.**[16]**

Genaro Moura (GM) and Oswaldo Fernandes (OF) are farmers who grow their crops in neighbouring fields. GM has planted a non-sweet forage maize that is genetically engineered to contain high levels of essential amino acids. He has followed all regulations but has not informed anyone that he is planting transgenic plants. This is because he is afraid that the environmental organization "Maize Liberation Front" will destroy his plantation and organize a campaign against him.

His neighbour OF, is opposed to genetic modification and uses only organic methods of agriculture. He is under a strict contract to sell his crop of sweet corn to the Gerber Baby Food Company. His crop must be certified as organic (under current regulations, organic food must be free of any transgenic material).

GM has noticed that lately, some of the corn kernels of his own crop that he has eaten, are sweet. He suspects that some of the pollen from OF's field has drifted into his field and has pollinated his plants.

This does not affect the value of his crop. But he realises that pollen from his genetically modified plants may have also drifted into his neighbour's field. GM realises that if foreign genes have been transfered to OF's maize, the entire organic crop will be rejected by the Gerber Baby Food Company.

GM decides NOT to inform OF that his crop may be contaminated with foreign genes.

Questions

1. Has GM made the right decision?
2 What do you think OF should do? Justify your position.
3. Did OF make the right decision? Justify your answer.
4. Did OF do the right thing? Justify your answer.

Q5) What is a patent? Explain the conditions to be satisfied by an invention to be patentable? What are the essential patent documents to be generated and submitted by a potential patentee? Explain in detail about patent cooperation treaty (PCT). **[16]**

OR

Q6) Describe the following in detail. **[16]**

a) Patenting in biotechnology

b) patent search

SECTION - II

Q7) What does copyright cover? What are the rights of a copyright holder? What is the term of a copyright? What is the rule for the transfer of copyright? **[18]**

OR

Q8) What is mean by trademark? What are well known trademarks and associated trademarks? How are terms certification trademarks and collective marks defined in the act? What is the term of a registered trademark? **[18]**

Q9) Depict the hierarchal structure in Indian biotechnology and explain the functions of each one in short. **[16]**

OR

Q10) What is GMP? What are its advantages? Explain it in detail related to anyone biotech product to ensure successful marketing applications **[16]**

Q11) Write in detail about :

Define quality assurance and quality control. What is the difference between QA and QC? Explain in detail about the steps involved in QC of any one biotech product. **[16]**

OR

Q12) What is international trade? Why there is need for international trade? What are the principal objectives of the Indian international trade? **[16]**

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[4164] - 681

B.E. (Polymer)
PRODUCTION PLANNING AND CONTROL
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
1)   *Answer Q.No. 1 or 2, Q.No. 3 or 4 and Q.No. 5 or 6 from Section - I. Answer Q.No. 7 or 8, Q.No. 9 or 10 and Q.No. 11 or 12 from Section - II.*
2)   *Answers to the two sections must be written in separate answer books.*
3)   *Figures to the right indicate full marks.*
4)   *Use of statistical charts, scientific calculator, and graph paper is allowed.*
5)   *Assume suitable data, if required.*

SECTION - I

Q1) a) The activity durations are given below. Draw the PERT network. Find free float, independent float and total float. **[8]**

Activity	Activity duration in days.
1-2	05
1-3	04
2-5	03
2-4	02
3-4	0
3-6	02
4-5	05
4-6	06
5-6	03
6-7	02

b) Explain the terms - Activity and Event as defined in PERT/CPM. Write in short about Fulkerson's Rule for numbering the PERT/CPM networks.**[5]**

c) Using graphical method, minimize time required to process i.e. for each machine find which job should be done first. Also calculate the total time required to complete both the jobs. Calculate idle time for each machine.**[5]**

job	Sequence of machines	A	B	C	D	E
1	Time	2	3	4	6	2
job	Sequence of machines	C	A	D	E	B
2	Time	4	5	3	2	6

OR

Q2) a) Five jobs are to be processed on three machines A, B and C in the order ABC. Find optimal sequence to minimize total elapsed time. Find also the idle time for each machine for the optimal sequence determined by you. **[10]**

job	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

b) Write in brief about resource leveling and smoothening with respect to PERT/ CPM. **[8]**

Q3) a) A shopkeeper has uniform demand of an item at the rate of 50 items per month. He buys from supplier at a cost of Rs. 6 per item and the cost of ordering is Rs. 10 each time. If the stock holding costs are 20% per year of the stock value, how frequently should he replenish his stocks? Suppose supplier offers a 5% discount on orders between 200 and 999 items and a 10% discount on orders exceeding or equal to 1000, can shopkeeper reduce his costs by taking advantage of either of these discounts? **[8]**

b) Derive an expression for Economic order quantity (EOQ) and optimum inventory cost for EOQ model with following assumptions- **[8]**

   i) Demand is uniform.

   ii) Lead time is zero.

   iii) Production rate is infinite i.e. production is instantaneous.

   iv) Shortages are not allowed.

   v) Holding cost and set - up cost is to be considered.

OR

Q4) a) Write in short about ABC analysis. **[6]**

b) Derive an expression for Economic order quantity (EOQ) for EOQ model with following assumptions- **[10]**

   i) Demand is uniform.

   ii) Lead time is zero.

   iii) Production rate is infinite i.e. production is instantaneous.

   iv) Shortages are allowed.

   v) Holding cost, set-up cost and shortage cost is to be considered.

Q5) a) Define and give interpretation of Process Capability Ratio C_p. What do you understand by one sided process capability ratios? **[8]**

b) A daily sample of 30 items was taken over a period of 14 days in order to establish control limits. If 21 defectives were found, what should be upper and lower control limits of the proportion of defectives? **[4]**

c) Write in short about any two good reasons for the usefulness of acceptance sampling. **[4]**

OR

Q6) a) Explain the relationship between C_p and C_{pk}. Also comment on situation where $C_p < C_{pk}$ and $C_p = C_{pk}$. **[6]**

b) Extrusion film thickness measurements taken at regular intervals are given below.

Sample No	Readings				
	1	2	3	4	5
1	1.44	1.54	1.45	1.43	1.32
2	1.44	1.54	1.48	1.43	1.62
3	1.40	1.54	1.45	1.63	1.22
4	1.44	1.54	1.45	1.23	1.39
5	1.74	1.64	1.48	1.43	1.52
6	1.44	1.54	1.45	1.36	1.62
7	1.41	1.59	1.35	1.25	1.52
8	1.60	1.57	1.45	1.43	1.72
9	1.44	1.54	1.45	1.43	1.42
10	1.44	1.54	1.47	1.49	1.42

Draw $\overline{X}$ and R charts. Also indicate whether the process is under statistical control. Use statistical chart for the useful factors. **[10]**

SECTION - II

Q7) a) A salesman wants to visit cities A, B, C, D and E. He cannot visit any city twice before returning to the point of starting the journey. Also he must visit all the cities. Cost of visiting one city to another is known and is given below.

	A	B	C	D	E
A	0	2	5	7	1
B	6	0	3	8	2
C	8	7	0	4	7
D	12	4	6	0	5
E	1	3	2	8	0

Find optimum solution to minimize cost. **[10]**

b) Find the basic feasible solution of following transportation problem using north - west corner method. **[6]**

	W_1	W_2	W_3	W_4	Supply
F_1	14	25	45	5	6
F_2	65	25	35	55	8
F_3	35	3	65	15	16
Required	4	7	6	13	Total 30

OR

Q8) a) Find the optimum solution to the following transportation problem.**[10]**

	B_1	B_2	B_3	B_4	B_5	Available
A_1	7	6	4	5	9	40
A_2	8	5	6	7	8	30
A_3	6	8	9	6	5	20
A_4	5	7	7	8	6	10
Required	30	30	15	20	5	Total 100

b) Give a mathematical representation of Assignment Model and discuss as to how assignment model can be treated as special case of transportation model. **[6]**

Q9) a) Arrival rate of telephone calls at a booth are according to Poisson's distribution with an average time of 9 minutes between the two consecutive arrivals. The length of telephone calls is assumed to be exponentially distributed with mean 2 minutes i.e. the service rate is ½ per minute. **[9]**

i) Determine the person arriving at the booth will have to wait.

ii) Find the average queue length that is formed from time to time.

iii) The company can install second booth if an arrival is expected to wait at least 4 minutes for the telephone. Find increase in flow of arrivals which will justify second booth.

iv) What is the probability that an arrival will have to wait for more than 10 minutes before the phone is free?

v) What is the probability that he will have to wait for more than 10 minutes before the phone is available and the call is also complete?

vi) Find the fraction of the day the phone will be in use.

b) Babies are born in sparsely populated state at a rate one birth every 10 minutes with time between the births following an exponential distribution. Find. **[7]**

i) Average number of births per year.

ii) Probability that no births will occur in any one day.

iii) The probability of issuing 50 birth certificates in three hours assuming that 40 were issued during the first 2 hours of 3 hour period.

OR

Q10) a) A mechanic repairs 4 machines. The mean time between the service requirements is 5 hours for each machine and forms an exponential distribution. The mean repair time is 1 hour and also follows the same distribution. Machine downtime costs Rs. 100 per hour and mechanic costs Rs. 300 per day. Determine- **[6]**

i) Expected number of operating machine (i.e. Machines which do not require servicing).

ii) Expected downtime cost per day.

iii) Is it economically possible to engage two mechanics, each repairing two machines?

b) A bottle capping machine caps the bottles at the rate of 1 every 2 seconds. Bottles arrive at a rate of 1 every 4 seconds. If in the beginning there are 20 bottles to be capped, how much time is required to service the bottles that are waiting? **[4]**

c) Write about replacement policies for the items that fail suddenly. **[6]**

Q11) a) Solve the game whose pay off matrix is shown below by the method of linear programming. **[12]**

	1	2	3
1	3	–4	2
2	1	–3	–7
3	–2	4	7

b) Discuss procedural steps, advantages and limitations of "Decision Tree Approach". **[6]**

OR

Q12) a) A company currently works on one manufacturing process and earns a profit of Rs. 10,000. Company is faced with alternatives of taking following decisions- **[10]**

   i) It can conduct research R_1, the cost of which is Rs. 9000 and probability of success is 90%. Success will earn a gross income of Rs. 30,000.

   ii) It can conduct research R_2, the cost of which is Rs. 6000 and probability of success is 50%. Success will earn a gross income of Rs. 25,000.

   iii) It can pay Rs. 5000 as a royalty for the new process which will earn a gross income of Rs. 20,000.

   iv) The company may continue with the existing process.
   Due to limited resources, company can conduct only one of the two research alternatives. Draw a decision tree and find optimum strategy.

b) A 2×2 two person zero sum game without any saddle point, is having a pay off matrix for player A as - **[8]**

Player B

	B_1	B_2
A_1	a_{11}	a_{12}
A_2	a_{21}	a_{22}

Player A

Find optimal mixed strategy and value of the game.

XII, FACTORS USEFUL IN THE CONSTRUCTION OF CONTROL CHARTS

Sample size n	Mean chart — Factors for control limit A	A₁	A₂	Factors for central line c₂	Factors for control limits B₁	B₂	B₃	B₄	Factors for central line d₂	Range chart — Factors for control limit D₁	D₂	D₃	D₄
2	2.121	3.760	1.880	0.5642	0	1.843	0	3.267	1.128	0	3.686	0	3.267
3	1.732	2.394	1.023	0.7236	0	1.858	0	2.568	1.693	0	4.358	0	2.575
4	1.500	1.880	0.729	0.7979	0	1.808	0	2.266	2.059	0	4.698	0	2.282
5	1.342	1.596	0.577	0.8407	0	1.756	0	2.089	2.326	0	4.918	0	2.115
6	1.225	1.410	0.483	0.8686	0.026	1.711	0.030	1.970	2.534	0	5.078	0	2.004
7	1.134	1.277	0.419	0.8882	0.105	1.672	0.118	1.882	2.704	0.205	5.203	0.076	1.924
8	1.061	1.175	0.373	0.9027	0.167	1.638	0.185	1.815	2.847	0.387	5.307	0.136	1.864
9	1.050	1.094	0.337	0.9139	0.219	1.609	0.239	1.761	2.970	0.546	5.394	0.184	1.816
10	0.949	1.028	0.308	0.9227	0.262	1.584	0.284	1.716	3.078	0.687	5.469	0.223	1.777
11	0.905	0.973	0.285	0.9300	0.299	1.561	0.321	1.679	3.173	0.812	5.534	0.256	1.744
12	0.866	0.925	0.266	0.9359	0.331	1.541	0.354	1.646	3.258	0.924	5.592	0.283	1.716
13	0.832	0.884	0.249	0.9410	0.359	1.523	0.382	1.618	3.336	1.026	5.646	0.307	1.692
14	0.802	0.848	0.235	0.9453	0.384	1.507	0.406	1.594	3.407	1.121	5.693	0.328	1.671
15	0.775	0.816	0.223	0.9490	0.406	1.492	0.428	1.572	3.472	1.207	5.737	0.347	1.652
16	0.750	0.788	0.212	0.9523	0.427	1.478	0.448	1.552	3.532	1.285	5.779	0.363	1.637
17	0.728	0.762	0.203	0.9551	0.445	1.465	0.466	1.534	3.588	1.359	5.817	0.378	1.622
18	0.707	0.738	0.194	0.9576	0.461	1.454	0.482	1.518	3.640	1.426	5.854	0.391	1.608
19	0.688	0.717	0.187	0.9599	0.477	1.443	0.497	1.503	3.689	1.490	5.888	0.403	1.597
20	0.671	0.697	0.180	0.9619	0.491	1.433	0.510	1.490	3.735	1.548	5.922	0.415	1.585
21	0.655	0.679	0.173	0.9638	0.504	1.424	0.523	1.477	3.778	1.606	5.955	0.425	1.575
22	0.640	0.662	0.167	0.9655	0.516	1.415	0.534	1.466	3.819	1.659	5.985	0.434	1.566
23	0.626	0.647	0.162	0.9670	0.527	1.407	0.545	1.455	3.858	1.710	6.006	0.443	1.557
24	0.612	0.632	0.157	0.9684	0.538	1.399	0.555	1.445	3.895	1.759	6.031	0.452	1.548
25	0.600	0.619	0.153	0.9696	0.548	1.392	0.565	1.435	3.931	1.804	6.056	0.459	1.541

◆◆◆◆

Total No. of Questions : 12]

P1779

[Total No. of Pages : 3

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B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours] [*Max. Marks :100*

Instructions to the candidates:-

1) *Answer three questions from each section in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Enlist the basic ingradients of portland cement and also their ill effects if used in excess. **[6]**

b) Explain the term grading of aggregate. Explain its effect on properties of concrete. **[6]**

c) Write note on Hydration of cement. **[6]**

OR

Q2) Write short notes on : **[4½ each]**

a) Gel space ratio.

b) Maturity concept.

c) Bouges compounds.

d) Crushing value test on aggregate.

Q3) a) Explain light weight aggregate concrete. State its uses. **[8]**

b) Write notes on : **[8]**

i) No fines concrete

ii) Heavy concrete

OR

P.T.O

Q4) a) What is Aerated concrete? How Aeration is obtained. **[8]**

b) Write notes on : **[8]**

    i) High Strength concrete

    ii) Bucket method of underwater concreting.

Q5) a) Enlist various non destructive methods of testing concrete. State the utility of each in brief. **[10]**

b) Write note on pull out test. **[6]**

<div align="center">OR</div>

Q6) Write notes on :

a) Stress wave propogation method. **[6]**

b) Ground penetration radar method. **[6]**

c) Core test. **[4]**

<div align="center"><u>**SECTION - II**</u></div>

Q7) a) What is fibre reinforced concrete? Explain its historical development. **[9]**

b) Write a note on Naturally occurring fibres including their types, merits and demerits. **[9]**

<div align="center">OR</div>

Q8) a) Explain factors affecting properties of FRC. **[5]**

b) Write a note on mixing of FRC. **[5]**

c) Write a note on steel and glass fibres. **[8]**

Q9) a) Enlist different properties of hardened FRC. Explain any one. **[7]**

b) Explain the effect of volume, aspect ratio and orientation of fibres on FRC. **[9]**

<div align="center">OR</div>

Q10) a) Explain the behaviour of SFRC under compression, tension and flexure. **[3×3=9]**

b) Write a short note on SIFCON with reference to definition, structure, properties and use. **[7]**

Q11) a) Define ferrocement. Write in detail about applications of ferrocement.**[8]**

b) Write note on materials used in ferrocement with respect to : **[8]**

    i) cement mortar mix.

    ii) skeletal steel.

<div align="center">OR</div>

Q12) a) Enlist various construction methods of ferrocement. Explain skeletal armature method with advantages and disadvantages. **[8]**

b) Explain construction of bridge (any type) using precast concrete elements. **[8]**

<div align="center">❄ ❄ ❄</div>

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B.E. (Civil)

INDUSTRIAL WASTE WATER MANAGEMENT

(2008 Pattern) (Open Elective) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Your answers will be valued as a whole.*

    5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain the following processes for the removal of colloidal & dissolved solids in waste water: **[18]**

    a)   Ultra filtration

    b)   Reverse -osmosis

    c)   Electro- Dialysis

<div align="center">OR</div>

Q2) a)   Discuss in detail about the Physical unit processes commonly used in waste water treatment. **[10]**

    b)   Explain the process for removal of color & odour from waste water by activated carbon filtration. **[8]**

Q3) a)   State & draw the single stage & two stage lime treatment process flow diagram for phosphorus removal. **[10]**

    b)   Discuss in detail about the chemical oxidation with ozone for the reduction in COD & colour in waste water? **[6]**

Q4) a) Explain briefly how wetland could be used for waste water treatment system? **[9]**

b) Explain chemical process for removal of heavy metals from waste water. **[7]**

Q5) a) Explain briefly about the biological process for removal of phenol from industrial waste water? **[9]**

b) Discuss the recycling of treated sewage after tertiary treatment? **[7]**

OR

Q6) Write in brief about: **[16]**

a) Membrane reactor with submerged membrane

b) Cyclic reactor

c) Nitrification process

d) Denitrification process

SECTION - II

Q7) a) Draw & describe the schematic diagram of a waste water treatment plant to reuse the sewage in residential complex. **[9]**

b) Describe the methods of three R principles to convert waste in to wealth? **[9]**

OR

Q8) a) Explain how waste water could be used for irrigation? Also discuss about preventive measures & health aspects? **[9]**

b) Explain the mechanism of Soda recovery in pulp & paper mills? **[9]**

Q9) a) Explain the concept of Zero Discharge of effluent? **[8]**

b) Discussed the application of zero discharge technology based on three R principle for pulp & paper industries. **[8]**

OR

Q10) a) Draw & discuss the flow sheet for the zero discharge of waste water produced in Sugar cane industries? **[8]**

b) Explain about the zero discharge of solid waste from residential complex? **[8]**

Q11) a) Discuss the pollution hazards due to radioactive materials? **[8]**

b) Explain the sorption mechanism & BDST model? **[8]**

OR

Q12) a) Explain in brief the standards related to solid waste from residential complex? **[6]**

b) Discuss about the green processes adopted in the industries? **[10]**

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[4164] - 642

B.E. (Petroleum Engineering)

IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
  1)   *Answers to the two sections must be written in separate answer books.*
  2)   *Question No 4(four) and 7(seven) is compulsory.*
  3)   *Figures to the right indicate full marks.*
  4)   *Neat diagrams should be drawn wherever necessary.*
  5)   *Use of a non - programmable calculator, log - log, semi - log paper is allowed.*
  6)   *Assume suitable data if necessary.*

SECTION - I

Q1) Derive the fractional flow equation for two phase flow. How is it used for waterflooding? **[16]**

Q2) a) Explain all the thermal EOR techniques. **[6]**

     b) Explain Insitu combustion in detail with the screening criteria. **[6]**

     c) Explain well site layout for a steam flood process. **[4]**

Q3) a) What is the screening criteria for CO_2 flooding? **[6]**

     b) Draw and explain the phase diagram for CO_2 flooding with reference to VGD and CGD. **[6]**

     c) Explain why you require such a screening criteria (3a). **[4]**

Q4) a) State four elements of Polymer Design and Steam flooding? **[6]**

     b) Name and explain any one model in Thermal EOR. **[6]**

     c) Define MMP, CDC, Cosurfactant, Cosolvent, UL and LL phases. **[6]**

SECTION - II

Q5) $\dfrac{\partial^2 p}{\partial x^2} = \alpha \dfrac{\partial p}{\partial t}$ is the given equation for flow in porous media. Formulate the discretised equation using variable grid blocks. Start with Taylors Series**[16]**

*Q6)* a) Given a one - dimensional reservoir, with the following data, set up the matrix using the crank nicolson method. L = 400 ft, ct = 5E - 6, P(x, 0) = 5000 psi, P (400, t) = 0 psi, P(0, t) = 5000 psi, viscosity = 5 cp, permeability = 5md , porosity = 20%. **[12]**

b) Show the solution profiles for different times on a P - x diagram and the steady state solution. **[4]**

Q7) Hanofer Oil Field, Eastern Europe, has an isopach map in Figure 1. Assume any other data and clearly state it. Well 1 is a producing well, well 2 is a dry well.

Discovery Date :	Jan, 86
No. of producing wells	One (shown by triangle)
Formation type	sandstone
Depth	5000ft
Average Porosity	11%
Average Permeability	43md
Average Water Saturation	17%
Reservoir Temperature	154 F
Residual Oil Saturation	0.27
Oil viscosity at reservoir temperature	6cp
Water viscosity at reservoir temperature	1cp
Initial Reservoir Pressure	2422 psia
Oil Gravity	25 API
IFT between oil and water	23 dyne/cm

a) Give possible reasons and justifications why this is a dry well. **[10]**

b) Economics require that you do not abandon the well. What steps will you take to correct the existing well? Explain in detail. **[8]**

Q8) a) Use taylors series to derive the finite difference approximation formulas for the Diffusivity equation. **[8]**

b) Modify the above equation if the left boundary has a flow rate condition.**[4]**

c) Modify the above equation if the left boundary has a pressure condition.**[4]**

FIGURE 1

ISOPACH MAP

↑N

Oil/water contact

30'

10' 20'

40'

0'

SCALE

0 ——————— 1 mile

(—' feet)

▲ Well No 1
◇ Well No 2

◆◆◆◆
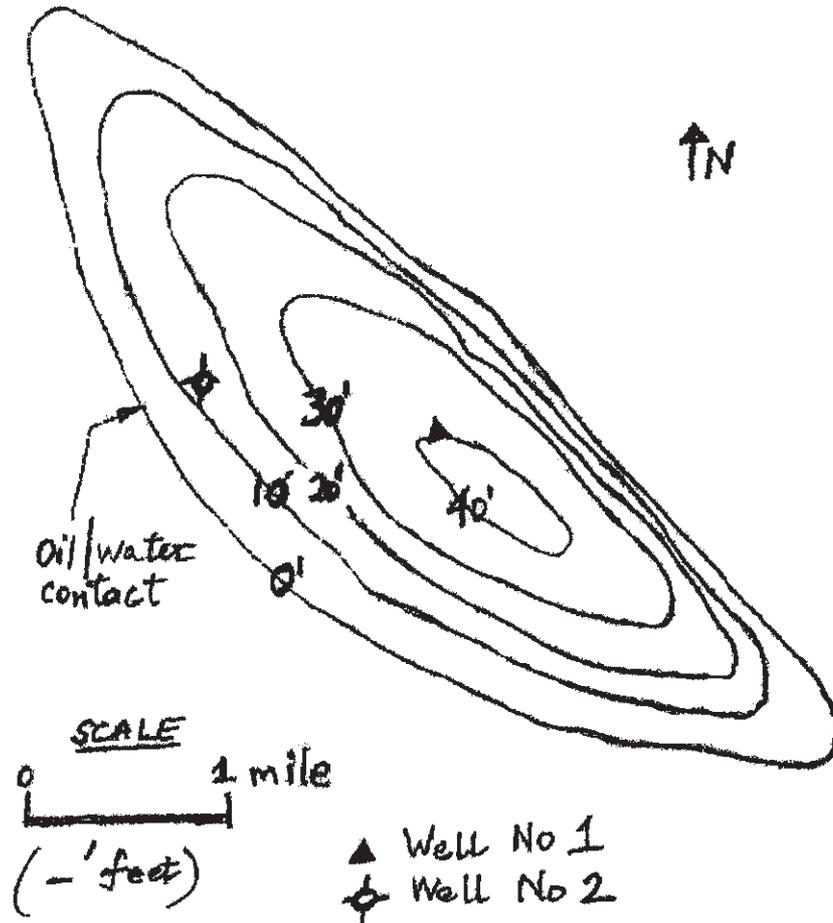
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B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Solve Q.1 or 2, Q.3 or 4, Q.5 or 6 from Section - I and Q.7 or 8, Q.9 or 10, Q.11 or 12 from Section - II.*
2) *Answer to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Specify the qualities of a good material for constructing sewers. Judging from these requirements,discuss the suitability of: **[8]**
     i) Bricks   ii) Cement concrete
     iii) Stone ware for sewers.

     b) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1 m, laid at a gradient of 1 in 500. The sewer runs at 0.6 depth. Use Mannings formula taking N = 0.012. **[8]**

OR

Q2) a) Differentiate between 'Oxygen Demand' and 'Biochemical Oxygen Demand'? How do you determine BOD? What are the limitations of BOD test? **[8]**

     b) The BOD of sewage incubated for one day at 30ºC has been found to be 100mg/l. What will be the 5-day 20ºC BOD. Assume K = 0.12 (Base 10) at 20ºC. **[4]**

     c) Give relationship between TOC, COD and BOD. **[4]**

Q3) a) Discuss fully the process of self purification of natural water. **[6]**

     b) The sewage of a town is to be discharged into a river stream. The quantity of sewage produced per day is 8 million liters, and its BOD is 250 mg/l. If the discharge in the river is 200 l/s and if its BOD is 6 mg/l, find out the

BOD of the diluted water. [4]

c) What do you understand by preliminary treatment of wastewater? Enumerate various unit operations falling under this. Also draw flow diagrams for possible arrangements of various units falling under preliminary treatment. [6]

OR

Q4) a) What do you understand by grit chambers? Why it is necessary to provide a grit chamber? Explain the configuration of a grit chamber with the help of neat sketches. [6]

b) Design a primary settling tank of rectangular shape for a town having a population of 50,000 with a water supply of 180 liters per capita per day. [4]

c) What is the difference between BOD and COD and Give effluent discharge standards as per BIS 2490 for BOD, COD and TS. [6]

Q5) a) Give the classification of microorganisms based upon
    i)   Nutritional Requirements   ii) Energy Requirements
    iii) Temperature Range   iv) Oxygen Requirements   [4]

b) Write notes on
    i)   SVI   ii) F/M ratio
    iii) Recirculation   [6]

c) Design a high rate single stage trickling filter for treating the following wastewater of a town having population of 4000 persons: [8]
    i)   Domestic sewage @ 150 lpcd having 200mg/l of BOD.
    ii) Industrial wastewater @0.25 million litres per day having 600mg/l of BOD.
         Assume the following
         1) BOD removal in primary clarifier = 35%
         2) Permissible organic loading of filter = 8000 kg/ hec-m/day (Excluding recirculated sewage)
         3) Recirculation ratio = 1.0
         4) Permissible surface loading = 160mL/hec/day (including recirculated sewage)
             Also determine the efficiency of the filter and BOD of the effluent.

OR

Q6) a) State the advantages and disadvantages of a conventional trickling filter.[4]

b) Explain with neat graph 'Growth Pattern of microorganisms' [6]

c) An average operating data for conventional activated sludge treatment plant is as follows: **[8]**

    i)   Wastewater flow   =   50000 cum/d

    ii)   Volume of aeration tank   =   15500 cum

    iii)   Influent BOD   =   200mg/l

    iv)   Effluent BOD   =   25mg/l

    v)   MLSS   =   3000mg/l

    vi)   Effluent Suspended solids   =   40mg/l

    vii) Watse sludge suspended solids   =   12000mg/l

    viii) Quantity of waste sludge   =   250cum/d

    Based on the information above, determine

    1)   Aeration Period (hours)

    2)   F/M ratio (kg BOD per day/kg MLSS)

    3)   Percentage efficiency of BOD removal

    4)   Sludge age (days)

SECTION - II

Q7) a) Explain with the help of neat sketch the working of an oxidation ditch. Distinguish clearly between an intermittent type and a continuous flow type oxidation ditch. **[6]**

b) Give advantages & disadvantages of oxidation ponds. **[5]**

c) Distinguish clearly between the working of an 'oxidation ditch' and 'oxidation pond' **[5]**

OR

Q8) a) What do you understand by 'stabilization Ponds'? Give classification of stabilization ponds. **[6]**

b) Explain the mechanism of purification in facultative ponds. **[5]**

c) Explain briefly root zone cleaning system. **[5]**

Q9) a) What do you understand by 'digestion of sludge'? Differentiate between anaerobic and aerobic digestion, Explain the mechanism of anaerobic digestion. **[8]**

b) Design a septic tank for a hostel housing 125 persons. Also design the soil absorption system for the disposal of the septic tank effluent, assuming the percolation rate as 20 min. per cm. Desludging period once in a year. **[8]**

*Q10)*a) What do you understand by sludge thickening? Enumerate various methods. Describe with the help of sketch gravity sludge thickener. **[8]**

b) Draw a neat sketch of Up flow Anaerobic Sludge Blanket Reactor (UASBR). Explain the principal of working and comment on its suitability for the treatment of Industrial wastewater. **[8]**

*Q11)*Write short note on the following chemical treatments of Industrial wastewaters. **[18]**

a) Reverse osmosis.

b) Electrodialysis

c) Chemical Oxidation

d) Chemical Coagulation

e) Adsorption

f) Air - stripping

OR

*Q12)*Give the range of important characteristics of wastewater from the following industries and draw a suitable flow diagram for treatment of each industry.**[18]**

a) Distillery Industry

b) Sugar Industry

c) Pulp and paper Industry.

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[4164] - 402

B.E. (Civil)

DAMS & HYDRAULIC STRUCTURES

(2008 Pattern) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

   1)   *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I, Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*

   2)   *Answer any 3 questions from each section.*

   3)   *Answer 3 questions from section I and 3 questions from section II.*

   4)   *Answers to the two sections should be written in separate books.*

   5)   *Neat diagrams must be drawn wherever necessary.*

   6)   *Figures to the right indicate full marks.*

   7)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   8)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What are 'arch' and buttress dams? Illustrate with sketches and mention site conditions favourable for construction of such dams.   **[10]**

     b)   Explain the influence of following factors on the choice of the type of dam.   **[6]**

        i)   Geology & foundation conditions.

        ii)   Spillway size and location.

OR

Q2) a)   Explain briefly is guidlines for dam safety.   **[6]**

     b)   Explain the thin cylinder theory of design of an arch dam.   **[10]**

Q3) a)   Explain step by step method of design of gravity dam.   **[9]**

     b)   Explain in detail the various forces causing instability in a gravity dam.**[9]**

OR

Q4) a) Explain with the help of diagram various joints and water seals provided in gravity dam. **[6]**

b) Find the hydrodynamic pressure & moment due to earthquake on a dam with vertical u/s face & depth of water equal to 100m when intensity of earthquake is 0.29. **[6]**

c) Explain foundation treatment for a gravity dam. **[6]**

Q5) a) Determine the factor of safety of downstream slope of (homogenous section) an earth dam drawn to a scale of 1:750, for the following data:**[8]**

i)	Area of N-rectangle	=	20 cm²
ii)	Area of T rectangle	=	10 cm²
iii)	Length of slip circle arc	=	20 cm
iv)	Angle of internal friction	=	26°
v)	Cohesion c	=	4000 kg / m²
vi)	Specific weight of soil	=	1760 kg/m³

b) Explain the following: **[8]**
   i) Cut-off   ii) Chimney drain

OR

Q6) a) What do you understand by piping? What measures may be taken to ensure safety of an earthen dam against the failure due to piping? **[10]**

b) Explain the terms **[6]**
   i) Relief well   ii) Rock toe   iii) Berms

SECTION - II

Q7) a) A spillway is to discharge water 30 m³/s/m length. The maximum water level above the river bed is 35M. The upstream face is vertical and the downstream face has a slope of 0.75 H to 1V. Design the profile of a spillway crest. **[8]**

b) Write short notes on **[8]**
   i) Bucket type energy dissipator
   ii) Side channel spillway.

OR

Q8) a) Write short notes on **[8]**
   i) Automatic gates   ii) Vertical gates.

b) How is Khosla's theory applied for design of a structure on permeable foundation? Explain the importance of exit gradient. **[8]**

Q9) a) How irrigation canals are classified? Describe briefly various considerations made in the alignment of an irrigation canal. **[10]**

b) What are cross drainage works? What is their necessity? How is the choice of the type of cross drainage works is made? Draw a neat sketch of an aqueduct. **[8]**

OR

*Q10)*a) Write short notes on (any two) **[8]**

    i) Canal Fall   ii) Canal regulators

    iii) Purpose of outlets.

b) Explain - bed load, Suspended load. Explain - Tractive force method of design of stable channel in alluvial material. **[10]**

*Q11)*a) Explain - Groynes - Purpose, Classification with sketches. **[8]**

b) Explain the following terms **[8]**
Gross head, Net head, Load factor, Utilization factor, Capacity factor, Hydraulic efficiency.

OR

Q12) Write short notes on (any four) **[16]**

    a) Cut off

    b) Ditched islands

    c) Surge tank

    d) Assessment of power potential

    e) Underground power house

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[4164] - 403

B.E. (Civil)
STRUCTURAL DESIGN - III
(2008 Pattern) (Sem. - I)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer Q.1 or Q.2, Q3 or Q.4 in Section I.*
2) *Answer Q.5 or Q.6 Q.7 or Q.8 in Section II.*
3) *Answers to the two sections should be written in separate answer books.*
4) *Figures to the right indicate full marks.*
5) *Use of IS 1343, IS 456, IS 3370 & non programmable calculator is allowed.*
6) *Neat diagrams must be drawn wherever necessary.*
7) *Assume any other data if necessary & mention it at the starting of the answer.*
8) *Mere reproduction from IS code as answer, will not be given full credit.*
9) *Assume any other data if required.*

SECTION - I

Q1) a) Explain in detail the loss of stress due to Elastic shortening in pre and post tensioned prestressed concrete. **[8]**

b) A post tensioned prestressed concrete beam of simply supported span 16m having the cross sectional details as top flange 500×150, web 125×400 and bottom flange 300×280 mm, The beam is prestressed with 3No. of 12/7 Freyssinet parabolic cables with their c.g. at 100 mm from extreme bottom fiber, stressed one at a time from only one end to 1100Mpa. Calculate total loss of prestress and jacking force at the age of 100 days, if coefficient of friction = 0.3, coefficient for curvature and wave effect = 0.0026/m length of cable, slip of anchorage at jacking end = 1.5 mm, creep coefficient = 2.2, Es = 2×10^5 Mpa, Creep and relaxation of steel = 1.1% of initial prestress concrete grade = M40.**[17]**

OR

Q2) a) Distinguish between RCC and PSC. **[4]**

b) Explain the factors affecting the cable profile. **[4]**

c) An unsymmetrical I section is used to support an imposed load of 10 kN/m over a span of 15m. The sectional details are top flange 400×150, web 150×400 and bottom flange 250×250mm. The applied prestressing force is 852 kN is located at from 65mm from soffit of the section at midspan. Cable profile is parabolic concentric at support. Calculate extreme fiber stresses in concrete at midspan at initial and final stages. Take loss ratio as 0.82 and unit weight concrete as 25 kN/m³. **[17]**

P.T.O.

Q3) a) Comment on the losses in simply supported and balanced cantilever post tensioned prestressed concrete. **[5]**

b) A post tensioned prestressed concrete two way slab, 7 × 8.5m with discontinuous edges to support imposed load of 5kN/m². Use S3(three strands, each having cross sectional area 100 mm²) having fy = 1900 MPa. Check the safety of the slab against collapse and deflection at service load take the grade of concrete = M45. **[20]**

OR

Q4) Design a post tensioned prestressed concrete 'I' or 'T' section beam for flexure to carry a live load of 13kN/m over entire simply supported span of 17m with M45 grade of concrete and Freyssinet cables of 12/5 (fy = 1750 Mpa) or 12/7 (fy = 1500 Mpa), including the design of end block. Draw sketches showing cable profiles and end block reinforcement details. Check fiber stresses in concrete and deflection. **[25]**

SECTION - II

Q5) a) Write detailed note on Portal method. **[8]**

b) Analyze a rigid jointed frame shown in fig(1) by Cantilever method for lateral loads. Flexural rigidity for all members is same. Analyze beam DEF using proper substitute frame, if it is subjected to vertical ultimate live & dead load incl. Of its self wt. Intensities of 12kN/m& 14 kN/m on DE and 17kN/m & 18kN/m on EF respectively. Calculate max, span moment for span DE and support moment at E. Design section for combined effect of vertical and horizontal Loads. Adopt 15% redistribution of moments for vertical load moments Use M20, Fe415.**[17]**
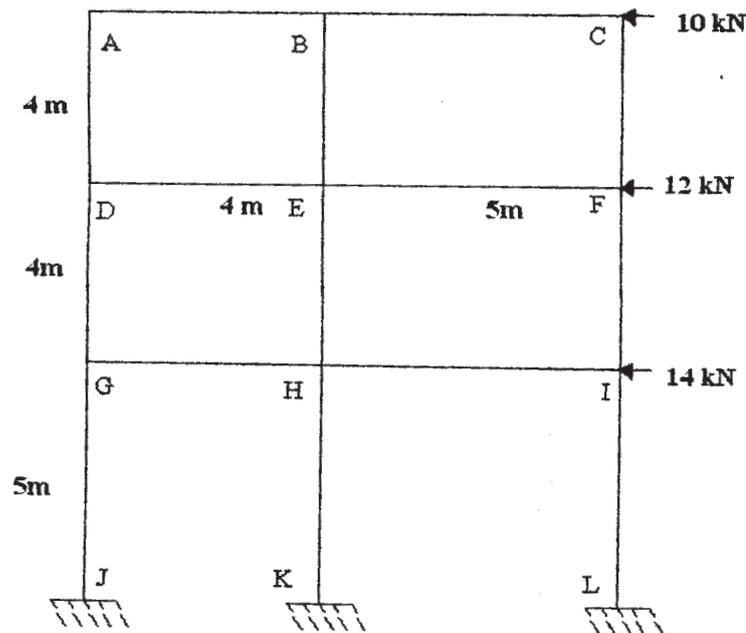
Fig(1)

Q6) Figure (2) shows an intermediate frame of a multistoried building the frame are spaced 4.4m centre to centre Analyze a rigid jointed frame taking live load of and dead load of 2.5kN/m² 4kN/m² respectively for all slab panels. The self weight of the beam may be taken for beams of 6m and 4m span as 3.5 kN/m and 2.5kN/m respectively.

The relative stiffnesses of the members are marked in the figure. Use Cantilever method for analyzing the frame for horizontal forces and proper substitute frame for vertical loads. Design the section for beam ABC for combined effect of vertical and horizontal Loads.Adopt 12% redistribution of moments for vertical load moments Use M20, Fe 500. **[25]**
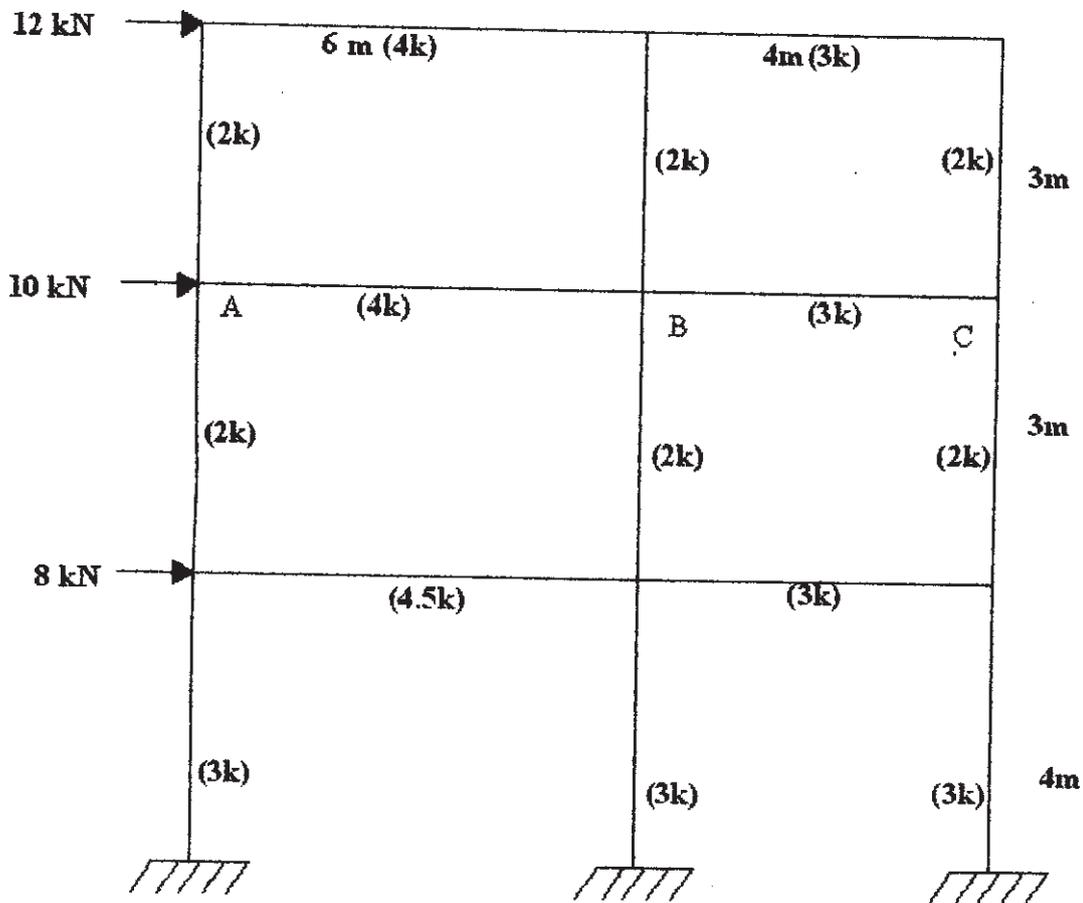

Fig. (2)

Q7) a) Draw exaggerated bent shape of wall of circular water tank fixed at base slab showing all details. **[5]**

b) Design a T shaped retaining wall for two layered leveled backfill for the following data.

Upper layer, height = 2.4m, $\varphi = 30°$, $\gamma = 17.5$ kN/m^3.

Lower layer, height = 2.4m, $\varphi = 31°$, $\gamma = 18.5$ kN/m^3.

Safe bearing capacity of the underlying strata = 170 kN/m^2. The coefficient friction between the base slab and the underlying strata = 0.55. Draw lateral pressure diagram and details of reinforcement of stem and base showing curtailment if any. **[20]**

OR

Q8) Design reinforced concrete combined rectangular footing for two columns A & B carrying working loads 600 kN and 850 kN respectively. Column A is 230 mm × 350mm size and Column B is 230mm × 450mm size. Centre to centre distance of columns is 3.4 m Safe bearing capacity 180 kN/m^2. Use M20 and TMT steel. Draw all details of reinforcements. **[25]**

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[4164] - 404
B.E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(Sem. - I) (2008 Pattern) (Elective - I)

Time :4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *From Section - I answer Q.1 or Q.2, Q.3 or Q.4 and from Section - II answer Q.5 or Q.6, Q.7 or Q.8.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *IS 800, IS 875, IS 1343 and steel table are allowed in the examination.*
5) *Neat diagrams should be drawn wherever necessary.*
6) *If necessary, Assume suitable data and indicate clearly.*
7) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain with neat sketches balanced cantilever bridges, rigid frame bridges and arch bridges. **[9]**

     b) Explain any two loads considered in the design of highway bridges. **[8]**

     c) Explain the causes for longitudinal forces on highway bridges. **[8]**

OR

Q2) a) Explain IRC loadings with neat sketches. **[9]**

     b) What are bearing used in R.C. bridges? Explain any one with neat sketches. **[8]**

     c) Explain Courbon theory for determining the load carried by longitudinal girders. **[8]**

Q3) Design the Reinforced Concrete deck slab for the reinforced concrete T-Beam deck slab bridge shown in fig. 3 with the following details. **[25]**

     a) Thickness of railings - 100mm

     b) Thickness of footpath - 150mm

     c) Thickness of wearing coat - 80mm

     d) Span of main girder - 24.0m

     e) Spacing of main girders - 2.75m c/c

     f) Spacing of cross-beams-4.0m c/c

     g) live load - IRC Class AA Tracked Vehicle.

     h) Materials - M30 grade of concrete and Fe415 grade of steel.

     i) Adopt $m_1 = 0.103$ and $m_2 = 0.074$.
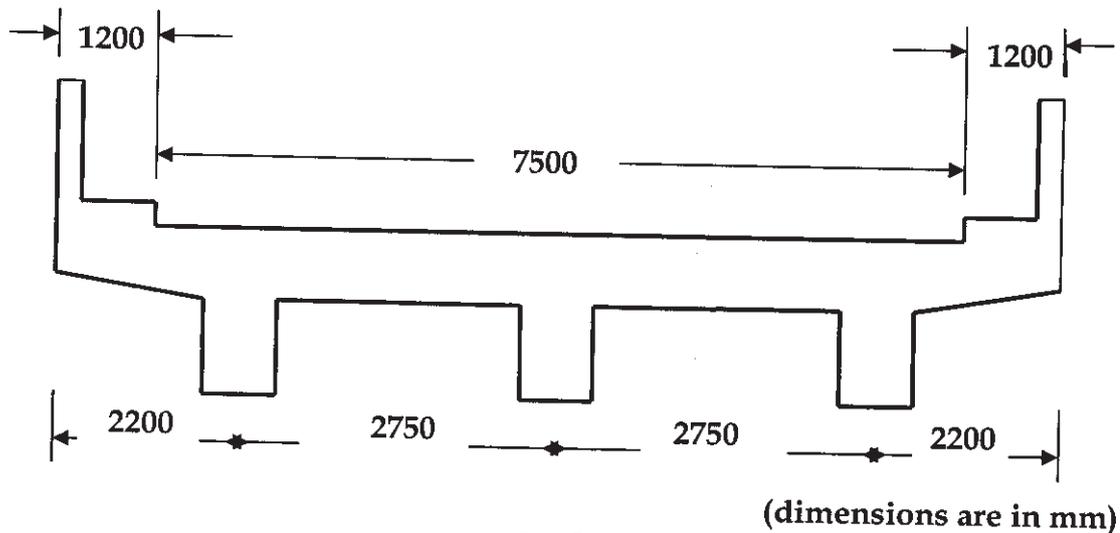
(dimensions are in mm)

Fig.3

OR

Q4) For the reinforced concrete T - Beam deck slab bridge given in Q.3, design the central post - tensioned prestressed girder. Use M45 grade of concrete and high tension strands of 7 ply 15.2 mm diameter having an ultimate tensile strength of 1600 N/mm². Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.85. **[25]**

SECTION - II

Q5) a) Explain the effect of wind on plate girder bridges. **[5]**

b) A through type plate girder bridge is provided for a single broad gauge track. The cross girders are spaced 3m. apart. The total span of main girders from centre to centre of bearings is 28m. The stringers are spaced 2m. between centrelines. The stock rails are 0.6 kN/m and check rails are 0.4 kH/m. The sleepers are spaced 450mm centre to centre and are of size 28m × 250mm × 250mm timber. Calculate Maximum section of main girder if EUDLL for bending moment is 2640 kN per track total & EUDLL for shear is 2866 kN per track total. Impact factor for 28m span is 0.476. The main girders are provided at spacing of 5m C/C. Design plate girder for flexure only. **[20]**

OR

Q6) a) Explain types of bearings for steel bridges. **[7]**

b) For the truss as shown in fig 6b and for equivalent udl 100 kN/m, inclusive of self weight. Impact factor is 0.3. Determine the forces and design the member U_4U_5, L_4L_5 **[18]**

10 panels @ 5 m each = 50m.
Fig 6.6.
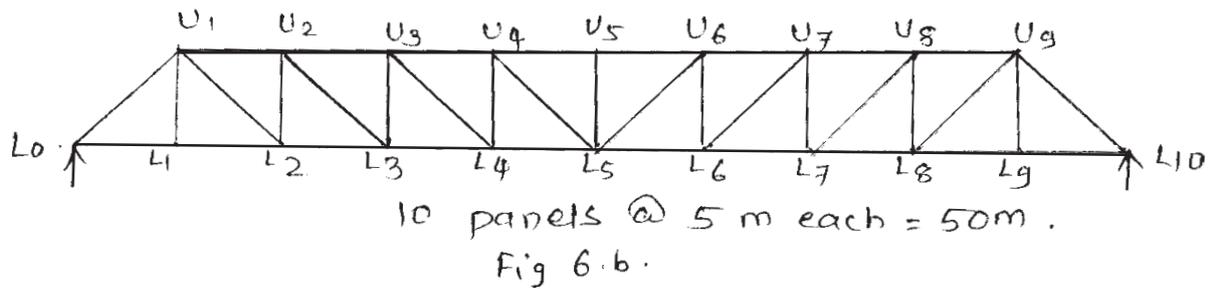
Q7) a) Explain with sketch types of bearings for steel bridges. show all important components of bearings. **[13]**

b) Explain various loads acting on railway steel bridge. **[12]**

OR

Q8) a) Design the rocker bearing for 40m span truss girder railway bridge with following data: **[18]**

   i) Reaction due to D.L, L.L & impact load = 1800 kN.

   ii) Vertical reaction due to overturning effect of wind at each end of girder = 150 kN.

   iii) The lateral load due to wind effect at each bearing = 50 kN.

   iv) The tractive force = 1000 kN.

   v) Breaking force = 500 kN.

b) Explain portal bracing & sway bracing draw neat sketches to illustrate. **[7]**

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P1331

[4164] - 406

B.E. (Civil)

AIR POLLUTION AND CONTROL

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State the relation between adiabatic lapse rate of rising phone of stack gas & ambient lapse rate. **[7]**

     b) Determine the effective height of a stack with following data: **[11]**

         i) Physical stack is 203 mts. tall with 107 cm inside diameter.

         ii) Wind velocity is 3.56 mls.

         iii) Air Temperature 15ºC.

         iv) Barometric pressure is 1000 millibars.

         v) Stack gas temperature is 149ºC.

OR

Q2) a) Explain in brief **[6]**

         i) Meterological aspects.

         ii) Day adiabatic lapse rate.

     b) Sketch the following plume phenomena & discuss each in relation to dryadiabatic lapse rate.

         i) Trapping

         ii) conning

         iii) Fumigating. **[6]**

P.T.O.

c) A factory uses 2,00,000 lit. of furnace oil [sp. Density = 0.97] per month. If for one million litres of oil used per year the particulate matter emitted is 3.0 tonnes per year, SO_2 emitted is 59.7 tonnes per year, No_x emitted is 7.5 tonnes per year, Hydrocarbon emitted are 0.37 tonnes per year, calculate the height of chimney required to be provided for safe dispersion of the pollutants. **[6]**

Q3) a) What are the objective of sampling of atmosphere & explain about selecting sampling station. **[5]**

b) Write about Instrument for sampling gas vapours. **[5]**

c) Explain Iso-kinetic condition & ambient air quality monitoring. **[6]**

OR

Q4) a) Explain about Air pollution survey. **[4]**

b) Enlist the sampling methods for Air Pollution & state about location of sampling sites. **[6]**

c) Explain the principle of Beta attenuation monitor. **[6]**

Q5) a) Explain about the sources of odours. **[5]**

b) List the various odorous industrial operations & mention the odorous materials produced during these operations. **[5]**

c) Explain the methods used to measured the odour. **[6]**

OR

Q6) a) Explain in brief about. **[8]**
   i) Odour masking.
   ii) Odour counteraction.

b) Explain in brief about sources & effects of Indoor Air Pollutants. **[8]**

SECTION - II

Q7) a) What are two broad approaches to control of air pollution emission?**[6]**

b) An air stream with a flow rate 7m/s is passed through a cyclone of standard proportions. The diameter of the cyclone is 2m & the air temperature is 77°C.
   i) Determine the removal efficiency for a particle with a density of 1.5 g/cm^3 and a dia of $10\mu m$.
   ii) Determine the collection efficiency based on the above if a bank of 64 cyclones with diameter of 24 cm are used instead of the single large unit. **[12]**

OR

Q8) a) Discuss the advantages & disadvantages of wet collectors. **[6]**

b) Explain in detail cyclone collector. **[6]**

c) Name and describe three control devices developed for control of automotive emission. **[6]**

Q9) a) Compare the functions of central pollution control board with the functions of the state pollution control board in the area of air pollution control. **[8]**

b) Discuss about main principal of land use planning as a method of control of air pollution. **[4]**

c) Write note on "Environment (protection) Act, 1986. **[4]**

OR

Q10) a) Write short note on: **[8]**

i) Air Act, 1981

ii) Environment (protection) Act, 1986.

b) What is your own opinion about economics of air pollution control on the basis of cost-benefit ratio and optimization. **[8]**

Q11) a) Differentiate the role of regulatory agencies and control boards in obtaining environmental clearance for project. **[8]**

b) Discuss about - environmental impact of thermal power plant in India. **[8]**

OR

Q12) a) What are the methodology for preparing environmental Impact assessment. **[8]**

b) Discuss about environmental impact of water resources projects in India. **[8]**

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[4164] - 408

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answer 3 questions from section I and 3 questions from section II.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Your answers will be valued as a whole.

5)   Use of logarithmic tables electronic pocket calculator is allowed.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Enlist the different soil classification and explain HRB classification. **[5]**

b) Discuss 'USCS'. **[5]**

c) Compared following two soils **[7]**

		Soil 'A'	Soil 'B'
i)	PL	16%	19%
ii)	LL	30%	52%
iii)	IF	11	06
iv)	W%	32%	40%

Find which soil is

1)   More plastic.

2)   Better foundation material on remoulding.

3)   Do these soils have organic matter.

OR

Q2) a) Discuss the different 'soil structures'. **[7]**

b) Enlist the different 'clay minerals' & explain the role of 'Montmorillonite'.**[5]**

c) Explain 'diffuse double layer'. **[5]**

Q3) a) A vertical retaining wall 4M high, supported a backfill with horizontal ground surface. The soil has $\gamma=18$ kN/m³, $\phi=35°$, $\delta=20°$. A footing running parallel to the retaining wall & carrying a load intensity of 18 kN/m, is to be constructed. Find the safe distance of the footing from the face of the wall so that there is no increase in lateral pressure on the wall due to the load of footing. **[10]**

b) A vertical excavation was planned in a clay deposit having $\gamma=20$ kN/m³, It caved in after the depth of digging reached 4M. Assuming $\phi=0$, calculate the value of cohesion. If the same clay is to be used as a backfill against a retaining wall, upto a height of 8M. Calculate

     i) Total active EP   ii) Total passive EP. **[7]**

OR

Q4) a) Design a gravity retaining wall, 5 M. high with vertical back to retain a dry cohesionless soil with $\gamma=18$kN/m³ & $\phi=30°$. Find also the FOS against sliding assuming the angle of friction bet^n the base of the wall & the foundation as 30°. The wall is having 1m topwidth & to be constructed in brick masonry having $\gamma=20$ kN/m³, Use Rankine's theory. **[9]**

b) Compute the embedment depth & pull in the anchor rod for the sheet pile, retaining 6M. high backfill, with anchor rod 1M. below the top. The soil of the backfill & below the dredge line is same, having the following, properties,

$\phi=\phi'=30°$, C = 0, $\gamma_{sat}=20$ kN/m³, $\gamma=18$ kN/m³, gWT = 3M above dredge line.

Use 'free earth support' Method. **[8]**

Q5) a) Discuss different types of geosynthetics, along with functions. **[6]**

b) Discuss the properties & functional requirements of geogrid. **[5]**

c) Discuss the applications of geosynthetics in geoenvironment. **[5]**

OR

Q6) a) Draw a sketch of 'Reinforced Earth Wall' & explain its components. **[6]**

b) Explain 'Binquet & Lee' Theory for reinforced foundations. **[5]**

c) Explain the term 'soil nailing'. **[5]**

SECTION - II

Q7) a) Differentiate clearly bet^n 'Free vibrations' & 'Forced Vibrations'. **[5]**

b) In a vertical block vibration test on 1m × 1m × 1m, block, the resonance have occurred at the frequency of 22 cycles / second. Determine C_u if the weight of oscillator is 62 kg & the force produced by it at 12 cycles per second is 100 kg. **[7]**

c) Explain 'Pauw's' Analogy. **[5]**

OR

Q8) a) Explain 'Elastic half space Method'. **[5]**

b) Discuss the design interia for impact type machines as per IS - 2974 (pt - II) - 1966. **[5]**

c) A machine having a total weight of 20,000 kN has an unbalance such that it's subjected to a force of magnitude 5000kN at a frequency of 600 rpm. What should be spring constant for the supporting springs if the max. Force transmitted into the foundation due to the machine is to be 500 kN? Neglect Damping. **[7]**

Q9) a) Explain the stages for construction of 'bared compaction pile'. **[5]**

b) Discuss 'Sand drains'. **[5]**

c) Explain the steps for 'Vibroflotation'. **[7]**

OR

Q10)a) Discuss different methods for 'grouting'. **[5]**

b) A clay layer 5m thick is consolidated with the help of sandrains of dia, 30 cm & spaced 2.7 M C/C. Determine the influence of the drain wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay impact wells would be equal to 20%.

The drainwells may be amanged in a square pattern, with following data,

i) $Kr = Kz$ ii)   for $U_z = 20\%$, $T_v = 0.031$. **[7]**

c) Explain the stage of inserting reinforcement in Vibro-expanded pile. **[5]**

*Q11)*a) Discuss the following, **[8]**

      i)   Rheology.

      ii)   Rheological Models & its utility.

  b) Explain the following. **[8]**

      i)   Saint Ve-nant's model.

      ii)   Reissener's Model with spring & dashpot.

<center>OR</center>

*Q12)*a) Discuss different 'Rheological Models' **[8]**

  b) Discuss the use of 'Rheological Models' to explain creep, viscosity & secondary consolidation. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1333

[Total No. of Pages : 3

[4164] - 410

B.E. (Civil)

HYDROINFORMATICS

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]
[Max. Marks :100

Instructions to the candidates:-

 1) *Answer any three questions from each section.*

 2) *Answer any three questions from section - I and three questions from section - II.*

 3) *Answer to the two sections should be written in separate answer booklet.*

 4) *Neat diagrams must be drawn wherever necessary.*

 5) *Figures to the right indicate full marks.*

 6) *Your answers will be valued as a whole.*

 7) *Use of electronic pocket calculator is allowed.*

 8) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Hydroinformatics. What is the necessity of Hydroinformatics? Explain with practical example. **[6]**

 b) What are components of hydroinformatics systems? Explain in detail hardware and software components. **[6]**

 c) Discuss about design of hydroinformatics system for flood warning in your city. **[6]**

OR

Q2) a) What are network components, peripheral components of a Hydroinformatics system? Explain in brief. **[6]**

 b) Discuss any web based hydroinformatics system in India or abroad giving details about scope, purpose, underlying model, software used in front end and back end. **[8]**

 c) Explain role of numerical modeling in Hydroinformatics. **[4]**

P.T.O.

Q3) a) Why multi-criteria decision support systems are required in Hydraulic Engineering? Discuss interrelation between various components of multi criteria decision support system. **[8]**

b) Discuss design of multi - criteria decision support system for wave watch giving details of information collection, analysis, prediction, estimation, decision - dissemination of the information. **[8]**

OR

Q4) a) What is a decision support system in water resources engineering? What are its components? What is the role of public sector in decision support system? **[8]**

b) Discuss design of multi - criteria decision support system for flood watch giving details of information collection, analysis, prediction, estimation, decision, dissemination of the information. **[8]**

Q5) a) Differentiate between physics based modeling and data driven modeling. Give examples of each. **[6]**

b) Discuss design of simulation model for household water distribution system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. **[10]**

OR

Q6) a) Discuss any commercial simulation model. **[6]**

b) Discuss design of simulation model for water inflow at a dam location objective, scope, basic formulae used, underlying solution procedure, simulation technique used. **[10]**

SECTION - II

Q7) a) Discuss the working of biological neuron. **[4]**

b) What is learning rate? What is momentum factor? **[6]**

c) How artificial neural networks compare with statistics? What is the terminology used in statistics for the following terms used in ANN? Input, output, training, generalization. **[8]**

OR

Q8) a) Discuss the working of an artificial neuron. **[4]**

b) Define epoch, epoch size, error function, weight surface. **[6]**

c) Define transfer function. What is its use in ANN? Discuss various transfer used in ANN? **[8]**

Q9) a) What is evolutionary computing? Explain 3 criteria for evolutionary process to occur. What are different types of evolutionary computing?**[8]**

b) Discuss Fitness function, population, terminals and functions in connection with the Genetic Algorithm. **[8]**

OR

Q10) a) What is mutation and cross over? Give an example of both by drawing the tree diagram. **[8]**

b) What are the steps in implementation of Genetic Algorithm? **[8]**

Q11) a) What are strengths and limitations of Artificial Neural Networks. **[8]**

b) Define soft computing techniques. Is Genetic Algorithm a soft computing technique? Why? What is the difference between Genetic Algorithm and Genetic Programming? **[8]**

OR

Q12) a) Discuss a study about application of Artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. **[8]**

b) Discuss a study about application of Genetic Algorithm in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs and results. **[8]**

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[4164] - 432

B.E. (Mechanical) (Common to Mechanical S/W)
DYNAMICS OF MACHINERY
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:
1) *Answer three questions from Section - I & three questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Four masses A, B, C and D carried by a rotating shaft at radii 80 mm, 100 mm, 160 mm and 120 mm respectively are completely balanced. Masses B, C and D are 8 kg, 4 kg and 3 kg respectively. Determine the mass A and the relative angular position of the four masses if the planes are placed 500 mm apart. **[8]**

b) What is meant by primary and secondary balancing of reciprocating masses? **[4]**

c) What are V-engines? How they differ from the rest of the reciprocating engine. **[4]**

OR

Q2) a) The three cylinders of an air compressor have their axes at 120º to one another and their connecting rods are coupled to a single crank. The length of each connecting rod is 270 mm and the stroke is 180 mm. The reciprocating parts have a mass of 2.6 kg per cylinder. Determine the primary and secondary forces if the engine runs at 2400 rpm. **[8]**

P.T.O

b) Explain the partial balancing of reciprocating engine. **[4]**

c) With the help of neat sketch, explain the working of dynamic balancing machine. **[4]**

Q3) a) A cylindrical disc is suspended from a point on its circumference. Find the equation of motion and also determine its natural frequency. **[6]**
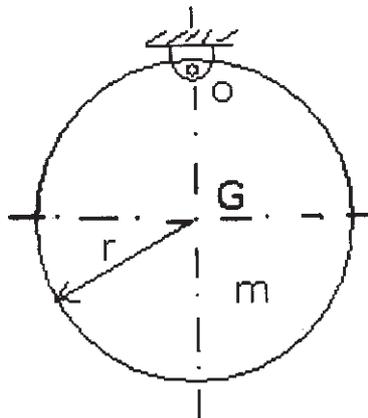
b) A mass placed on rough surface is attached to a spring and is given an initial displacement of 120 mm from its equilibrium position. After completing 8 cycles of oscillations in 2 sec, the final position of mass is found to be 10 mm from its equilibrium position. Find the coefficient of friction between the surface and mass. **[6]**

c) What is meant by underdamping, overdamping and critical damping? Show amplitude versus time plot. **[4]**

OR

Q4) a) For a spring mass damper system m = 1.5 kg, k = 5000 N/m. Determine the magnitude of coefficient of damping 'c' for the system to be critically damped. **[2]**

b) The spring mass damper system has spring stiffness 10 kN/m, viscous damping coefficient 1500 N-s/m and a mass of 7kg. The mass is displaced by 0.01 m and released with a velocity of 10 m/sec in the direction of return motion. Find. **[8]**

    i)   An expression for the displacement x of mass in terms of time t.

    ii)   Displacement of mass after 0.02 second.

c) A mass of 2 kg is supported on a spring of 3 kN/m and has a dashpot having damping coefficient of 5 N-sec/m. If the initial displacement of 8 mm is given, find **[6]**

    i)   Damped natural frequency;

    ii)   Logarithmic decrement;

    iii) Amplitude after 3 Cycles.

Q5) a) Define motion and force transmissibility and derive an expression for it, incase of spring - mass - dashpot vibratory system. **[6]**

b) A vehicle has a mass 490 kg and the total spring constant of suspension system is 58800 N/m. The profile of the road may be approximated to a sine wave of amplitude 40 mm and wave length 4 m, determine: **[8]**

    i)   Critical speed of the vehicle.

    ii)   The amplitude of steady state vibration of the mass when the vehicle is driven at critical speed and damping factor = 0.5.

    iii) The amplitude of steady state motion of mass when the vehicle is driven at 57 km/hr and damping factor = 0.5.

c) A 70 kg machine has a rotating unbalance of 0.15 kg-m. The machine operates at 125 Hz and is mounted on a foundation of equivalent stiffness 2000 kN/m and damping ratio 0.12. What is the machine's steady - state amplitude? **[4]**

OR

Q6) a) A reciprocating air compressor has a mass of 1000 kg running at 1500 rpm. The equivalent reciprocating parts of compressor are of 1 kg and stroke length is 0.2 m. To reduce the effect of vibration, isolators of rubber having static deflection of 2 mm under compressor weight and an estimated damping factor of 0.2 are used. Determine. **[10]**

   i) Amplitude of vibration of compressor.

   ii) Force transmitted to the foundation.

   iii) Phase lag.

   iv) Phase angle between transmitted force and exciting force.

   v) Speed at which maximum amplitude of vibration would occur.

   b) Derive an expression for amplitude of steady state forced vibration having excitation force $F_0 \sin(\omega t)$. **[8]**

SECTION - II

Q7) a) A reciprocating IC engine is coupled to a centrifugal pump through gearing. The shaft from the flywheel of the engine to the gear wheel is 60 mm diameter and 950 mm long. Shaft from pinion to pump is 40 mm diameter and 300 mm long. Engine speed is $1/4^{th}$ the pump speed. The moment of inertia of the flywheel and gear wheel are 800 kg-m² and 15 kg-m² respectively. The moment of inertia of the pinion and pump impeller are 4 kg - m² and 17 kg-m² respectively. Determine the natural frequency and postition of node of the torsional oscillation of the system. Modulus of rigidity of shaft material is G = 84 GPa. **[12]**

b) Explain the whirling of the shaft carrying a single rotor without damping and show that the deflection of the shaft is given by the following expression. **[6]**

$$y = \frac{\left(\frac{\omega}{\omega_n}\right)^2 e}{\left[1 - \left(\frac{\omega}{\omega_n}\right)^2\right]}$$

OR

Q8) a) Fig shows a coupled pendulum. Determine the natural frequencies, corresponding amplitude ratio for the two principal modes of vibration. $m_1 = 5$ kg, $m_2 = 3$ kg, $K = 40$ N/m, $a = 70$ mm, $L = 200$ mm. **[12]**
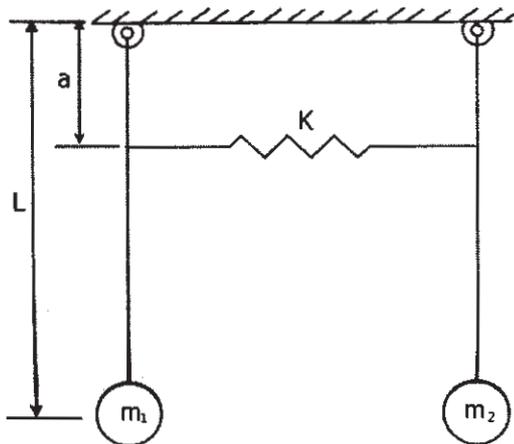
b) Explain the Holzer method to determine the natural frequency and mode shapes of multirotor torsional vibration system. **[6]**

Q9) a) Define sound fields. Explain the various types of sound fields in the vicinity of a sound source. **[6]**

b) The sound pressure level measured at a machine floor with a noisy machine operating nearby is 89.0 dB. When machine is turned off, the sound pressure level measured at the same location is 81.0 dB. What is sound pressure level due to machine alone? **[4]**

c) Explain the terms : sound reflection, absorption and transmission. **[6]**

OR

Q10) a) Explain with neat diagram the working of human hearing mechanism. **[6]**

b) Calculate the total noise if there are four sources of noise with the 45 dB, 54 dB, 48 dB and 50 dB magnitudes. **[4]**

c) Explain in brief the following: **[6]**

    i)   Various sources of noise.

    ii)   Sound power level and Acoustic intensity.

    iii)   Working of microphone.

Q11) a) What is sound enclosure? Describe the two types of sound enclosure. **[6]**

b) A seismic instrument with a natural frequency of 6 Hz is used to measure the vibration of a machine running at 120 rpm. The instrument gives the reading for relative displacement of the seismic mass as 0.05 mm. Determine the amplitudes of displacements, velocity and acceleration of the vibrating machine. Neglect damping. **[6]**

c) Explain undamped dynamic vibration absorber with frequency response curve. **[4]**

Q12) a) Explain the experimental setup for free and force vibration test with instruments required. **[4]**

b) What is vibration isolation? Discuss the various methods of vibration isolation. **[6]**

c) What is meant by time domain and frequency domain analysis? Explain how frequency spectrum can be used to detect vibration related faults in a system. **[6]**

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[4164] - 433

B.E. (Mechanical)
INDUSTRIAL FLUID POWER
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*
Instructions to candidates:
1) *Attempt any one question in each unit.*
2) *Figures to the right indicate full marks.*
3) *Assume suitable data.*
4) *Answer to the sections I and II should be written separately.*

SECTION - I
Unit - I

Q1) a) Compare characteristics of water based fluids and petroleum oil based used in hydraulic systems. **[6]**

   b) Explain the terms: **[6]**
      i) Schedule Number of pipe,
      ii) Beta Rating,
      iii) Full flow filters.

   c) Explain the term 'rating of filters' and discuss in brief on 'pressure line filters'. **[6]**

OR

Q2) a) Discuss the functions of different accessories used in hydraulic circuit. **[6]**

   b) Discuss in brief the different materials used for seals used in hydraulic components. **[6]**

   c) Write in brief about pressure line filters (Draw sketch showing location in hydraulic circuit). **[6]**

Unit - II

Q3) a) Sketch and explain construction, working and performance of radial piston pump. **[8]**

   b) Write short notes on 'different applications of accumulator in hydraulic system. **[6]**

   c) Discuss in brief important consideration while selecting a pump for a particular fluid power application. **[4]**

OR

Q4) a) Sketch and explain construction, working and performance of Variable Displacement Vane pump. **[8]**

b) Difference between positive displacement and non-positive displacement pumps. **[4]**

c) A hydraulic motor has a displacement of 164 cm^3 and operates with a pressure of 70 bar and a speed of 200 rpm. If the actual flow rate consumed by the motor is 0.006 m^3/s and the actual torque delivered by the motor is 170 N.m, find : **[6]**
   i) Volumetric efficiency,
   ii) Mechanical efficiency,
   iii) Overall-efficiency and
   iv) The actual kW delivered by the motor.

Unit - III

Q5) a) Explain difference between direct and pilot operated pressure relief valve. **[6]**

b) Sketch a typical sequencing circuit and explain its working. What is difference between sequence valve and a pressure relief valve. **[8]**

OR

Q6) a) What is a function of a pressure sequencing valve? Draw simple sketch and symbol and explain its working. State its applications. **[6]**

b) Write short note on (any two): **[8]**
   i) Unloading valve,
   ii) Counter balance valve,
   iii) Solenoid operated directional control valve.

SECTION - II

Unit - IV

Q7) a) Explain any four types of linear actuators with neat sketch. **[6]**

b) Explain the method to achieve piston deceleration towards the end of stroke in hydraulic cylinders. **[6]**

c) Draw regenerative circuit. **[6]**

OR

Q8) a) Explain function of hydraulic inline axial motor with neat sketch. **[6]**

b) Explain the hydraulic motor braking circuit. **[6]**

c) Draw unloading circuit. **[6]**

Unit - V

Q9) a) Explain typical compressed air generation and distribution system. **[8]**

   b) Explain construction and working of pneumatic filter and lubricator. **[8]**

OR

Q10) a) Compare hydraulic and pneumatic systems. **[4]**

   b) Draw neat sketch of air motor and explain its working. **[6]**

   c) Explain quick exhaust valve and shuttle valve with sketch. **[6]**

Unit - VI

Q11) Fig. 1 shows a pneumatic circuit. Identify the components of the circuit and explain the working of it. **[16]**

Fig. 1
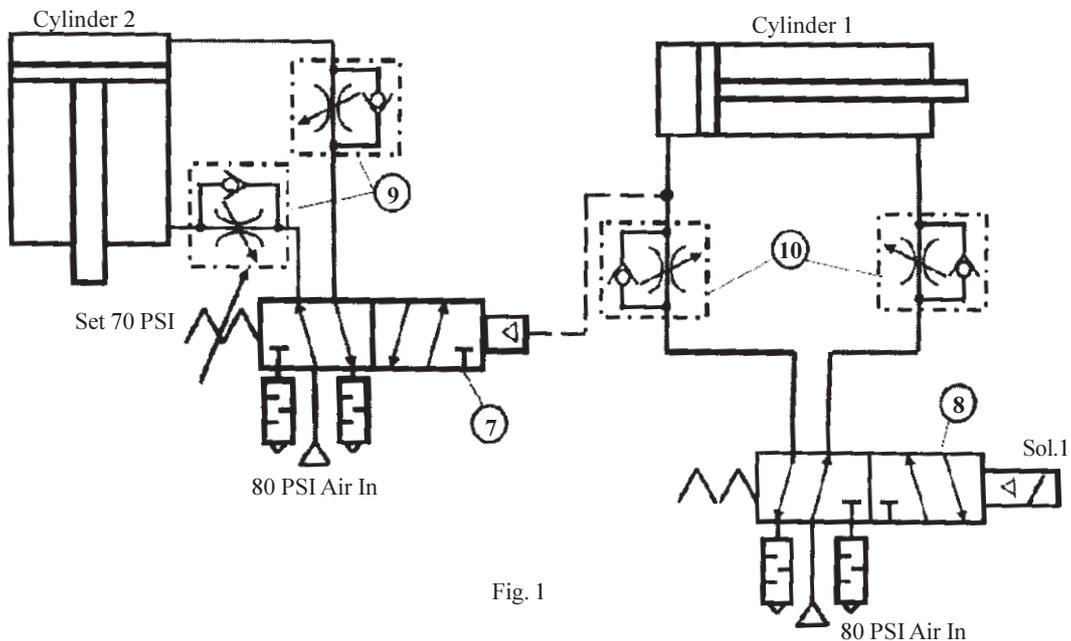
OR

Q12) Construct a hydraulic circuit for a machine of following sequence requirements; **[16]**

   a) Cylinder 1 extends fully to contact the work piece. Pressure exerted by the cylinder in work piece should be 60 Bar.

   b) Cylinder 2 extends fully.

   c) Cylinder 2 retracts fully, while cylinder 1 should be in the extended position.

   d) When pressure in the system drops to 25 Bar Cylinder 1 retracts.

   Draw a hydraulic circuit. Select the components from the given catalogue.

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DATA

1. SUCTION STRAINER:

Model	Flow capacity
	(lpm)
S1	38
S2	76
S3	152

2. PRESSURE GAUGE:

Model	Range (bar)
PG1	0-25
PG2	0-40
PG3	0-100
PG4	0-160

3. VANE PUMP:

Model	Delivery (lpm)		
	at 0 bar	at 35 bar	at 70 bar
P1	8.5	7.1	5.3
P2	12.9	11.4	9.5
P3	17.6	16.1	14.3
P4	25.1	23.8	22.4
P5	39	37.5	35.6

4. RELIEF VALVE:

Model	Flow range	Max. working pressure
	(lpm)	(bar)
R1	11.4	70
R2	19	210
R3	30.4	70
R4	57	105

5. FLOW CONTROL VALVE:

Model	Max. working pressure	Flow range
	(bar)	(lpm)
F1	70	0-4.1
F2	105	0-4.9
F3	105	0-16.3
F4	70	0-24.6

6. DIRECTION CONTROL VALVE:

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
D1	350	19
D2	210	38
D3	210	76

7. CHECK VALVE

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
C1	210	15.2
C2	210	30.4
C3	210	76

8. SEQUENCE VALVE

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
PO1	210	19
PO2	210	38
PO3	210	76

9. CYLINDER (Max. working pressure -210)

Model	Bore Dia.		Rod Dia.
	(mm)		(mm)
A1	25		12.5
A2	40		16
A3	50		35
A4	75		45
A5	100		50

10. OIL RESERVOIR:

Model	Capacity (lit)
T1	40
T2	100
T3	250
T4	400
T5	600

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B.E. (Mechanical)

PRODUCT DESIGN & DEVELOPMENT

(Elective - I) (Sem. - I) (2008 Pattern)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:

1) *Answer any three questions from each Section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Unit - I

Q1) a) Explain the concept of Quality function deployment. **[8]**

    b) Differentiate between Product Development and Product Design. **[8]**

OR

Q2) a) Discuss the factors considered in product design. **[8]**

    b) Give a note on prototyping concept and discuss in detail any one of them. **[8]**

Unit - II

Q3) a) Discuss the concept of economic analysis considering an appropriate product. **[8]**

    b) Describe various methods of technology forecasting. **[9]**

OR

Q4) a) How S Curve and technological improvements are Co-related? **[8]**

    b) How do you understand customers' needs? Why environmental factors are considered in Customer's needs? **[9]**

Unit - III

Q5) a) Explain in details FMEA. **[8]**

    b) Discuss concept generation process used in product design. **[9]**

OR

Q6) a) Explain the process of product embodiment. **[8]**

    b) Discuss subtract and operate procedure for a simple product. **[9]**

SECTION - II

Unit - IV

Q7) a) Explain benchmarking approach in new product development. **[8]**

b) Explain in detail teardown process. **[8]**

OR

Q8) a) Explain the role of value analysis in setting product specifications. **[8]**

b) Discuss fixed unsharing portfolio architecture and platform portfolio architecture. **[8]**

Unit - V

Q9) a) Discuss in detail manufacturing cost analysis. **[8]**

b) Explain weighted sum Assessment method for lifecycle assessment in detail. **[9]**

OR

Q10) a) Discuss the guidelines of design for manufacture. **[8]**

b) Explain need and importance of design for environment along with guidelines. **[9]**

Unit - VI

Q11) a) Discuss in details product data management. **[8]**

b) Explain the need of PLM and corporate challenges that demand PLM in detail. **[9]**

OR

Q12) a) Explain product lifecycle with suitable example. **[8]**

b) Explain the significance of PLM to internal drivers such as workers and management and external drivers as customers and vendors. **[9]**

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[4164] - 448

B.E. (Mechanical Engg.)
MANAGEMENT INFORMATION SYSTEM
(Elective - IV) (2008 Pattern) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:
   1)   Attempt any one question in each unit.
   2)   Figures to the right indicate full marks.
   3)   Answers to the sections I and II should be written separately.

SECTION - I
Unit - I

Q1) a)   Need, Objectives and Resources of Information System.   **[8]**

       b)   Discuss roles of MIS and how it offer support to organization.   **[8]**

                                    OR

Q2) a)   Discuss the relationship between MIS and Management Process.   **[8]**

       b)   Discuss what do you mean by operational support systems & explain
            following types of support systems: **[8]**
            i)   Transaction processing systems.
            ii)   Process control systems.
            iii) Enterprise collaboration systems.

Unit - II

Q3) a)   Discuss Structured, Semi - Structured and Unstructured decision process.
                                                                               [6]

       b)   Explain building blocks of information system - Input.   **[6]**

       c)   Describe the term systems development life cycle (SDLC) & explain
            Waterfall model.   **[6]**

                                    OR

Q4) a)   Explain different phases of decision process.   **[6]**

       b)   Enumerate tools of decision support and explain one in detail.   **[6]**

       c)   Compare Waterfall model and V-Shaped SDLC Model.   **[6]**

Unit - III

Q5) a)   Explain the concept and use of Group DSS.   **[6]**

       b)   Write short note on : Knowledge Management Systems.   **[6]**

       c)   Explain the importance of Software Requirements Specification.   **[4]**

                                    OR

Q6) a) Enumerate tools of decision support and explain any one in detail. **[6]**

b) Write short note on : Expert systems. **[6]**

c) Describe the use of Data warehousing in Decision Making. **[4]**

SECTION - II
Unit - IV

Q7) a) Explain various modern software design techniques. **[10]**

b) What are software metrics? Classify software metrics. **[4]**

c) Write a short note on "Quality management and software development".
[4]

OR

Q8) a) What is verification? What are the terms involved in verification? **[6]**

b) What is validation? What are the terms involved in validation? **[6]**

c) Explain CMM in software engineering. Explain any three CMM maturity levels in detail. **[6]**

Unit - V

Q9) a) Define software reliability. Enlist characteristics of software reliability.
[6]

b) List and explain the testing approaches. **[6]**

c) Write a short note on: **[4]**
  i)   Walkthrough.
  ii) Inspections.

OR

Q10) a) State the software review process with the help of block diagram. **[6]**

b) State types of software maintenance. Explain any one in detail. **[4]**

c) Write a short note on: **[6]**
  i)   Software errors.
  ii)   Faults.
  iii) Availability.

Unit - VI

Q11) a) Explain the application of MIS in production management with block diagram and flow chart. **[8]**

b) Explain the case study on 360º Feedback system. **[8]**

OR

Q12) a) Explain the application of MIS in supply chain management with block diagram and flow chart. **[8]**

b) Explain the case study E-Enterprise management. **[8]**

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[4164]-501
B.E. (Electrical)
PLC AND SCADA APPLICATIONS
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any one question from each pair of questions Q. 1 and Q. 2, Q. 3 and Q.4, Q. 5 and Q. 6, Q. 7 and Q. 8, Q. 9 and Q. 10, Q. 11 and Q. 12.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define PLC and explain how it is helpful in automated process. **[6]**

     b) State and explain advantages and disadvantages of PLC in detail. **[8]**

     c) Explain brief history of PLC along with some important names. **[4]**

OR

Q2) a) Draw and explain the main block diagram of PLC. **[8]**

     b) State some applications of PLC. **[5]**

     c) Write a short note on input module. **[5]**

Q3) a) Explain the rules for constructing the ladder diagram. **[8]**

     b) Draw the ladder diagram for the following function table. **[8]**

Inputs - I1, I2   **Outputs** - Q1, Q2, Q3, Q4

I1	I2	Q1	Q2	Q3	Q4
0	0	1	1	1	1
0	1	0	0	0	0
1	0	0	0	0	0
1	1	1	1	1	1

OR

Q4) a) Explain Input ON/OFF and analog devices in detail. **[8]**

b) Explain Output ON/OFF and analog devices in detail. **[8]**

Q5) a) Draw and explain block diagram of PID control using PLC. **[8]**

b) Explain 'adjust and Observe' tuning method. **[8]**

<div align="center">OR</div>

Q6) a) Draw and explain AC motor starter. **[8]**

b) Explain speed control of DC motor with DC source. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) Define SCADA. **[4]**

b) Draw and explain SCADA architecture in detail. **[10]**

c) State applications of SCADA. **[4]**

<div align="center">OR</div>

Q8) a) Explain : **[9]**

i) Human Machine Interface.
ii) Master Terminal Unit.
iii) Remote Terminal Unit.

b) Explain advantages and disadvantages of SCADA systems. **[9]**

Q9) a) Explain first, second and third generations of SCADA architecture. **[8]**

b) Write a short note on Energy Management System. **[8]**

<div align="center">OR</div>

Q10) Write short notes on SCADA system used in :

a) Petroleum Refining Process. **[8]**

b) Water Purification System. **[8]**

Q11) a) Explain DNP3 protocol. **[8]**

b) What are Open Systems Interconnection protocols? **[8]**

<div align="center">OR</div>

Q12) a) Explain relationship among CIP and other protocols. **[8]**

b) Explain Control Net protocol. **[8]**

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[4164]-502
B.E. (Electrical)
POWER SYSTEM OPERATION AND CONTROL
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1) *Answer any three questions from each section.*
   2) *Answers to the two sections should be written in separate books.*
   3) *Neat diagrams must be drawn wherever necessary.*
   4) *Figures to the right indicate full marks.*
   5) *Use of electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Explain following terms :   **[9]**

   i)   Steady state stability.
   ii)   Transient stability.
   iii) Dynamic stability.

   b) Draw a plot of power angle verses time for stable as well as unstable system. Explain the concept of equal area criterion applied to power system stability.   **[9]**

OR

Q2) a) Derive an expression for the critical clearing angle for a power system consisting of a single machine supplying to an infinite bus, for three phase short circuit fault occurred close to generator bus.   **[9]**

   b) Explain 'point by point method' for the solution of swing equation. **[9]**

Q3) a) Explain reactive power generation by synchronous machine. Explain the loading capability of a synchronous generator.   **[10]**

   b) Write a note on static compensation schemes for reactive power control.
                                                                      [6]

OR

P.T.O.

Q4) a) Explain various types of FACTs controllers used for reactive power control. **[10]**

b) Describe the effect of connecting series capacitors in the transmission system. **[6]**

Q5) a) Write brief note on Sub asynchronous resonance. **[8]**

b) Explain Unified Power Flow Controller (UPFC) with diagram. **[8]**

OR

Q6) a) Explain the principle of working of static compensator (STATCOM). State the advantages and applications of STATCOM. **[8]**

b) Explain the principle of operation of Thyristor Controlled Series Capacitors (TCSC) with its advantages. **[8]**

SECTION - II

Q7) a) What is Automatic Generation Control (AGC). Explain with block diagram the working of proportional plus integral load frequency controller for an isolated power system. **[10]**

b) Write short note on : **[6]**

i) Speed governing model.
ii) Turbine model.
iii) Generator-load model.

OR

Q8) a) With neat block diagram explain two area load frequency control. Also explain the concept of Area Control Error (ACE). **[10]**

b) Explain the effect of speed governor dead band on automatic generation control. **[6]**

Q9) a) Define unit commitment and explain following concepts with reference to Unit Commitment. **[10]**

i) Minimum up time, Minimum down time.
ii) Fuel constraint.
iii) Must run.
iv) Hydro-constraint.

b) State various methods of unit commitment and explain 'priority list method' of unit commitment with example. **[8]**

OR

Q10) a) Explain with mathematical formulation, the economic load dispatch with transmission loss and including equality constraint of meeting load.**[12]**

b) Explain the heat rate curve and cost curve of a thermal generating unit.**[6]**

Q11) Out of following, explain <u>any four</u> types of power interchange. **[16]**

    a) Energy banking.

    b) Capacity interchange.

    c) Diversity interchange.

    d) Emergency power interchange.

    e) Inadvertent power exchange.

<div align="center">OR</div>

Q12) Write short note on : **[16]**

    a) Power Pools.

    b) Interchange evaluation with unit commitment.

    c) Multi utility Interchange transactions.

    d) Inter utility economy energy evaluation.

<div align="center">☒☒☒☒</div>

[4164]-503
B.E. (Electrical)
CONTROL SYSTEM - II
(2008 Pattern) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

  1) *Answer any three questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Derive transfer function of lag network. **[8]**

   b) The open loop transfer function of a unity feedback control system is given below :

$$G(s) = \frac{2000}{s(s+20)}$$

and phase margin > 45°. Determine the parameters of phase lead network to be used for this work using Bode plot. **[10]**

OR

Q2) a) Derive transfer function of lead network. **[8]**

   b) Design a phase lag compensation for a feedback control system having following open loop transfer function.

$$G(s)H(s) = \frac{800}{s(1+0.005s)(1+0.001s)}$$

and phase margin is 40°. **[10]**

Q3) a) Derive Caley-Hamilton theorem for the determination of state transition matrix. **[8]**

   b) Evaluate the STM by Laplace inverse method. **[8]**

$$A = \begin{bmatrix} -1 & 1 \\ 0 & 2 \end{bmatrix}$$

P.T.O.

Q4) a) Give important properties of state transition matrix. **[8]**

b) For a given system obtain eigen values, eigen vectors, modal matrix and STM. **[8]**

$$A = \begin{bmatrix} 0 & 1 \\ -3 & 4 \end{bmatrix}$$

Q5) a) Test controllability and observability for **[8]**

$$A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 0 & 2 \end{bmatrix}$$

b) Explain controllability and observability using Kalman's test. **[8]**

OR

Q6) a) State and output equations of a system are **[8]**

$$\dot{x}_1 = -4x_1 + x_2$$
$$\dot{x}_2 = -5x_1 + u$$
$$y = x_1$$

Design observer gain vector such that observer poles are located at $S_1 = -10 \quad S_2 = -20$

b) Explain effect of pole-zero concellation on controllability and observability of the system. **[8]**

SECTION - II

Q7) a) Compare PI, PID controller by working principle, illustration, advantages and disadvantages. Also explain effect of those on system performance.**[8]**

b) Explain Ziegler Nichols rules for tuning of PID controller. **[8]**

OR

Q8) a) Explain design of PID controller in time domain. **[8]**

b) A unity feedback control system has the following time domain specifications $\omega_n = 2.5$ rad/sec $\qquad \xi = 0.8$

Forward path transfer function $G(s) = \dfrac{4.5}{(s+3)(s+5)}$

Design a PI controller for the system. **[8]**

Q9) a) Explain the following nonlinearities in the system. **[8]**

    i)   Saturation.
    ii)   Dead zone.
    iii)   Back lash.
    iv)   Non linear spring.

    b) Explain describing function of ON-OFF relaywith dead zone. **[8]**

<div align="center">OR</div>

Q10) a) Explain the following peculiar nonlinear characteristics present in nonlinear system. **[8]**

    i)   Frequency-Amplitude dependance.
    ii)   Jump resonance.
    iii)   Limit cycle.
    iv)   Soft and Hard excitation.

    b) A unity feedback system of $G(s) = \dfrac{0.833}{s(0.5s+1)(0.33s+1)}$ having ideal relay in forward path transfer function with maximum amplitude $M = \pm 1$. Apply describing function method to determine stability. Calculate amplitude and frequency of limit cycle if avilable. **[8]**

Q11) a) Explain isocline method for constructing phase plane trajectory. Compare it with delta method. **[10]**

    b) Explain in the sense of Liapunov stability. **[8]**

    i)   Stability.
    ii)   Asymptotic stability.
    iii)   Asymptotic stability in large.
    iv)   Instability.

<div align="center">OR</div>

Q12) a) Explain the terms : **[8]**

    i)   Phase plane.
    ii)   Phase plane plot.
    iii)   Phase plane trajectory.
    iv)   Phase plane portrait.

    b) Examine stability by selectivy proper Liapunov function for the system. **[10]**

$$\dot{x}_1 = -x_1 - 2x_2$$
$$\dot{x}_2 = -x_1$$

<div align="center">☒☒☒☒</div>

[4164]-504
B.E. (Electrical)
ROBOTICS AND AUTOMATION
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain different types of Automation. **[6]**

b) What are the advantages and disadvantages of CNC machines over robots? **[6]**

c) Give historical development of Robot. **[6]**

OR

Q2) a) Explain degree of freedom. **[6]**

b) Give concept of yaw, pitch and roll. **[6]**

c) Define work volume, reach and compliance use neat sketches for each.**[6]**

Q3) a) Explain different types of joints. **[5]**

b) Explain different types of End-Effectors. **[5]**

c) Draw and explain cylindrical Robot. **[6]**

OR

Q4) a) Explain Robot classification according to control methods. **[8]**

b) Explain selection criteria of drive (motor) and hence explain gear reduction ratio. **[8]**

Q5) a) Robot manipulator is at location $[0.8, -0.8, 1]^T$ is allowed to rotate by 60° in *x*-direction, 45° in *y*-direction and 30° in *z*-direction. Find co-ordinates of final point P of robot manipulator. **[10]**

b) Explain in detail Translational Transformation. **[6]**

OR

Q6) a) Write short note on concept of Homogeneous transformation with the help of Homogeneous co-ordinate. **[8]**

b) Two points $A = (4, 3, 2)^T$ and $B = (4, 2, 6)^T$ are to be translated a distance +2 units along X-axis and −3 units along Z-axis. Using the appropriate homogeneous transformation matrix, determine new points A' and B'. **[8]**

SECTION - II

Q7) a) Explain rules for establishing link - co - ordinate frames of kinematic chains. **[8]**

b) In 3R Robotic arm, the shoulder joint is arranged on the axis of a rotary base and the axis of rotation of shoulder and elbow joints are parallel to each other. Draw the diagram showing link co-ordinate system. **[10]**

Link	a	α	d	θ
1	0	90	0	θ_1
2	a_2	0	0	θ_2
3	a_3	0	0	θ_3

OR

Q8) a) What is direct approach in inverse kinematic. **[6]**

b) Which are the four important parameters of D-H notation to describe how a frame. (*i*) Relates to previous frame (*i*-1) Give the technical definition of each parameter. **[12]**

Q9) a) Explain Lagrangian analysis for deriving dynamic equation of motion.**[8]**

b) Explain joint position control with the help of neat sketch. **[8]**

OR

Q10) a) Explain resolved motion rate control using neat sketch. **[8]**

b) Give the concept of linear and angular velocity for manipulator differential motion. **[8]**

Q11) a) What is on line and off line programming. **[8]**

b) Write Robot application in case of welding. **[8]**

OR

Q12) a) In case of spray painting, discuss the following points. **[8]**

     i)   Method of control required.

     ii)   Selection of drive.

     iii) Types of robot.

b) Classify Robot specific languages on basis of hardware level and structured programming level. **[8]**

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[4164] - 522

B.E. (Electronic)
ELECTRONICS SYSTEM DESIGN
(2008 Pattern)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from section I and 3 questions from section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to right indicate full marks.*
4) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss in details different stages of an electronic product development. Explain the implications of skipping a particular stage in development.**[10]**

   b) Discuss the need for providing redundant hardware in hgih reliability systems. Explain the advantages and disadvantages of redundancy provided. **[8]**

OR

Q2) a) Explain the different soldering techniques used in large-scale production and high reliability products. **[10]**

   b) A communication system is to be designed to work at RF range. Discuss the considerations in design as far as reliability of the system is concerned. **[8]**

Q3) a) An analog signal conditioning circuitry is to be used for bio medical application; measurement of small differential signal in presence of large common mode noise at high frequencies. Suggest the analog signal conditioning circuitry and discuss factors affecting its choice. **[12]**

   b) Discuss how ground bounce originates in high-speed circuits and measures taken to limit it. **[4]**

Q4) a) List different ADC specifications and write their importance from design point of view. **[8]**

   b) What are different DAC techniques? Compare on the basis of accuracy?**[8]**

Q5) For a load cell based weighing machine designed to display weight, rate and price information on display, determine the hardware design considerations and choice of keyboard, display, buses and protocols and microcontroller used. **[16]**

Q6) a) What are factors affecting selection of buses and protocols in high speed electronic product. **[8]**

   b) What are different types of relays and factors affecting selection of it in microcontroller-based circuit? **[8]**

SECTION - II

Q7) a) What are features of assemblers and cross compiler. **[8]**

   b) Explain the different stages in software development at which bugs may enter. List the common bugs and how to overcome these bugs. **[8]**

Q8) Write short notes on **[16]**
   a) Structured programming
   b) Real time software
   c) Steps in programming assembly code on PC
   d) Choice between assembly and high-level language.

Q9) a) Discuss practical cases where following PCB layout practices assume importance **[10]**
   i) Guarding
   ii) Component level shielding
   iii) Star grounding
   iv) Ground loops.
   Discuss remedial measures taken to prevent product malfunctioning due to these.

   b) A microcontroller circuit is implemented on PCB using FR4 laminate ($\varepsilon_r = 4.1$). If at certain location on PCB, the length of two tracks carrying a signal is 12 cm, what should be the maximum clock rise time for which lumped circuit analysis would be valid? **[6]**

*Q10)*a) Calculate the characteristic impedance for **[10]**

    i) Strip line geometry when the PCB laminate thickness is 1.6 mm and relative permittivity is 4.2. The width of embedded track is 1.2 mm and thickness 35 micron.

    ii) What would be width of track for micro strip geometry that will result in $60\,\Omega$ characteristic impedance when the PCB laminate thickness is 1.6 mm and its relative permittivity is 4.3? Assume thickness of track to be 70 micron.

  b) Explain different termination schemes for avoiding reflections in high-speed PCB designs. **[6]**

*Q11)*a) With the proper examples establish the need for following diagnostic instruments **[9]**

    i) Analog oscilloscope

    ii) Mixed signal oscilloscope

    iii) Logic analyzer

  b) What different tests are required to be carried out on a product for EMI/ EMC? Discuss different types of EMI and the mechanism by which functioning of electronic product is affected. **[9]**

OR

*Q12)*a) Specify with justification the choice of environmental tests to be carried out on following products: **[9]**

    i) Washing machine

    ii) PLC

    iii) ECG machine

  b) Draw the circuit diagram of transistor LC oscillator and explain how you can make use of DC or operating point analysis and transient analysis to diagnose the circuit. **[9]**

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P1388

[4164] - 523
B.E. (Electronics)
VLSI DESIGN
(2008 Pattern) (Sem. - I)

Time :3 Hours]
[Max. Marks :100

Instructions to the candidates:

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Draw CMOS Inverter and explain Voltage Transfer Curve in detail. **[8]**

b) Derive the expressions for Static and Dynamic power dissipations. Compare them. **[8]**

OR

Q2) a) Design 4:1 multiplexer using Transmission Gate and compare it with conventional method. **[8]**

b) What is feature size and λ ? List basic λ rules in CMOS design. What is DRC, SRC & ERC? **[8]**

Q3) a) Explain read / write operation of 6T SRAM cell with the help of timing diagrams. **[8]**

b) Differentiate between SRAM & DRAM technologies. **[8]**

OR

Q4) a) Draw the schematic of DRAM cell with necessary peripherals and explain read / write cycles with the help of timing diagrams. **[8]**

b) Give the classification of memory with the applications of each. **[8]**

Q5) a) Write VHDL code for 4 bit resettable UP/DOWN counter. Also write test bench for it. **[9]**

b) With suitable examples explain delta delay, inertial delay and transport delay. **[9]**

OR

Q6) a) Write a VHDL code for 4 bit shift register, using structural modeling. Also write test bench for it. **[9]**

b) What are different modeling styles of architecture? How to make a decision to use a particular style? **[9]**

SECTION - II

Q7) a) Draw the block diagram of CPLD and List its specifications. **[8]**

b) Differentiate between FPGA & CPLD. **[8]**

OR

Q8) a) Draw the block diagram and explain in detail the architecture of FPGA.**[8]**

b) Explain how half adder logic gets implemented in FPGA and CPLD differently. Explain with suitable schematic. **[8]**

Q9) a) Explain with block diagrams, Full & Partial Scan path arrangements.**[8]**

b) Explain in detail stuck at fault model. **[8]**

OR

*Q10)*a) What is the need of design for testability? With schematic explain different Faults. **[8]**

b) Explain TAP controller with state diagram. **[8]**

*Q11)*a) Explain Global and Switch box routing. **[9]**

b) Explain off chip connection and I/O architecture. **[9]**

OR

*Q12)*Write short notes on the following: **[18]**

a) Power distribution and optimization.

b) Two phase clocking and clock distribution.

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[4164] - 524
B.E. (Electronics)
EMBEDDED SYSTEM
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *Neat diagrams must be drawn wherever necessary.*
6) *Use of non programmable electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain the design metrics in context with a case study. **[8]**

b) Explain the steps involved in software Development of Embedded System. **[8]**

OR

Q2) a) Define embedded systems, and give characteristics of typical Embedded systems. **[8]**

b) Write short note on: **[8]**
   i) Zigbee   ii) CAN

Q3) a) What is interrupt, Interrupt Vector address and Interrupt Service Routine (ISR)? What is its role in embedded application development? **[10]**

b) Explain the RISC Design philosophy. **[8]**

OR

Q4) a) Explain different Embedded processor and give one of the internal Architecture of Embedded processor. **[10]**

b) Explain Memory organization and Memory selection and interfacing aspects for Embedded application **[8]**

Q5) a) Draw and explain the block diagram of LPC 2148. **[8]**

b) Explain the ISP and IAP in LPC 2148 And also explain the status Registers and control Registers. **[8]**

OR

Q6) a) Explain the ARM 7 LPC 2148 Data flow model and programming model. **[8]**

b) Explain ARM 7 operating modes. **[8]**

SECTION - II

Q7) a) State all the on chip communication protocols of LPC 2148 and Explain the USB Device controller in detail. **[8]**

b) Write and explain the code for 5*5 keyboard matrix interfacing with LPC 2148. **[8]**

OR

Q8) a) Explain steps to configure on chip ADC interface of LPC 2148 Also write a program to display analog input on LCD. **[8]**

b) Explain the software development tools in tool chain for Embedded System design. **[8]**

Q9) a) Give the μcos - II RTOS features. Draw and Explain the μcos - II Architecture in detail. **[12]**

b) Explain preemptive and non preemptive Kernel. **[6]**

OR

*Q10)*a) Draw and explain the task state transition diagram of μcos - II. **[12]**

b) Explain shared data problem and methods to solve it. **[6]**

*Q11)*a) Explain priority inversion problem and solution for the same. **[8]**

b) Explain the tasks involved in Automatic chocolate vending machine. **[8]**

OR

*Q12)*a) Explain Memory management in μcos - II RTOS. **[8]**

b) Explain the Embedded Systems application Cruise control. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1390

[Total No. of Pages : 3

[4164] - 527

B.E. (Electronics)

BIOMEDICAL INSTRUMENTATION

(2008 Pattern) (Sem. - I) (Elective - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answer any 3 questions from each section.

2)   Answers 3 questions from section I and 3 questions from section II.

3)   Answers to the two sections should be written in separate answer books.

4)   Neat diagrams must be drawn wherever necessary.

5)   Figures to the right indicate full marks.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Discuss Ten most important factor to be consider in Design of medical instrument. **[10]**

b) Define BioElectrode. Enlist different bioelectrode & why silver chloride electrode is popular in BioMedical Application. **[8]**

OR

Q2) a) State and explain the sensor performance characteristic. **[6]**

b) Explain fiber optic sensor for temperature Measurement. Give four advantage of same sensor. **[6]**

c) Name type of Electrode used for ECG. Explain any one with diagram. **[6]**

Q3) a) Draw block diagram of ECG. Machine & Explain working of different block. **[8]**

b) Give important specification of ECG Amplifier. **[6]**

c) Explain Systole & diastole. **[2]**

P.T.O.

OR

Q4) a) What are different problems frequently encountered in the Measurement of ECG? **[8]**

b) Write the equation to calculate **[4]**

    i) aVF   ii) aVR

    iii) aVL   iv) Lead II

c) What are different protection provided in ECG. machine. **[4]**

Q5) a) Draw schematic block diagram of EEG m/c and Explain each block in detail. **[8]**

b) Explain basic requirement of implantable pacemaker. Enlist different type of pacemaker. Explain any one in detail. **[8]**

OR

Q6) a) Explain grounding and Shielding techniques used in hospital. **[8]**

b) What is central nervous system? Explain it in detail & what are function of central nervous system? **[8]**

SECTION - II

Q7) a) Explain the application of MRI with neat diagram. **[8]**

b) What is CT scanner? Explain the techniques of producing CT images. **[8]**

OR

Q8) a) Specify Preamplifier Requirement in EMG machine with circuit. **[8]**

b) Enlist various method of blood cell counting. Explain any one in detail. **[8]**

Q9) a) Discuss 'Rwave' Triggered 'R wave' inhabited and 'P wave' Triggered mode of pacemaker while explaining the purpose behind the necessity of pacemaker. **[8]**

b) What are the properties of X ray? Explain in detail the technique for visualization of Xray? **[8]**

OR

*Q10)*a) Which are diseases those cured with laser? Explain them. **[8]**

   b) Describe the working of Flamephotometer. **[8]**

*Q11)*a) What is MRI scanning? What are differences between MRI and CT scan? **[9]**

   b) Draw structure of Neuron. Explain each part of Neuron in detail. **[9]**

OR

*Q12)*Write short note (Any Three) **[18]**
   a) Oximeter.
   b) Blood gas Analyser.
   c) Cardio Vascular System
   d) Electronic Stethoscope

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[4164] - 528

B.E. (Electronics)

ADVANCED COMPUTER ARCHITECTURE

(2008 Pattern) (Sem. - I) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answer any 3 questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Explain the Amdahl's law for speedup performance.   **[6]**

b)   Why do we need high speed computing? Explain the Von-neuman computer architecture and its limitations.   **[8]**

c)   Write a short note on: Instruction level Parallelism.   **[4]**

OR

Q2) a)   Explain in brief Fengs classification and Handlers classification for Parallel computer architectures.   **[10]**

b)   State the various applications of Parallel processing. Explain the application of Parallel processing in weather forecasting.   **[8]**

Q3) a)   Explain the architecture of Itanium Processor in detail.   **[10]**

b)   Define the following terms: **[6]**

   i)   Forbidden Latency.

   ii)   Collision Vector.

   iii) Simple Cycle.

   iv)   Greedy Cycle.

   v)   MAL - (Minimum average latency)

   vi)   Throughput.

OR

Q4) a) State the key features of SPARC. Explain in brief Register window structure of SPARC. **[8]**

b) What do you mean by EPIC? State and explain features of EPIC. **[8]**

Q5) a) How does Vectorization work? Explain any two vector optimizing functions. **[8]**

b) Explain : Vector loops and pipeline chaining. **[8]**

OR

Q6) a) State the characteristics of CRAY - 1 computer system. Draw and explain the computation section of CRAY - 1 vector processor. **[12]**

b) State the desirable features of parallel languages. **[4]**

SECTION - II

Q7) a) Explain matrix Multiplication on SIMD architecture. **[9]**

b) Explain the algorithm to compute fast fourier transform for SIMD architecture. **[9]**

OR

Q8) Explain the various interconnection networks used for interconnecting the processors in parallel computer system along with their salient features. **[18]**

Q9) a) Give a typical architecture for MPP. Explain in detail. **[8]**

b) Explain the cache coherency problem explain the "Write-invalid" protocol. **[8]**

OR

Q10)a) What is chip Multiprocessing. With block diagram explain the architecture of IBM power 4 processor. **[10]**

b) Write a note on : Inter process Communication and Synchronization.**[6]**

*Q11)*a) Discuss in brief Latency hiding Techniques with respect to multithreaded architecture. **[8]**

b) Explain use of following primitives w.r.t. parallel programming. **[8]**
   i) Send ( );
   ii) Receive ( );
   iii) Fork ( );
   iv) Join ( );

OR

*Q12)*a) State the following terms w.r.t. multithreading. **[8]**
   i) Latency
   ii) Context switching overhead.
   iii) Interleaved multithreading
   iv) Latency hiding

b) What is data parallel programming. Explain in detail. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1392

[Total No. of Pages : 3

[4164] - 529

B.E. (Electronics Engineering)

ENTREPRENEURSHIP & BUSINESS PLANNING

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   *Answer 3 questions from section I and 3 questions from section II.*

2)   *Answers to the two sections should be written in separate answer books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Assume suitable data, if necessary.*

<u>SECTION - I</u>

Q1) a)   Define Entrepreneurship? Explain types of entrepreneurial businesses in brief.   **[9]**

b)   Identify the characteristics of successful Entrepreneurs. What are the challenges faced by different Entrepreneurs in the present scenario. **[9]**

OR

Q2) a)   Define the concept of supply and demand?   **[6]**

b)   How does the market structure affect the price of a good or service?**[6]**

c)   Discover how different types of costs affect the prices entrepreneurs charge.   **[6]**

Q3) a)   What are different forms of ownership? Explain in Brief.   **[6]**

b)   What is Franchise? State its advantages and disadvantages.   **[6]**

c)   What is the role of government in entrepreneurial development?   **[4]**

OR

Q4) a)   What is SWOT analysis? Explain in brief in the context of entrepreneurial businesses.   **[4]**

b)   What are the issues in setting up of business.   **[4]**

c)   Define Business plan? Discuss a typical business plan with a case study.   **[8]**

P.T.O.

Q5) a) What is product Marketing? Explain with a example. **[8]**

b) Why are channels of distribution different for different types of businesses. **[8]**

OR

Q6) a) What is the importance of advertising? Explain different types of advertisements. **[6]**

b) What is inventory? What are different types of inventory? **[6]**

c) How do you reduce the inventory cost. **[4]**

SECTION - II

Q7) a) Categorize business risk. Identify security precautions to protect your business from different types of theft. **[6]**

b) Explain the different types of insurance you may need for your business.**[6]**

c) What are the alternatives to hiring permanent staff. **[6]**

OR

Q8) a) Define leadership qualities, explain in brief. **[6]**

b) What are the different methods of record keeping? Explain the advantages and disadvantages of each. **[6]**

c) Define and explain Break even Analysis. **[6]**

Q9) a) What is the role of computer technology and Internet in business? **[6]**

b) Explain the services provided by a financial advisor. **[4]**

c) Explain in brief financial management. **[6]**

OR

*Q10)*a) Explain in brief the regulations that promote competition. **[8]**

b) What are the laws of protect business. **[4]**

c) Explain in brief Ethics of Business management. **[4]**

*Q11)*a) What are green business opportunities, explain in the context of Environmental Threat and Opportunity Profile (ETOP). **[8]**

b) What are the responsibilities entrepreneurs have to suppliers, customers and community. **[8]**

OR

*Q12)*a) Explain business idea with an example. **[6]**

b) Explain different business ideas for a start up business. **[6]**

c) Cash flow management. **[4]**

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[4164] - 531

B.E. (Electronics Engineering)
ROBOTICS & AUTOMATION
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   [Max. Marks :100

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronics pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the term Work envelop & Work Volume for the following types of robot **[10]**

   i)   Cartesian Robot

   ii) Cylindrical Robot

   iii) Spherical Robot

   Explain the significance of these terms with respect to Industrial applications.

   b) State & explain various specifications of Robot system. (Any 4)   **[8]**

OR

Q2) a) Draw neat sketch showing basic components of Robot system & explain function of each. Explain the term Degree of freedom related to Robot. **[10]**

   b) Explain in detail History of robotics & three Laws of robotics. Also explain current research in robotics. **[8]**

P.T.O.

Q3) a) Suppose that $[q]^m = [0, 0, 10, 1]^T$ represents the homogeneous coordinates of a point located 10 units along the third vector of a mobile coordinate frame M. Suppose that initially M is coincident with a fixed coordinate frame F. If we rotate the mobile M frame by $\dfrac{\pi}{4}$ radians about the first unit vector of F, Find **[8]**

    i) Resulting Homogeneous coordinate Transformation Matrix.

    ii) Physical coordinate of the point q in the fixed coordinate frame F.

b) Explain the term robot arm dynamics explain Kane's method used for formulation of dynamical equations. **[8]**

<p align="center">OR</p>

Q4) a) What is D-H representation? Discuss D-H Algorithm. **[8]**

b) Consider the following coordinate transformation matrix, which represents a fundamental rotation. What is the axis of rotation (1, 2, or 3) & what is angle of rotation. **[8]**

$$R = \begin{bmatrix} 0.500 & 0 & -0.866 \\ 0 & 1 & 0 \\ 0.866 & 0 & 0.500 \end{bmatrix}$$

Q5) a) Explain following mechanisms with neat diagram. **[8]**

    i) Rack & Pinion Mechanism

    ii) Slider - Crank Mechanism.

b) Write Short note on (any two) **[8]**

    i) Gyroscopes

    ii) Accelerometer

    iii) Proximity sensors

<p align="center">OR</p>

Q6) a) Explain Lift & Try Technique for slip detection with the help of neat diagram. **[8]**

b) With the neat diagram explain the operation of Laser range finder. **[8]**

<p align="center"><u>SECTION - II</u></p>

Q7) a) Draw the block diagram of fuzzy controller & explain. **[8]**

b) What is Jacobian? Discuss Jacobian in terms of D-H Matrix. **[10]**

Q8) a) Explain with the block diagram different parameters involved in trajectory planning problem? Explain different steps in Trajectory planning. **[10]**

b) Explain types of motion used while trajectory planning. **[8]**

Q9) a) What are different types of vision sensors used in robotics? Explain any one of them with the help of neat sketch. **[8]**

b) Explain industrial applications of vision controlled robotics system. **[8]**

<div align="center">OR</div>

*Q10)*a) With the help of block diagram explain components of video analytics system. **[8]**

b) Write short note on: **[8]**
   i) Object recognition   ii) Motion detection.

*Q11)*Write short note on: **[16]**
   a) Automatic assembly operations.
   b) Automatic part inspection system using robot.
   c) Welding automation using robot.
   d) Intelligence requirement of robot in glass / mirror industries.

<div align="center">OR</div>

*Q12)*a) Write short note on Roll of robotics in industrial automation. **[8]**

b) Write short note on: **[8]**
   i) Need of automation in industry & relation of automation with productivity.
   ii) Different sensors for robot intelligence.

<div align="center">☞ ☞ ☞</div>

[4164] - 532

B.E. (Electronics)

COMPUTER NETWORK & SECURITY

(2008 Pattern) (Sem. - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer 3 questions from section - I and 3 questions from section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) How do the layers of the TCP/IP Model correlate to layers of OSI Model.
[8]

b) Explain Service primitives and relationship of services to Protocols. **[8]**

OR

Q2) a) Draw Explain Different types of topologies in brief. **[8]**

b) Explain in brief physical address, network address & port number. **[4]**

c) Explain: **[4]**

   i) Frame relay   ii) ATM

Q3) a) Explain Telnet & FTP in detail with respect to client sever communication.
[8]

b) List the advantages & disadvantages of HTML. **[4]**

c) How does streaming live audio/video differ from streaming stored audio/video. **[4]**

Q4) a) What is a socket? Explain. [4]

b) Explain p2p file sharing. [4]

c) Explain: [8]

i) TFTP.   ii) BOOTP.

iii) RPC.   iv) DNS in detail.

Q5) a) Compare connection oriented Vs connectionless service? Compare TCP Vs UDP. [6]

b) Explain Shortest path routing along with example. [6]

c) Compare IPv4 vs IPv6. [6]

<div align="center">OR</div>

Q6) a) Write short note on [9]

i) DHCP   ii) ICMP

iii) IGMP

b) Explain the two categories of congestion control in detail. [6]

c) Explain different QOS parameters in brief. [3]

<div align="center">

SECTION - II

</div>

Q7) a) Explain ALOHA, CSMA/CD & CSMA/CA in brief. [9]

b) Explain different Multiple access techniques. [9]

<div align="center">OR</div>

Q8) a) Draw and Explain Physical layer of 802.11 Wireless Networks in detail.[9]

b) Explain Fast Ethernet & Gigabit Ethernet communication. [5]

c) A noiseless 6kHz channel is sampled every 1ms. What is the maximum data rate. [4]

Q9) a) Compare LEO Vs MEO Vs GEO. [8]

b) Compare circuit switching, packet switching. [4]

c) What is DSL? Explain. [4]

<div align="center">OR</div>

*Q10)*a) Explain Transmission media in detail.   **[8]**

b) Draw & Explain functional block diagram of modem. Explain in brief various modem standards.   **[8]**

*Q11)*a) Compare public key & private key security algorithm. Explain RSA algorithm in detail.   **[8]**

b) Explain in brief a model for network security.   **[8]**

OR

*Q12)*a) Using the RSA public key cryptosystem, with $a = 1$, $b = 2$, etc.,

i)   If $p = 7$ and $q = 11$, list five legal values for d.

ii) If $p = 13$, $q = 31$ and $d = 7$, find e.   **[8]**

b) What is Symmetric-Key Algorithm? Explain DES algorithm in detail. **[8]**

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B.E. (Electronics Engineering)

PROCESS AUTOMATION

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Draw diagram with appropriate sensing element for temperature control process automation of reactor. Electrical heater is used for heating. **[8]**

b) Explain process control principles with: **[8]**

    i)   Human Aided Control   ii)   Automatic Control

OR

Q2) a) What is process. Draw and Explain Process control block diagram in detail. **[8]**

b) List various controller modes? Explain continuous controller mode in detail. **[8]**

Q3) a) Explain pneumatic proportional derivative mode controller. **[8]**

b) Why tuning is required for controller Explain self tuning regulator. **[8]**

OR

Q4) a) Draw schematic diagram of a PI and PD controller using OPAMPs. **[8]**

b) Explain the factors consider for selection of control valve. **[8]**

Q5) Write short note on (any Three) **[18]**

    a)   Control system parameters.

    b)   Different types of control valve and their applications.

    c)   Valve noise.

    d)   Instrumentation Standard signsls.

<div align="center">OR</div>

Q6) Explain in detail following. (any Three) **[18]**

    a)   Cavitation and flashing.

    b)   Tunning of PID Controller.

    c)   Hydraulic Controllers.

    d)   Valve Sizing.

<div align="center">

SECTION - II
</div>

Q7) a)   Explain with examples application of selective and adaptive control system in process industry. **[8]**

    b)   Explain in detail statistical process control. Compare statistical process Control and process control. **[8]**

<div align="center">OR</div>

Q8) a)   Explain Feedback Control system. What is the limitations of feedback control system how it overcomes? **[8]**

    b)   Explain with suitable example feed forward control system. **[8]**

Q9) a)   Define term heat exchanger. Explain any one type of heat exchanger. **[8]**

    b)   Why robotics is needed in process Industry. Explain with examples. **[8]**

<div align="center">OR</div>

Q10) a)   With neat block diagram explain basic components of robotic systems. **[8]**

    b)   Write Classification of robotics. Explain different applications in industry. **[8]**

Q11) a) Explain function of Alarm Annunciator in process industry. **[6]**

b) Draw and explain instrumentation diagram for Distillation Column Control. **[6]**

c) Explain role Control panels in process automation. **[6]**

OR

Q12) a) Why needs supervisory control system in industry. Draw the block diagram of a Distributed Control system and explain the function of each block. **[10]**

b) Write a note on SCADA. **[8]**

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B.E. (Electronics)

AUDIO AND VIDEO ENGINEERING

(2008 Pattern) (Sem. - II) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1)   Answer any three questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Use of electronic pocket calculator is allowed.

5)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Justify the choice of 625 lines for TV transmission. Why is the total number of lines kept odd in all television systems? What is the significance of choosing the number of lines as 625 and not 623 or 627? **[6]**

b) Describe basic principle of a colour camera with the help of suitable diagram. Explain why dichroic mirrors are used in camera optics? **[6]**

c) What do you understand by interlaced scanning? How interlace scanning reduces flicker and conserves bandwidth? **[6]**

OR

Q2) a) Give construction and operation of LCD TV screen and TFT displays used for TV? **[6]**

b) Define Luminance, saturation and Hue? **[6]**

c) What do you understand by resolution or Kell-factor? How does it affect the vertical resolution of a television picture? Show that the vertical resolution increases with increase in number of scanning lines? **[6]**

Q3) a) Draw block diagram of an NTSC colour TV receiver and describe how does it produce R, G and B signals? **[8]**

b) Explain with block diagram IF modulated TV Transmitter? **[8]**

P.T.O.

OR

Q4) a) A 300 line TV system has following specifications. **[8]**
Vertical scanning frequency = 25 hz
Blanking duration (horizontal and vertical) = 15% of active duration
Aspect ratio = 4/3
Interlace ratio = 1:1
Kell factor = 0.69
Calculate maximum BW required for transmission?

b) Explain working of PAL Encoder with suitable block diagram? Explain How colour signals are modulated with suitable diagrams? **[8]**

Q5) a) With timing diagram explain MAC technology in detail. State advantages of MAC signal? Explain the time compression used in MAC technology? **[8]**

b) Explain DCT base image encoding & decoding for JPEG? **[8]**

OR

Q6) Write short note on any four **[16]**
a) MPEG - 2.
b) Wobbuloscope Applications.
c) Component Encoded DTV receiver.
d) Composite encoded DTV transmitter.
e) Pattern Generator & applications.

SECTION - II

Q7) a) Explain block diagram of set Top Box in context to direct to home service. State names of Direct to home service providers in India? What is CAS facility? **[8]**

b) Describe with the help of block diagram the working of Component Encoded High definition TV Transmitter? **[6]**

c) Explain 3D stereoscopic technique? What are different glasses used?**[4]**

OR

Q8) a) With suitable block diagram explain advantages and applications of CCTV? **[4]**

b) Explain the concept of video on demand in satellite television? **[4]**

c) State different standards used for HDTV broadcast? **[4]**

d) Digital broadcasting case study on Cricket match? **[6]**

Q9) a) Draw and explain the block diagram of a CD player. Write important specifications of CD? **[8]**

b) Explain MP3 Audio compression format? **[4]**

c) Define following terms to P.A. system? **[4]**

   i) Phase delay.　　　　　　ii) Acoustic feedback.

OR

*Q10)*a) Explain in detail Dolby sound system and also state its advantages? **[4]**

b) Compare the performance of magnetic tape recording with optical recording? **[8]**

c) Compare Audio CD versus DVD? **[4]**

*Q11)*a) Explain concept of Reverberation and echo. Mention typical reverberation periods? **[6]**

b) Explain different Acoustical design aspects of an Auditorium? **[4]**

c) Draw & explain the block diagram of Satellite Radio receiver? **[6]**

OR

*Q12)*Write short note on any Four **[16]**

   a) Cordless microphone System.
   b) Blue - ray disk DVD System.
   c) Audio tape versus video tape.
   d) VHS video formats.
   e) Graphic Equalizer.

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B.E. (Electronics Engineering)

IMAGE PROCESSING AND MACHINE VISION

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answer any 3 questions from each section.

2) Answers to the two sections should be written in separate answer books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is an image model? Explain image sampling & Quantization. **[8]**

b) Explain the applications of image processing in remote sensing & medical imaging. **[8]**

OR

Q2) a) Explain the fundamental steps in image processing with the help of suitable diagram. **[8]**

b) Write a short note on human visual system. **[8]**

Q3) a) With reference to relation between pixel explain the following: **[8]**

i) 4-connectivity.   ii) 8-connectivity.

iii) Mixed connectivity.

b) Explain following statistical parameters for an image & calculate all these parameters for segment of an image given below: **[8]**

i) Mean   ii) Variance

iii) Standard deviation   iv) Histogram

$$img = \begin{bmatrix} 20 & 140 & 100 & 20 \\ 20 & 140 & 100 & 20 \\ 240 & 140 & 240 & 240 \\ 240 & 140 & 240 & 240 \end{bmatrix}$$

OR

Q4) a) Explain the use of low pass filter and median filter in image smoothing. **[8]**

b) Find the DFT of the image: **[8]**

$$\text{img} = \begin{bmatrix} 0 & 1 & 2 & 1 \\ 1 & 2 & 3 & 2 \\ 2 & 3 & 4 & 3 \\ 1 & 2 & 3 & 2 \end{bmatrix}$$

Q5) a) Explain the importance of thresholding & non maximal suppression in the canny edge detection process. How do the two concept influence in the resulting edge image. **[8]**

b) Explain segmentation using region splitting & region merging. **[10]**

OR

Q6) a) Explain global processing in the image segmentation using haugh transform. How it is used for edge linking. **[8]**

b) Explain the following terms: **[10]**
  i)   Robert's cross gradient operator.
  ii) Prewit operator.
  iii) Sobel operator.

SECTION - II

Q7) a) Find a set of code words and average word length using Huffman coding scheme for a set of input gray levels with probabilities as given below:

Gray levels   G1 G2 G3 G4 G5 G6 G7 G8
Probabilities   0.02 0.15 0.03 0.15 0.05 0.2 0.1 0.3

Calculate the average length of the code. **[8]**

b) What is difference between loss-less and lossy compression technique? Explain the block transform coding in detail. **[8]**

OR

Q8) a) Explain discrete cosine transform. Explain how it can be used for image compression. **[8]**

b) What is image restoration? How it can be done using 'Inverse filter'. **[8]**

Q9) a) Explain the different algorithms of region identification. **[8]**

b) Explain the contour based shape representation & description of an image.
[8]

OR

Q10) a) Explain the region based shape descriptors. **[8]**

b) Explain the region decomposition considering shape recognition is hierarchal process. **[8]**

Q11) a) Explain the projective ambiguity & matching constraints with reference to scene reconstruction. **[10]**

b) Explain the support vector machine approach to pattern recognition.**[8]**

OR

Q12) a) Explain the statistical pattern recognition. **[10]**

b) Explain the camera model of a single perceptive camera. **[8]**

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B.E. (Electronics)
OPTICAL AND MICROWAVE COMMUNICATION
(2008 Pattern) (Sem. - II) (Elective - III)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in brief advantages and disadvantages of optical fiber cable over coaxial cable. **[6]**

b) What is LASER? Mention Population Inversion condition? Compare LASER and LED. **[8]**

c) A multimode step index fiber with a core diameter of 80μ m and a relative index difference of 1.5% is operating at a wavelength of 0.85μ m. If the core refractive index is 1.48, estimate: **[4]**
   i) The normalized frequency for the fiber;
   ii) The number of guided modes.

OR

Q2) a) Explain how light is propagated within a fiber. Define the following terms with respect to an optical fiber: **[6]**
   i) Acceptance cone.
   ii) Numerical Aperature.

b) Define fiber splicing? Explain different types of splicing. **[6]**

c) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19} J are incident upon it. **[6]**
   i) At what wavelength is the photodiode operating?
   ii) Calculate the incident optical power required to obtain a photocurrent of 2.5 μ A when the photodiode is operating as described above.

Q3) a) What is dispersion? Explain intermodal dispersion and Intramodal dispersion? **[8]**

b) Explain the basis structure of an STS - NSONET frame. Also explain how it is different from STS - 1. **[8]**

OR

Q4) a) Describe the concept of wavelength Division Multiplexing and state the key system features of WDM. **[8]**

b) What are the three classes of Optical Amplifiers and explain their applications. **[8]**

Q5) a) Explain working of Laser Welding with the help of neat diagram. Also state its advantages. **[6]**

b) Explain how Laser can be used for measurement of current. **[6]**

c) Write short note on - LASER applications in Medicine. **[4]**

OR

Q6) a) Describe the working principle of Michelson Interferometer. **[6]**

b) Explain how Laser can be used in trimming of resistor. **[6]**

c) Write short note on - Pulse - Echo Technique. **[4]**

SECTION - II

Q7) a) What are waveguides? Explain the following terms as applied to the waveguides: **[10]**
  i)   Cutoff wavelength.
  ii) Guide wavelength.
  iii) Phase velocity and Group Velocity.
  iv) Characteristics wave Impedance.

b) Explain Directional Coupler. Define: **[8]**
  i)   Coupling coefficient.
  ii) Directivity.
  iii) Insertion loss.
  iv) Isolation loss.

OR

Q8) a) Explain the working of E plane and H plane Tec. **[6]**

b) Write short notes on the following: **[6]**

i) Microwave Isolator.

ii) S Matrix and its properties.

c) Determine the cutoff wavelength for the dominant mode in a rectangular waveguide of breadth 10cms. For a 2.5 GHz signal propagated in this waveguide in the dominant mode; calculate the guide wavelength, the group and the phase velocities. **[6]**

Q9) a) Explain working of Two Cavity Klystron Amplifier. **[6]**

b) An X - band pulsed cylindrical magnetron has V_o = 30 KV, I_o = 80 A, B_o = 0.01 Wb/sq.m a = 4cm, b = 8 cm. **[6]**

Calculate:

i) Cyclotron Angular Frequency.

ii) Cut-off Voltage.

iii) Cut-off Magnetic Flux Density.

c) Explain how mode jumping is avoided in Magnetron. **[4]**

OR

Q10) a) A reflex Klystron operates under the following conditions: **[8]**

V_o = 500V, R_{sh} = 20kΩ, F_r = 8GHz L = 1mm is the spacing between repeller and cavity. The tube is oscillating at F_r at the peak on n = 2 mode or $1\dfrac{3}{4}$ mode.

Assume that the transit time through the gap and through beam loading effect can be neglected.

i) Find the value of repeller voltage V_R.

ii) Find the dc current necessary to give microwave gap of voltage of 200V.

iii) Calculate the electronic efficiency.

b) What is Slow Wave Structures? What are their types? Which one is most practical? How does it aid the performance of Travelling Wave Tube? **[8]**

Q11) a) Describe how Tunnel Diode can be used as an amplifier and Oscillator.

[8]

b) What is Varacter Diode? Give its construction, working principle and explain any one application. **[8]**

OR

Q12) a) Explain various modes of operation of Gunn Diode. Explain LSA mode and give limitation of this mode. **[8]**

b) Explain power frequency limitations of a microwave bijunction transistor.

[8]

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B.E. (Electronics)
SOFT COMPUTING TOOLS
(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define soft computing and explain its constituents along with conventional artificial intelligence in detail. **[9]**

b) Explain Neurofuzzy and soft computing characteristics. **[9]**

OR

Q2) Consider two fuzzy sets A & B. **[18]**

$$A=\left\{\frac{1}{2}+\frac{0.3}{4}+\frac{0.5}{6}+\frac{0.2}{8}\right\}$$

$$B=\left\{\frac{0.5}{2}+\frac{0.6}{4}+\frac{0.1}{6}+\frac{1}{8}\right\}$$

Perform the following operations on fuzzy sets.

a) $A \cup B$

b) $A \cap B$

c) Complement of fuzzy set A.

d) Difference (A/B)

e) $\overline{A \cup B}$

f) $A \cup \overline{B}$

g) algebraic sum of the given fuzzy sets

h) bounded sum of the given fuzzy set

i) algebraic product of the given fuzzy sets.

Q3) a) Describe in detail the process of defuzzification. Explain any three defuzzification schemes in detail. **[8]**

b) Explain the extension principle for fuzzy set with suitable example. **[8]**

OR

Q4) a) Let A = {(x_1, 0.2), (x_2, 0.3) (x_3, 0.4)} & B = {(y_1, 0.3), (y_2, 0.6)} be two fuzzy sets defined on the universes of discourse X = {x_1, x_2, x_3} and Y = {y_1, y_2} respectively.

   i) Find the fuzzy relation R resulting out of the fuzzy cartesian product. A × B.

   ii) If fuzzy set C = {(z_1, 0.3), (z_2, 0.4) (z_3, 0.6)} then find relation between R and C using max-min composition. **[12]**

b) Define and explain following terms. **[4]**

   i) Support   ii) core

   iii) convex set   iv) fuzzy singleton

Q5) a) What are the steps involved in designing a fuzzy logic controller. **[8]**

b) With a neat block diagram, explain the architecture of a fuzzy logic controller. **[8]**

OR

Q6) Write notes on. **[16]**

   a) Mamdani inference system / model.

   b) Sugeno Model.

   c) Tsukamoto model.

   d) Synthesis and validation of fuzzy controller.

SECTION - II

Q7) a) Explain the architecture of multilayered network. Give the steps used in training a multilayered network using back propogation algorithm. **[10]**

b) List and explain various Neural network learning methods. **[8]**

OR

Q8) a) Explain the architecture of SOM given by kohonen. Describe the sequence of training steps involved in training of SOM. **[8]**

b) Train a perceptron network to recognize two input AND gate patterns. Assume initial weights W_1 and W_2 equal to 0.2 with a bias weight b_1 = 0.1, The learning rate of 0.1 is to be considered. Train the network for four iterations. Find the error in each iteration. **[10]**

Q9) a) Explain how neural network principles are useful for a texture classification problem. **[8]**

b) Explain application of Neural Network in communication field. **[8]**

OR

Q10) Discuss various problems involved in recognizing handwritten characters. Explain the convolutional network architecture's usefulness in recognizing handwritten digits. **[16]**

Q11) a) Explain the concept of adaptive network based fuzzy inference system (ANFIS) with architecture. **[10]**

b) Write notes on : **[6]**
   i) Hybrid learning algorithm.
   ii) ANN for process control.

OR

Q12) a) What are Radial Basis function networks. Explain RBF training steps. **[8]**

b) Explain the equivalence between. ANFIS and RBFN with conditions. **[8]**

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B.E. (Electronics)
ADVANCED COMMUNICATION SYSTEM
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-
1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe the operation of cellular system.   **[8]**
  b) Explain each of the following in brief.   **[6]**
   i) Frequency Re-use schemes.
   ii) Hand-off mechanism.
  c) Explain Fading effect due to delay spread.   **[4]**

OR

Q2) a) Define the term Co-channel interference reduction factor? How CCIR can be calculated. Explain.   **[8]**
  b) State and Explain formula for mobile radio propagation between fixed stations.   **[6]**
  c) Write short notes on long distance propagation.   **[4]**

Q3) a) What is Beam width? Explain relationship between gain and beamwidth.**[8]**
  b) What is the need of 'Handoff in mobile communication'? What are the different types of handoff methods used? Explain.   **[8]**

OR

Q4) a) Design of directional antenna system for K = 7 cell pattern.   **[8]**
  b) Explain the following terms: **[8]**
   i) UHF - TV interference.
   ii) Space diversity antennas.

P.T.O.

Q5) a) What is cell splitting? What are the different types of cell splitting? Explain.
[8]

b) Explain in detail Microcells. [8]

OR

Q6) a) Draw the GSM Architecture and explain its various elements. [8]

b) Write short notes on Narrow beam concept. [4]

c) Explain the Handover mechanism in GSM. [4]

SECTION - II

Q7) a) Explain briefly various look angles for satellite earth station. [8]

b) Explain in detail telemetry, Tracking commands and Monitoring System.[8]

OR

Q8) a) The earth subtends an angle of 17 when viewed from geostationary orbit. What are the dimensions and gain of a horn antenna that will provide global coverage at 4 GHz? [4]

b) Explain the following terms: [8]

i) Power System

ii) Attitude and orbit control system.

c) List the advantages of Geostationary Satellite. [4]

Q9) a) Write a note on Telephony and Television signals. [8]

b) Explain the meaning of Noise temperature of receiver. With the help of overall noise model of the receiver derive the expression for effective system noise temperature Ts for the receiving earth stations. [10]

OR

Q10) a) Calculate the Noise Temperature (Ts) of a 8 GHz receiver, which has different gains and noise temperatures as given below. [6]

T_{in} = 50k

T_{RF} = 50k G_{RF} = 23db

T_M = 500k G_M = 0db

T_{IF} = 1000k G_{IF} = 30db

b) Explain the terms: **[8]**

    i)   C/N ratio   ii)   G/T ratio

c) Compare the BPSK and QPSK system. **[4]**

*Q11)*a) Explain the necessity of multiple access techniques. **[4]**

    b) Write a short note on CDMA. **[6]**

    c) Explain TDMA. **[6]**

<center>OR</center>

*Q12)*a) With a neat schematic of a VSAT/WLL communication network explain how a GEO satellite is used to link a large number of VSATs. **[8]**

    b) Explain the terms with respect to VSAT. **[8]**

        i)   Link Budget.

        ii)   Free - space path loss.

        iii)   Noise Band width.

        iv)   Edge of coverage loss.

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B.E. (Electronics)
AUTOMOTIVE ELECTRONIC SYSTEMS
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer three questions from section - I and three questions from section - II.*
2) *Attempt not more than six questions of which atleast three questions must be from each section.*
3) *Answers to the two sections should be written in separate answer books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of, electronic pocket calculator is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain two stroke engine on the basis of following actions.   **[8]**
   i) Intake   ii) Compression
   iii) Power   iv) Exhaust.

   b) Explain the Ignition system of IC Engine.   **[6]**

   c) Explain the construction of battery used in Automotive system.   **[4]**

OR

Q2) a) Explain four stroke engine on the basis of following actions: **[8]**
   i) Intake   ii) Compression
   iii) Power   iv) Exhaust

   b) Explain Hybrid Electric Vehicle (HEV) and its modes of operation.   **[6]**

   c) Define following terms in context with batteries: **[4]**
   i) CCA Capacity (Cold Cranking Amperes)
   ii) Ah rating.

Q3) Explain various applications for following sensors in context with automotive systems.   **[16]**
   a) Temperature Sensor   b) Velocity Sensor
   c) Pressure Sensor   d) Torque Sensor

OR

Q4) Justify the use of sensors for following applications: **[16]**
    a)   Anti-collision system   b)   Fuel - injection system
    c)   Vehicle tyres   d)   Speedometer

Q5) a)   Explain the concept of steering control system in detail. **[8]**
     b)   Write short note on 'Control Scheme for Vehicle braking'. **[8]**

OR

Q6) a)   Explain different strategies of engine management system. **[8]**
     b)   Write short notes on: **[8]**
        i)   Cruise Control System
        ii)   Remote keyless entry

SECTION - II

Q7) a)   With the help of interfacing diagram and its 'C' program explain the temperature controller using PIC. **[8]**
     b)   Explain the selection criteria for processors of Automotive system. **[6]**
     c)   What is the use of watch dog timer and interrupts in ECU. **[4]**

OR

Q8) a)   With the help of interfacing diagram and its 'C' program explain RPM indication using Timer / Counter of PIC. **[8]**
     b)   State and explain software and hardware defugging techniques. **[6]**
     c)   State and explain an algorithm for PWM technique using PIC. **[4]**

Q9) a)   Write short notes on following in context with Automotive system. **[8]**
        i)   Bluetooth   ii)   GPRS
     b)   Explain the recent trends in Automotive buses such as OBDII and MOST. **[8]**

OR

*Q10)*a)   Compare architectural features of ARM 9 and ARM cortex. **[8]**
     b)   Distinguish between CAN, LIN and Flex Ray buses. **[8]**

*Q11)*a)   What do you mean by diagnostic systems? Explain on board diagnostics. **[8]**
     b)   Explain various safety norms and standards for Automotive System. **[8]**

OR

*Q12)*a)   Explain in detail passenger comfort and security system. **[8]**
     b)   Explain off board diagnostic systems in detail. **[8]**

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B.E. (Electronics)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

  1) *Answer any 3 questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is an agent? Explain the structure of an agent?   **[8]**

 b)   Explain typical problem characteristics and problem solving approach?**[8]**

OR

Q2) a)   What do you mean by environments and enlist the different types of environments?   **[8]**

 b)   Compare Depth first search and Best first search.   **[8]**

Q3) a)   Explain Minimax search algorithm. What are the modifications to increase efficiency of Minimax algorithm?   **[8]**

 b)   Explain Hill climbing algorithm in detail.   **[8]**

OR

Q4) a)   Explain Generate and test algorithm with suitable examples.   **[8]**

 b)   Apply the constraint satisfaction to solve following cryptarithmetic problem to assign single digit number from 0 to 9 each alphabet
 TAKE + THAT = SHEET   **[8]**

Q5) a)   Explain the resolution process in predicate logic?   **[8]**

 b)   What do you mean by semantic network and explain with suitable example.
                                                                       [10]

OR

Q6) a) What is predicate logic and enlist the advantages of predicate logic over propositional logic. **[8]**

b) Consider the following sentences & translates the sentences into formulas in predicate logic & clause form. Prove "John likes peanuts" using resolution? **[10]**

John likes all kinds of food.

Apples are food.

Chicken is food.

Anything any one eats & isn't killed by is food.

Bill eat peanuts and is still alive.

Sue eats anything Bill eats.

SECTION - II

Q7) a) Explain the forms and types of learning. **[8]**

b) Consider the following representation from blocks world. **[8]**

Start : ON (B, D) ∧ ON (C, D) ∧ ONTABLE (D) ∧ ONTABLE(A)

Goal: ON (A, B) ∧ ON (C, D) ∧ ONTABLE (B) ∧ ONTABLE (D)

i) Show how strips would solve this problem?

ii) Did these processes produce optimum plans and if not justify how it can be done?

OR

Q8) a) Explain Winston's learning program? **[8]**

b) Explain Artificial Neural Networks architecture? **[8]**

Q9) a) What is Waltz's algorithm and explain with example? **[8]**

b) Define the following terms. **[8]**

i) Action   ii) Vision

OR

*Q10)*a) Explain forward and Backward reasoning? **[8]**

b) Draw the functional elements of expert system and explain functionality of each of them? **[8]**

*Q11)*a) Explain in detail how does prolog qualify itself as an Artificial Intelligence language? **[10]**

b) What is NLP? Write down the all steps involved in it? **[8]**

<div align="center">OR</div>

*Q12)*a) Define probabilistic language processing and explain its models? **[10]**

b) Define the syntactic analysis? Explain syntactic processing with example? **[8]**

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[4164] - 541

B.E. (Electronics)

NANOTECHNOLOGY IN ELECTRONICS

(2008 Pattern) (Sem. - II) (Elective - IV)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from section I and 3 questions from section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the fundamental science behind Nanotechnology. **[8]**

   b) Enlist the tools for measuring nanostructures. Explain any one tool in detail. **[8]**

OR

Q2) a) Explain the tools to make nanostructures. **[8]**

   b) Explain the tools to imagine nano-behaviours. **[8]**

Q3) a) Explain the silicon Nano crystal non volatile memories. **[8]**

   b) Write short note on Novel dielectric materials for Future transistors. **[8]**

OR

Q4) a) Explain the nano - CMOS devices. Also give its applications. **[8]**

   b) Explain the nanoscale lithography. **[8]**

Q5) a) Write short note on following: **[10]**

   i) Metal nanostructures.

   ii) Semiconducting nanoparticles.

   b) Explain the properties of nanotubes. **[8]**

P.T.O.

OR

Q6) a) Explain the following related to carbon nanostructure. **[10]**
 i) Carbon Molecules.
 ii) Carbon Clusters.

 b) Explain any two applications of carbon nanotubes. **[8]**

SECTION - II

Q7) a) Explain the Micro Electro Mechanical Systems (MEMS). **[8]**
 b) Write a short note on molecular and supermolecular switches. **[8]**

OR

Q8) a) Explain the Nano Electro Mechanical Systems (NEMS). **[8]**
 b) Explain the lithography. **[8]**

Q9) a) Explain the tools of manufacturing of Micro and nano fabrication optical lithography. **[8]**
 b) Explain the Atomic lithography. **[8]**

OR

*Q10)*a) Explain the Electron beam lithography. **[8]**

 b) Explain the nano Electronics for advanced computation and communication. **[8]**

*Q11)*a) Enlist the applications of nano structures in Electronics. Explain any one in detail. **[10]**

 b) Explain the application of nanotechnology to capture the light energy.**[8]**

OR

*Q12)*a) Give the applications of nano technology in Biomedical Electronics. Explain any one in detail. **[10]**

 b) Explain the application of nano structures in sensors and optics. **[8]**

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[4164]-721

B.E. (Information Technology)
INFORMATION ASSURANCE AND SECURITY
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer question 1 or 2, 3 or 4, and 5 or 6 from Section - I and question 7 or 8, 9 or 10 and 11 or 12 from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different types of ciphers? Explain in detail. **[10]**

     b) Differentiate between Active attacks & Passive attacks. **[8]**

OR

Q2) a) Enlist the Security goals and mechanism in detail. **[10]**

     b) State Euclid's Algorithm with example? **[8]**

Q3) a) What are the possible attacks on DES? Explain double DES and triple DES. **[10]**

     b) Explain the working of MD5 in detail. **[6]**

OR

Q4) a) Write working of AES algorithm in detail. **[10]**

     b) Calculate Cipher text using RSA algorithm. Given data is as follows :- Prime numbers P, Q as 7, 17 respectively & the plain text is to be send is 10. **[6]**

Q5) a) What is PKI? Explain the different PKI Architectures. **[8]**

     b) Encryption does not solve all the security problems: Justify. **[8]**

OR

Q6) a) Explain the Needham/Schroeder Protocol for secret key distribution. **[8]**

b) How the Digital Certificate creation takes place? Enlist the contents of digital certificate. **[8]**

SECTION - II

Q7) a) What is IPSEC? How does AH and ESP differs while working under Tunnel Mode and Transport Mode? **[10]**

b) What is IDS? Explain working of Honeypots as Intrusion detection system. **[6]**

OR

Q8) a) What is SSL? Explain the SSL architecture in detail. **[10]**

b) Explain the different phases in IKE-Internet Key Exchange Protocol. **[6]**

Q9) a) Which are the key participants in SET? How does SET protect payment information from the merchant? Explain the SET model. **[10]**

b) Write a note on Smart Cards and Chip Cards transaction. **[6]**

OR

Q10) a) What are the possible attacks on the E-Transaction using cards. **[4]**

b) Explain the steps to carry out Payment over the Internet. **[6]**

c) Write a note on Electronic Cash. **[6]**

Q11) a) Explain in detail about Information Security Policy. **[8]**

b) What are different methods of Industrial Espionage? How can we prevent Industrial Espionage? **[10]**

OR

Q12) Write Short Notes on : **[18]**

a) Indian IT Act.

b) Security by obscurity.

c) Computer Forensics.

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[4164] - 414

B.E. (Civil Engineering)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2008 Pattern) (Sem. - II)

Time :4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Your answers will be valued as a whole.*

   5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   State the purposes of preparing detailed estimate. Hence differentiate between supplementary and revised estimate.   **[2 + 6 = 8]**

    b)   What is an approximate estimate? Prepare the approximate estimate for a three storried R.C.C. building with following details.   **[2 + 6 = 8]**

       i)   Carpet area on each floor = 600 sq.m.

           Total no. of floors = 3.

       ii)   Area occupied by walls = 15% of carpet area.

       iii)   Area occupied by passage, Sanitary block and staircase = 30% of carpet area.

       iv)   Rate of construction = Rs. 20,000/- sq.m. of builtup area.

P.T.O.

v) Work charge establishment and contingencies = 3% and 5% of construction cost respectively.

vi) Water supply, drainage and electrification = 15% of sum total.

OR

Q2) a) Enlist various methods used for preparing approximate estimate of civil engineering projects. State the purposes of preparing approximate estimate and explain plinth area method. **[2 + 2 + 4 = 8]**

b) Explain the following terms in brief. **[4 × 2 = 8]**

i) Provisional sum item ii) Prime cost items

iii) Work charge establishment iv) Contingencies.

Q3) a) Figure 1 shows plan and section of a load bearing office building. Determine the quantities of following items and enter in a measurement sheet.

i) Earthwork in excavation for foundation. **[3]**

ii) UCR masonry in C.M.(1:6) in plinth and foundation. **[3]**

iii) Brick masonry (1:4) in superstructure. **[3]**

iv) R.C.C. (M20) in slab and lintels. **[4]**

v) Steel reinforcement, if steel reinforcement is 1% of R.C.C. work. **[2]**

Schedule for openings is given below

Door D1 : 1.5 × 2.1, D2 = 1.2 × 2.1

Windows W1 : 1.5 × 1.2

W2 : 1.0 × 1.2

W1

W2

0.3m

Hall no.1
6m x 4m

Hall no.2
3m x 4m

Store

R=2m

D2

D1

D2

D2

Fig 1(a) Plan

Hall no.3
3m x 4m

W2

R=1.5m

0.3m

0.7

GL

0.4m

0.1m

0.5m

0.6m

0.2m

0.9m

Fig 1(b) Section
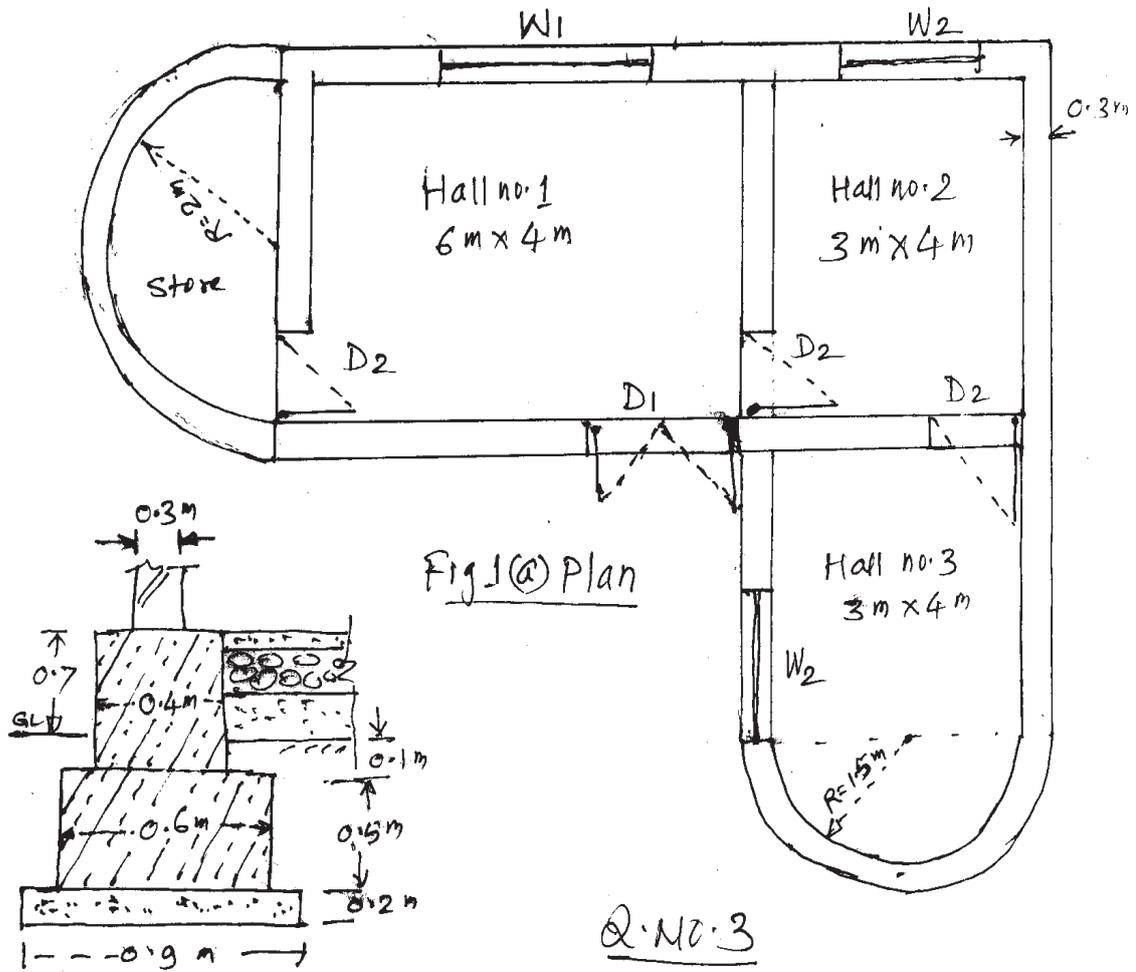
Q.No.3

- Floor to Floor height = 3.2m.
- Slab thickness = 0.15m

b) Explain with neat sketch the method for taking out quantity for R.C.C. work in footing. **[3]**

OR

Q4) a) Figure no. 2 shows a section of 10m long R.C.C. retaining wall. Determine,

i) R.C.C. M20 in retaining wall. **[3]**

ii) Steel reinforcement, 8mm, 10mm and total. Also prepare bar bending schedule. **[6]**

0.3 m

1.5 m

b

1.5 m

a

e

c

0.2 m

e

1 m   0.4 m   1.5 m

a = 10 mmφ @ 200 mm c/c
b = 10 mm @ 400 mm c/c
c = 10 mm φ @ 200 mm c/c
d = 10 mmφ @ 200 mm c/c
e - distribution steel
   8 mmφ @ 200 mm c/c
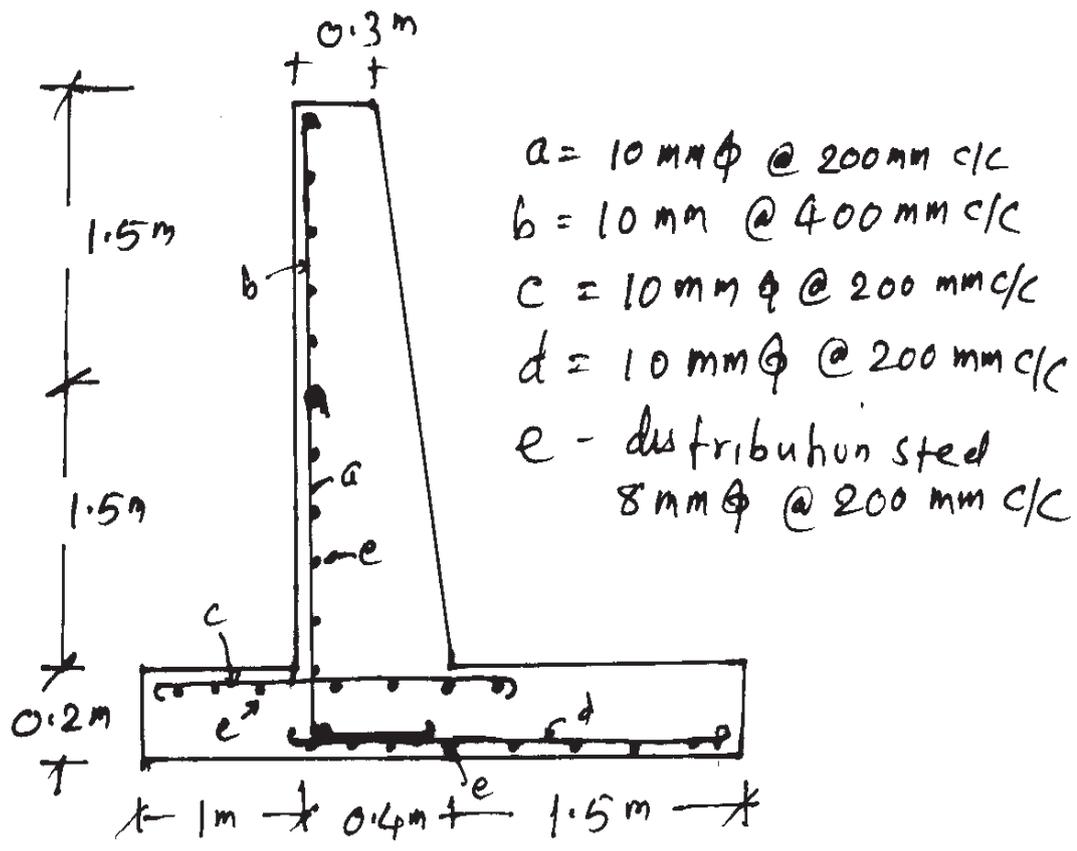
Fig 2, Q. NO. 4

b)   Determine the quantity of earthwork for the portion of a road between chainage 00 to 300m. The ground levels at various chainages are given below. **[9]**

Ch.(m)	0	30	60	90	120	150	180	210	240	270	300
G.L. in m	150	150.45	150.85	151.2	152.00	152.5	151.8	151.2	150.5	150	149.50

The formation level at Ch. 00 is 149.50 and the road is in rising gradient of 1 in 150. The formation width is 12m, side slope 2:1 in embankment and 1.5:1 in cutting.

Q5) a)   Draft a detailed specification for execution of R.C.C. M20 work in superstructure with reference to materials, proportions, method of execution, workman ship, tests, mode of measurement and payment.**[8]**

b) A brick masonry wall in C.M. (1:6) is to be provided for a residential buildings. Details are as below.

Total length = 50m, height above plinth = 3m, thickness of wall = 0.2m.

Determine

i) Materials like bricks, cement and sand required for masonry work.**[6]**

ii) If 3 masons and 8 mazdoors are employed for the construction, find the time in days required for the construction of masonry work. **[2]**

OR

Q6) a) Determine the rate /cu.m. for providing and laying R.C.C. (1:1.5:3) for slab excluding formwork and steel reinforcement.

If the total R.C.C. work in slab is 75m³, find the basic materials like cement, sand and coarse aggregate required for the work. **[6 + 3 = 9]**

b) Draft a detailed specification for providing and laying brick masonry in C.M. (1:6) in superstructure. **[7]**

SECTION - II

Q7) a) Differentiate between the following (write 2 differences each) **[8]**

i) Distress value - scrap value

ii) Value - cost.

iii) Freehold property - Leasehold property.

iv) Depreciation - obsolescence.

b) Explain *five* purposes of valuation in brief. **[5]**

c) Briefly explain the belting method used for land valuation. **[5]**

OR

Q8) a) State various methods used for valuation of land with buildings. Explain any one method in detail. **[5]**

b) What is meant by 'land reversion'? Explain briefly 'reversionary value'? **[5]**

c) Determine fair market value of the property using following data: **[8]**

    i) Built up area of building = 250 m²

    ii) Plot area = 500 m².

    iii) Year of construction = 1980.

    iv) Present land cost = Rs. 10000/- per m²

    v) Present construction rate = 20000/- per m².

    vi) Rate of interest on Government securities = 6%

    vii) Scrap value = 10%

Building was constructed with all 'First Class' specifications. Assume expected life of building = 60 years.

Q9) a) What is meant by a 'tender'? Explain the standard (usual) way of opening the tender and its scrutiny. **[4]**

b) State the advantages and disadvantages of 'post - qualification' of contractors. **[4]**

c) Explain the terms 'earnest money' and 'security deposit'. **[4]**

d) Explain the PWD method (procedure) of execution of a work. **[4]**

OR

Q10)a) Draft out a typical tender notice to be advertised in an English Newspaper for construction of tenements of a residential co-operative housing society

with an approximate construction cost of 1 crore of rupees. **[6]**

b) Enlist the essential elements of a typical tender form. Briefly (in 1 or 2 sentences) explain their necessity. **[5]**

c) Explain the PWD procedure of executing a minor work. **[5]**

*Q11)*a) Enlist the essential requirements of a valid contract. **[4]**

b) What is meant by 'arbitration'? State its necessity / advantages in civil engineering contracts. **[4]**

c) Justify the 'bankruptcy of contractor' clause in the conditions of a civil engineering contract. **[4]**

d) State the advantages of an 'item - rate contract'. **[4]**

OR

*Q12)*a) Write a note on 'termination of a contract' **[4]**

b) You are owner of a proposed building under construction. During your visit you have come across the following situations at the site:

i) You found that inferior quality sand and bricks are being used for construction.

ii) The labour is asking for more money (compensation) from you, telling that the contractor is paying wages less than the minimum wages prescribed by the government.

Briefly explain the action you will take as owner to salvage the situation in each case. Mention clearly the relevant (appropriate) typical clause of the contract to support your action. **[4]**

c) State whether following statements are 'True' or 'False'. Give reason for each of them. (No marks will be given if reason not given) **[4]**

i) The method of measurement of completed works (items) should be a part of the contract document.

ii) The patent rights and royalties clause should be included in the contract conditions (document)

d) State the advantages of a 'lump-sum contract' **[4]**

[4164] - 424

B.E. (Civil)

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(2008 Pattern) (Open Elective) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

 1) *Answer to the two sections should be written in separate answer books.*

 2) *Figures to the right indicate full marks.*

 3) *Neat diagrams must be drawn wherever necessary.*

 4) *Use of non programmable calculator is allowed.*

 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain direct method and variational method used for formulation of element stiffness matrix with suitable examples. **[8]**

   b) Derive global stiffness matrix for a beam element that includes axial force, shear force and bending moment effects. **[10]**

OR

Q2) a) Determine the forces in the two-bar truss supported by a spring as shown in fig.1 Take E = 200 GPa and A = 5×10^{-4} m². Bar one has a length of 5m and bar two a length of 10m. The spring stiffness is k = 2000 kN/m. **[12]**
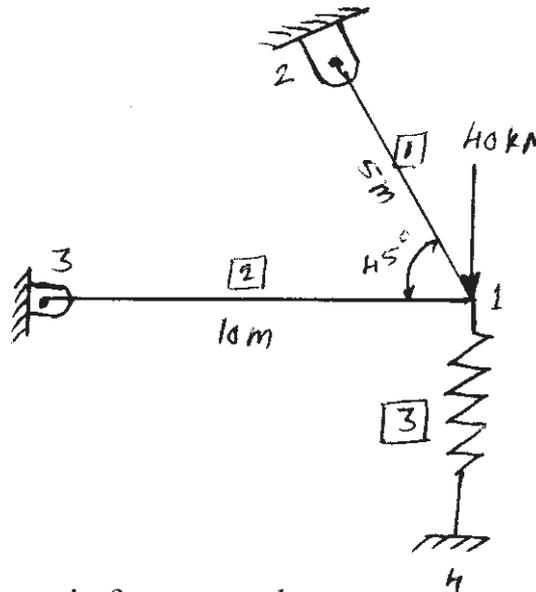
   b) Derive stiffness matrix for a truss element. **[6]**

Q3) Assemble element stiffness matrices for the rigid frame shown in the fig. 2.
E = 200 Gpa, I = 38 × 10⁻⁶ m⁴, A = 3 × 10⁻³ m². **[16]**
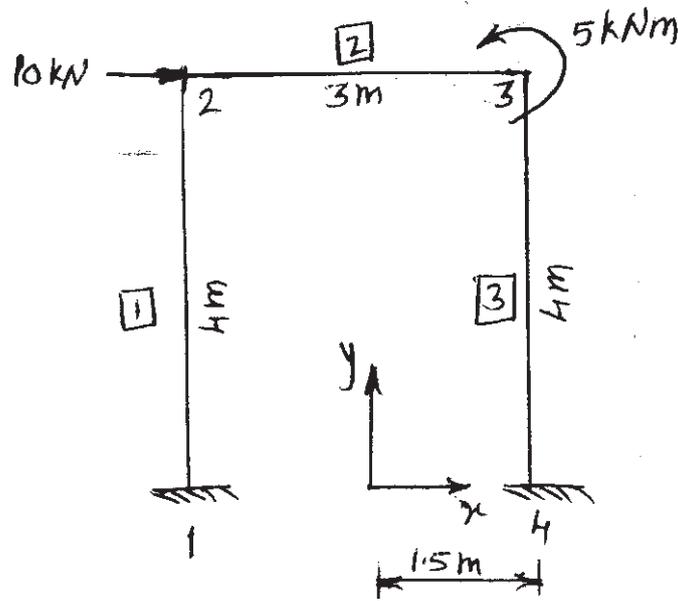
Fig. 2

OR

Q4) Obtain stiffness matrix for a gird element. Also explain transformation matrix for a grid element. **[16]**

Q5) a) State and Explain 'Convergence Requirements of displacement function' **[8]**

b) What do you understand by C^0 and C^1 continuity? Explain with suitable examples. **[4]**

c) Explain two dimensional state of stress and strain. **[4]**

OR

Q6) a) Derive element stiffness matrix for constant strain triangular element. **[8]**

b) Explain the procedure of finite element solution of a plain stress problem. **[8]**

SECTION - II

Q7) a) What role does the 'Theory of minimum potential energy' play in generating the stiffness matrix in FEM analysis? **[8]**

b) Give two dimensional and three dimensional Pascal's triangle. Explain its use in FEM analysis. **[10]**

Q8) a) Obtain the shape functions for a nine noded plane quadratic element. Start from stating the shape functions for a three noded bar element.**[12]**

b) What do you mean by Higher order elements? Explain its application with examples. **[6]**

Q9) a) Derive the shape function for a Tetrahedron Element. **[6]**

b) Obtain strain displacement matrix for a CST element. **[6]**

c) Define stiffness matrix and explain its special features. **[4]**

OR

Q10) a) Derive the shape function for a Tetrahedron Element. **[6]**

b) Determine the shape functions for a CST element. Show that they are noting but area coordinates. **[10]**

Q11) a) State and explain the three basic laws on which isoparametric concept is developed. **[8]**

b) Explain isoparametric formulation of rectangular plane stress element.**[8]**

OR

Q12) a) Explain isoparametric formulation of bar element stiffness matrix. **[8]**

b) Explain sub and super parametric elements and isoparametric elements. **[8]**

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[4164] - 452

B.E. (Mechanical Sandwich)

INDUSTRIAL HYDRAULICS AND PNEUMATICS

(2008 Pattern) (Sem. I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*

   2)   *Figures to the right indicate full marks.*

   3)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   4)   *Assume suitable data, if necessary.*

   5)   *All questions are compulsory.*

SECTION - I

Q1) a)   Explain desirable properties of hydraulic fluid.   **[6]**

     b)   Compare hydrostatic and hydrodynamic power transmission.   **[6]**

     c)   What are the different seals used in hydraulic system.   **[6]**

OR

Q2) a)   What are the different locations where filters are provided in hydraulic systems.   **[6]**

     b)   Write in short on fluid power applications is hydraulic presses.   **[6]**

     c)   What are the effects of contaminants on different components of hydraulic systems?   **[6]**

Q3) a)   Draw a neat sketch and explain working of a typical vane pump.   **[6]**

     b)   What are the different typical applications of accumulators? Explain in brief.   **[6]**

     c)   Discuss the characteristics of pumps used in hydraulic systems.   **[4]**

OR

Q4) a)   Explain with neat sketch the working of Gear pump with its characteristics.**[6]**

     b)   What are the different accessories provided in a hydraulic power unit? What are their functions?   **[6]**

     c)   What are the functions of different parts of a typical reservoir assembly?   **[4]**

Q5) a) Draw a neat sketch and explain working of a typical pressure and temperature compensated flow control valve. **[10]**

b) Write in brief on 'Cartridge Valves'. **[6]**

OR

Q6) a) Classify different direction control valves and Differentiate open centre and closed centre valve position in direction control valves. **[6]**

b) Explain the counter balance valve with neat sketch, its working with a typical application. **[10]**

SECTION - II

Q7) a) What are different cylinder mountings? **[5]**

b) Draw a typical circuit for motor braking. **[5]**

c) Draw regenerative circuit explaining its applications. **[8]**

OR

Q8) a) Explain the following terms with respect to hydraulic motor. **[6]**
   i) Volumetric efficiency.
   ii) Mechanical efficiency.
   iii) Over all efficiency.

b) Analyse the circuit. **[12]**
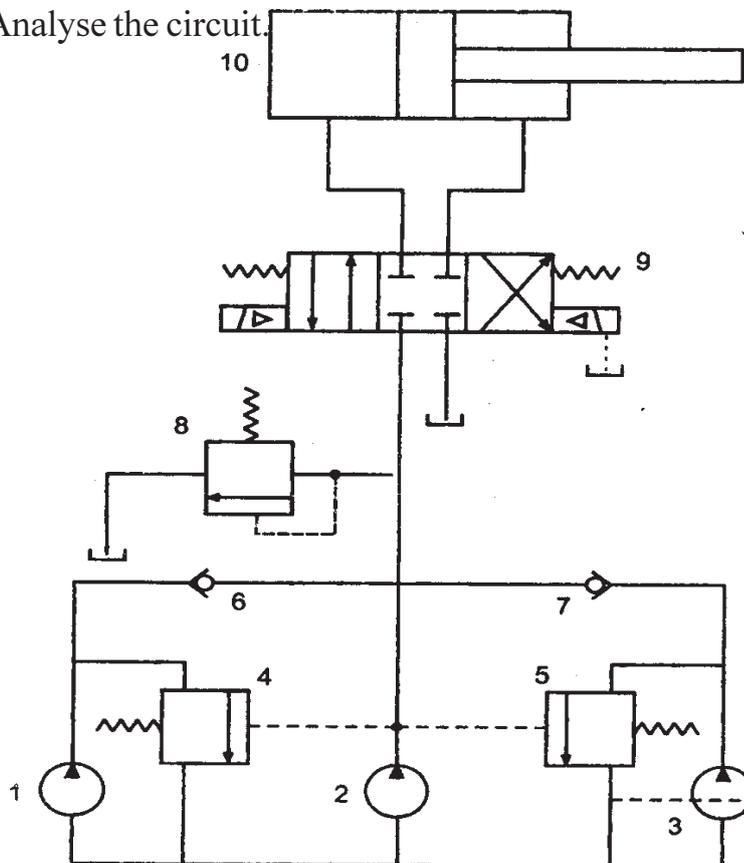
Q9) a) Compare characteristics of Hydraulic & Pneumatic systems. **[6]**

b) Explain with a neat sketch the working of 'OR' valve with typical application. **[8]**

c) Classify different compressors used in Pneumatics. **[2]**

OR

Q10) a) Explain with neat sketch the working of 'AND' valve with a typical application. **[8]**

b) Explain with a neat sketch the working of time delay valve with a typical application. **[8]**

Q11) A machine slide is moved by a cylinder. The motion required is as follows. Draw circuit.

a) The piston rod of a cylinder A is to be advance only if a workpiece is inserted in the work piece retainer, a guard has been lowered and operator presses the push button valve upon the release of a push button or if the guard is no longer in the lower position. The cylinder 'A' is to retract to the initial position. **[10]**

b) Describe with sketch the working of pressure regulator. **[6]**

OR

Q12) a) Draw a neat sketch and explain working of a typical 3/2 direction control valve used in pneumatics. What are the different methods of operating these valves. **[8]**

b) Draw a typical synchronization circuit and explain its working. **[8]**

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[4164] - 476

B.E. (Production)

MECHATRONICS

(Elective - III) (2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

　1)　*All questions are compulsory.*

　2)　*Neat diagrams must be drawn wherever necessary.*

　3)　*Figures to right indicate full marks.*

　4)　*Assume suitable data, wherever necessary.*

SECTION - I

Q1) a)　Explain in detail the advantages and disadvantages of PLC's　**[8]**

　　b)　Compare PLC's with other types of controllers.　**[8]**

OR

Q2) a)　What are the PLC ladder construction limitations?　**[8]**

　　b)　Describe with neat sketch Overall PLC system.　**[8]**

Q3) a)　Bypass / control stations increases flexibility of PLC. Explain with neat sketch.　**[4]**

　　b)　Discuss in brief any four input / output specifications of PLC.　**[4]**

　　c)　Explain with neat sketch register / BCD inputs? What are advantages of it?　**[8]**

OR

Q4) a)　Explain in detail types of racks in discrete I/O system.　**[8]**

　　b)　What is I/O rack and table mapping? Explain the process with neat sketches.　**[8]**

Q5) a)　What is the necessity of Analog system in PLC's? How to give instructions for analog input modules.　**[8]**

　　b)　Explain with neat sketch transformation of an analog signal into a binary or BCD value.　**[10]**

P.T.O.

OR

Q6) a) Explain with neat sketch transformation of binary data into an analog signal. **[8]**

b) An input module, which is connected to a temperature transducer, has an A/D with a12-bit resolution. When the temperature transducer receives a valid signal from the process (100 to 600ºC), it provides, via a transmitter, a + 1 to +5 VDC signal compatible with the analog input module. **[10]**

    i) Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts, and

    ii) Find the same values for a module with a 10-bit resolution.

SECTION - II

Q7) a) What is the necessity of special type of I/O modules? Explain in detail it's types. **[8]**

b) Explain with neat sketch Proportional-integral-derivative module (PID).**[8]**

OR

Q8) a) What are positioning interfaces? Explain with neat sketch PLC system using stepper modules to control three axes. **[8]**

b) Fuzzy logic modules work with other modules to input and output process information according to fuzzy control algorithms. Explain with neat sketch. **[8]**

Q9) a) Explain Counters used in PLC programming. Write each specification counter and use of the same in program. **[6]**

b) Given four push to ON switches. PB1 for START, PB2 for STOP, PB3 for RED and PB4 for GREEN button. The objectives are

    i) The START button should start the process.

    ii) STOP button shell stop it immediately.

    iii) When PB3 is pushed and PB4 is not pushed RED light should be ON

    iv) When PB4 is pushed and PB3 is not pushed, GREEN light should be ON

Write Boolean equation of each rung you write.

Write PLC ladder program using Ex-ON and /or EX-OFF condition symbols.

Write all the assumptions you do e.g. PB2 is connected to which input, etc. **[12]**

*Q10)*a) Write a comment on Arithmatic instructions used in PLC programming.**[6]**

b) For a bottle filling plant, a conveyor is to be used. It has two locations namely L1 and L2, poximity switches of NO type. The START button (Push-to-ON) and STOP button (Push-to-ON). The conveyor starts when START button is pushed and stops when STOP button is pushed. The L1 proximity, when ON again starts the conveyor and L2 proximity when ON it stops the conveyor. Write a PLC program for the same.
Write Boolean equation of each rung you write.
Write PLC ladder program using Ex-ON and / or Ex-OFF condition symbols.
Write all the assumptions you do e.g. PB2 is connected to which input, etc. **[12]**

*Q11)*a) What are types of thermal transducers? Explain with neat sketch construction and working of RTD. **[8]**

b) Explain linear variable differential transformer (LVDT) mechanism with it's any one application. **[8]**

OR

*Q12)*a) What are flow transducers? Explain with neat sketch Motion Detection Fluid Flow Meter. **[8]**

b) Explain with neat sketch construction and working of any one strain gauge. **[8]**

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[4164] - 484

B.E. (Production Sandwich)
MECHATRONICS & ROBOTICS
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any three questions from section I and any three questions from section II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Use of calculator is allowed.*

4) *Figures to the right indicate full marks.*

5) *Answer one question from 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12.*

SECTION - I

Q1) a) Explain the difference between closed loop control system & open loop control System. With block diagram an example of Open Loop System.**[10]**

b) Explain the Various Elements of Mechatronics System with Suitable example. **[8]**

OR

Q2) a) Explain with suitable example Data Acquisition System. **[6]**

b) Explain various elements of Measurement system with suitable example.**[6]**

c) Explain integrator and differentiator Operational Amplifier. **[6]**

Q3) a) With neat diagram the elements of Microcontroller. **[6]**

b) Draw the block diagram of 8085. Explain registers used in 8085. **[10]**

OR

Q4) a) Explain the following for a Microprocessor. **[8]**

     i) Assembler

     ii) Memory Status

b) Explain in detail CMOS & Digital Logics along with example. **[8]**

Q5) a) Write a program in Assembly Language to determine the Maximum Temperature obtained from a list of measured temperature. **[10]**

b) Explain the following command with example. **[6]**

OR

Q6) Explain the following with neat figures. **[16]**

a) Hand Shaking
b) Serial Interfacing.
c) Need of Interfacing
d) Bidirectional Buffer.

SECTION - II

Q7) a) What are the different criteria for selection of a PLC. **[8]**

b) Compare the Relay Logics and PLC. **[8]**

OR

Q8) a) Explain the Specification of PLC. **[6]**

b) An electric motor is started by a STRAT switch which is NO, stopped by a STOP switch which is NC.A Selector switch is used to select either clockwise or Anticlockwise rotation of the motor. The motor stops 25 seconds after the STOP Switch is pressed. An extra emergency STOP switch is also provided. **[10]**

Q9) a) Write a short note on steeper Motor. **[6]**

b) State and Explain sensors to measure the following: **[10]**

    i) Fluid Pressure   ii) Liquid Flow

    iii) Temperature   iv) Proximity Sensor

OR

Q10) a) Explain the use of relays in the Control system along with Example. **[6]**

b) A 5kg rectangular block is gripped in the middle and lifted vertically At velocity 1 m/s. If it accelerates to this velocity at 27.5 m/s^2 and the Coefficient of friction between the gripping pad and block is 0.48. Calculate minimum force that would prevent slippage. **[10]**

*Q11)*a) Define Robot State Classification of Robot along with suitable Application.

[6]

b) State Different types of Sensors used in robot. **[6]**

c) Explain the Vision system used in Robotics. **[6]**

OR

*Q12)*Write a short note on the following: **[18]**

a) Different types of Grippers used in Robot.

b) Application of Robot in Medical Field.

c) Dynamics Properties of Robot.

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[4164] - 487

B.E. (Production Sandwich)

AUTOMOBILE ENGINEERING

(Elective - I) (2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a)   What are the various components of automobile?   **[8]**

     b)   Describe the working of steering system mechanism.   **[8]**

     c)   What do you mean by Chassis?   **[2]**

OR

Q2) a)   Explain working of Simple carburettor.   **[8]**

     b)   List various types of frame and describe in brief the conventional frame.**[8]**

     c)   What do you mean by articulated vehicle?   **[2]**

Unit - II

Q3) a)   What is the purpose of the fins in an air-cooled system? Explain its construction.   **[6]**

     b)   What are antifreeze solutions?   **[6]**

     c)   List out the different types of additives used.   **[4]**

OR

Q4) a) What are the problems encountered with liquid cooling? **[8]**

b) What is thermosyphon cooling? Explain **[8]**

Unit - III

Q5) a) Explain in brief dry sump lubrication. **[6]**

b) What is friction? Why it occurs? **[3]**

c) List out the various tests performed on lubricants. **[7]**

OR

Q6) a) Explain Electronic ignition system. **[8]**

b) What are the advantages and disadvantages of Magneto ignition system?**[8]**

SECTION - II
Unit - IV

Q7) a) How a multi-plate clutch is able to transmit more power in comparison to a single plate clutch. Explain. **[8]**

b) Explain the working of differential with the help of Diagram. **[10]**

OR

Q8) a) With the help of neat sketch, explain the construction and operation of constant mesh gear box. **[12]**

b) Where are dog clutches used? **[6]**

Unit - V

Q9) a) Explain torsion bar and give its advantages and disadvantages. **[10]**

b) Write short note on shock absorber. **[6]**

OR

*Q10)*a) What are the advantages and disadvantages of rubber spring? **[8]**

b) What are the components of the steering system? **[8]**

Unit - VI

*Q11)*a) Write short notes on: **[10]**
    i)   Vacuum brakes   ii)   Air brakes

   b) Write the functions of brakes in an automobile. **[6]**

OR

*Q12)*a) What is mean by servicing? And explain different types of servicing.**[8]**

   b) Give the troubleshooting chart for cooling system with its complaint, cause and remedy. **[8]**

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[4164] - 493

B.E. (Production S/W)
PRODUCT DEVELOPMENT
(Elective - II) (2008 Pattern) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

1) *Answer Que. No. 1 or Que. No. 2, Que. No. Q3 or Que. No. Q4, Que. No. Q5 or Que. No. Q6 from Section I and Que. No. Q7 or Que. No.8, Que. No. Q9 or Que. No. 10, Que. No.11 or Que. No.12 from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I
Unit - I

Q1) a) What do you mean by product design? Explain the role of customer in design of a new product. **[8]**

b) Explain the following terms for Product Development. **[8]**
   i) Product verification   ii) Production validation
   iii) Simplification   iv) Specialization.

OR

Q2) a) Explain in detail seven phases of Product Design. **[8]**

b) What is prototyping? Explain the methods of rapid prototyping in detail. **[8]**

Unit - II

Q3) a) Explain the following terms: **[8]**
   i) Customer Needs   ii) Customer Satisfaction.
   iii) Customer Population   iv) Market Segmentation.

b) What is Technology Forecasting? Explain in detail Technology S-Curve. **[8]**

P.T.O.

OR

Q4) a) How will you collect the information from customers? Explain the types of analysis of gathered information. **[8]**

b) What is Mission Statement and Technical Questioning? Explain the Economic Analysis of Product. **[8]**

Unit - III

Q5) a) What is functional modelling? Explain decomposition in detail. **[8]**

b) Explain the following terms. **[10]**

     i) Pugh's Concept   ii) Selection Charts

     iii) Numerical concept scoring   iv) System modelling.

OR

Q6) Write short notes on following (Any three) **[18]**

     a) FMEA   b) Augmentation & Aggregation

     c) Brainstorming   d) Estimation of technical feasibility

SECTION - II
Unit - IV

Q7) a) What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. **[8]**

b) What are the applications of product teardown? Explain force flow diagram in detail. **[8]**

OR

Q8) a) Explain the tools used in benchmarking in detail. **[8]**

b) Explain in detail measurement & experimentation. **[8]**

Unit - V

Q9) a) Explain the design guidelines for design for manufacture & Design for assembly. **[8]**

b) What is design for piece part production? Explain manufacturing cost analysis? **[8]**

OR

*Q10)*a)   Explain the global need & importance of design for environment.   **[8]**

b)   Explain the following terms: **[8]**
   i)   Product Testing   ii)   Field Trials.
   iii) Virtual Trials   iv)   Iterations.

Unit - VI

*Q11)*a)   What is product life cycle? Explain its need & benefits.   **[8]**

b)   What is the link between product data & product workflow? Explain PLM in detail.   **[10]**

OR

*Q12)*Write short notes following: **[18]**
   a)   Customer involvement
   b)   Technologies in product life cycle
   c)   Reliability.

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Total No. of Questions : 8]

SEAT No. :

P1534

[Total No. of Pages : 2

[4164] - 494

B.E. (Production S/W)

SUPPLY CHAIN MANAGEMENT

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) *Answer any Three questions from each Section.*

2) *Your answers will be valued as a whole.*

3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss primary and secondary objectives of supply chain Management.**[10]**

   b) What actions a manager can take to overcome the obstacles and achieve Co-ordination in supply chain?   **[7]**

Q2) a) What actions a manager can take to overcome the obstacles and achieve Co-ordination in supply chain?   **[10]**

   b) Discuss various forecasting techniques used in SCM.   **[7]**

Q3) a) How can a company use pricing to change demand patterns? Give Examples.   **[7]**

   b) Identify cycles & push-pull boundary in supply chain when you are Purchasing **SONY LCD TV** from a shop in your city.   **[9]**

Q4) a) Discuss the procedure of forecasting the demand.   **[7]**

   b) What are the different methods of forecasting? Discuss them briefly.**[9]**

SECTION - II

Q5) a) Why is IT the key component of SCM system? "Successful IT Implementation is the outgrowth of the participation of knowledge Workers". Comment with examples. **[8]**

b) Explain the basic purchasing cycle and the role of purchasing manager in Detail. **[8]**

Q6) Write short notes on any three of the following: **[18]**

a) Cycle stock in SCM.

b) Economics of scale.

c) Facility location decisions in supply chain.

d) Impact of financial factors on supply chain decisions.

e) Aggregate planning in SCM.

Q7) a) List out various factors influencing Network design in supply chain. How the exchange rates & import duties affect the location decision in supply chain? **[9]**

b) Changing the distribution network affects the supply chain cost. Discuss. **[7]**

Q8) a) Discuss the actions taken by Manager to overcome the obstacles and to achieve co-ordination in supply chain. **[8]**

b) What is DCF analysis? Why it is used in SCM. **[8]**

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[4164] - 512

B.E. (Electrical)

SWITCHGEAR & PROTECTION

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answer 3 questions from section I and 3 questions from section II.

2) Answers to the two sections should be written in separate answer books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain high & low resistance principles of arc interruption in case of circuit breakers. **[8]**

b) In a system of 132 kv, the circuit phase to ground capacitance is 0.01 μf, the inductance per phase is 6H. Calculate the voltage appearing across the pole of a C.B. if magnetising current of 10 amp is interrupted (instantaneous)

Calculate the value of resistance to be used across contact space to eliminate the restriking voltage transient. **[4]**

c) Explain the following terms w.r.t. CB. **[6]**

i) Restriking voltage.

ii) R.R.R.V.

iii) Recovery voltage.

OR

Q2) a) A three phase alternator has the line voltage of 11 kv. The generator is connected to a circuit breaker. The inductive reactance upto CB is 5 ohm per phase. The distributed capacitance upto circuit breaker between phase & neutral is 0.01 μf

Determine:

i) Peak restriking voltage across CB

ii) Frequency of restriking voltage transient.

iii) Average rate & restriking voltage.

iv) Maximum RRRV. **[8]**

b) Explain current chopping phenomenon associated with CB. **[4]**

c) Write short note on Resistance switching in circuit Breakers. **[6]**

Q3) a) Explain various ratings of high voltage circuit breakers. **[8]**

b) Explain the construction & working of Air Blast circuit breaker. **[8]**

OR

Q4) a) Explain construction & working of Puffer type SF$_6$ circuit breaker. **[8]**

b) Write a short note on 'Auto reclosing'. **[8]**

Q5) a) What is protective Relaying? What is need for protective system? What are different types of faults & its effects. **[8]**

b) What are the essential qualities of protective relaying. Explain in detail. **[8]**

OR

Q6) a) It is given that fault current is 2000 Amp. The relay 1 is set for 100%. The CT ratio is 200/1. The relay 2 is set for 125% for discrimination the time gradient margin between the relays is 0.5 second. Determine time of operation of the two relays if TSM for relay 1 is 0.2. Also find TSM for relay 2. From IDMT curve (Ref. Fig. 1) **[8]**

PSM	2	3.6	5	8	10	15	20
Time (sec)	10	6	3.9	3.15	2.8	2.2	2.1
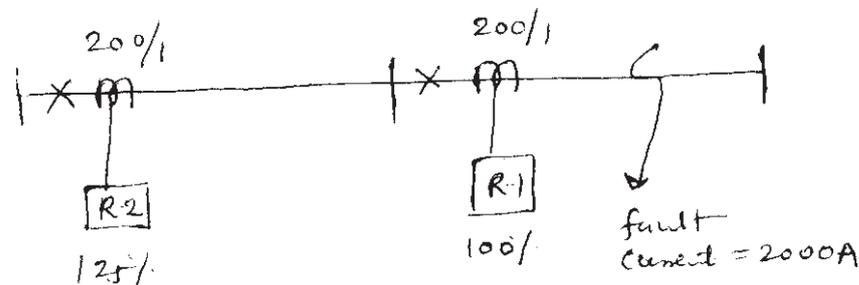
Fig. 1

b) Derive the torque equation in case of induction type relays. **[8]**

SECTION - II

Q7) a) Draw a block diagram of static relay & explain its working. State advantages & limitations of static relay. **[10]**

b) Write short note on **[6]**

  i) Anti - Aliasing filter.

  ii) Sampling theorem.

OR

Q8) a) Draw & explain block diagram of numerical relays. Give its advantages over conventional & static relays. **[10]**

b) Why half cycle data window preferred over the full cycle data window for numerical protective relaying. **[6]**

Q9) a) Explain construction & working of Buchhloz relay. State advantages, disadvantages & application of the same. **[10]**

b) The neutral point of a 3 phase 20 MVA, 11 kV alternator is earthed through a resistance of $5\,\Omega$. The relay is set to operate when there is an out of balance current of 1.5 Amp. The CT's have ratio of 1000/5. What is the percentage of winding protected against earth faults.

If 90% of winding is required to be protected against earth fault, calculate the value of neutral earthing resistance. **[6]**

OR

Q10) a) What are different types of faults occurring in an alternator. Explain each in short. **[10]**

b) A 3 phase 66 kv/11kv, Star-Delta connected transformer is protected by Merz-Price system. The CTs on LT side have a ratio of 420/5. Find the CT ratio on HT side. **[6]**

Q11) a) Explain time graded system protection of three phase feeders using over current relays. **[6]**

b) Explain draw backs of over current relays while protecting a transmission line. **[6]**

c) Write a short note on wide Area measurement (WAM) system. **[6]**

OR

Q12) a) Explain the concept of distance relaying applied to protection of transmission lines. Compare impedance relay, reactance relay & Mho relay with reference to applications & characteristics. **[8]**

b) Explain the effect of arc resistance and power swing on performance of distance relay. Mension which relay is highly effected in above cases.**[10]**

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[4164] - 513

B.E. (Electrical)

INDUSTRIAL DRIVES & CONTROL

(2008 Pattern) (Sem. - II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from section I and 3 questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Explain the different types of load in industry with suitable load torque characteristics and suitable choice of motor with example. **[8]**

b) A horizontal conveyor belt is moving at a velocity of 1.5 m/s and moves load at the rate of 60,000 kg/hr. The belt is 90m long and is driven by a motor with the speed of 960 rpm. Determine the equivalent rotational inertia at the shaft of the motor. **[8]**

OR

Q2) a) What is steady state stability of a drive explain with suitable example explain how we determine stability of operating point. **[8]**

b) A motor is used to drive a hoist motor. Characteristics are given by

Quadrants I, II & IV : T = 200-0.2N, N-m

Quadrants II, III & IV: T = –200-0.2N, N-m

Where N is speed in rpm.

When hoist is loaded, the net load torque T_L = 100 N-m and when it is unloaded, net load torque T_L = –80 N-m. Obtain the equilibrium speeds for operation in all the four quadrants. **[8]**

Q3) a) Draw the speed torque characteristics of DC series motor under dynamic braking. Draw circuit diagram and explain the operation with equation.**[8]**

P.T.O.

b) State and explain how armature current and speed of a DC separately excited motor will be affected by each of the following changes in its operating conditions. **[8]**

   i) Halving armature voltage with field current and load torque remaining constant.

   ii) Halving armature voltage with field current and power developed remaining constant.

   iii) Doubling the flux with armature voltage and load torque remaining constant.

   iv) Halving both armature voltage and field flux and developed power constant.

OR

Q4) a) Compare regenerative braking and plugging of 3 phase induction motor with suitable characteristics. **[8]**

   b) A 3 phase, 440 V, 50Hz, 6 pole, star connected induction motor has following parameters referred to stator.

   R_s: $0.5\,\Omega$, R'r = $0.6\,\Omega$; $X_s = X_r' = 1\,\Omega$

   Stator to rotor turns ratio is 2. If the motor is used for the regenerative braking, Determine **[8]**

   i) Maximum overhauling torque it can hold and the range of the speed in which it can safely operate.

   ii) The speed at which it will hold a load with a load torque of 160 N-m.

Q5) a) Draw circuit diagram of single phase fully controlled rectifier control of DC separately excited motor. Draw voltage & current waveforms. Also draw speed-torque characteristics & explain the operation with mathematical equation. **[10]**

   b) Explain the operation of a closed loop speed control scheme with inner current control loop. What are the various functions of inner current control loop? **[8]**

OR

Q6) a) A 220V, 1500 rpm, 10A, separately excited DC motor is fed from a single phase fully controlled rectifier with an AC source voltage of 230V, 50Hz. $R_Q = 2\,\Omega$. Conduction can be assumed to be continuous Calculate firing angles for rated motor torque and (-1000) rpm. **[6]**

   b) Draw circuit diagram of three phase fully controlled rectifier control of separately excited DC motor. Draw waveform for $\alpha = 30°$. **[6]**

   c) Draw circuit diagram of chopper control of series excited DC motor and explain its operation with equation. **[6]**

SECTION - II

Q7) a) How speed control of IM is achieved using stator voltage control. Explain draw backs associated with it. **[8]**

b) A 2.8 kW, 400V, 50Hz, 4 pole, 1370 rpm 3 phase delta connected squirrel cage induction motor has the following parameters Rs = 2 Ω, Rr' = 5 Ω, Xs = Xr' = 5 Ω, Xm = 80 Ω. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate. **[8]**

   i) Motor terminal voltage, current and torque at 1200 rpm

   ii) Motor speed, current and torque at terminal voltage of 300V

OR

Q8) a) Explain variable frequency control used for 3 phase induction motor. Explain with power circuit VSI fed Induction motor drive and steady state equations. **[8]**

b) A 3 phase delta connected 6 pole 50 Hz 400V 925 rpm, squirrel cage induction motor has following parameters Rs = 0.2 ohm, Rr' = 0.3 ohm, Xs = 0.5 ohm, Xr' = 1ohm Calculate. **[8]**

   i) Speed for frequency of 35 Hz and slip speed of 60 rpm

   ii) Frequency and motor current for a speed of 600 rpm and 80% full load torque.

Q9) a) Explain principle of static scherbius drive. What are its advantages over rotor resistance control? **[8]**

b) What are different classes of duties of motor. Explain with one example each. **[8]**

OR

Q10) a) How variable speed drives can be useful in saving energy of pumps. **[8]**

b) A motor operates on a periodic duty cycle consisting of a loaded period of 20 mins and a no load period of 10 min. The maximum temperature rise is 60ºC. Heating and cooling time constant are 50 and 70 min respectively. When operating continuously on no load the temperature rise is 10ºC. Determine **[8]**

   i) Minimum temperature during duty cycle.

   ii) Temperature when the motor is loaded continuously.

*Q11)*a) Explain basics of vector control induction motor drive with block diagram only. **[6]**

b) Explain application of ASD in rolling mills. **[6]**

c) Explain working and advantages of commutatorless DC motor. **[6]**

OR

*Q12)*a) Write short note on ASD used in textile mills. **[6]**

b) Explain application of drive in sugar mills. **[6]**

c) Explain how ASD can be used in machine tool applications. **[6]**

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Total No. of Questions : 12]

P1537

[4164] - 520

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

(2008 Pattern) (Sem. - II) (Elective - IV)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any one question from each pair of Questions Q1 & Q2, Q3 & Q4, Q5 & Q6 , Q7 & Q8, Q9 & Q10, Q11 & Q12.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of electronic unprogrammable pocket calculator is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the advantages and limitations of Digital control system **[6]**

b) Determine, whether the following systems are time (shift) variant or time (shift) invariant. **[6]**

i) $y(n) = x(n) - x(n-1)$ ii) $y(t) = x(t^2)$

iii) $y(n) = e^{x(n)}$

c) Draw Block diagram of D/A converter with Basic elements & explain it.**[5]**

OR

Q2) a) Explain the sampling & reconstruction process; State the sampling theorem & give its importance. **[6]**

b) Which are standard discrete input test signals? Explain them with neat diagrams. **[6]**

c) Draw a block diagram of typical successive approximation A/D converter. Explain in brief. **[5]**

Q3) a) State and prove important properties of Z-transform. **[5]**

b) i) Determine Z transform of $x(t) = \sin wt$ **[12]**

ii) Obtained Z transform & ROC of signal;

$x(n) = 3(4^n) u(n) - 5(3^n) u(n)$ use linearity property.

OR

P.T.O.

Q4) a) Derive relation between pulse Transfer Function and state model of discrete time system. **[5]**

b) Find the Inverse Z transform of the following: **[12]**

i) $X(z) = \dfrac{1 - \dfrac{1}{2}z^{-1}}{1 - \dfrac{1}{4}z^{-2}}$; $|z| > \dfrac{1}{2}$ By partial Fraction Method.

ii) $X(z) = \dfrac{10Z}{(Z-1)(Z-2)}$ By Cauchy Residue Method.

Q5) a) Show with proper diagram mapping of S-plane into Z-plane. **[8]**

b) Examine the stability of the following characteristic equation by Jury's Test. **[8]**

$P(z) = Z^4 - 1.2Z^3 + 0.07Z^2 + 0.3Z - 0.08 = 0.$

OR

Q6) a) Describe the general rules for constructing the Root Loci in the designing Discrete - time system. **[8]**

b) What is the physical significance of Bilinear Transformation? Explain its use in stability investigation of discrete time system. **[8]**

SECTION - II

Q7) a) Discuss the various methods used for computation of state transition matrix (STM) $\phi(k)$ from the given state difference equation, $x(k+1) = Gx(k) + H\,u(k)$ **[8]**

b) Use Direct Decomposition Method to determine discrete time state space model for the system having pulse transfer function **[8]**

$\dfrac{Y(z)}{U(z)} = \dfrac{0.36Z + 0.25}{Z^2 - 1.5Z + 0.5}$

OR

Q8) a) Define state Transition matrix and state its important properties incase of discrete - time system. **[8]**

Find STM for the system represented by state equation

$x(k+1) = \begin{bmatrix} 0.8 & 0 \\ 1 & 0.5 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u(k)$

b) For the discrete - time control system represented by the state space

$$x(k+1) = \begin{bmatrix} -1 & 1 \\ -0.25 & 0 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u(k)$$ **[8]**

$y(k) = [1\ 0]\ x(k)$, determine pulse Transfer Function $\dfrac{Y(z)}{U(z)}$

Q9) a) Define and explain precisely the concept of controllability and observability of discrete time control system. State the controllability and observability tests.   **[6]**

b) Investigate the controllability and observability for the system represented by state space model.   **[10]**

$$x(k+1) = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} u(k);\ y(k) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x(k)$$

OR

Q10) a) Explain Ackermann's formula for the determination of observer feedback gain matrix Ke.   **[6]**

b) Consider the system $x(k\,H) = Gx(k) + Hu(k)$; $y(k) = C\,x(k)$

Where $G = \begin{bmatrix} 0 & -0.16 \\ 1 & -1 \end{bmatrix}$, $H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $C = [0\ 1]$ Design a Full - order State - observer for the desired eigen values of observer matrix as

$Z = 0.5 + j\ 0.5$, $Z = 0.5 - j0.5$ **[10]**

Q11) a) Draw a neat block diagram of digital position control scheme and explain the function of each block.   **[8]**

b) Consider the system; $\dfrac{Y(z)}{U(z)} = \dfrac{Z+1}{Z^2 + 1.3Z + 0.4}$, determine its state space representation in

i)   Controllable canonical form and

ii) Observable canonical form.   **[10]**

*Q12)*a) Draw a neat block diagram of Digital Temp. Control Scheme and explain the function of each block. **[8]**

b) Consider the pulse Transfer function of discrete - time system given as

$$\frac{Y(z)}{U(z)} = \frac{b_0 z^n + b_1 z^{n-1} + b_2 z^{n-2} + - - - - - + bn}{z^n + a_1 z^{n-1} + a_2 z^{n-2} + - - - - - + an}$$

Determine its controllable & observable canonical form. **[10]**

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[4164] - 543

B.E. (E & TC)

ELECTRONICS PRODUCT DESIGN

(2008 Pattern)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer 3 questions from section - I and 3 questions from section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic & pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain Bathtub curve for reliability indicating all its regions. Also explain how failure rates can be reduced in different regions of bathtub curve.**[8]**

b) Explain the terms MTBF & MTTF. **[4]**

c) Classify electronics products and specify approximate cost, performance ratio, reliability and temp range for each category. **[6]**

OR

Q2) a) What are the different product approvals required while developing electronic product? **[4]**

b) What is exponential law of reliability? How to improve reliability of electronic product? **[8]**

c) A single stage amplifier uses 4 resistors, 4 capacitors, 1 transistor, 1 power transformer and 4 diodes with failure rates 0.61, 0.6, 0.6, 0.2 and 0.18 per 10^6 hours respectively. Calculate MTBF for the circuit. Also calculate MTTF for transistor. **[6]**

Q3) a) What are the different factors, affecting on selection of ADC & DAC?**[8]**

b) Design data acquisition system for any suitable application. **[8]**

OR

Q4) a) Explain Instrumentation amplifier with different specification? **[8]**

b) Explain Different parameters of OpAmp while selecting it for signal conditioning applications? **[8]**

Q5) a) What are the different touch screen technologies? Explain each technology in short? Which type of touch screen is more popular & why? **[10]**

b) What are different factors for selecting a particular micro controller for given application? **[6]**

OR

Q6) a) What are different buses & Protocols used in electronic systems? Also mention their advantages & limitation leading to choice of particular bus for given application? **[10]**

b) What are different LED configurations? Give suitable example for same.**[6]**

SECTION - II

Q7) a) Mention factors affecting choice between assembly & high level Language? **[6]**

b) Explain different software debugging techniques. **[10]**

OR

Q8) a) Give some details of documentation practices & templates for Assembly & C language? **[8]**

b) What is the necessity of hardware test program? Give some examples of hardware test programs. **[8]**

Q9) a) Give overviews of different EMI-EMC standards related to conducted emissions, radiated emissions and susceptibility to radiation. **[8]**

b) Explain different design consideration while designing PCB for high speed digital circuits? **[8]**

OR

*Q10)*a) Explain the precautions to be taken to minimize interference to other circuits & components while designing a mixed signal circuits (analog + digital)? **[8]**

b) A parallel plate capacitor has a capacitance c = $\varepsilon 0 \varepsilon rA/d$. Find the area (A) required to form a 2.2 pf to form capacitance if d of the plate separate is 11.6mm (a typical PCB thickness) & εr for PCB laminate is about 6.**[8]**

*Q11)*a) Explain selection criteria of frequency bands in various applications. Also mention reason for selecting particular band for particular application.**[10]**

b) Explain detail working of any one type of PLL. **[8]**

OR

*Q12)*a) What is communication link analysis? Explain various sources of signal loss and noise. **[8]**

b) Write a short note on: **[10]**

i) Equalizer.

ii) Interleaver.

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[4164] - 554

B.E. (Electronics and Telecommunication)

TELECOMMUNICATION AND SWITCHING SYSTEM

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State and explain switching functions of switching system. **[8]**

b) Draw typical centralised SPC organisation. State the processor configuration used. Explain the various modes of this configuration in brief. **[8]**

OR

Q2) a) Explain the operation of sequential Read/Random write time division time switching with a neat block diagram. **[8]**

b) Derive and calculate the unavailability for dual processor system with MTBF = 1500 HRS. and MTTR = 8 HRS. in 30 years. **[8]**

Q3) a) Define and explain **[10]**
   i) Grade of service.
   ii) Average Holding time.
   iii) Call completion rate.
   iv) Erlang and CCS.

b) A group of 20 trunks provides a grade of service of 0.015 when offered 12 E of traffic. **[8]**
   i) How much is the grade of service improved if one extra trunk is added to the group?
   ii) How much does the grade of service deteriorates if one trunk is out of service?

P.T.O.

OR

Q4) a) Explain the term 'Offered Traffic' and 'Carried Traffic'. How are these traffics related in loss systems and delay systems. **[8]**

b) During the busy hour 1350 calls were offered to a group of trunks and 10 calls were lost. The average call duration was 210 seconds. Find**[10]**
   i)   The Traffic Offered.
   ii)   The Traffic Carried.
   iii) The Traffic Lost.
   iv)   The grade of service.
   v)   The total duration of period of congestion.

Q5) a) What is limited availability and full availability in switching network? Explain the principal of Grading. **[8]**

b) Derive the equation for total no. of cross points required for two stage network with 'N' incoming and 'N' out going trunks. **[8]**

OR

Q6) a) Design grading for connecting 20 trunks to switches having 10 outlets.**[8]**

b) Draw and explain PCM signalling. **[8]**

SECTION - II

Q7) a) What is clock instability? Explain main sources of clock instability. **[8]**

b) What is timing jitter? Draw and explain block schematic diagram for measuring timing jitter. **[8]**

OR

Q8) a) Explain synchronization of a clock in a transmitter & receiver system using PLL. **[8]**

b) What is pulse stuffing approach for network synchronization? Explain in brief. **[8]**

Q9) a) Explain the circuit switched and packet switched network with the help of diagram. **[8]**

b) Explain the terms with reference to ISDN. **[8]**
   i)   Functional Groups.
   ii)   Reference Points.

OR

*Q10)*a) Explain the ISO-OSI reference model for communication architecture with the help of a neat diagram. **[10]**

b) What is ISDN? Explain in brief what is the motivation for ISDN. **[6]**

*Q11)*a) Explain the following terms in brief: **[10]**
  i)   Frequency Reuse.
  ii) Cell Splitting.
  iii) Hand Off.
  iv) Roaming.
  v)   Sectoring.

b) Explain logical and physical channels of IS - 95. **[8]**

OR

*Q12)*a) State and explain cellular telephone Network Components. **[10]**
b) Explain wireline to cellular telephone call procedure. **[8]**

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[4164] - 556

B.E. (E & TC)

SOFT COMPUTING

(2008 Pattern) (Sem. - II) (Elective - III)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) *Question Nos. 1 and 12 are compulsory. Out of the remaining attempt 2 questions from Section I and 2 questions from Section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Write notes on (any three) **[18]**

   a) Applications of Soft Computing.

   b) Hybrid systems.

   c) Neuro-Fuzzy and Soft Computing characteristics.

   d) Compare and contrast hard and soft computing.

OR

Q2) a) Define a fuzzy set and explain the concept of a fuzzy number. What is the significance of fuzziness. **[8]**

   b) Consider two fuzzy sets A and B find Complement, Union, Intersection, Difference, and De Morgan's laws: **[8]**

$$A = \left\{ \frac{0.8}{2}, \frac{0.4}{3}, \frac{0.6}{4}, \frac{0.1}{5}, \frac{0.3}{6} \right\}$$

$$B = \left\{ \frac{0.3}{2}, \frac{0.8}{3}, \frac{0.6}{4}, \frac{0.8}{5}, \frac{0.2}{6} \right\}$$

Q3) a) Explain any four fuzzy membership functions with their transfer characteristics. **[8]**

b) Given a rule : IF x is A, THEN y is B, where $A = \left\{ \dfrac{0.2}{1}, \dfrac{0.5}{2}, \dfrac{0.7}{3} \right\}$ and

$B = \left\{ \dfrac{0.6}{5}, \dfrac{0.8}{7}, \dfrac{0.4}{9} \right\}$.

Infer B' for another rule: IF x is A', THEN y is B', where

$A' = \left\{ \dfrac{0.5}{1}, \dfrac{0.9}{2}, \dfrac{0.3}{3} \right\}$, using Mamdani Implication rule and max-min composition. **[8]**

OR

Q4) a) Describe the architecture of a Mamdani type Fuzzy Logic Controller and compare it with a conventional PID controller. **[8]**

b) What are the principal design parameters of a Fuzzy Logic Controller? Explain with a suitable example. **[8]**

Q5) a) What are the advantages of Fuzzy Logic Controller over that of a conventional controller. **[8]**

b) Explain the Sugeno Fuzzy Inference Model with a suitable example. **[8]**

OR

Q6) a) Define the following terms with reference to fuzzy inference systems: **[6]**
   i) Premise (Antecedent)
   ii) Conclusion (Consequent)
   iii) Rule - base.

b) Given two rules: **[10]**
   RULE 1 : if height is "TALL", then speed is "HIGH"
   RULE 2 : if height is "MEDIUM", then speed is "MODERATE"
   The fuzzy sets for height (in feet) and speed (in m/s) are:

   $H_1 = \text{"TALL"} = \left\{ \dfrac{0.5}{5}, \dfrac{0.8}{6}, \dfrac{1}{7} \right\}$, $S_1 = \text{"HIGH"} = \left\{ \dfrac{0.4}{5}, \dfrac{0.7}{7}, \dfrac{0.9}{9} \right\}$

   $H_2 = \text{"MEDIUM"} = \left\{ \dfrac{0.6}{5}, \dfrac{0.7}{6}, \dfrac{0.6}{7} \right\}$, $S_2 = \text{"MODERATE"}$

   $= \left\{ \dfrac{0.6}{5}, \dfrac{0.8}{7}, \dfrac{0.7}{9} \right\}$.

For a given H' = "ABOVE AVERAGE" = $\left\{\dfrac{0.5}{5}, \dfrac{0.9}{6}, \dfrac{0.8}{7}\right\}$,

Compute S' = "ABOVE NORMAL"

SECTION - II

Q7) a) State the various learning rules in neural networks. **[8]**

b) Using Mc-Culloch Pitts neuron, implement a bipolar AND function. Assume initial weights to be [1 1]. **[8]**

OR

Q8) a) What is a perceptron network? State the algorithm for perceptron learning. **[8]**

b) Train a perceptron network for learning a binary OR gate function. Work out two complete iterations. **[8]**

Q9) a) Explain backpropagation algorithm for MLP with a neat signal flow graph. **[8]**

b) Enlist the various activations functions used in neural networks and explain any two in details. **[8]**

OR

Q10) State the applications of artificial neural networks and explain any two in details. **[16]**

Q11) a) Explain unsupervised learning mechanism in contrast with a supervised learning mechanism. **[8]**

b) Describe the Self Organizing Map architecture and explain the Kohonen model. **[8]**

OR

Q12) Write notes on (any two) **[18]**
   a) Architecture of ANFIS
   b) Advantages of ANFIS over FIS
   c) Use of ANN in process control.

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[4164] - 568

B.E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION

(Elective - I) (2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a)   What are the voltage range, frequency range, and electrode used for ECG, EMG and EEG signals?   **[8]**

     b)   Explain electrode offset potential? How effect of electrode offset potential is overcome.   **[8]**

OR

Q2) a)   With the help of neat sketch describe structure of Human Cell and its function.   **[8]**

     b)   Define Ergonomics and explain ergonomic design in Operation table.**[8]**

Q3) a)   Why ECG preamplifier should be multistage amplifier. Discuss the importance of isolation amplifier in ECG machine.   **[8]**

     b)   State the specifications of ECG recorder.   **[8]**

OR

Q4) a)   Describe heart valves and their functions, subsequently generated heart sound.   **[8]**

     b)   Discuss the various ECG leads configuration in detail.   **[8]**

Q5) a) Define the term: **[8]**
Cardiac output, Mean Arterial Pressure, Systolic Pressure, Diastolic Pressure.

b) Draw and explain electromagnetic blood flow meter with transformer voltage handling techniques. **[10]**

OR

Q6) a) Describe in brief various techniques used for BP measurement. **[10]**

b) Explain phonocardiography. **[8]**

SECTION - II

Q7) a) Enlist Specification of EEG. **[8]**

b) Explain various EEG recording modes. **[8]**

OR

Q8) a) Draw and explain the structure of neuron. How unidirectional flow of signal is maintained in neuron transmission. **[8]**

b) Define the term:
Efferent Nerves, Afferent Nerves, Biofeedback, Evoked Potential. **[8]**

Q9) a) Explain tonometer in detail. **[8]**

b) Design instrument used for measurement of loss in the peripheral vision of the subject. **[8]**

OR

Q10) a) Draw and explain three main sections of Human auditory system? Explain the middle ear functioning. **[10]**

b) Explain pure tone audiometer? **[6]**

Q11) a) Explain various types of flow Spirometer? **[10]**

b) Explain the following terms with respect to respiratory measurement. **[8]**
i) RV   ii) ERV
iii) TLC   iv) TV

OR

Q12) a) State the condition of patient at which support of ventilator is essential? **[10]**

b) Define let-go-current and hold-on current and discuss precautions to minimize shock hazards. **[8]**

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[4164] - 607

B.E. (Chemical)

MEMBRANE TECHNOLOGY

(Elective - I) (2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

   1)   *Answer any 3 questions from each section.*

   2)   *Answers to the two sections should be written in separate answer books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Compare the performance of membrane separation process with conventional methods of separation. **[6]**

    b) Define - selectivity and volume flux of a membrane. Explain how they represent efficiency of membrane. **[6]**

    c) Define membrane and classify membranes based on nature morphology.**[6]**

OR

Q2) a) What are composite membranes? How are they prepared? **[6]**

    b) State industrial applications of membrane technology. **[6]**

    c) Define separation factor of a membrane. Explain its significance. **[6]**

Q3) a) Explain steroisomerism in case of polymeric membranes. **[8]**

    b) Explain the effect of chain flexibility and chain interactions on properties of polymeric membranes. **[8]**

OR

Q4) a) Explain the effect of polymeric structure on glass transition temperature of a membrane **[8]**

    b) State the factors which determine thermal and chemical stability of membrane **[8]**

P.T.O.

Q5) a) With neat sketches explain the characteristics of porous, non-porous and carrier mediated transport membranes. **[8]**

b) Explain four different methods for preparation of phase inversion membranes. **[8]**

OR

Q6) a) Explain immersion precipitation techniques for preparation of flat and tubular membranes. **[8]**

b) Explain any four methods of preparation of composite membranes. **[8]**

SECTION - II

Q7) Explain the following methods for determination of structure - related parameters of MF membranes. **[18]**

a) Scanning electron microscopy.

b) Bubble - point method.

c) Mercury intrusion porometry.

OR

Q8) a) Explain the permeability method used to determine the pore size and pore size distribution of hydrophobic MF membranes. **[6]**

b) Explain the following methods to characterise the UF membranes. **[12]**
   i) Gas adsorption - desorption.
   ii) Thermoporometry.
   iii) Permporometry.

Q9) a) Explain the driving forces responsible for transport through membranes. Derive the expression for average dimensionless driving force. **[8]**

b) Explain transport mechanisms of gases through porous membranes by **[8]**
   i) Kundsen flow through narrow pores.
   ii) Viscous flow in wide pores.

OR

Q10) a) Explain friction model approach for transport through porous membranes based on viscous flow and diffusion mechanisms. **[8]**

b) Explain unified approach for transport through porous and nonporous membranes based on the diffusional flow and convective flow described by the equation. **[8]**

$$J_i = \frac{D_i C_j}{RT}\left[RT\frac{d\,|\,n\,a_i}{dx} + V_i\frac{dp}{dx} \right]$$

*Q11)*a)   Explain concentration polarisation in pressure driven processes.   **[8]**

b)   Explain gel layer model for describing concentration polarisation.   **[8]**

OR

*Q12)*a)   Explain boundary layer resistance model for describing concentration polarisation.   **[8]**

b)   Explain the factors responsible for membrane fouling.   **[8]**

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Total No. of Questions : 12]

P1543

SEAT No. :

[Total No. of Pages : 2

[4164] - 610

B.E. (Chemical)

CHEMICAL PROCESS SYNTHESIS

(2008 Pattern) (Sem. - I) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) Answers to the two sections should be written in separate answer books.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain two approaches to chemical process design. **[8]**

b) Explain in short overall process design. **[8]**

OR

Q2) a) Explain in short different parameters in choice of reactor. **[8]**

b) Discuss idealized reactor model. **[8]**

Q3) a) Explain the effect of reactor pressure on the selectivity and reactor volume. **[8]**

b) Explain four possible arrangements for fixed bed reactors. **[8]**

OR

Q4) a) Explain Heterogeneous catalyst and catalytic degredation. **[8]**

b) Discuss fluidized bed catalytic reactor with neat sketch. **[8]**

Q5) a) Discuss preliminary selection factors, if distillation is the choice of separator. **[8]**

b) Explain various types of dryers with neat sketch. **[10]**

OR

P.T.O.

Q6) Write short notes on; **[18]**
     a)   Practical reactors.
     b)   Various parameters on the performance of absorption.
     c)   Centrifugal separation.

SECTION - II

Q7) a)   Explain heat integration in sequencing of simple distillation column. **[8]**
     b)   Discuss thermal coupling for direct and indirect distillation sequencing. **[8]**

OR

Q8) a)   Explain threshold problems in heat exchanger network. **[8]**
     b)   Discuss integration of refrigeration cycle . **[8]**

Q9) a)   Explain heat recovery problem with one hot stream and one cold stream with suitable example. **[8]**
     b)   Explain graphically heat recovery pinch. **[8]**

OR

*Q10)*a)   Discuss integration of steam turbine with the process. **[8]**

     b)   Explain criteria of utility selection in detail. **[8]**

*Q11)*a)   What are safety and health considerations. **[6]**

     b)   Discuss major hazards in process plants. **[6]**
     c)   Explain the intensification of hazardous materials. **[6]**

OR

*Q12)*Write short note on; **[18]**

     a)   Attenuation of hazardous materials.

     b)   Hazard triangle.

     c)   Toxic release from process.

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[4164] - 625

B.E. (Chemical Engineering)
PETROCHEMICAL ENGINEERING
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

  1)   *Answer three questions from section I and three questions from section II.*

  2)   *Answers to the two sections should be written in separate books.*

  3)   *Neat diagrams must be drawn wherever necessary.*

  4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a)   Discuss the importance of petrochemicals and the status of Petrochemical Industries in India. **[8]**

     b)   Enlist and explain the basic raw material for petrochemical synthesis and their sources. **[8]**

OR

Q2) a)   Explain the preparation of feedstocks for petrochemical production.**[8]**

     b)   What are the main building blocks of petrochemical industry? Give the details of petrochemical products that are produced from benzene. **[8]**

Q3) Draw a flowsheet for production of naphthene and explain the process with specification and process conditions. **[16]**

OR

Q4) Explain the production, separation and purification of BTX. Draw a neat schematic diagram. **[16]**

Q5) Describe the process for Production of low molecular weight olefins by Hydrocarbon cracking. Draw necessary diagrams. **[18]**

Q6) Write short notes on; **[3 × 6]**

    a) FCC in petrochemical industries.

    b) Ziegler - Natta catalysts.

    c) Thermal cracking.

SECTION - II

Q7) a) With neat schematic diagram describe about the production of maleic anhydride from benzene? **[12]**

    b) Discuss the various types and uses of second generation intermediates used as solvents and formulating agents. **[4]**

OR

Q8) a) With neat schematic diagram describe about the production of terphthalic acid from p-Xylene? **[12]**

    b) Enlist the various compounds derived from second generation petrochemicals along with its derivatives and industrial applications. **[4]**

Q9) What is addition polymerization. Describe the steps and mechanism of addition polymerization. **[16]**

OR

Q10) With neat sketches explain in detail about production of PVC along with its engineering problems. **[16]**

Q11) Describe the various sources of power generation through refinery and briefly mention about key issues and challenges for petrochemical industry in India. **[18]**

OR

Q12) Write short notes on; **[3 × 6]**

    a) Safety consideration in petrochemical plants.

    b) Recent advances in petrochemical plants & refineries in India.

    c) Pollution control aspects in the petrochemical plants.

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[4164]-645

B.E. (Petroleum)
DEEP WATER TECHNOLOGY
(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A 18–3/4" subsea stack having two 5M shaffer spherical annular preventers, four Hydryl MPL, 10M ram preventers and six fail safe valves of 10M working pressure, requiring 1.1 gallons fluid to open or close each valve A 3000 psi working pressure BOP control unit at surface is used to operate BOP. Calculate the number of accumulator bottles of 11 gallons capacity required in the unit. The minimum operating pressure of accumulator should not be less than 1200 psi data given as **[8]**

   18–3/4", 5M shaffer spherical annular
   preventer, volume to close = 48.16 gallons
   volume to open = 37.61 gallons.

   18–3/4", 10M hydril MPL Ram preventer
   Volume to close one ram = 17.10 gallons
   Volume to open one ram = 15.60 gallons
   Take 50% safety factor, precharge pressure is 1000 psi.

   b) Draw subsea well head system and compair with surface well head system.
   [8]

OR

Q2) a) Discuss Lower Marine Riser (LMRP) Package components in detail. **[8]**

   b) What do you understand by "Station keeping" of a drill ship or a submersible? Discuss any one station keeping method. **[8]**

P.T.O.

Q3) a) Explain subsea cementation process for 9–5/8" casing with suitable sketch.

[8]

b) Show that minimum horizontal stress is [5]

$$\sigma_h = \left(\frac{\gamma}{1-\gamma}\right)\sigma_v$$

γ - poisson's ratio

σ_v - vertical stress

σ_h - horizontal stress

c) Calculate principle stresses and angle of failure plane using equations. If $\sigma_x = 17.5$ psi $\sigma_y = 12.5$ psi $\tau_{xy} = 4.33$ psi are normal stress of state.

[5]

OR

Q4) a) Discuss stresses around well bore for linear elastic behaviour of formation and plot a tensor. [6]

b) Discuss gas hydrate problem and remedy in deepwater drilling. [6]

c) What is ECD? Discuss effect of ECD on Bottom hole pressure. [6]

Q5) a) What are different offshore mobile drilling units? Explain with the help of neat sketches. [8]

b) Using linear wave theory find out wave length and wave celerity for a propagating wave with a wave period of 12 second in deep and shallow water. For same wave find out maximum horizontal and vertical displacement of water particle in deep and shallow water condition if wave height is 8m. [8]

OR

Q6) a) Write short notes : [12]
   i) ROV.
   ii) Airy's theory of linear waves.

b) Discuss different types of principle motions on a floating offshore rig. [4]

SECTION - II

Q7) a) What are different types of platform? Discuss advantages and disadvantages of concrete gravity platform. [8]

b) Discuss effect of wind, wave and current forces on Jack up/fixed platform.

[8]

OR

Q8) Discuss fixed offshore production platform design and planning considerations in detail. **[16]**

Q9) a) Discuss any one subsea completion tree with suitable sketch. **[8]**

b) Discuss design considerations of 3-phase separator on offshore production platform. **[8]**

OR

Q10) a) Discuss any type of EOR technique with suitable sketch. **[12]**

b) Write short note on production monitoring and control system. **[4]**

Q11) a) Write short notes on : **[12]**
   i) FPSO.
   ii) Storage tanks.

b) Discuss logistic considerations in exploratory and drilling operations (offshore). **[6]**

OR

Q12) a) Discuss the assumptions and derive Weymount equation for horizontal gas flow in a pipe **[12]**

$$q = \left[\frac{(p_1^2 - p_2^2)D^5}{r_g \ TZFL} \right]^{0.5} C \ \frac{T_b}{P_b}$$

b) Discuss drill stem test in brief. **[6]**

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[4164]-650

B.E. (Petroleum)

WELL CONTROL METHODS

(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss BHP (Bottom hole pressure) in following different well situations.

[6]

   i) When not circulating
   ii) While drilling
   iii) Shutting the well after a kick
   iv) While tripping in
   v) While tripping out

b) What is leak off test? Discuss necessity and test procedure in brief. Calculate LOT value in ppg if casing shoe depth is 8000 ft TVD/8250 ft (MD), Mud weight - 10 ppg, LOT pressure - 1200 psi, find out formation leak-off pressure. **[12]**

OR

Q2) a) What is MAASP? a casing is lowered to a depth of 9500 ft, shoe TVD 8700 ft. After drilling shoe & 15 ft of formation, leak of test was conducted with 11.6 ppg mud. Calculate **[8]**

   i) MAASP if sub-surface formation leak-off pressure is 6500 psi.
   ii) MAASP if formation fracture gradient is 0.75 psi/ft.

b) Discuss shallow gas hazard in top hole drilling in detail. **[8]**

c) Discuss causes of reduction in hydrostatic head. **[2]**

P.T.O.

Q3) a) Discuss shut in procedures (As per API RP59) for land/jack-up rigs. in brief while drilling. **[8]**

b) Calculate influx height, gradient and nature of influx. **[8]**

SIDPP = 500 psi   SICP = 610 psi kick volume = 10 bbl
Hole size = 8.5"   OH × drill pipe capacity = 0.0459 bbl/ft
TVD = 10,000 ft   OH × drill collar capacity = 0.03 bbl/ft
Mud weight = 10 ppg, drill collar length = 600 ft.

OR

Q4) a) Discuss gas influx behaviour in open well migration. **[4]**

b) Calculate the vertical height of influx with following data. **[6]**

Hole size = 8.5" well depth = 11460 ft.
Hole inclination at the bottom = 10°
Drill collars: 6.5", 2-5/8" ID, 360 ft
OH × Drill collar capacity = 0.0289 bbls/ft
OH × Drill pipe capacity = 0.04511 bbls/ft
Pit gain = 28 bbls.

c) Discuss causes of kick and positive kick signs in brief. **[6]**

Q5) a) Accumulator bottle capacity = 10 gallons **[6]**
Number of bottles = 20
Max. operating pressure = 3000 psi
Minimum operating pressure = 1200 psi
Pre-charge pressure = 1000 psi
During BOP function the pressure on the accumulator bottle bank drops from 3000 psi to 1700 psi. How many gallons of fluid did that function use?

b) Discuss the functions of BOP accumulator components. **[10]**
i) Hydro electric pressure switch
ii) Hydro pneumatic pressure switch
iii) Four way valve
iv) Manifold regulator
v) Accumulator pressure relief value.

OR

Q6) a) Discuss procedure to test pipe ram (BOP pressure test) after installation of BOP or nipple/up BOP on casing head with suitable sketch. **[8]**

b) Write short note on : **[8]**
i) Bit float.
ii) Mud gas separator.
iii) Diverter.
iv) IBOP.

SECTION - II

Q7) a) Discuss wait and weight method of well control in detail. **[8]**

b) Discuss well control considerations for horizontal wells and associated problems in detail. **[8]**

OR

Q8) a) Prepare kill sheet for following well data. **[16]**

Hole size = 8.5" inch, Hole depth = 11962 ft/10892 ft

Casing $13 - \frac{5}{8}''$ set at 9537 ft/9472 ft

Drill pipe 5" inch, capacity 0.0176 bbl/ft.
HWDP 5" inch, 484 feet long, capacity = 0.0088 bbl/ft
Drill collar 6.25" inch, 720 feet, capacity = 0.007 bbl/ft
Mud density = 14.5 ppg.

Capacities

Drill collar in open hole 0.0322 bbl/ft
Drill pipe/HWDP in open hole 0.0447 bbl/ft
Drill pipe/HWDP in casing 0.0493 bbl/ft
Mud pump displacement = 0.0109 bbl/stroke
Slow circulating rate = 720 psi at 30 spm
Fracture mud weight at casing shoe 16.9 ppg

Kick data
SIDPP = 550 psi   SICP = 783 psi

Find
i) Initial Maasp
ii) Drill string volume
iii) Open hole volume
iv) Total annulus volume
v) Total well system volume
vi) What is the pressure safety margin at casing shoe with the well shut in?
vii) Kill mud density
viii) ICP and FCP

Q9) a) How to identify following unusual situations plug bit nozzle, washed out bit nozzle, plugged choke, washed out choke or choke manifold. **[8]**

b) It was decided to reduce the mud weight from 12.4 ppg while tripping in the well of 9980 ft TVD, string was run to 5950 ft and original mud was displaced by 10.7ppg mud. **[4]**

i) What will be bottom hole pressure now?

ii) When string was run down to bottom the entire well was displaced by 10.8 ppg mud

Calculate BHP in static condition. **[4]**

c) Write short note on underground blow out.

<center>OR</center>

Q10) a) A well is being using wait and weight method at 30 spm with following data. **[4]**

Well depth : 9000 ft, SIDPP = 400 psi SICP = 600 psi

Original mud : 11ppg

After 1000 strokes, pump speed changed from 30 spm to 40 spm keeping casing pressure constant. What will be the pumping pressure now? Ignore any annular pressure losses.

b) Discuss in brief snubbing operation. **[8]**

c) What is "bull heading"? **[4]**

Q11) a) Discuss subsea BOP stack with suitable sketch. **[9]**

b) Describe kick prevention and detection in deep water floater ring. **[9]**

<center>OR</center>

Q12) Write short notes on : **[18]**

a) Hydrate formation & prevention

b) Choke line friction.

c) Riser booster pump.

d) Volumeric kill lubrication method.

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[4164]-653

B.E. (Petrochemical Engg.)
PROCESS DYNAMICS AND CONTROL
(2008 Course) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Why linearized approximate models are useful for process control purposes? Develop an linearized expression for the following square root relationship. **[8]**

$$q = C^* \ (h)^{1/2}$$

b) Solve the differential equation with help of Laplace Transform : **[8]**

$$\frac{d^2y}{dt^2} + 3.4\frac{dy}{dt} - y = 23.7 \quad \text{where } y' \ (0) = 0 \text{ and } y \ (0) = 3.2$$

OR

Q2) a) Discuss importance and usefulness of Process Control in Petrochemical Industry and Refineries. **[8]**

b) Discuss the merits and usefulness of Feed-forward and Feed-back Control loops. Draw neat schematic diagram and explain the mode of operation of both. **[8]**

Q3) a) Derive the expression for overall transfer function of a simple thermometer. Comment on the dynamics of the system. **[8]**

b) Define following with help of neat diagrams : **[4]**
Response Time, Damping factor

c) Write a short note on Hierarchy of Process Control Activities. **[6]**

Q4) a) Determine the transfer function $\dfrac{H(s)}{Q(s)}$ for the liquid level system shown in the figure. Resistances R_1 and R_2 can be considered to be linear. Flow from tank 3 is maintained constant at a pre-set value M by means of a pump. All 3 tanks are non-interacting with each other. **[9]**
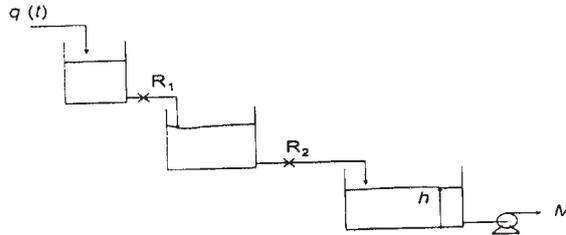
b) For a liquid level system as shown below, cross-sectional area of tank = $3.0 m^2$. The valve characteristics is given by $q_{out} = 4.7*h$ **[9]**
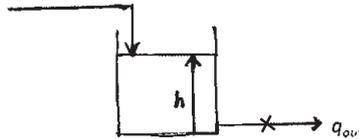
Where, q_{out} is flowrate in m^3/h at outlet and h denotes level of liquid above tank in m.
Calculate the time constant for the system if the average operating level is 5.6 m.

Q5) a) With help of neat sketch explain the proportional, derivative and integral modes of a PID controller. **[8]**

b) Discuss how the transportation lag parameter can be minimized in the Chemical Industry. Discuss its effects on the complexities in the overall control architecture. **[8]**

Q6) a) Differentiate between Servo and Regulatory control problems - explain with help of neat diagram. **[8]**

b) Write short notes on : **[8]**
    i) Integral Control Action and Reset Windup.
    ii) Performance Criteria for Closed Loop System.

SECTION - II

Q7) a) For the control system represented by characteristic equation. **[6]**

$$s^4 + 4s^3 + 6s^2 + 4s + (1+K) = 0$$

Determine the maximum value of gain K which leads to a stabilized operation.

b) Draw Bode Plot for the following System : **[8]**

$$20* (4.2s + 1)^{-1} *(3s + 1)^{-1}$$

c) Discuss Ziegler Nichols method of controller Tuning. **[4]**

OR

Q8) a) Draw Root locus Diagram for the following closed loop transfer function. Comment on the stability of the system. **[10]**
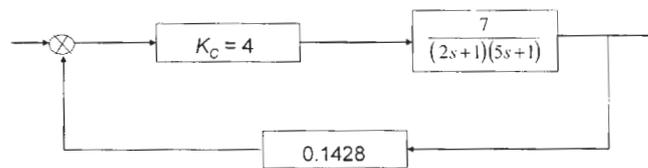
b) Explain the actual working of a simple feedback loop with pneumatic valve as the final control element. Provide schematic diagram. **[8]**

Q9) a) Explain Cascade Control Scheme for a shell and tube heat exchanger. **[8]**

b) Oil and water are to be separated based on their differences in density. Develop a programmable logic control (PLC) algorithm for this industrially important process. **[8]**

OR

Q10) a) With help of diagram explain Gain Margin and Phase Margin and their significances. **[5]**

b) Calculate Amplitude Ratio and Phase Angle for overdamped 2nd order system with transfer function : $G(s) = \dfrac{12}{(4.5s + 1)(1.6s + 1)}$ **[6]**

c) With help of suitable example explain Ratio Control and its usefulness. **[5]**

Q11) a) Discuss the selection of Control modes for following processes : **[8]**
   i)   Vapor Pressure Control.
   ii) Temperature Control.
   iii) Flow Control.

b) Explain the working of DCS and its advantages in a Grass root Refinery Complex. **[8]**

OR

Q12) Write short notes on (Any Three) :   **[16]**

    a) Fieldbus Technology.

    b) Z-Transform and its Applicability.

    c) Analog to Digital Conversion of signals.

    d) Control Valve sizing and its characteristics.

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[4164]-664

B.E. (Petrochemical)

PLANT DESIGN AND PROCESS ECONOMICS

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any 3 questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What are the different items that should be considered in making a feasibility survey of a typical Chemical/Petrochemical Engineering project? **[6]**

b) What are logical steps in design activities of any process plant? What are important points must be taken into consideration in process developments? **[6]**

c) Discuss the role of Chemical/Petrochemical engineer in process design?**[6]**

OR

Q2) a) Discuss in brief about the factors to be considered in Plant location and site selection. **[6]**

b) Discuss the anatomy of Chemical/Petrochemical engineering projects? What are the standard references/resources for chemical engineers working in Projects? **[6]**

c) What do you mean by pilot plant? What is importance of pilot plant in process development? **[6]**

Q3) a) Write a note on HAZOP and HAZEN study to be carried out in any process plant with respect to safety aspects. **[8]**

b) Differentiate clearly between PFD, PBD and P&ID regarding their contents. Also write about specific purpose(s) of these diagrams. **[8]**

OR

Q4) a) What are the key differences between a batch processes and a continuous processes? Which of the processes listed below would you describe as continuous processes, which as batch processes and which as semi-continuous (or semi-batch) processes? Justify your decisions. **[8]**

   i) Passing wastewater through an activated sludge system.

   ii) Feeding crude oil through a fractional distillation column.

   iii) Preparing a batch of dilute acid by half filling a tank with water and then adding concentrated acid to the tank slowly and continuously, mixing all the time, until the desired acid concentration is reached.

   iv) Feeding ethylene at a pressure of 266 Mpa and a temperature of over 300°C through an 800-meter long reactor to produce polyethylene.

b) What are process utilities? Briefly discuss important utilities required in a typical Petrochemical complex/refinery unit. **[8]**

Q5) a) A project has the following activities, activities duration and predecessors.
   [8]

Activity	Duration (Days)	Predecessor
A	6	-
B	10	A
C	12	A
D	9	B,C
E	8	C
F	5	D,E

   i) Draw the PERT chart for this problem and determine the critical path.

   ii) Indicate the critical path on the PERT chart.

b) Discuss the important consideration to be given in design of Plant Layout. **[8]**

OR

Q6) a) Discuss the drawbacks of Milestone chart, GANT chart and BAR chart. **[8]**

b) Most process units require consideration of proper materials of construction. The following table gives a relative cost of metals using carbon steel as a base. **[8]**

Material	Relative Cost
Carbon Steel	Base Cost (Lowest)
Low Alloy Steel	Low-Moderate
Stainless Steel	Moderate
Aluminium and Aluminium Alloys	Moderate
Copper and Copper Alloys	Moderate
Titanium and Titanium based Alloys	High
Nickel and Nickel based Alloys	High

Why is the selection of the correct material important, and what are some of the constraints one must deal with when making choice. Consider different situations such as for example a crude tower in an oil refinery or a vessel in a vaccine -manufacturing unit.

SECTION - II

Q7) Answer **Any Three** from the following : **[18]**

a) Discuss breakdown of Fixed Capital Investment (FCI) items for a chemical process.

b) Define the following and give examples of each :

   i) Current assets.

   ii) Current liabilities.

   iii) Fixed assets.

   iv) Intangible assets.

c) Often it is said, "Depreciation and taxes are irrevocably tied to each other." Give your comment on this statement.

d) Discuss the types of cost indices available in the Chemical Engineering literature. Discuss the importance of these cost indices for cost estimation of chemical engineering equipment.

e) A company is considering the manufacture of ethylene oxide as an intermediate for its polymer division. The process to be used is the direct oxidation of ethylene. The company built a similar unit in 2002 that had a rated capacity of 100,000 tons annually for Rs. 65,000,000. The projected production of the new facility is to be 150,000 tons annually. Estimate the fixed capital investment in 2012 to produce the required ethylene oxide.

Data :

CE Index for 2002 = 388.

CE Index for 2012 = 535

f) Write a brief note on : "Taxes and Insurance".

OR

Q8) a) Recently a cast iron leaf pressure filter with 9.29 m^2 was purchased for clarifying an inorganic liquid stream for Rs. 9,50,000. In a similar application, the company will need a 40.80 m^2 cast iron leaf pressure filter. The size exponent for this type filter is 0.6. Estimate the purchased price of the 40.80 m^2 unit. **[10]**

b) Discuss in brief the various components of a balance sheet and profit and loss account statements. **[8]**

Q9) a) The following data are available for two distillation columns from a petrochemical plant:

Item	Distillation Column (with Sieve Trays)	Distillation Column (with structured packings)
Installed cost	Rs. 25,00,000	Rs. 35,00,000
Salvage value	0	0
Service life	3	?
Interest rate (i)	12%	12%

If the capitalized cost is same for both the distillation columns, estimate service life for distillation column with structured packings. **[8]**

b) Two projects A and B have initial capital investment of Rs. 10,00,000 each the cash-inflows of the two projects are as under :

	Cash in flows	
Year	Project A	Project B
1	Rs. 4,00,000	Rs. 2,50,000
2	Rs. 5,00,000	Rs. 3,50,000
3	Rs. 1,00,000	Rs. 2,50,000
4	Rs. 25,000	Rs. 1,50,000
5	Rs. 25,000	Rs. 2,00,000
6	Rs. 20,000	Rs. 1,75,000

Choose one out of the two projects or the basis of pay-back period method of evaluation. Comment on the limitation of pay-back period method? **[8]**

OR

Q10) a) A reactor having a negligible scrap value is estimated to have a service life of 10 years. The original value of the reactor was Rs. 6,20,000. Determine the depreciation charges for the 7th year using following methods:

i) Straight line method.

ii) Double declining balance method.

iii) Sum of years digit method.

Estimate also the percentage of the investment paid off in the first seven-year service life with these methods. **[8]**

b) Write a brief note on "Break Even Analysis". **[4]**

c) Determine break even point (in units and values) for the project having following details : **[4]**

Variable cost = Rs. 50 per unit at 100% capacity.

Fixed Cost = Rs. 150000per year.

Selling Price = Rs. 5 per unit.

Q11) An existing plant has been operating in such a way that a large amount of heat is being lost in waste gases. It has been proposed to save money by recovering heat now being lost. Four different heat exchangers have been designed to recover the heat and all prices. Saving has been calculated for each of the design is given in the following table. The plant manager wants at least 16% annual return on initial investment. Which one of the four designs should recommend to the plant manager? **[16]**

Data:

Item	Design I	Design II	Design IV	Design III
Initial Installed cost (Rs)	2,50,000	4,00,000	5,00,000	6,50,000
Operating Cost, (Rs.)	7,500	7,500	7,500/-	7,500
Fixed Charges, % of initial cost per year	10%	10%	10%	10%
Value of heat saved (Rs/Year)	1,00,000	1,40,000	1,60,000	2,00,000

OR

Q12) a) A plant is producing 100 tonnes/year of a product. The overall yield is 70% on mass basis. The raw material costs Rs.100/tonne, and the product sells at Rs.350/tonne. A process modification has been devised that will increase the yield to 75%. The additional investment required is Rs. 40,000. Is the modification worth making if the minimum acceptable rate of return is 20%. **[6]**

b) If the delivered cost of equipments of solid fluid processing plant is Rs. 5×10^6, estimate the capital cost of the plant using Lang's factors method. **[6]**

c) Write a brief note on : "Importance of Process Economics to Chemical/ Petrochemical Engineers". **[4]**

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[4164]-691

B.E. (Polymer Engineering)
POLYMER THERMODYNAMICS AND BLENDS
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Draw neat diagrams wherever necessary.*
3) *Numbers to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *Use of logarithmic table, electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain the following terms :   **[6]**
   i) Heat
   ii) Internal Energy.
   iii) Work.

     b) State The First Law Of Thermodynamics for Cyclic Process and derive the relation for the same for non flow process. **[8]**

     c) State Limitations of The First Law Of Thermodynamics. **[4]**

OR

Q2) a) Explain in detail Entropy term. **[6]**

     b) State The Third Law Of Thermodynamics. **[4]**

     c) Explain the following terms : **[8]**
   i) Steady State.
   ii) Equilibrium State.
   iii) Phase Rule.
   iv) Intensive Properties.

Q3) a) Explain in detail the necessity conditions governed by Free energy of mixing for Equilibrium – Phase Behaviour of mixtures. **[8]**

     b) Write a short note on effect of molecular weight on phase equilibrium. **[8]**

<center>OR</center>

Q4) a) Define the excess properties and derive the relation for S^E, G^E, H^E, V^E (S=Entropy, G=Gibbs free energy, H=enthalpy, V=volume and suffix E for excess) **[8]**

b) Explain stable, metastable and unstable phases. State the thermodynamic conditions for Phase separations. **[8]**

Q5) a) Plot a single graph, the composition dependence of the free energy of mixing per site (normalized by the thermal energy) $\Delta G_{mix}/kT$ of a symmetric polymer blend with $N_A=N_B=100$ using 5 different choices of parameter X=0.0.01, 0.02, 0.03, 0.04. Which choice of X make blends miscible in all proportions (i.e. over whole composition range $0 \le \varphi \le 1$) and why? [ΔF_{mix} = free energy of mixing, k=Boltzman constant, T=temperature, X= Flory interaction parameter, φ=volume fraction].**[8]**

b) Derive the 'Flory Huggins equation for polymer blends'. **[8]**

<center>OR</center>

Q6) a) Explain with one example. **[10]**
   i) Effect of Hydrogen bonding interaction.
   ii) Effect of Hilderbrand solubility parameter.

b) Explain with example from lattice theory why polymer blends have stymied entropy? **[6]**

<center>**SECTION - II**</center>

Q7) a) Explain any two methods of preparation of Polymer Blends with suitable example. **[9]**

b) With the help of two commercial examples, Property advantages and Applications discuss the term Miscible Blends. **[9]**

<center>OR</center>

Q8) a) Discuss the advantages and disadvantages of the following engineering Polymeric modifier: **[9]**
   i) Polycarbonate (PC)
   ii) Acrylonitrile butadiene styrene (ABS)
   iii) Polyethylene Terephthalate (PET).

b) Discuss the following terms with suitable examples : **[9]**
   Ease of Processing, Economy, Enhanced Property, Ecology via Polymer Blend technology.

Q9) a) Discuss with examples Rubber Toughening of Brittle and Ductile Polymer matrix. **[8]**

b) Discuss the importance of Maleated Polymers in Polymer Blend Technology. **[8]**

OR

Q10) a) Discuss Equilibrium Morphology and phase inversion concept in polymer blends. **[8]**

b) Discuss the role of compatibilizer and different factor contributing to end use properties of polymer blend. **[8]**

Q11) a) Explain the how to use known model system to predict rheology of miscible polymer blends. **[8]**

b) Discuss the classifications of interpenetrating Polymer Network and discuss any one with suitable example. **[8]**

OR

Q12) Write a note on : **[16]**

a) Semi-IPN of PU/PMMA.

b) Compatibilized Blend of PS/PP.

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[4164]-725

B.E. (Information Technology)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain intelligence and artificial intelligence system. Also explain with examples how does conventional computing differs from intelligent computing? **[8]**

b) For each of the following agents develop a PEAS description of the task environment : **[8]**
   i)   Robot soccer player.
   ii) Internet book-shopping agent.

OR

Q2) a) In your own words, define how an agent and a program differ. What types of interface agents could be used in an Internet environment? **[8]**

b) What is swarm intelligence? What problems do swarm intelligent systems solve? **[8]**

Q3) a) What is heuristic search? Explain with example. Also write heuristics function for following problems. **[6]**
   i)   Travelling Salesman Problem.
   ii) Tic-tac toe.

b) Explain generate and test algorithms by giving its advantages and disadvantages. **[6]**

c) Discuss the performance of A* algorithm when the heuristic function either under-estimates or over estimates the value of states. **[6]**

OR

Q4) a) What is uninformed (or blind) search and how does it differ from informed (or heuristic) search? **[6]**

b) What is ply in game-tree search? Given the game tree shown below what is the value at the root node and which nodes are pruned from the search? **[6]**
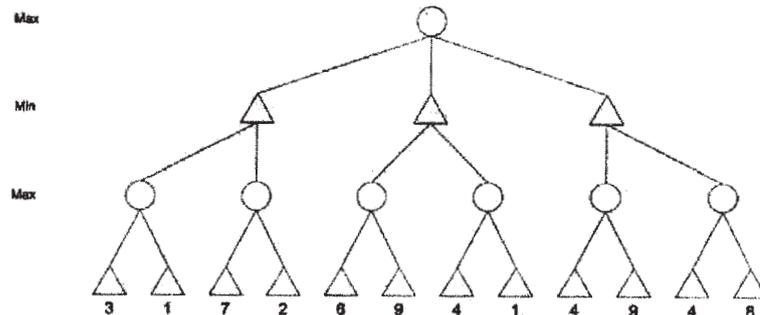
c) Solve the following cryptarithmatic problem. **[6]**

       N I N A
   +   S I N G
   ─────────────
     A G A I N

Q5) a) Write the difference between predicate logic and proportional logic. How can you represent the resolution in predicate logic. **[8]**

b) Represent each of the following sentences in first-order logic. **[8]**
   i)   A whale is a mammal.
   ii)   Jane loves John.
   iii) John knows Jane's father.
   iv)   If it's raining, then the ground is wet.
   v)   If the switch is on and the light is off then the light-bulb is broken.
   vi)   All computers have a processor.
   Also describe the advantages of predicate logic over propositional logic.

OR

Q6) a) Write brief notes on frames and scripts. Give examples for each. **[8]**

b) Identify application areas where reasoning under uncertainty condition is necessary? Explain various methods to represent uncertainty. **[8]**

SECTION - II

Q7) a) Describe the STRIPS language for representing states, goals, and operators within a planning system. **[6]**

b) What is block world problem? Give suitable example. **[6]**

c) Explain is the basic principal of goal stack planning? **[6]**

OR

Q8) a) What is perception? What are the problems in perceptions? **[6]**

b) How computer vision is used for manipulation and navigation? **[6]**

c) Explain perception as applied to image processing. **[6]**

Q9) a) Give two examples of each of the following and briefly describe each model. **[8]**

i) Supervised Learning.

ii) Unsupervised Learning.

b) Contrast expert systems and neural networks in terms of knowledge representation, knowledge acquisition and explanation. Give one domain in which the expert system approach would be more promising and one domain in which the neural network approach would be more promising. **[8]**

OR

Q10) a) Explain learning by induction with suitable examples. **[8]**

b) What do you mean by knowledge engineering? Discuss various stages of knowledge acquisition. **[8]**

Q11) a) Write short note on : **[8]**

i) Distributed AI

ii) Genetic algorithms.

b) Explain the structure of prolog program. Also explain how conversion from English to Prolog facts and Rules is performed? **[8]**

OR

Q12) a) What is cut? You are given the following PROLOG program. **[8]**
vehicle(X):- heavy(X).
light(X):- car(X).
heavy(X):- bus(X).
heavy(X):- truck(X).

car(zen).
car(swift).
bus(tata).
bus (ashok)
truck(mahindra),

What will be the output of the query? -Vehicle(X) in each of the cases if the following rule is added in the beginning of the above program.

    i)   vehicle(X):- light (X).
    ii)   vehicle(X):- light (X),!.
    iii) vehicle(X):- !, light (X).
    iv)   vehicle(X):- light (X),fail.
    v)   vehicle(X):- light (X),fail,!.
    vi)   vehicle(X):- light (X),!,fail.

b) What is List in Prolog? How to manipulate list? Give suitable examples.**[8]**

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Total No. of Questions : 12]

SEAT No. :

P1551

[Total No. of Pages : 3

[4164]-728

B.E. (Information Technology)
EMBEDDED SYSTEMS
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *In section I attempt: Q.No. 1 or Q.No. 2, Q.No.3 or Q.No. 4, Q.No.5 or Q.No.6.*
   In section II attempt: Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12.
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the advantages of using ASIC & SOC in embedded systems? Explain. **[8]**

b) Classify embedded systems. Give examples for each category. **[8]**

OR

Q2) a) What are the salient features of embedded systems? **[6]**

b) What are the features of ARM7 core? **[6]**

c) Differentiate between CISC and RISC. **[4]**

Q3) a) Describe special structural units of processor that helps to improve its performance when used in Embedded system. **[6]**

b) What are the techniques of power & energy management in a system?**[6]**

c) What are the types of memory that can be integrated in a processor?**[6]**

OR

Q4) a) What is the difference between level 1 and level 2 cache? Which other techniques are used to improve memory performance? **[6]**

b) What is the importance of clocking unit in embedded systems? How does it affect performance of an embedded system? **[6]**

c) What is the role of Watchdog timer in an Embedded system? **[6]**

P.T.O.

Q5) a) What is the difference between serial & parallel I/O? Mention different standards used for both. **[8]**

b) Describe I²C protocol and the applications where it is preferred. **[8]**

OR

Q6) a) Which optical devices are used in the embedded systems? **[4]**

b) Compare USB and CAN protocols. **[4]**

c) How does host recognize the device insertion in USB protocol. **[8]**

SECTION - II

Q7) a) What are the different phases of software development cycle for a typical embedded system? **[8]**

b) What are queues in C language? What are their uses in embedded system programming? **[6]**

c) When do you use high level language instead of assembly language for embedded system programming? **[4]**

OR

Q8) a) When do you consider object oriented programming language for embedded systems? Explain. **[6]**

b) What is cross compiler? How it is different than generic compiler? Give details. **[6]**

c) How embedded system software can be debugged? Give one example for such a debugger. **[6]**

Q9) a) What are the different characteristics of real time operating system? Give two example of RTOS. **[6]**

b) With the help of neat diagram, explain cooperative round robin scheduling model for RTOS. What is interrupt latency time for this scheduling model. **[10]**

OR

Q10) a) With the help of neat diagram, explain cyclic scheduling with time slicing for RTOS. **[8]**

b) Define and explain interrupt latency period. What is its significance in RTOS? **[4]**

c) What is a Process and a Thread? **[4]**

Q11) a) Differentiate MicroC/OS-II and VxWorks based on features and their area of application. **[6]**

b) With the help of neat system block diagram, explain the system requirements and tasks for chocolate vending machine. **[10]**

OR

Q12) a) How tasks are managed in MicroC/OS-II? Explain in detail. **[8]**

b) With the help of neat diagram, explain synchronization of tasks and IPCs for smartcard application. **[8]**

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[4164]-738

B.E. (Information Technology)
NEURAL NETWORK AND EXPERT SYSTEM
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the TWO sections should be written in SEPARATE sheet.*

   2)   *Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe features of the biological neural network that make it superior to the most sophisticated Artificial Intelligence computer system for pattern recognition tasks. **[9]**

     b) Explain, with examples, differences between the following pattern recognition tasks: **[9]**

        i)   Association vs classification.

        ii)   Classification vs mapping.

OR

Q2) a) Compare the performance of a computer and that of a biological neural network in terms of speed of processing, size and complexity, storage, fault tolerance and control mechanism. **[9]**

     b) With the help of suitable diagram discuss functioning of a simple artificial neuron. Explain how the functionality is affected if two such neuron are connected in series. **[9]**

Q3) a) Draw and explain Rosenablatt's perceptron model of a neuron. Write the equations which describe the operation of the perceptron model of a neuron. **[8]**

     b) What does Learning laws describes? Explain Perceptron Learning Law.**[8]**

OR

Q4) a) What are the main differences among the three models of artificial neuron, namely, McCulloch-Pitts, perceptron and ADALINE? **[8]**

b) What is conjugate gradient method? Comment on the performance of the conjugate-gradient method. **[8]**

Q5) a) Draw and explain architecture of Radial Basis Function (RBF) Networks. **[8]**

b) Explain how Support Vector Machines is used for pattern classification and non-linear regression? **[8]**

<div align="center">OR</div>

Q6) a) Explain Radial basis function network for function approximation, with one output unit and L hidden units. Draw suitable diagram. **[8]**

b) What is the basic concept of Relevance Vector Machines? Explain how it is used for classification problem? **[8]**

<div align="center"><u>**SECTION - II**</u></div>

Q7) a) Explain the principal goal of self-organizing map (SOM). Explain three essential processes involved in the formation of the self-organizing map. **[10]**

b) What are the salient features of the Kohonen's self-organizing learning algorithm? **[8]**

<div align="center">OR</div>

Q8) a) Explain architecture of a Boltzmann Machine. Illustration it with suitable diagram. **[10]**

b) What is Hopfield model of a neural network? What is meant by capacity of feedback network? **[8]**

Q9) a) What are the main advantages in keeping the knowledge base separate from control module in knowledge-based systems? **[8]**

b) Identify and describe two good application areas for an expert system within a university environment. **[8]**

<div align="center">OR</div>

Q10) a) What is blackboard system architecture? Draw diagram to explain three functional components of blackboard system. **[8]**

b) What is uncertainty? Explain at least two approaches which are used to deal with uncertainly problem. **[8]**

Q11) a) What is the need of knowledge system building tools for expert system? Which features and capabilities a developer should consider when evaluating building tools for expert system development? **[8]**

b) Explain how MYCIN helps diagnoses infectious blood diseases and recommend therapy for patients. **[8]**

OR

Q12) a) Explain how DENDRAL determine molecular structure of an unknown compound. Write prominent features of DENDRAL. **[8]**

b) What do you mean by knowledge engineering? Explain various stages of knowledge acquisition. **[8]**

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[4164]-741

B.E. (Biotechnology)

BIOSEPARATION - II

(2008 Pattern) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

    1) *Answer three questions from Section I and three questions from Section II.*

    2) *Answers to the two sections should be written in separate answer books.*

    3) *Neat diagrams must be drawn wherever necessary.*

    4) *Figures to the right indicate full marks.*

    5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in detail role and importance of downstream processing in biotechnological processes. **[10]**

    b) What do you mean by purification? Describe problems and requirement of bio product purification. **[6]**

OR

Q2) Write in detail about process design criteria for following classes of bio-products. **[16]**

    a) High volume and Low value Products.

    b) Low volume and High value Products.

Q3) Write short notes on : (Any 2) **[16]**

    a) Spectroflurometry.

    b) Spectrophotometry.

    c) Atomic absorption spectroscopy.

    d) NMR.

Q4) Explain in detail gel permeation chromatography with the help of following points : **[18]**

    a) Principle.

    b) Retention.

    c) Procedure.

    d) Material.

    e) Application.

OR

Q5) Describe in detail reversed phase chromatography and hydrophobic interaction chromatography. **[18]**

SECTION - II

Q6) Write short notes on : (Any 2) **[16]**

    a) Gas chromatography.

    b) Liquid chromatography.

    c) GC-MS.

    d) LC-MS.

Q7) What are hyphenated techniques? Illustrate the concept with examples. **[16]**

OR

Q8) What do you mean by SFE? Explain in detail technique with case study. **[16]**

Q9) a) Explain production of penicillin with respect to bioseparation techniques. **[9]**

    b) Write a historical background of beer production and elaborate on advancement of the production process. **[9]**

OR

Q10) Describe the process of butanol production and methods of butanol separation. **[18]**

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[4164]-742

B.E. (Biotechnology)

INSTRUMENTATION AND PROCESS CONTROL

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer three questions from Section I and three questions from Section II.*

    2)   *Answer to the two sections should be written in separate answer books.*

    3)   *Neat diagrams should be drawn whenever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of electronic pocket calculator is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe in brief the principle, construction and working of a thermocouple. **[8]**

    b) Explain in brief the working principle of the following instruments : **[8]**

        i)   Shadow graph interferometer.

        ii)   Optical pyrometer.

OR

Q2) a) With the help of neat sketch, explain the principle and working of a diaphragm pressure gauge. **[8]**

    b) Give an overview of the advantages and disadvantages of Electromagnetic flow meter. **[4]**

    c) Describe the working of a level gauge. **[4]**

Q3) a) Derive the transfer function for mercury in glass thermometer clearly stating the assumptions. **[6]**

    b) Determine Y(5) if $Y(s) = \dfrac{5}{s^2 + 3s + 2}$. **[6]**

    c) With the help of a neat sketch, describe the response of a first order system to sinusoidal input. **[6]**

OR

Q4) a) A thermometer having a time constant of 1 min is initially placed at 50ºC. It is then immersed in a bath maintained at 100ºC at $t = 0$. Determine the thermometer reading at 1.2 min. **[6]**

b) In a typical mixing process, a stream of solution containing dissolved salt flows at a constant volumetric flow rate q into a tank of constant hold up volume V. The concentration of salt in the entering stream x (mass of salt/volume) varies with time. Derive the transfer function for this process relating the outlet concentration y to the inlet concentration x. **[6]**

c) Differentiate between the response of a first order system to step input and impulse input. **[6]**

Q5) a) Describe in detail the response of a second order system for step forcing function. Discuss this with reference to the different values of the damping coefficient. **[8]**

b) Derive the transfer function for a liquid level system having a linear resistance. How does the response of the above system change if it is having a constant flow output? **[8]**

OR

Q6) a) The liquid level process shown in figure is operating at steady state when at $t = 0$, 1 ft³ water is added suddenly (unit impulse) to the tank. Sketch the response of the level in the tank versus time and determine the level at $t = 0.5$ min. **[8]**
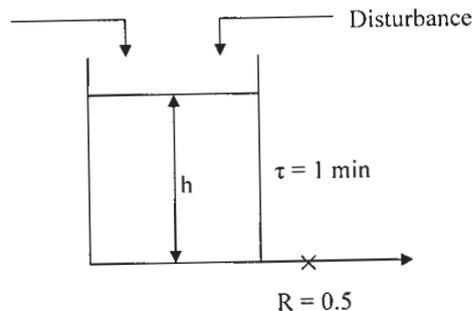
b) Explain the concept of transportation lag in process industries. Derive its transfer function. **[8]**

SECTION - II

Q7) a) Derive the transfer function for a PID controller and discuss the characteristics of control action of the same. **[6]**

b) Differentiate between Servo and regulator problem. **[2]**

c) Derive the transfer function Y(s)/X(s) for the following control system:**[8]**
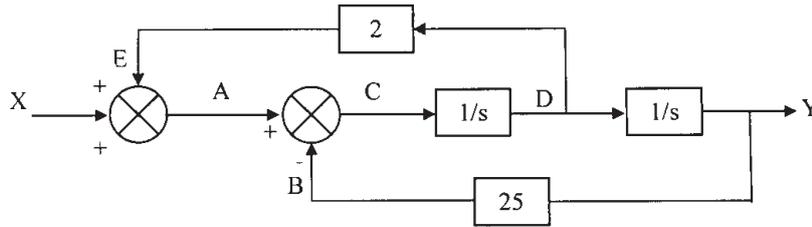
OR

Q8) a) Sketch the block diagram of a simple control system enlisting its elements and the standard nomenclature. **[6]**

b) Determine the overall transfer function of the following cascade control system. **[6]**
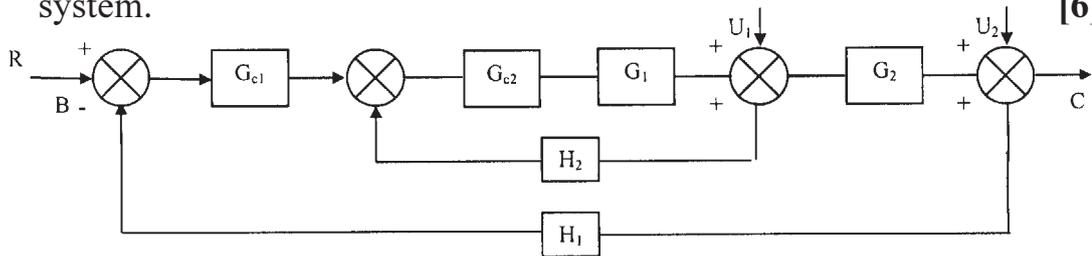
c) A pneumatic controller is to be used to control temperature within the range of 40 to 80°C. It is adjusted so that the output pressure varies from 5 psi to 10 psi when the temperature reading varies from 50 to 70°C. Calculate the proportional band and gain. **[4]**

Q9) a) Write the characteristic equation for the control system shown in the figure: **[9]**
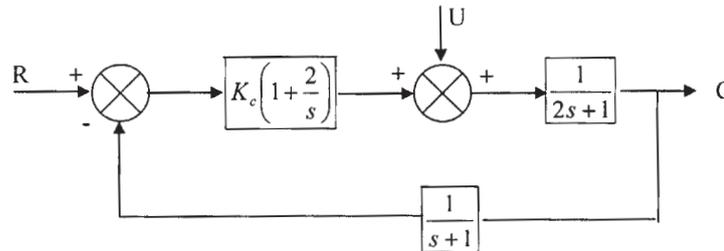
i) Determine the transfer function C/R and C/U.

ii) Using the Routh test determine if the system is stable for $K_c = 4$.

b) Sketch the root locus plot for the following system: **[9]**

$$G(s)=\frac{(s+1)}{(s+1)(s+2)(s+3)}$$

OR

[4164]-742 3

Q10) a) Write the characteristic equation and construct the Routh array for the control system shown below. Is the system stable for $K_c = 9.5$ and $K_c = 11$? **[6]**
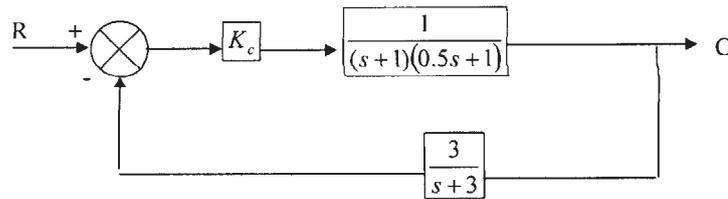
b) Describe the procedure for plotting the Bode plot for two non-interacting first order systems in series. **[6]**

c) Explain the Cohen and Coon tuning rules. **[6]**

Q11) a) With the help of neat diagrams describe the feed forward control system and its applications in the industry. **[8]**

b) Write notes on the following : **[8]**
   i)   Split range control.
   ii) Ratio control.

<div align="center">OR</div>

Q12) Write short notes on the following : **[16]**
   a) Advantages of cascade control.
   b) Fuzzy logic.
   c) Temperature control in fermenter.
   d) Adaptive control.

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[4164]-747

B.E. (Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from Section - I and Section - II.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) Describe the following methods of power generation :   **[18]**

a) Solar Energy.

b) Wind Energy.

c) Fuel Cell.

OR

Q2) a) What is the environmental impact of conventional energy sources? Give advantages of non-conventional energy.   **[9]**

b) Describe briefly conventional and non-conventional energy sources. **[9]**

Q3) a) Describe with neat sketch working of wind energy systems with main components.   **[8]**

b) Explain in detail the geothermal energy and classify.   **[8]**

OR

Q4) a) What is the basic principle of wind energy conversion system, explain briefly.   **[8]**

b) Write a brief note on :   **[8]**

i) Geothermal energy

ii) Wave and tidal energy.

P.T.O.

Q5) a) Write a short note on solar power and its applications. **[8]**

b) Describe the principle of power generation in solar photovoltaic system.**[8]**

OR

Q6) a) Comment on need of solar energy to World and India. **[8]**

b) Describe briefly the different methods of producing hydrogen from solar energy. **[8]**

SECTION - II

Q7) a) Write a brief note on biomass and biogas. **[9]**

b) What is photobioreactor? Explain types and advantages of each. **[9]**

OR

Q8) a) Define biodiesel and the properties of biodiesel. **[9]**

b) Explain in detail the steps involved in the production of biodiesel from microalgae. **[9]**

Q9) a) Describe the common methods for alcohol production. **[8]**

b) Explain the concept of biorefinery and its economics. **[8]**

OR

Q10) Describe the different pretreatment processes undertaken for ethanol production from lignocellulosic materials. **[16]**

Q11) a) Comment on Hydrogen as fuel of the future. **[8]**

b) Explain the factors affecting biogas production. **[8]**

OR

Q12) What are the method for maintaining biogas production. **[16]**

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[4164]-749

B.E. (Biotechnology)
BIOMATERIALS
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   **[Max. Marks :100**

Instructions to the candidates:

1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) What are medical fibers? Name and explain processes for preparation of biofibers with its application and importance. **[16]**

OR

Q2) List out different mechanical properties of materials and describe their importance when material is implanted in human body. **[16]**

Q3) How cross linking or curing occur in silicone elastomers? Describe methods of curing with mechanism. Explain an example of oxidative addition/reductive elimination of Pt in silicone elastomers. **[16]**

OR

Q4) What are various types and properties of metals which are being used during implants? Explain processing steps involved for metallic implant device with one case study. **[16]**

Q5) Explain the properties and biomedical applications of three natural polysaccharides. **[18]**

OR

Q6) a) Describe the synthesis of polylactic acid starting from lactic acid highlighting the intermediate products. **[9]**

b) Discuss the biomedical application of Pullalan in targeted drug delivery.**[9]**

P.T.O.

SECTION - II

Q7) What is a biocatalyst? Explain in detail application of biocatalyst in production of aromatic precursors with one suitable case study? **[16]**

OR

Q8) What are PHA and PHB? Discuss in detail production of PHA with its applications. **[16]**

Q9) Write a short note on : (Any Three) **[18]**

   a) Dental implants.

   b) Porous materials.

   c) Ceramics.

   d) Nanobiomaterials.

OR

Q10) Explain the optical properties of quantum dots and enumerate their applications in biomedicine. **[18]**

Q11) a) What are the characteristics of bioadhesives? Describe various applications of bioadhesives. **[8]**

   b) How can we use stress strain diagram in selecting the most appropriate materials for orthopedic biomaterials. **[8]**

OR

Q12) List a type of materials used in each of the following medical applications: **[16]**

   a) Skin repair.

   b) Bone plates.

   c) Contact lenses.

   d) Tissue engineering scaffold.

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Total No. of Questions : 12]

SEAT No. :

P1557

[Total No. of Pages : 3

[4164]-751
B.E. (Biotechnology)
PLANT ENGINEERING AND PROJECT COSTING
(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1) *Answer any three questions from Section - I and any three from Section - II.*

   2) *Answer to the two sections should be written in separate books.*

   3) *Neat diagrams must be drawn wherever necessary.*

   4) *Figures to the right indicate full marks.*

   5) *Make necessary assumptions wherever necessary.*

   6) *Use of programmable calculator is not allowed.*

SECTION - I

Q1) a) Discuss the process design aspects.   **[6]**

    b) Explain the following :   **[12]**

       i)   P & ID Presentation.

       ii) Pilot Plant and Laboratory data.

OR

Q2) a) State which items should be consider in a comparison of different processes for the manufacture of same product.   **[6]**

    b) Explain the procedure for drawing process flow diagram.   **[6]**

    c) Explain the importance of laboratory data and pilot plant data. **[6]**

Q3) What are factors affecting on plant location and layout? Explain in detail.**[16]**

OR

Q4) Write note on following :   **[16]**

    a) Process Feasibility.

    b) Kinetic Feasibility.

    c) Thermodynamic Feasibility.

P.T.O.

Q5) a) Write short note on colour code of pipeline carrying utilities. **[7]**

b) Discuss about : **[9]**
   i) Pipe routing.
   ii) Pipe expansion and
   iii) Contraction.

<div align="center">OR</div>

Q6) a) State various type of thermal insulation for heating and cooling used in piping design. **[4]**

b) Discuss about plant safety operation and maintenance. **[6]**

c) State various types of pipe supports used in pipe line with the application of any one pipe supports. **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Write a brief note on : **[12]**
   i) CPM technique.
   ii) PERT technique.

b) Discuss in detail about plant testing and commissioning. **[4]**

<div align="center">OR</div>

Q8) a) Discuss about Cost of finance and Interest calculation. **[8]**

b) What are the factors affecting on investment? **[8]**

Q9) a) Define profitability and explain any three methods of profitability evaluation technique. **[12]**

b) Discuss effect of inflation on profitability analysis. **[6]**

<div align="center">OR</div>

Q10) a) Comments on practical factors in alternative-investment and replacement analysis. **[6]**

b) A project expected to have cash flow for five years as follows after all expenses and taxes. The initial fixed capital investment is twelve lakh and working capital investment is 10% of fixed capital investment. **[12]**

Time (year)	Cash flow (Rs.)
0-1	200000
1-2	270000
2-3	330000
3-4	400000
4-5	475000

Find :

i) The rate of return using straight line depreciation.

ii) Payout time if the interest is allowed on investment is 10%.

Q11) Define depreciation and what are the various methods used for determination? Explain. **[16]**

OR

Q12) Write short note on : **[16]**

a) Current value.

b) Salvage value

c) Recovery period.

d) Depreciable investment.

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[4164]-754

B.E. (Biotechnology)
INTRODUCTION TO SYSTEMS BIOLOGY
(2008 Pattern) (Sem. - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

  1) *Answer three questions from section I and three questions from section II.*
  2) *Answers to the two sections should be written in separate answer books.*
  3) *Draw neat diagrams wherever necessary.*
  4) *Figures to the right indicate full marks.*

SECTION - I

Q1) What is Human Genome Project? Enlist the different phases involved in it. In what ways did the Human Genome project impact biology? **[18]**

OR

Q2) What is the Central dogma of Molecular biology? Mention the different components of systems biology and describe the four distinct phases which lead to system level understanding. **[18]**

Q3) How and in which fields has genomics transformed the outlook. **[16]**

OR

Q4) Describe in detail pyrosequencing technique? What is the approach taken by the Roche 454 sequencer, give a detailed summary. Write a note on Genome annotation. **[16]**

Q5) What is a microarray? Give the various types of microarrays available in the market. What are the applications of microarrays? **[16]**

OR

Q6) Write a short note on RNAi technology and its real world applications. **[16]**

SECTION - II

Q7) Write a short note on epigenetics. What are the different types of modifications observed which lead to epigenetic inheritance of various traits? **[18]**

OR

P.T.O.

Q8) Comment on Epigenetics and disease with respect to prions causing disease in mammals. **[18]**

Q9) Describe pharmacogenomics as an upcoming field. What are the different benefits and the barriers to drugs developed using the pharmacogenomic approach. **[16]**

OR

Q10) Write a note on methods for drug delivery, drug metabolism and excretion, what are slow metabolisers and extensive metabolisers. **[16]**

Q11) Describe in detail any two of the techniques (8 marks each) : **[16]**

a) 2-D Gel electrophoresis.

b) MALDI-TOF analyzers.

c) Mass spectrometry.

OR

Q12) What is a metabolome. What are the different techniques used in metabolomics study, comment on the use and applications of metabolomics. **[16]**

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[4164]-589

B.E. (Printing)

QUALITY CONTROL TECHNIQUES IN PRINTING

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *All questions are compulsory.*
2)   *Answers to the two sections should be written in separate books.*

SECTION - I

Q1) a)   Explain in detail Quality specification.   **[16]**

b)   Explain the concept Quality Inspection & Quality Challenges in Printing.

OR

a)   Explain the concept of Quality in detail.   **[16]**

b)   Explain Quality cost in detail.

Q2) The amount of Ink filled in 2 litter can by an automatic canning machine is Monitored using a control chart.   **[18]**

Draw X-bar & S charts for the data collected at 10 different times. Is the process in control? Assume $A_2 = 0.577$, $d_2 = 2.326$, $D_3 = 0$, $D_4 = 2.115$, $B_3 = 0$, $B_4 = 2.089$

1	2	3	4	5	6	7	8	9	10
2.01	2.00	1.99	1.98	1.96	2.10	2.02	2.01	1.96	1.99
2.02	1.98	1.98	1.99	2.01	2.04	2.00	1.98	1.99	2.00
2.00	1.99	2.1	2.00	2.03	2.07	1.99	1.97	2.03	2.04
2.01	2.00	2.2	1.96	2.12	2.02	1.97	1.99	2.06	2.01
2.01	1.97	2.00	1.95	1.99	1.99	2.04	2.02	2.10	2.02

A line inspector in an engineering company recorded dimensions of each of the five jobs selected at the end of every half an hour of the five hours in the morning. **[18]**

1	2	3	4	5
25.00	25.01	25.00	25.03	25.01
25.00	25.03	25.00	25.04	25.03
25.01	25.02	25.02	25.03	25.02
25.01	25.02	25.02	25.01	25.04
25.02	25.02	25.03	25.03	25.00
25.06	25.03	25.02	25.00	24.99
24.99	24.98	25.02	25.02	24.99
25.02	25.01	25.01	24.99	25.02
25.03	25.01	24.97	25.01	25.03
25.02	24.99	24.99	24.98	24.97

Plot X bar & R chart & find out which of the given observations are out of control $A_2 = 0.5768$, $D_3 = 0$, $D_4 = 2.114$.

Q3) a) Explain World class manufacturing in detail. **[8]**

b) Explain Lean manufacturing in detail. **[8]**

a) Explain Computer integrated manufacturing. **[8]**

b) Explain Flexible manufacturing system in detail. **[8]**

Q4) a) Explain any two Physical properties of Ink. **[9]**

b) Explain Inventory management in Printing industry. **[9]**

OR

a) Explain any two Physical properties of Paper. **[9]**

b) Explain Press performance testing of ink. **[9]**

Q5) a) Explain Raster image Processing in detail. **[8]**

b) Explain Quality of originals & input resolution. **[8]**

OR

a) Explain need of Printer profile with respect to obtaining Quality Printing. **[8]**

b) Explain file formats. **[8]**

Q6) Explain the process of Gravure press characterization & Standardization.**[16]**

OR

Explain in short following Press Standards. **[16]**
GRACoL, SWOP, TAPPI and ISO.

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Total No. of Questions : 12]

P1637

[4164]-559
B.E. (E & TC)
TEST AND MEASUREMENT SYSTEMS
(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from Section - I and three questions from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Your answers will be valued as a whole.*
6) *Assume suitable additional data if necessary.*
7) *Use of logarithmic tables, slide rule, electronic non-programmable pocket calculator is allowed.*

SECTION - I

Q1) a) Explain following terms and give example of each with any instrument.**[8]**

     i)   Accuracy.

     ii)   Linearity.

     iii)   Sensitivity.

     iv)   Resolution.

     b) Explain calibration, calibration standards and traceability.   **[10]**

OR

Q2) a) A set of voltage measurement by five observers is recorded as 340m Volts, 350m Volts, 400m Volts, 375m Volts and 380m Volts. Calculate**[8]**

     i)   Arithmetic mean.

     ii)   Average deviation.

     iii)   Standard deviation and

     iv)   Variance.

     b) Draw a Typical instrument block diagram. Explain Simple & Distributing types of measurements in detail.   **[10]**

P.T.O.

Q3) a) What is the significance of Q-factor? Explain basic 'Q' meter with neat diagram. **[10]**

b) With the help of neat diagram, explain the method of True RMS measurement. **[6]**

OR

Q4) a) With the help of block diagram explain vector impedance meter. **[8]**

b) What are different types of DVM? With the help of block diagram explain **[8]**

  i) Ramp-type DVM and
  ii) Successive-approximation DVM.

Q5) a) Explain the effect of resistive, inductive and capacitive load on CRO probes. List various types of CRO probes. Explain any one type of probe in detail. **[10]**

b) Why delay line is required in vertical section of CRO? **[6]**

OR

Q6) a) Explain with neat block diagram digital storage oscilloscope. **[8]**

b) Explain the triggering controls used in analog and digital oscilloscope. What are the special trigger settings available only in digital oscilloscope? **[8]**

SECTION - II

Q7) a) Draw the block diagram of a logic analyzer and explain its operation. Explain display methods used in analysis using logic analyzer. **[10]**

b) Explain with neat diagram heterodyne wave analyzer. **[8]**

OR

Q8) a) Explain swept super-heterodyne spectrum analyzer with neat block diagram. **[8]**

b) Explain FFT analyzer with neat block diagram. **[4]**

c) Explain thermocouple power meter with neat block diagram. **[6]**

Q9) a) Draw the block diagram of a Direct Digital Synthesizer (DDS). Explain its operation. What are its advantages and limitations over other techniques? **[10]**

b) Draw the block diagram of an Arbitrary Waveform Generator (AWG). Explain its operation. What is meant by vertical resolution? **[6]**

OR

Q10) a) Draw and explain block diagram of network analyzer and state its applications. **[8]**

b) Explain test set up for conducted EMI. **[8]**

Q11) Write short notes on :

a) Features of LABVIEW. **[8]**

b) Virtual instruments and its components. **[8]**

OR

Q12) a) Explain in detail Network Connection Model. **[8]**

b) What are the requirements of the Automatic Test Equipments (ATE).**[8]**

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[4164]-578

B.E. (Instrumentation & Control)
ADVANCED BIOMEDICAL INSTRUMENTATION
(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) With the help of neat diagram, explain the working of programmable pacemaker. **[8]**

b) Draw and explain the heart-lung machine model. **[8]**

OR

Q2) a) It is required to set up an ICU for 8 beds. Elaborate the implementation plans. **[8]**

b) What is a synchronized dc defibrillator? Draw a block diagram of it and explain its working? **[8]**

Q3) a) Explain the need and working of an 'Autoanalyser'. **[8]**

b) With the help of graph, explain the basic working principle of a pulse oximeter. **[4]**

c) Explain the working of an In-Vivo type of oximeter with the help of a suitable diagram. **[6]**

OR

Q4) a) Describe with the help of neat waveform various modulation techniques for a typical Telemedicine System. **[8]**

b) Explain the conductivity type blood cell counter for RBC and WBC measurement. **[10]**

Q5) a) Explain the principle of CT-scanning. How it overcomes the drawback of X-Ray imaging? **[8]**

b) What is the role of 'Hounsfield number' in image reconstruction? **[8]**

OR

Q6) a) Describe the various components of X-ray machine. **[8]**

b) Draw the diagram of image intensifier and explain how it helps to improve the image qualify in fluoroscopy. **[8]**

SECTION - II

Q7) a) With the help of a suitable block diagram, explain the working of Gamma camera. **[8]**

b) Explain A scan, B scan and M-scan in ultrasound imaging. **[8]**

OR

Q8) a) Draw a diagram, explaining what is meant by spin-spin relaxation time and spin lattice relaxation time. What is the importance of it? **[8]**

b) Write a note on Positron Emission Tomography. **[8]**

Q9) a) What is Nuclear medicine? Describe various types of detectors that are used to detect β and γ rays. **[8]**

b) With the help of a suitable block diagram, explain the working of rectilinear Scanner. **[8]**

OR

Q10) a) Explain laser application in diabetic retinopathy and glaucoma. **[8]**

b) Explain in brief various types of dialysers used for Hemodialysis. **[8]**

Q11) a) Describe various Orthotic and Prosthetic devices. **[8]**

b) Explain different types of wheelchair and joysticks. Specify their materials and properties. **[10]**

OR

Q12) a) What is kidney stone? Explain lithotripsy based on acoustic shock wave with plasma explosion. **[8]**

b) Explain Instrumentation in Hemodialysis. **[10]**

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[4164]-586
B.E. (Printing)
TECHNOLOGY OF GRAVURE
(2008 Pattern) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from each section.*
2) *Answers to the two sections should be written separately.*
3) *Draw neat diagram wherever necessary.*

SECTION - I

Q1) a) Explain in detail etching process for gravure cylinder making. **[10]**

b) Explain the benefits of Engraving Process over Etching process. **[8]**

OR

Explain in detail laser engraving of a Gravure cylinder.

Q2) Write Notes on : **[16]**

a) Features of Copper in cylinder making.

b) Role of Nickel and Chrome in cylinder making.

OR

Explain in detail the factors to be controlled for copper plating.

Q3) Explain in detail unit configuration of a Gravure press. **[16]**

OR

Explain different types of ink used in gravure printing.

SECTION - II

Q4) Explain in detail the factors that govern the ink viscosity. **[16]**

OR

Explain with diagram Spray or Weir inking system of gravure press.

P.T.O.

Q5) Impression roller plays a vital role in ink transfer. Explain. **[18]**

OR

Explain the techniques used for pressure application of impression roller.

Q6) Explain in detail splicing system for a Gravure press. **[16]**

OR

Write notes on: (Any four)
a) Doctor Blade Steaks.
b) Bleeding.
c) Web Treatment.
d) Dancer roller.
e) Web Transport Rollers.

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[4164]-595

B.E. (Printing)

PACKAGE DESIGN & TECHNOLOGY

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

SECTION - I

Q1) Explain any two :   **[18]**

     a) Explain the need of rigid packaging against flexible packaging with example.

     b) Write down various types of materials used for rigid packaging, explain each with their advantage and disadvantage.

     c) Explain marketing function of secondary packaging, also explain basic element of graphic layout for this function.

Q2) Solve any two :   **[16]**

     a) List and explain various types of paper and paper board used for packaging.

     b) List down various physical properties of paperboard required for manufacturing of box, explain any one of them.

     c) What are the different raw materials and chemicals used for paperboard manufacturing? Explain their effect on surface properties of paperboard.

Q3) Answer any two :   **[16]**

     a) Explain the importance of flute profile in corrugated board.

     b) Explain various manufacturing defects of corrugated board.

     c) Explain different variables that need to control during manufacturing of corrugated board.

SECTION - II

Q4) Answer any two : [18]

a) Explain various drawing symbols, their code and description used in graphic layout which is required for die making operation.

b) Explain Flatbed and rotary punching machine.

c) Explain the one advantage and one disadvantage of following structural layouts of packaging style.

   i) Universal type Carton Style.

   ii) Straight Tuck Carton Style.

   iii) Infold/Outfold fold Tray Style.

   iv) Autolock Bottom Carton Style.

Q5) Answer any two : [16]

a) Calculate the following for universal carton. Total weight of paper required, cost per carton from following data.

   i) L×B×H: 18" × 10" × 12".

   ii) Paper 200 GSM, 20B.F., E Flute.

   iii) 3Ply.

   iv) 8000Qty.

   v) Paper cost: Rs. 20 per kg. And conversion cost Rs. 9 per kg. (Assumed suitable data if required).

b) Consider a corrugated box which takes 185 kg load in the laboratory. This boxes stacks for 3 months under relative humidity 60%. Consider a brick style for stacking. Calculate final BCT value of the same box by considering duration for stack, stacking style and humidity. (Assumed suitable data).

c) Short notes on (any two)

   i) GSM of corrugated board.

   ii) Stack strength.

   iii) Stacking style.

   iv) Take up factor.

Q6) Explain following tests of packaging required for transportation (any four):**[16]**

a) BCT.

b) Vibration Test.

c) ECT.

d) Drop Test.

e) FCT.

f) RCT.

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[4164]-596

B.E. (Printing)

PRINT PRODUCTION PLANNING AND CONTROL

(2008 Pattern) (Sem. - II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Assume suitable data, if necessary.*
3) *Answers to the two sections should be written in separate books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) Explain the classification of Production Systems in detail with suitable examples. **[16]**

OR

Explain the functions of Production Planning and Control in detail with suitable examples. **[16]**

Q2) Consider a project consisting of 12 activities with following precedence relationship and durations. **[16]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Immediate predecessor	-	-	A	A	A	D	C	D	E,F	B,I	G,H	J,K
Duration (weeks)	4	8	2	4	9	1	7	3	2	2	5	4

a) Draw network diagram & find the critical path.

b) List the total float, free float and independent float for all activities.

OR

The time estimates (in weeks) for the activities of a PERT network are given below.

Activity	T_0	T_m	T_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network and determine expected project length.
ii) Calculate the Std. Dev. And variance of the project.
iii) What is the probability that project will be completed no more than 4 weeks earlier than expected time.
iv) If the project due date is 19 weeks, what is the probability of not meeting the due date. **[16]**

Given data : $Z = 1.33, P = 0.9082$
$Z = 0.67, P = 0.7486$
$Z = 1.28, P = 0.9$

Q3) There are seven jobs, each of which has to go through the machines A & B in the order AB. Processing time in hours are given as,

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B. **[18]**

OR

There are five jobs, each of which is to be processed through three machines A, B and C in the order ABC. Processing times in hours are,

Job	1	2	3	4	5
Machine A	3	8	7	5	4
Machine B	4	5	1	2	3
Machine C	7	9	5	6	10

Determine the optimum sequence for the five jobs and the minimum elapsed time. Also find the idle time for the three machines and waiting time for the jobs. **[18]**

Q4) A job production unit has four jobs A, B, C and D, which can be manufactured on each of the four machines. The processing cost of each job for each machine is given. How should the jobs be assigned so as to minimize the processing cost. **[16]**

	P	Q	R	S
A	31	25	33	25
B	25	24	23	21
C	19	21	23	24
D	38	36	34	40

OR

Solve the following Assignment problem for minimization. The costs are given below. Find all the alternate solutions, if any. **[16]**

	X1	X2	X3	X4	X5
A	15	29	35	20	38
B	21	27	33	17	36
C	17	25	37	15	42
D	14	31	39	21	40
E	19	30	40	19	18

Q5) Find the initial feasible solution for the following problem. The supply, demand and unit cost figures are given. **[16]**

	W1	W2	W3	W4	Supply ↑
P1	190	300	500	100	70
P2	700	300	400	600	90
P3	400	100	400	200	180
	50	80	70	140	

Demand →

OR

Solve the following Transportation problem. **[16]**

	D1	D2	D3	D4	Supply ↑
S1	10	20	5	7	10
S2	13	9	12	8	20
S3	4	15	7	9	30
S4	14	7	1	0	40
S5	3	12	5	19	50
	60	60	20	10	

Demand →

Q6) A company makes three products X, Y and Z which go through three departments – Drill, Lathe and Assembly. The hours of department time required by each of the products, the hours available in each of the departments and the profit contribution of each of the products are given in the following table.

Products	Time required per unit (Hours)			Profit Contribution (Rs. per Unit)
	Drill	Lathe	Assembly	
X	3	3	8	9
Y	6	5	10	15
Z	7	4	12	20
Hrs. Available	210	240	260	

The marketing department of the company indicates that the sales potential for the products X and Y is unlimited, but for Z it is not more than 30 units. Determine optimum production schedule. **[18]**

OR

A company machines and drills two castings X and Y. The time required to machine and drill one casting including machine set up time is as follows.

Casting	Machine Hours	Drilling Hours
X	4	2
Y	2	5

There are two lathe and three drilling machines. The working week is of 40 hours; there is no overtime and lost time. Variable costs for both the castings are Rs. 120 per unit while the total fixed costs amount to Rs. 1000 per week. The selling price of casting X is Rs. 300 per unit and that of Y is Rs. 360 per unit. There are no limitations on the number of X and Y castings that can be sold. The company wishes to maximize profits. Formulate the linear programming model for the same. **[18]**

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[4164]-597

B.E. (Printing)

ELECTRONIC PUBLISHING

(2008 Pattern) (Elective - III) (Sem. II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the following HTML tags with example and syntax **[8]**
   i)   <Table>
   ii) <p>(Paragraph)

   b) Explain different image file formats in detail. Compare and explain which image file format is best in web page. **[8]**

OR

Q2) a) Explain what is electronic publishing with examples. **[8]**

   b) Explain HTML tag <img> to embed graphics. Explain all properties of <img> tag with example. **[8]**

Q3) a) Explain what plagiarism is. **[6]**

   b) Explain why textual content formatting is necessary. Explain different factors considered for textual content formatting. **[10]**

OR

Q4) a) Explain design challenges in online rich text editor. **[8]**

   b) Explain wiki, blog and face book text editing features. **[8]**

Q5) a) Explain the following SQL statements with example. **[12]**

 i) DELETE.

 ii) UPDATE.

 iii) INSERT.

 b) Explain difference between XML and HTML with example. **[6]**

<div align="center">OR</div>

Q6) a) Explain all types of SQL 'SELECT' statement with examples. **[10]**

 b) Create XML file for the following table **[8]**

No.	Book Title	Publication	Author	Price
1	The handbook of digital publishing	Technical Publication	Michal Kleper	Rs. 400
2	Multimedia making it work	Prentice Hall	Infra Suit	Rs. 600
3	The columbia guise to digital publishing	Technical Publication	William Kasdorf	Rs. 650

SECTION - II

Q7) a) Explain concept of typography with example. **[8]**

 b) Explain use of CSS in web page designing with example. Write a program to include css file in HTML program. **[10]**

<div align="center">OR</div>

Q8) a) Explain concept of indexing. Write HTML program to explain indexing concept. **[12]**

 b) Explain concept of teletext. **[6]**

Q9) a) Explain E-publication formats E-Pub, AZW, and mobi e-book text formats in detail. **[12]**

 b) Explain necessity of E-publication text formats. **[4]**

<div align="center">OR</div>

Q10) a) Explain any one e-commerce application. **[8]**

 b) Explain use of E-publishing in the field of printing. **[8]**

Q11) a) Explain content management system (CMS). **[8]**

b) Explain enterprise content management system (ECMS). **[8]**

OR

Q12) a) Explain main features of dot net like common language runtime (CLR), cross language interoperability. **[10]**

b) Explain web content management system (WCMS). **[6]**

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[4164]-600
B.E. (Printing)
FLEXIBLE PACKAGING
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to two sections should be written separately.*

   2)   *Draw neat diagram wherever necessary.*

SECTION - I

Q1) Packaging is a silent salesman. Explain.   **[18]**

OR

Write notes on :   **[18]**

  a) Nylon.

  b) Polystyrene.

  c) BOPP.

Q2) Explain the Rotogravure process for Flexible Packaging.   **[16]**

OR

Explain the Rotary Letterpress process in Flexible Packaging.   **[16]**

Q3) Explain the Hot-Melt lamination process.   **[16]**

OR

Explain the making of Polyethylene film.   **[16]**

SECTION - II

Q4) Explain in detail Aseptic technique for a product.   **[16]**

OR

Explain in detail Boil-in-Bag process for a liquid product.   **[16]**

Q5) Closures are integral part of a Package. Explain. **[16]**

<div align="center">OR</div>

Write notes on : **[16]**

a) VFFS.

b) HFFS.

Q6) Explain the packaging methods for Horticultural products and Beverages.**[18]**

<div align="center">OR</div>

Mention deterioration factors and packaging techniques for the following:**[18]**

a) Red Meat.

b) Chocolate.

c) CSD.

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[4164]-603

B.E. (Chemical)

PROCESS DYNAMICS AND CONTROL

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the incentives for Chemical process control. **[8]**

    b) Derive the Input-output model for CSTR. **[8]**

OR

Q2) a) Derive the transfer function of single tank liquid level system. Draw a suitable sketch. **[8]**

    b) A thermometer showing steady state temperature of 30°C is suddenly immersed into a hot bath at 150°C. If the time constant of thermometer is 7 sec, determine the following : **[8]**

      i)   Thermometer reading after 7 sec.

      ii)   Time required to read 90°C on Thermometer.

      iii) Time required for 90% response.

Q3) a) Derive the transfer function for damped vibrator. Comment on type of dynamic response of the system. **[8]**

    b) Discuss the characteristics of underdamped response and plot the graph of overshoot and decay ratio versus damping factorξ. **[8]**

OR

Q4) a) Define P, I & D controller and derive their transfer functions. Discuss their open loop and closed response with neat diagrams. **[8]**

b) A second order process with following transfer function is controlled by P controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e $Gf(s) = Gm(s) = 1$;

The open loop process is $Gp(s) = \dfrac{1}{s^2 + S + 1}$ [8]

Determine the following :

i)   Closed loop transfer function.
ii) Order of response.
iii) Closed loop gain, time constant.
iv) Offset.

Q5) a) Define stability of the process and discuss the Routh-Hurwitz criteria.[6]

b) Draw the root locus diagram for the system with following transfer function: [12]

$$Gp(s) = \dfrac{1}{s(s+1)(s+2)}$$

OR

Q6) Define controller tuning and discuss the following tuning methods;   [18]

a) Time integral performance criteria.
b) Reaction curve method.
c) Ziegler Nichols method.

SECTION - II

Q7) a) Sketch the Bode diagram for PD controller.   [9]

b) Sketch the Nyquist diagram for PI controller.   [9]

OR

Q8) a) Derive the response of general first order system to sinusoidal input. Define amplitude and phage lag.   [9]

b) Discuss the following :   [9]

i)   Dead Time system.
ii) Nyquist stability criteria.
iii) Gain margin & phase margin.

Q9) Draw a neat sketch and write short notes on :   [16]

a) Inverse Response system.

b) Feed forward control & feedback control.

OR

Q10) Draw a neat sketch and discuss in detail about : **[16]**

    a)   Adaptive control.

    b)   Inferential control.

Q11) Draw the instrumentation diagram for Adiabatic plug flow reactor control and discuss in detail about its functioning. **[16]**

<p align="center">OR</p>

Q12) Write short notes on : **[16]**

    a)   PLC & SCADA systems.

    b)   Digital approximation of classical controllers.

    c)   Data Bus concept.

    d)   Role of digital computers in control.

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[4164]-606
B.E. (Chemical)
ENVIRONMENTAL ENGINEERING
(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write note on Kyoto Protocol.

b) Discuss about clean development mechanism.

[18]

OR

Q2) a) Discuss the impact of hydro power on environment.

b) Discuss various air pollution laws.

[18]

Q3) Discuss the effects of SOX on human health, vegetation & animals. **[16]**

OR

Q4) Classify the different types of air pollutants and explain sampling train. **[16]**

Q5) Give the operating principles of spray tower, centrifugal scrubber and venturi scrubber, with neat diagram. **[16]**

OR

Q6) What is absorption? How to control NOX by using absorption? Explain in detail. **[16]**

SECTION - II

Q7) a) Differentiate between Domestic and Industrial wastewater.

b) What are the sources of wastewater in dairy industry.

[16]

OR

Q8) Define - Oxygen deficit and discuss the method of determination of BOD constants. **[16]**

Q9) Describe Trickling filter for wastewater treatment. Mention the advantages and disadvantages. **[18]**

OR

Q10) Explain with neat sketch photo catalytic reactor, its advantages, disadvantages and working. **[18]**

Q11) Write notes on : **[16]**

a) Recovery of material from process effluents.

b) Micro screening.

OR

Q12) Write notes on : **[16]**

a) Incineration.

b) Nitrification.

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[4164]-614

B.E. (Chemical)
ADVANCED SEPARATION PROCESSES
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain in detail Liquid chromatography separation system and characterization of chromatography processes.   **[18]**

OR

Q2) a) What are various applications of chromatography in separation of enzymes and proteins.   **[6]**

b) Discuss all aspects of pressure swing regeneration.   **[6]**

c) What is adsorption selectivity.   **[6]**

Q3) a) Explain various types of membranes .   **[8]**

b) State advantages of membrane separation processes over conventional processes.   **[8]**

OR

Q4) a) Explain Osmotic pressure with appropriate equation.   **[4]**

b) Discuss all aspects of dialysis.   **[6]**

c) Explain Pressure Swing Adsorption (PSA) technique used for separation of gas mixtures.   **[6]**

Q5) Write short notes on : [16]

a) Separations based on reversible chemical complexation.

b) Reactive distillation.

OR

Q6) a) Distinguish between pervaporation and gas permeation processes. [8]

b) Explain reactive crystallization in detail. [8]

SECTION - II

Q7) a) Give the classification of flotation technique based on mechanism and size of material. [9]

b) Explain collapse and drianage phenomena. [9]

OR

Q8) a) Explain modes of operation of foam fractionation equipment. [9]

b) State and explain the adsorption properties of foam. [9]

Q9) Write note on : [16]

a) Counter current electrophoresis.

b) Adductive crystallization.

OR

Q10) a) What is zone refining. [8]

b) What are molecular sieves and state its advantages. [8]

Q11) Explain the following terms in detail. [16]

a) Recoil method.

b) Exchange Reaction.

OR

Q12) a) Explain selection of separation processes with one case study. [10]

b) Write note on Ultracentrifuge in detail. [6]

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[4164]-633

B.E. (Petroleum Engineering)
WELL ENGINEERING AND DESIGN
(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Question No. 1 and 5 are compulsory. Out of the remaining attempt 2 questions from Section I and 2 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss importance of drilling montage in well planning. Discuss classification of well types. **[8]**

b) In a leak off test volume pumped is 8.5 bbls leak of pressure noted is 1300 psi casing is set at 12,000 ft and the mud weight is 13.9 ppg. Determine the formation fracture gradient. **[4]**

c) 13 – 3/8" intermediate casing set at 9750 ft external mud weight 11.0 ppg, internal mud weight 11.2 ppg, drilling ahead 12–1/4" hole at 13,360 ft, experienced total losses and fluid level dropped to 2528 ft find out net collapse load at casing shoe. (Fluid level dropped inside casing) **[6]**

Q2) a) Derive equations for calculating increments ΔV, ΔN and ΔE by Radius of curvature directional survey method. **[8]**

b) Discuss BHA design considerations in directional/horizontal drilling in brief. **[8]**

Q3) a) Discuss primary, secondary and tertiary well control. Explain any one type of well control method in detail. **[10]**

P.T.O.

b) If SIDPP = 500 psi   **[6]**

    SICP = 650 psi

    well depth = 10,000 ft, Mud weight used = 10.7 ppg

    SCR at 30 SPM = 200 psi Find out

    i)   Kill mud weight.

    ii)   ICP.

    iii)   FCP.

Q4) Write short notes on :   **[16]**

    a) Trip margin.

    b) Collapse and Burst pressure in casing design.

    c) Deflection tools.

    d) BOP control unit.

SECTION - II

Q5) a) Discuss API classification of drill string components.   **[8]**

    b) 5" D/P in 12.25" hole at 60º inclination, critical buckling force = 26,000 lbs, calculate BHA weight. Safety factor = 0.8 WOB = 50,000 lbs B.F. = 0.832.   **[4]**

    c) Discuss different costs in AFE calculations.   **[6]**

Q6) a) Discuss criteria of optimum hydraulics in detail.   **[8]**

    b) Discuss Bingham plastic and Power law model of hydraulics in brief.**[8]**

Q7) a) Discuss different squeeze cementation methods in brief.   **[10]**

    b) What is cycle speed and commercial speed calculate both for the following operations.   **[6]**

    11th September to 30th September – Rig move, rig building time.

    1st October to 10th January – drilling days production testing days = 20 days.

    Meterage drilled = 3200 m.

Q8) Write short notes on :   **[16]**

    a) Margin of overpull (MOP)

    b) Cement rhology.

    c) Bit selection.

    d) Down hole problems.

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[4164]-712

B.E. (Computer Engineering)
VLSI & DIGITAL SYSTEM DESIGN
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain VLSI Design Flow. **[8]**

b) Draw and explain physical structure of an nMOS enhancement transistor. **[8]**

OR

Q2) a) Draw and explain structure and model of an NPN bipolar transistor alongwith its VI characteristics. **[8]**

b) Explain briefly about semiconductor technology families. **[8]**

Q3) a) Explain in detail a basic n-well CMOS process alongwith suitable diagram. **[9]**

b) What is Shallow Trench Isolation? Explain STI process flow. **[8]**

OR

Q4) a) Explain in detail steps involved in silicon on insulator (SOI) CMOS process along with neat diagram. **[9]**

b) Explain photolithography process in detail. **[8]**

Q5) a) Explain basic concept of crystal structure. Also explain unitcell and miller indices. **[8]**

b) What is principle of thermal oxidation. Explain: Regenerative thermal and catalytic oxidizer. **[9]**

P.T.O.

OR

Q6) a) Explain in detail : **[8]**
   i) Wet Etching.
   ii) Plasma Etching.

b) What is chemical vapor deposition and physical vapor deposition explain its types. **[9]**

SECTION - II

Q7) a) Explain architecture of FPGA. What is selection criterion of FPGA in application? **[8]**

b) Explain operator overloading in VHDL. **[8]**

OR

Q8) a) Write code in VHDL for 4:1 multiplexer in three different modeling types. **[8]**

b) Write a note on shift operators. **[8]**

Q9) a) Define following terms with respect to CMOS circuits: **[8]**
   i) Fan Out.
   ii) Transition Time.
   iii) Propagation delay and
   iv) Power consumption.

b) Discuss logic levels and noise margins with respect to CMOS circuits.**[9]**

OR

Q10) a) Discuss the advantages of digital circuits over analog circuits. **[9]**

b) Write short note on :
   i) Hamming code and
   ii) CRC code. **[8]**

Q11) a) Listout different design steps for clocked synchronous state machine.**[8]**

b) Draw a neat diagram and explain briefly internal structure of synchronous SRAM. **[9]**

OR

Q12) a) Explain in brief applications of parity checking. **[8]**

b) Explain along with suitable logic diagram PAL16L8. **[9]**

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[4164]-726

B.E. (Information Technology)
COMPILER DESIGN
(2008 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1) Answer three questions from each section.
   2) Answer to the two sections should be written in separate answer-books.
   3) Neat diagrams must be drawn whenever necessary.
   4) Figures to the right indicate full marks.
   5) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is a pass in the compiler? What factors influence the number of passes of a compiler? Explain how you can group the difference phases of the compiler into passes. **[6]**

   b) Explain in detail the process of compilation. Explain the output of each phase for the following statement V4 = V3 + 34 – (45*V1 - V2); where V4 and V2 are float and V3 and V1 are integer. **[10]**

OR

Q2) a) Differentiate between : **[6]**

   i)   Lexeme and token.
   ii) Interpreter and compiler.

   b) Explain in detail the various phases of a compiler, describe the output for the following expression after each phase.

   V4 = V3 + 34 – (45*V1 - V2);

   Where + and - has equal precedence and * has higher precedence over + and – . **[10]**

Q3) a) Describe the role of lexical analyzer and describe role of regular expression in lexical analysis phase of compiler. **[6]**

b) In words, describe the languages denoted by following regular expressions : **[10]**

   i)   0*10*10*10*

   ii)   (0|1)*0(0|1)(0|1)

   iii) (0)*11(0|1)(00)*

and the example of such strings which will be represented by the given regular expression.

<p align="center">OR</p>

Q4) a) Explain the need for a look ahead operator in the lexical analysis phase of compiler with example. **[6]**

b) Specify the lexical form (regular definition and DFA) of numerical constants, identifiers and keywords in the 'C' programming language.**[10]**

Q5) a) Explain the steps to calculate the FIRST and FOLLOW set in the predictive parser use the same steps to design the predictive parser table for the following Grammar. **[12]**

$$S \rightarrow a \,|\,^\wedge|\,(T)$$
$$T \rightarrow T, S \mid S$$

b) What is left recursion? How can it be eliminated? Give suitable example.**[6]**

<p align="center">OR</p>

Q6) a) Consider the following grammar : **[12]**

$$S \rightarrow L = R|R$$
$$L \rightarrow * R|id$$
$$R \rightarrow L$$

   i)   Construct a predictive parse table for above mention grammar.

   ii)   Show the actions of the parser for the input string "id = *id".

b) What is left factoring? Explain with suitable example. **[6]**

<h2 align="center">SECTION - II</h2>

Q7) a) What are the different fields in activation record? How these fields help to handle the procedure calls? Explain with suitable example. **[12]**

b) Give the parse tree and translations for the expression ($*7 + 19)*2 according to syntax directed translation scheme. **[6]**

<p align="center">OR</p>

Q8) a) Discuss the importance of symbol table in compiler design. How is the symbol table manipulated at various phases of compilation? **[6]**

b) Give the output of the following program using the following parameter passing methods : **[12]**

 i) Pass by value.
 ii) Pass by reference.
 iii) Pass by name.
 iv) Pass by value result.

```
#include<stdio.h>
int i = 0;
Void p(int x, int y)
{
x += 1;
i += 1;
y += 1;
}
Main()
{
int a[2] = {1, 1}
p(a[i],a[i]);
printf("% d %d\n", a[0],a[1]);
Return 0 ;
}
```

Q9) a) Consider the following code that produces a 10*10 identity matrix. **[12]**

```
Int z;
Int func (int sel, int a, int b)
{
    Switch(sel)
    {
      Case 5:
        Z = a+b;
        Break;
      Default:
        Z = a-b;
        Break;
    }
        Z = z + b;
}
```

Construct the

 i) three address code
 ii) basic blocks
 iii) flow graph

b) How can three address code implemented in a compiler? Describe triples and indirect triples method of three address code. **[4]**

OR

Q10) a) Generate three address code and quadruple for following C program**[12]**

```
main()
{
  int i;
  int a [10];
  while(i<=10)
  a[i] = add _ fun(int c, int d);
}
Int add_fun(int c, int d)
{
Int e;
E = c+d;
Return(E);
}
```

b) What is type systems and type checking? What are the type checking functions? **[4]**

Q11) a) How are the object layout is maintain in Multilevel inheritance and hybrid inheritance (give example)? How compiler handle this inheritance. **[10]**

b) What is constructor in object oriented programming? What is default constructor and parameterized constructor? What is their significance? Explain with suitable example. **[6]**

OR

Q12) a) Compare the concept of object and classes of object oriented programming languages with structure of procedural languages? How compilers handle objects, classes and structures? **[10]**

b) What is constructor and destructor in object oriented programming? What is their significance? Explain with suitable example. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P1662

[Total No. of Pages : 2

[4164]-470

B.E. (Production Engineering)
MATERIALS AND LOGISTICS MANAGEMENT
(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer three questions from Section - I and three questions from Section - II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION - I

Unit - I

Q1) a) Explain the importance of materials management in manufacturing organisations. **[9]**

    b) Define value analysis? What are the types of values? Explain the importance of VA technique in the competitive industrial situation. **[9]**

OR

Q2) a) Explain value engineering techniques by considering any suitable illustration. **[9]**

    b) Explain MRP in detail. **[9]**

Unit - II

Q3) a) Explain SR's in brief. **[8]**

    b) Explain Import substitution in brief. **[8]**

OR

Q4) a) Explain purchase cycle in detail. **[8]**

    b) Explain vendor development in brief. **[8]**

Unit - III

Q5) a) Explain methods of issuing of materials in brief. **[8]**

    b) Explain waste disposal system. **[8]**

P.T.O.

Q6) Write short note on : [16]
   a) Centralised and decentralised store.
   b) Bin Card.
   c) Inward and Outward register.

SECTION - II

Unit - IV

Q7) a) What are the functional areas of logistics? [8]

   b) Explain various economic and service benefits of warehouse management and explain how these benefits can be achieved. [8]

OR

Q8) a) Explain the importance of transportation in logistic management. What are the different factors which affect the transportation cost? [8]

   b) Describe the logistical performance cycle in brief. [8]

Unit - V

Q9) a) Discuss supply chain revolution and its implications on Managing business. [8]

   b) Explain the rate of supply chain in manufacturing. [8]

OR

Q10) a) Compare and contrast Modern day global supply chain with traditional distribution channels. [8]

   b) Explain the drivers of supply chain in brief. [8]

Unit - VI

Q11) a) Explain various costs associated with Inventory decisions in detail. [9]

   b) Derive the formula for EMQ when replanishment is non instanteneous (Gradual). State the assumption mode. [9]

OR

Q12) a) Differentiate between Fixed Order Quantity System & Fixed Order Internal System. [9]

   b) Explain optimal service level. Explain the risk and precautionary measures to be considered in case of uncertainty in demand and lead time. [9]

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SEAT No. :

P1668

[4164]-654

B.E. (Petrochemical Engineering)
ENVIRONMENTAL ENGINEERING
(2008 Course) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any 3 questions from each section.*
    2)   *Answers to the two sections should be written in separate books.*
    3)   *Neat diagrams must be drawn wherever necessary.*
    4)   *Figures to the right indicate full marks.*
    5)   *Use of electronic pocket calculator is allowed.*
    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is Biomedical waste? How it should be treated?   **[8]**

      b)   Describe the structural and functional components of Ecosystem.   **[8]**

OR

Q2) a)   Explain the natural and manmade impacts on water?   **[8]**

      b)   Explain the natural and manmade impacts on land   **[8]**

Q3) a)   With the help of flow diagram, explain working of scrubber for SO_2 removal.   **[8]**

      b)   Why flare is required for organic vapor emissions? Explain the working of flare.   **[8]**

OR

Q4) a)   Discuss at least three basic mechanisms with principle, working, advantages and disadvantages for removing particulate matter from gas streams.   **[8]**

      b)   What are the air pollution control laws of vehicular pollution?   **[8]**

Q5) a)   What are the wastes generated from Paper and pulp industries? How are these waste treated?   **[4]**

      b)   Discuss the Meteorological aspects of air pollution.   **[8]**

P.T.O.

c) A conventional cyclone with diameter 1.5 m handles 8 m^3/s of standard air carrying particles with a density of 2000 kg/m^3. For effective number of turns (Ne) = 9. Determine the cut size. What will be the cut size for a high efficiency cyclone? Take viscosity of gas (μg) as 2.81×10^{-5} kg/(m.s.). Neglect density of the gas. **[6]**

OR

Q6) Write a short note on following (Any 4) : **[18]**
   a) CDM.
   b) Kyoto Protocol.
   c) Plume Behavior.
   d) COD/BOD ratio.
   e) Green House effect.
   f) Ventury Scrubber.

SECTION - II

Q7) a) What are various types of water pollutants and their effects? **[6]**

   b) Why the discharge limits differ for waste being disposed to land, river and water? **[6]**

   c) What is Chemical Oxygen demand? Can we determine tentative BOD of wastewater if its COD is known? How? **[4]**

OR

Q8) a) Name at least five physical and chemical waste water characteristics. **[6]**

   b) Discuss the different sources of wastewater from domestic and industrial sources? **[6]**

   c) Discuss the different water pollution laws and standards which protect water from pollution. **[4]**

Q9) a) Explain working of any one low cost waste water treatment method. **[8]**

   b) Discuss principle, construction, working, advantages and disadvantages of trickling filter with neat sketch. **[8]**

OR

Q10) a) Discuss the methods of removal of dissolved solids. **[8]**

   b) Explain the various methods for removal of suspended solids. **[8]**

Q11) a) Discuss the sources and method of treatment for fertilizer with neat sketch.
[9]

b) Discuss the sources and treatment method for steel plant industry waste water with neat sketch. **[9]**

OR

Q12) Write a short note on (Any four) : **[18]**

a) OSHA.

b) Importance of regulations for hazardous waste.

c) Paper & Pulp mill waste treatment.

d) Sanitary land filling operations.

e) ISO 14000.

f) Role of MPCB & CPCB.

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[4164] - 675

B.E. (Polymer)

POLYMER COMPOUNDING

(2008 Pattern) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

    1)   *Answer question number 1 or 2, 3 or 4, 5 or 6 from Section - I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section - II.*

    2)   *Answers to the two sections should be written on separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Draw neat sketches wherever required.*

    5)   *Use of calculator, graph paper is allowed.*

    6)   *Assume suitable data if required.*

<u>SECTION - I</u>

Q1) a)   Write a note on mixing indices.   **[7]**

    b)   With neat sketches, explain mixing action taking place in tumble blenders. Explain how cross mixing can be improved in different types of tumble blenders.   **[6]**

    c)   Explain dispersive mixing.   **[3]**

OR

Q2) a)   Explain the concept of scale of segregation and intensity of segregation. Explain limitations of striation thickness as measure of mixing.   **[7]**

    b)   Write a note on rate of mixing.   **[6]**

    c)   Explain distributive mixing.   **[3]**

Q3) a)   Explain the theory of polymer blend compatibilization with suitable examples.   **[8]**

    b)   List and explain various specific properties of fillers important during polymer compounding.   **[5]**

    c)   Write a note on polymer nanoclay composites.   **[5]**

OR

P.T.O.

Q4) a) Write a note on interfacial agents used to enhance filler - matrix compatibility with suitable examples. **[9]**

b) What are polymer composites? Explain the role of the various components in polymer composites. **[6]**

c) What are polymer compounds? **[3]**

Q5) a) Explain reinforcing effects of **[7]**
i) Carbon black.
ii) ZnO.
iii) $CaCO_3$.

b) Explain the mechanism of working of flame retardants, processing aids and coupling agents. **[9]**

OR

Q6) a) Write a note on compounding methods used for making of nano composites. **[9]**

b) Explain twin screw extruder compounding lines used for filler polymer compounding. **[7]**

SECTION - II

Q7) a) Write a note on reactive extrusion. **[8]**

b) Explain the role of various additives used in PVC compounding. **[8]**

OR

Q8) a) Write a note on compounding of SBR and natural rubber. **[6]**

b) Explain reactive blending with a suitable example. **[6]**

c) List the various ingredients used in making dough molding compound from unsaturated polyester resin. **[4]**

Q9) a) With a neat sketch, explain the type of mixing achieved in the following mixing sections.
i) Cavity mixers.
ii) Variable depth mixers. **[8]**

b) Discuss important characteristics of a dispersive mixing section. **[8]**

OR

Q10) a) Explain with neat sketch, constructional features of a Bussko - Kneader. **[6]**

b) Explain mixing action in a turbulent mixing ring. **[6]**

c) Explain with a neat sketch a double block head mixing section. **[4]**

Q11) a) Write a note on melting mechanism in a co-rotating Twin Screw extruders.
[6]

b) Explain structure, principle of operation and mixing in a continuous mixer.
[8]

c) With suitable sketches, classify twin screw extenders. **[4]**

OR

Q12) a) Explain the construction and mixing mechanism in a 2 roll mill. **[9]**

b) Explain the construction and mixing mechanism in an internal mixer. **[9]**

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[4164] - 676
B.E. (Polymer)
MOLD AND DIE DESIGN - I
(2008 Pattern) (Sem. - I)

Time :4 Hours]

[Max. Marks :100

Instructions to the candidates :
1) *Answer question number 1 or 2, 3 or 4, 5 or 6 from Section - I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section - II.*
2) *Answers to the two sections must be written on separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Draw neat sketches wherever required.*
5) *Use of calculator, graph paper is allowed.*

SECTION - I

Q1) Design a 2 cavity 2 plate mold for the component in Fig.1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection systems. Illustrate the relevant design calculations. **[35]**

FIg 1

Matl: PP

Cavity pressure : 140 kg/cm²

P.T.O

Q2) Design a 2 cavity 3 plate mold for component in Fig.2. Draw at least 2 views with one sectional view to bring out details of the feed, cooling and ejection systems. Illustrate relevant design calculations. **[35]**

FIG2

matl: ABS

Cavity pressure : 180 kg/ cm²

Q3) Explain any one mechanism of stripper plate actuation. **[6]**

OR

Q4) Explain annular cavity cooling system. **[6]**

Q5) Draw a neat labelled sketch of an in-line pipe die and explain its constructional features. **[9]**

OR

Q6) a) With a neat sketch, explain constructional features of offset pipe die.**[6]**

b) Write down the design formula to find pressure drop due to shear through a blown film die. **[3]**

SECTION - II

Q7) a) Discuss important functions and applications of different alloying elements in steel. **[6]**

b) Define heat treatment of steel. Discuss various steps involved in heat treatment of steel. **[6]**

c) Write short note on buffing. **[4]**

OR

Q8) a) Why is tempering carried out on steel? **[6]**

b) Write a note on spark erosion technique. **[6]**

c) Write a note on material selection for various mold components. **[4]**

Q9) a) Calculate the limits of tolerance and allowance for a 20mm shaft and hole pair designated. H8d9 based on the following information.

i) Value of fundamental tolerance factor is given by $i = 0.45\sqrt[3]{D} + 0.001D$.

ii) Fundamental tolerance on hole is $25i$ and that on shaft is $40i$.

iii) Fundamental deviation on hole is zero and that on shaft is $-16D^{0.44}$. Draw a neat sketch of the fit indicating disposition of tolerances & deviations. **[10]**

b) Draw symbols for following geometric characteristics :-

Circular runout, perpendicularity, circularity, straightness. **[4]**

c) Comment on the hole based and shaft based system. **[4]**

OR

*Q10)*a) Write short notes on : **[4]**

i) Allowance.

ii) Clearance fit.

b) Derive an expression for effective diameter or the pitch diameter of a thread using three wire method. Draw a neat sketch. **[8]**

c) Explain any method for testing parallelism of any surface with reference to a standard flat surface. **[6]**

*Q11)*a) Explain diaphragm and tab gate. **[8]**

b) Explain with neat sketch constructional features of standard guide pillar and guide bush. **[8]**

OR

*Q12)*a) What are the various types of locating rings? Explain constructional features of any one. **[8]**

b) Compare the efficiency of a trapezoidal and round runner. **[4]**

c) Explain over lap gate with a neat sketch. **[4]**

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[4164]-405

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2008 Pattern) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Minimize $Z = 4x_1 + x_2$

     Subject to $3x_1 + x_2 = 3$

                $4x_1 + 3x_2 \geq 6$

                $x_1 + 2x_2 \leq 3$

                $x_1, x_2 \geq 0$

     Use Big M method.   **[12]**

    b) What is degeneracy in LPP? How is it resolved?   **[4]**

OR

Q2) a) What is dual LPP? When is it preferable to solve dual LPP?   **[4]**

    b) Applying the principle of duality, solve the following LPP.   **[12]**

Maximize $Z = 3x_1 + 2x_2$

Subject to $x_1 + x_2 \geq 1$

$$x_1 + x_2 \leq 7$$

$$x_1 + 2x_2 \leq 10$$

$$x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

Q3) A construction material is to be transported from 4 sources to 5 sites. The quantity available at sources and quantities required at sites are given below. The unit transportation costs are also given in the table below : **[18]**

Sources	Sites					Quantity Available
	1	2	3	4	5	
A	9	10	11	2	21	20
B	7	14	9	3	7	40
C	22	11	17	9	14	120
D	12	15	6	16	5	120
Demands	20	40	60	80	100	

Find the initial feasible solution by Voqel's Aproximation Method (VAM) and using the initial solution obtained by VAM, find the distribution policy which will minimize the cost of transportation.

OR

Q4) a) A company has to assign five jobs to five employees such that each employee is assigned to one job. The time in hours each employee may take to perform each job is given in the table below. How should the job be assigned to the employees to minimize the total man hours? **[10]**

Employees

Jobs	1	2	3	4	5
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

b) How will you use Assignment model for solving a maximization problem?

[4]

c) How will you solve a transportation problem if it is degenerate? **[4]**

Q5) A builder has 4 money units which he wishes to invest in projects A, B and C. The expected returns from the three projects for each level of investment are given below. Use dynamic programming to obtain the best allocation to maximize the overall returns. **[16]**

Investment in money units	Returns from projects		
	A	B	C
0	0	0	0
1	7	8	9
2	25	20	15
3	30	36	19
4	38	44	30

OR

Q6) a) Explain the following terms used in dynamic programming. **[6]**

   i) Bellman's principle of optimality.

   ii) Stages and states.

   b) Explain advantages and limitations of Dynamic Programming. **[6]**

   c) State any four different applications of dynamic programming. **[4]**

SECTION - II

Q7) a) Define the terms : **[6]**

   i) Global and local optima.

   ii) Hessian matrix.

   b) Write a short note on 'Non Linear Programming'. **[3]**

   c) Verify whether the following functions are convex or concave. **[9]**

   i) $f(x) = 2x_1^3 - 8x_2^2$

   ii) $f(x) = 2x_1 x_2$

   iii) $f(x) = 2x^4 + 8x^2 + 5x$

OR

Q8) a) Use the method of Lagrangian multiplier to **[8]**

   Maximise $Z = 6x_1 + 8x_2 - x_1^2 - x_2^2$

   Subject to $4x_1 + 3x_2 = 16$

   $3x_1 + 5x_2 = 15$

   Where $x_1, x_2 \geq 0$.

b) Solve the following problem by Golden Section method. Maximise $f(x) = 48x - 60x^2 + x^3$ with $n = 6$ and within the range (0 to 1). **[10]**

Q9) a) What are the main elements of a queueing system? Explain any two of them. **[6]**

b) What is the need fo simulation? How can you use Monte Carlo simulation for industrial problems? **[4]**

c) Find the sequence for the following eight jobs that will minimise the total elapsed time for the completion of all the jobs. Each job is processed in the order CAB. **[6]**

Jobs		1	2	3	4	5	6	7	8
Times in	A	3	5	6	5	6	7	4	2
Machine	B	9	10	8	8	12	12	11	10
	C	10	8	7	9	7	10	12	11

Also find the idle time for machines.

OR

Q10) a) Customer arrive at a bank counter manned by a single cashier according to poisson's distribution with mean arrival rate 5 customers/hour. The cashier attends the customers as first come first served basis at an average rate of 9 customers/hour with the service time. **[8]**

Find :

i) The probability of the number of arrivals (0 through 5).

ii) Probability that the queueing system is idle.

iii) Probability associated with the number of customers (0 through 5) in the queueing system.

iv) The time a customer expect to spend in the queue.

b) Give any three different examples of sequencing problems in day to day life. Also discuss the five cases in sequencing problem. **[8]**

Q11) a) Define following terms : **[4]**

    i)   Game.

    ii)   Pure strategy.

    iii) Mixed strategy.

    iv) Zero sum game.

b) Obtain value of following game. **[2]**

	X	Y
A	5	6
B	4	4

c) The maintenance cost and resale value per year for an excavator is given below : **[10]**

Year	1	2	3	4	5	6	7	8	9	10
Mainte. cost	40000	42000	44000	46000	48000	50000	53000	57000	62000	67000
Resale value	230000	220000	210000	200000	180000	160000	140000	120000	100000	70000

The purchase price of the excavator is Rs.2,50,000/- Find the year in which replacement is to be carried out.

OR

Q12) a) Why is replacement of items required? Explain the theory of replacement with the help of example. **[6]**

b) Write any two applications of Games theory. Explain by giving probable strategies. **[4]**

c) Solve the following game. **[6]**

B

1	7	2	5
0	4	7	8
5	2	6	10

A (label to the left of the middle row)

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[4164] - 416

B.E. (Civil)

ADVANCED STRUCTURAL DESIGN

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:

   1)   *Attempt Q.1 or Q.2, Q.3 or Q.4 from Section - I and Q.5 or Q.6, Q.7 or Q.8 from Section - II.*

   2)   *Answers to the two sections should be written in separate answer books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Assume suitable data, if necessary.*

   6)   *Use of cell phone is prohibited in the examination hall.*

   7)   *Use of electronic pocket calculator, steel table and relevant IS code is allowed.*

SECTION - I

Q1) a)   What are the advantages of cold form light gauge sections.   **[10]**

     b)   Two channel sections without bent lips 200mm x 50mm are connected with webs to act as a beam. The thickness of channel is 2.5mm. The effective span of simply supported beam is 5m. Determine the maximum uniformly distributed load inclusive of self weight which can be supported by the beam. The beam is laterally supported throughout the length. Take I = 780 x 10^4 mm^4.   **[15]**

OR

Q2) a)   State the advantages of castellated beams.   **[7]**

     b)   Explain design steps for moment resistance bases.   **[9]**

     c)   State and explain design concept of pre engineering building.   **[9]**

Q3) Design a castellated beam to carry an imposed load of 4 kN/m and dead load of 2.5 kN/m over a simply supported span of 16m. Assumes that the compression flange is fully restrained. Use limit state method.   **[25]**

OR

Q4) Analyzed the gable portal frame shown in Figure and obtain the Plastic moment. Plot the bending moment diagram. **[25]**

Figure

SECTION - II

Q5) A simply supported rectangular R C grid floor is 12m x 15m with centre to centre spacing of grid 1.5m in both the directions. Take live load = 4 kN/m^2 and floor finish = 1.5 kN/m^2. Use M_{20} grade of concrete and Fe_{415} grade of steel. Draw the details of the reinforcement in beams and slab. **[25]**

OR

Q6) Design only container of circular water tank for 8 x 10^5 liters capacity. Draw the detail layout and reinforcement details at wall., top slab, bottom slab and beams supporting bottom slab. Bottom of the tank is at 12m above the ground level, EQ zone III, hard strata is available at 2m blow ground level, safe bearing capacity = 200 kN/m^2, basic wind pressure = 1000 N/m^2 and material M_{25}, Fe_{500}. **[25]**

Q7) Design staging and foundation for water tank of Q. 6, assuming the size and load of the container. Draw the design sketches. **[25]**

OR

Q8) Design an interior panel of size 6m x 6m of a flat slab with suitable drop to support a live load of 4500 N/m^2. The slab is provided with floor finish of 1200 N/m^2. The floor system is supported by columns of size 500mm x 500mm. Floor to floor distance is 4m. Use M_{20} grade of concrete and Fe_{500} grade of steel. Draw the reinforcement details. **[25]**

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[4164] - 454

B.E. (Mechanical Sandwich)

COMPUTATIONAL FLUID DYNAMICS

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates :

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data if required.*

SECTION - I

Q1) a) Describe impact of CFD on modern engineering designs with examples. **[6]**
b) Obtain differential form of momentum equation using suitable flow model for control volume. **[10]**

OR

Q2) a) Describe various flow models of control volume used to analyse the flow. **[6]**
b) Describe use of CFD in civil engineering applications with suitable examples. **[10]**

Q3) a) Explain what is artificial viscosity. **[6]**
b) Using Runge-Kutta method, solve the system of equations

$$\frac{dy}{dx} = x + yz$$

$$\frac{dz}{dx} = x^2 - y^2$$

subject to $x_0 = 0$, $y_0 = 1$, $z_0 = \frac{1}{2}$

to find y and z at $x = 0.2$ taking $h = 0.2$. **[10]**

P.T.O.

Q4) a) Classify following equations into elliptic, parabolic or hyperbolic **[6]**

   i) $\dfrac{\partial^2 f}{\partial x^2} + \dfrac{\partial^2 f}{\partial y^2} = 0$

   ii) $\dfrac{\partial f}{\partial t} = \dfrac{\partial^2 f}{\partial x^2}$

   iii) $a^2 \dfrac{\partial f}{\partial x^2} - \dfrac{\partial^2 f}{\partial t^2} = 0$

   b) Discuss advantages and disadvantages of implicit & explicit approach.**[5]**

   c) What are the types of errors encountered in numerical analysis. **[5]**

Q5) a) What is unstructured mesh explain in detail with example. **[8]**
   b) Explain use of adaptive grid in CFD. **[10]**

OR

Q6) a) What is transformation of grid? **[8]**
   b) Write a note on modern development in grid generation. **[10]**

SECTION - II

Q7) Develop solution algorithm for one dimensional transient heat conduction problem based on
   a) Implicit scheme
   b) Explicit scheme. **[16]**

OR

Q8) a) What are stability requirements? Explain it with CFL conditions. **[6]**
   b) Explain MacCormak's technique. **[10]**

Q9) Explain SIMPLE Algorithm. **[16]**

OR

Q10) a) Outline MAC algorithm for fluid flow solutions. **[8]**
   b) Write Navier - Stokes equation for incompressible flow and explain each term. **[8]**

*Q11)*a) Give advantages & disadvantages of finite volume method. **[8]**

b) Explain finite volume method for CFD. **[10]**

OR

*Q12)*Write short note on any 3 of the following : **[18]**

a) Errors in CFD.
b) Discretization in CFD.
c) Automotive applications of CFD.
d) Aerospace applications of CFD.

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[4164] - 526

B.E. (Electronics)

ADVANCED POWER ELECTRONICS

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :
1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *All questions carry equal marks.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What is the need of PWM technique in converter circuits? Explain with circuit diagram & waveforms, working 3ϕ IGBT based PWM rectifier with suitable load. Comment on Pf & hormonics. **[10]**

b) Explain, EMI & power quality problem of Thyrister converter. **[6]**

OR

Q2) a) What is power conditioning of diode rectifier? Explain. **[6]**

b) What is the need of 12 pulse converter in heavy industries? Justify how it improves the system performance as compare to conventional converters. **[10]**

Q3) a) What is Phase Locked Loop Control System? Explain with diagram speed control of DC Motor using PLL for varying load conditions. State its advantages & dis-advantages. **[10]**

b) Explain the need of μc based DC drive in industries. **[6]**

OR

Q4) a) What are AC drives? Explain with block diagram 3ϕ, reversible Flux Control for IM drive. State its advantages and disadvantages. **[8]**

b) Justify why cycloconverter based IM are not recommended for high power industrial applications. **[8]**

Q5) a) What are different types of modulation techniques used in inverters? Explain any one type. State its advantages. **[6]**

b) What is the need of DC-Link inverter? State its advantages and disadvantages. **[6]**

c) What is adaptive control? Explain. **[6]**

OR

Q6) a) What are Multi-Level Inverters? Explain with circuit diagram switching of Multi-level inverters. State its advantages & dis-advantages. **[10]**

b) Write short notes on <u>any two</u> : **[8]**
   i) Z - source inverters.
   ii) Space vector modulation.
   iii) Double sided converter system.
   iv) UPS.

SECTION - II

Q7) a) What is soft switching in Resonant converter? Explain with circuit diagram & waveforms, working SLR converter. **[10]**

b) What is hot swappable redundant Power Supply? Explain. **[6]**

OR

Q8) a) Explain the difference between single & Multi-resonant converter. **[8]**

b) What is ZCS? Explain with circuit dia & waveforms working of ZCS. State its advantage & dis-advantages over ZVS. **[8]**

Q9) a) What are different types of Renewable energy sources? Explain the role of DC - to DC converter in variable wind energy y-conversion system. **[10]**

b) What is the role of Power Electronic Converters (PEC's) in Wind Power Plants (WPP's). **[8]**

OR

Q10) a) What are battery powered drives? Explain. **[6]**

b) Explain in brief, <u>Photovoltalic</u> energy conversion system. **[6]**

c) What is the role of Back to Back Power Electronic Converters (PEC's) & state its Limitations. **[6]**

*Q11)*a) What is solar power conditioning? Explain in brief. **[6]**

b) What is power quality? Mention different power line disturbances. Suggest preventive & nullifying measures for these disturbances. **[10]**

OR

*Q12)*Write short notes on any three : **[16]**

a) Traction drives.

b) Universal Motors.

c) FACTS.

d) Battery chargers.

e) Cascaded Multi-Level Inverters.

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[4164] - 570

B.E. (Instrumentation and Control)
ADVANCED CONTROL SYSTEMS
(Elective - I) (2008 Pattern) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to candidates:
1) *Answer any three questions from each Section.*
2) *Assume suitable data, if necessary.*
3) *Figures to the right indicate full marks.*

SECTION - I

Q1) Attempt following:

a) Explain Inherent and intentional nonlinearities with examples. **[8]**

b) Determine the Describing function of the ideal relay nonlinearity. **[10]**

OR

Q2) Attempt following:

a) What is phase plane and what are the characteristics of phase plane method? **[8]**

b) Explain saddle point and stable point with neat sketches and suitable examples. **[10]**

Q3) Attempt following:

a) Explain stability analysis by describing function method. **[6]**

b) Consider a nonlinear system described by **[10]**

$$\dot{x}_1 = x_2$$
$$\dot{x}_2 = -x_2 - x_1^3$$

Investigate whether the system is stable or not.

OR

Q4) Attempt following:

a) Explain positive definite, negative definite and semi definite functions with examples. **[6]**

P.T.O

b) A second order system represented by $\dot{x}=Ax$ where **[10]**

$$A=\begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$$

Assuming matrix Q to be identity matrix, solve for matrix P in the equation $A^TP + PA = -Q$.

Use Liapunov theorem and determine the stability of the system. Write the Liapunov function V(x).

Q5) Attempt following:

a) Explain in brief direct and indirect model reference adaptive control with block diagram. **[8]**

b) Discuss the essential aspects of an adaptive control system. **[8]**

OR

Q6) Explain Lyapunov and MIT rule approaches for designing of Model reference adaptive controller. **[16]**

SECTION - II

Q7) Explain indirect self tuning regulator using least squares estimator for

$$Ay(t) = B(u(t) + v(t))$$

where y is the output, u is the input of the process, and v is a disturbance. Also give the algorithm for obtaining it. **[16]**

OR

Q8) Consider the process **[16]**

$$G(s)=\frac{1}{s(s+a)}$$

Where a is an unknown parameter. Assume that the desired closed loop system is

$$G_m(s)=\frac{\omega^2}{s^2+2\zeta\omega s+\omega^2}$$

Construct continuous indirect self tuning algorithm for the system.

Q9) A first order system is described by the differential equation   **[16]**

$$\dot{x}(t) = 2x(t) + u(t)$$

It is desired to find the control law that minimizes the performance index

$$J = \frac{1}{2} \int_{o}^{t_f} (3x^2 + \frac{1}{4}u^2) \, dt$$

$t_f = 1$ sec.

<div align="center">OR</div>

Q10) Obtain the control law which minimizes the performance index.   **[16]**

$$J = \int_{0}^{\infty} (x^2 + u^2) \, dt$$

For the system

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Q11) Attempt following:
   a) Explain requirements for formulation of an optimal control problem.

                                                                                              [9]
   b) Discuss performance measures for optimal control problems.   **[9]**

<div align="center">OR</div>

Q12) Write short notes on:
   a) Applications of Adaptive control.   **[9]**
   b) Optimal control applications.   **[9]**

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B.E. (Instrumentation & Control)

AUTOMOBILE INSTRUMENTATION

(Sem. - I) (2008 Pattern) (Elective - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data if necessary.*
5) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Write a short note on : Current Trends in Modern Automobiles.   **[8]**

b) Explain in detail the system components for Electronic Engine Management.   **[8]**

OR

Q2) a) What are the fundamentals steps involved in Automotive Electronics? Explain briefly.   **[8]**

b) Explain in detail the Vehicle Motion Control.   **[8]**

Q3) a) Explain with the help on neat diagram the Electronic Fuel Ignition System.   **[8]**

b) Write a short note on : "Carburetor Control System".   **[8]**

OR

Q4) a) Explain in detail the Electronic Spark Timing Control System.   **[8]**

b) Explain in detail the principle of operation of Solid State Ignition System.   **[8]**

Q5) Write short notes on : **[18]**

    a)   Engine Control system.

    b)   Idle speed Control.

    c)   Engine Mapping.

<div align="center">OR</div>

Q6) a)   Explain briefly Integrated Engine Control System. **[9]**

    b)   Write a short note on : "Exhaust Emission Control System". **[9]**

<div align="center">

SECTION - II

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Q7) a)   Explain in detail the Electronic Power Steering. **[8]**

    b)   Write a short note on : "Different Electronic Control Methods". **[8]**

<div align="center">OR</div>

Q8) a)   Explain the role of control in Automobile Chassis. **[8]**

    b)   Explain in detail ABS. **[8]**

Q9) Write short notes on : **[16]**

    a)   Automotive Control Locking System.

    b)   Air Bag Technology.

<div align="center">OR</div>

Q10) Write short notes on : **[16]**

    a)   Electronic Controlled Doors and Windows.

    b)   Control System for Anti Theft Technology.

Q11) a)   Explain in detail the role of Agronomics with respect to Automobiles. **[9]**

    b)   Explain briefly the Air Conditioning System in Automobiles. **[9]**

<div align="center">OR</div>

Q12) Write short notes on : **[18]**

    a)   Battery Monitoring System.

    b)   Fuel Monitoring System.

    c)   Lightening System.

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[4164] - 590

B.E. (Printing)

COMMERCIAL GRAPHIC DESIGN

(2008 Pattern) (Elective - I) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instruction to the candidates :

Solve any 3 questions from each section.

<u>SECTION - I</u>

Q1) Discuss Basic elements to be considered for a graphic design.   **[16]**

OR

What are paper sizes? Discuss margins to be considered for a graphic layout.

Q2) What are file formats of a Digital Camera? Compare in detail.   **[18]**

OR

Describe in detail Raw image processing.

Q3) Explain in detail importance of pre flight check.   **[16]**

OR

Describe a work and tumble layout for printing of 8 page four color job.

<u>SECTION - II</u>

Q4) Describe parameters to be considered in package design.   **[18]**

OR

Discuss process of label manufacture for beverage packaging.

P.T.O.

Q5) Describe file formats used in web graphics. Also discuss elements for webpage design. **[16]**

OR

Discuss image editing using adobe photoshop for web designing.

Q6) Discuss workflow process and PDF workflow systems. **[16]**

OR

What are the cost elements involved in designing and printing of a flyer?

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[4164] - 598

B.E. (Printing)

MAINTENANCE OF PRINTING MACHINES

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:
1) *All questions are compulsory. Answer any one of each question a or b.*
2) *Questions 1,2,4 and 5 have 16 marks and questions 3 and 6 have 18 marks.*

SECTION - I

Q1) a) i)   What are the different types of gears used in printing machines.

       ii)   Where are worm and worm wheel gears used in printing machines.

       iii)   What is the function of a lead screw. Where is it used in the printing industry name at least 4 instances.

       iv)   What is the function of an air cylinder?

    b) i)   In a printing machine different types of speed control systems are used. List the same and explain a electrical variable speed drive.

       ii)   What are the different types of bearings used in printing machines.

       iii)   What is the type of coupling used in a Vacuum pump? Explain with suitable diagram.

       iv)   Where are hydraulic systems used in Printing industry?

Q2) a) i)   What are the various mechanical groups of a printing machine?

       ii)   Purpose of undercuts on cylinders. If you do not know the undercut of a machine how would you find out the same?

       How is the motion on the feeder mechanism on a printing machine changed from vertical to horizontal?

       What are the different types of plate clamps used in printing machines?

b) i) What is the dampening system of a offset printing machine. Called? Explain any one with diagram.

   ii) What are the different types of feeding systems used in printing machines.

   iii) Explain the function of a stream feeder in brief.

   iv) How is the blanket clamped to the cylinder?

Q3) a) What is the purpose of daily/routine inspection of a machine.
How does it help in keeping the equipment running with minimum mean time between failures?

   b) What is understood under the term Preventive and Breakdown Maintenance? How can preventive maintenance reduce the incidence of Breakdowns?

SECTION - II

Q4) a) What do you understand under Maintenance? Explain in detail.

   b) What is the type of leveling instrument used for leveling of a printing machine. What are the required tolerances necessary.

   Can this be replaced by a Laser level instrument. If yes why? If no Why?

Q5) a) i) When installing a machine what are the important points to be observed?

   ii) Importance of proper lubrication and types of lubrication systems.

   b) i) What is the advantage of a ball bearing over a bush (sliding) bearing.

   ii) In modern machines often the entire gear and other drive components are encased in an oil bath/oil sprinkler system. Explain reasons for the same.

Q6) a) i) What are the essential tools required by a Maintenance Engineer?

   List at least 15.

   ii) The cutting action of a Paper cutting machine is -----?

   Explain the reason for the same.

b) What are the principles of Plant layout? Explain in detail.

Prepare a layout for a printing press room with following equipment: Explain the work flow.

1. 4 colour offset machine 19 x 25 inches.

   Area of the machine is 30 feet by 7.5 feet.

   CPC unit requires an area of 5 feet x 7 feet.

   Ancillary equipment such as compressor, chilling unit etc occupies an area of 6 feet x 10 feet.

2. 2 colour offset machine 25 x 38 inches.

   Area required for the machine is 8 feet x 17 feet.

3. 2 single colour offset machines 20 x 30 inches

   area required by the machines 6 x 10 feet

4. I die cutting cylinder machine 25 x 38 inches

   area required by the machine is 12 feet x 6.5 feet

   Supervisor cabin 8 x 10 feet

      Test equipment table 6 feet x 4 feet

      Storage area for consumeables and spares 10 x 15 feet.

Prepare the layout taking into consideration the above equipment providing space for working area and work in process.

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[4164] - 640

B.E. (Petroleum Engg.)

NON CONVENTIONAL HYDROCARBON RESOURCES

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates :

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams should be drawn wherever necessary.*
3) *Figures to the right indicate marks.*
4) *Assume additional data if necessary.*

SECTION - I

Q1) a) How is continuous accumulation system different than conventional system? **[10]**

   b) What are the petrophysical characteristics of a CBM reservoir? **[5]**

OR

Q2) Describe in brief technological challenges related to following areas in the production of heavy and extra heavy oil. **[15]**

   a) Geomechanics

   b) In situ viscosity and fluid characterization

   c) Flow assurance

   d) Downhole sampling.

Q3) a) Draw a schematic diagram of CBM reservoir to understand heterogeneity. How does it different from Shale Gas? **[10]**

   b) What is a shale gas? How is porosity on different scales visualized in shale? **[5]**

OR

Q4) a) Describe with suitable diagram physical conditions that control presence of gas hydrate in an oceanic setting. **[9]**

b) Write in brief factors controlling physical properties of gas hydrates. **[6]**

Q5) Answer <u>any four</u> from the following : **[20]**

    a) Risked gas in place.

    b) Jarwie classification of Shale Gas based on ductility.

    c) Estimated Carbon Balances for a Fischer - Tropsch Dual-Feed Coal - and Biomass-to-Liquids Plant.

    d) Coal storage and transport mechanism.

    e) Relationship between the Sorption Isotherm Curve and Gas Content and the Influence on Recovery for CBM.

    f) Material balance equation for coalbed methane.

SECTION - II

Q6) a) Discuss use of Fork type dual lateral horizontal well to extract Heavy oil. Draw a suitable sketch. **[10]**

b) Discuss chemo-poro-thermo-elastoplastic behavior of rock deformation in brief. **[5]**

OR

Q7) a) Explain design of hydro fracturing job in detail. **[10]**

b) A 400 acre lease is to be developed by 10 vertical wells. Calculate possible number of horizontal wells that will drain the lease effectively if 1000 ft, 2000 ft long horizontal wells are to be drilled in shale gas development field. **[5]**

Q8) a) Describe causes of formation damage and perforation damage. **[10]**

b) An undersaturated coal system has the following reservoir parameters :

Drainage area = 240 acres

Thickness = 21 ft

Porosity = 3%

Initial pressure = 750 psia

Desorption pressure = 450 psia

Total compressibility = 16×10^{-5} psi^{-1}.

Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption pressure.   **[5]**

Q9) Answer <u>any four</u> from the following :   **[20]**

   a)   Inhibition of hydrate formation

   b)   Elastic properties of rocks

   c)   Radioactive minerals in Shale

   d)   Treatment for produced water

   e)   In situ stress and importance of construction of Mohr's diagram

   f)   Capillary pressure and relative permeability relationship in conventional and low permeability reservoir.

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[4164]-646

B.E. (Petroleum Engineering)
TRANSPORT OF OIL AND GAS
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6 from section-I and Q. No. 7 or 8, Q. No. 9 or 10, Q. No. 11 or 12 from section-II.*
2) *Answers to the two sections must be written in separate answer books.*
3) *Figures to the right indicates full marks.*
4) *Neat diagram should be drawn wherever necessary.*
5) *Use a non programmable calculator.*
6) *Assume suitable data if necessary and clearly state it.*

SECTION - I

Q1) a) Draw neat sketches and explain flow regimes in horizontal and vertical multiphase pipeline. **[8]**

     b) Explain the following : **[8]**
        i) Gathering System.
        ii) Oil and gas Storage Tanks.

OR

Q2) Write short note on : **[16]**
     a) Trunk line system.
     b) Role of flow improvers.
     c) Factors affecting oil and gas flow characteristics.
     d) Complex flow system for oil and gas.

Q3) a) Describe pressure loss considerations in oil and gas pipe line. **[8]**

     b) How will you calculate line size and pipe wall thickness in design of oil and gas pipeline? **[8]**

OR

P.T.O.

Q4) **Given :** flow rate of gas is 23 MMSCFD **[16]**

Viscosity = 3 cp

Gas gravity = 0.85

Length = 7000 ft

Inlet pressure = 900 psi

Temperature = 80°F

Gas viscosity = 0.013

Roughness factor = 0.004 (assume old steel)

Z = 0.67

E = 0.95

Problem : Solve for pressure drop in a 4-in. and 6-in. ID line using the :

1. General Equation.
2. Assumption of $\Delta P < 10\%$ P1.
3. Panhandle B Equation.
4. Weymouth Equation.

Q5) a) Discuss in brief about leak and ruptures in pipeline maintenance and repair. **[8]**

b) Classify different types of valves used in oil and gas transport operation and explain in detail any one with neat sketch. **[10]**

OR

Q6) a) Explain in detail about Pigging operations and equipments with a neat sketch? **[8]**

b) What do you mean by testing of oil and gas pipelines? Explain. **[5]**

c) Write about different flow meters used oil and gas transport. **[5]**

SECTION - II

Q7) a) Give advantages and disadvantages of centrifugal and reciprocating pumps? **[8]**

b) Explain with a neat sketch construction, working and principle of rotary pump? **[8]**

OR

Q8) a) Explain with a neat sketch construction, working and principle of reciprocating compressor? **[8]**

b) Given following information of a centrifugal compressor answer the following conditions :

Operating conditions : Ps = 750 psia, Pd = 1046.4 psia, Ts = 529.7 deg R, Td = 582.6 deg R, Q g, sc = 349 MMSCFD

Gas properties : SG = 0.6, k = 1.3, Zavg = 0.95

Calculate :

1. Isentropic efficiency?
2. Actual volumetric flow rate?
3. Isentropic head?
4. Power requirement (assume 98% mechanical efficiency)? **[8]**

Q9) a) What is gas monetization? Explain in brief different methods of gas monetization? **[8]**

b) Explain the following conversions : **[8]**

i) Gas to liquid.
ii) Gas to ammonia and urea.

OR

Q10) Explain in brief : **[16]**

a) Marginal gas field.
b) Associated gas reserves.
c) Methanol production using gas.
d) Power generation using natural gas.

Q11) a) Discuss in detail subsea challenges for installing, operating and troubleshooting of oil and gas pipelines? **[8]**

b) Write short note on : **[10]**

i) Economics of long distance oil and gas pipelines.
ii) Flow assurance.

OR

Q12) a) Explain in detail about Asphaltene, wax and hydrate formation and inhibition? **[8]**

b) Write short note on : **[10]**

i) Subsea pipeline supervision and safety.
ii) Subsea pipeline heat transfer and thermal insulation.

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[4164]-665

B.E. (Petrochemical)

PROCESS MODELLING AND SIMULATION

(Elective - III) (2008 Pattern) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Enlist different types of mathematical models. Explain in brief the principles of formulation of these models. **[8]**

     b) Write in details any four applications of simulation in petrochemical industry. **[8]**

<div align="center">OR</div>

Q2) What is continuity equation? Explain and deduce total and component continuity equations for microscopic and macroscopic systems with suitable examples. **[16]**

Q3) Develop the dynamic mathematical model for steam assisted LPG flash vaporizer. **[18]**

<div align="center">OR</div>

Q4) A perfectly mixed, isothermal CSTR has an outlet weir. The flowrate over the weir is proportional to the height of liquid over the weir, how, to the 1.5 power. The weir height is hw. The crosssectional area of the tank is A. Assume constant density. A first order reaction takes place in the tank :

$A \xrightarrow{\quad K \quad} B$. Derive the equations describing the system. **[18]**

Q5) a) Explain mathematical procedure for modified Euler's method. **[4]**

b) Using modified Euler's method, solve the equation : **[12]**

$$\frac{dy}{dx}=1+xy \quad [x_0=0, \ y_0=1]$$

to find *y* at *x* = 0.1 and *x* = 0.2 with *h* = 0.1

OR

Q6) a) Note the predictor and corrector formulae for Milne's method. **[4]**

b) Solution of the equation $5x\frac{dy}{dx}+y^2-2=0$ is tabulated as : **[12]**

x	4.0	4.1	4.2	4.3
y	1.0	1.0049	1.0097	1.0143

Use Milne's predictor-corrector method to find y at x = 4.4 and 4.5.

SECTION - II

Q7) a) Explain steady and dynamic simulation. **[8]**

b) Draw and brief about the structure of a process simulator. **[10]**

OR

Q8) Develop simulation approach steps for the following interacting and non-interacting tanks : **[18]**

Q9) Explain single loop controllers and model predictive controllers. Develop exact matrix representation of state-space variables for a system :

$$mx'' + bx' + kx - f(t) = 0 \qquad \textbf{[16]}$$

Q10) Describe the dynamic MIMO modelling for a crude distillation unit in a refinery. **[16]**

Q11) Write in details about empirical models based on following parameters :**[16]**
   a) Chemical Reaction.
   b) Phase.

OR

Q12) a) For a fuzzy logic system, note the base equations required for a multistage countercurrent extraction. **[8]**

   b) What is Artificial Neural Network? Enlist three applications of ANN in petrochemical industry. **[8]**

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[4164] - 666

B.E. (Petrochemical Engineering)
FINE CHEMICAL INDUSTRIES
(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to candidates:
- *1) Answer any three questions from each Section.*
- *2) Answers to the two sections should be written in separate books.*
- *3) Neat diagrams must be drawn wherever necessary.*
- *4) Figures to the right indicate full marks.*

SECTION - I

Q1) a) Mention about the aspects of process development in manufacturing of fine chemicals. **[10]**

     b) Write a note on catalysis in fine chemical manufacturing. **[8]**

Q2) a) Mention the importance of pilot plant studies and the environmental and safety aspects of process development. **[10]**

     b) Write a note on the scale up roots and the scale up ratio. **[6]**

Q3) a) Discuss catalyst performance based on the activity, selectivity and stability. **[10]**

     b) Write a note on selection of catalyst. **[6]**

Q4) a) Mention in brief about distillation as a most widely used method for separation in manufacture of fine chemicals. **[10]**

     b) Write a note on applications of ion exchange resins for preparation of fine chemicals. **[6]**

SECTION - II

Q5) a) Mention about the mixed plants used for preparation of fine chemicals. **[12]**

     b) Mention principles of good manufacturing practice. **[6]**

Q6) a) Explain in brief the criteria and constraints in production planning, scheduling and design of batch plants. **[10]**

b) Explain in brief about the types of extraction processes used in manufacture of fine chemicals. **[6]**

Q7) a) Mention in brief about the differences in the processes used for manufacturing of fine chemicals and commodity chemicals. **[10]**

b) Write a note on mechanism of homogeneous catalysis. **[6]**

Q8) a) Mention scale up procedures with respect to the scale up effects, material factors and size / shope factors. **[10]**

b) Write a note on the role of catalysis in waste management. **[6]**

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[4164]-687

B.E. (Polymer)

PROCESSING OF COMPOSITES

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the different types of glass filers commonly used. What are the advantages and disadvantages of glass fibers? **[6]**

b) Assuming that the unidirectional continuous fibers of round corss-section are arranged in a simple square array as shown in the figure.1 below. Calculate the theoretical fiber volume fraction in the composite lamina. What is the maximum fiber volume fraction that can be arranged in this fashion? **[6]**

a = distance between centres of two fibres.

r_f = radius of the round fiber.

fig.1

c) What is the primary function of a fiber surface treatment? Discuss what surface treatment is given to glass fibers, aramid fibers and carbon fibers. **[6]**

OR

Q2) a) How are fibers incorporated into a polymer matrix? Discuss in detail how fibers are incorporated into a thermoplastic resin matrix. **[6]**

b) Derive the "Rule of mixtures" for an unidirectional fibre composite and solve the following.
PEEK is to be reinforced with 40% by volume of unidirectional carbon fibres and the properties of the individual materials are given below. Calculate the density, modulus and strength of the composite in the fibre direction. **[6]**

Material	Density (kg/m^3)	Tensile strength (GN/m^2)	Modulus (GN/m^2)
PEEK	1300	0.058	3.8
Carbon fibre	1800	2.1	400

c) List the different types of thermoset and thermoplastic matrices used to make composites. Discuss any one thermoplastic and one thermoset matrix. **[6]**

Q3) a) Discuss how a Differential Scanning Calorimeter (DSC) can be used to find the degree of cure. What is the effect of cure time and cure temperature on the degree of cure and rate of cure. **[4]**

b) Discuss prepreg lay up process w.r.t. tooling requirement, raw material and basic processing steps and explain the use of vaccum bag and autoclave during prepreg lay up. State the merits and demerits of the process. **[6]**

c) Explain the Darcy's model for resin flow through fiber network or prepreg lay up. Also explain the Kozeny-Carman equation for determination of permeability. Explain the limitations of Darcy's model and Kozery-Carman equation. **[6]**

OR

Q4) a) With a typical exothern curve explain the gel-time test to determine the curing characteristics of a resin-catalyst combination. **[5]**

b) Discuss the features of screw design and barrel design for thermoset injection molding. **[5]**

c) Compare the tooling requirements for various processes like wet lay up; spray lay up and prepreg lay up. **[6]**

Q5) a) What is liquid composite molding process? Explain resintransfer molding w.r.t material, mold, process steps and applications. Compare RTM with compression molding. **[6]**

b) Explain the theory for void formation in autoclave processing. **[4]**

c) Discuss four sub models in short to analyze the complete composite processing phenomena. **[6]**

OR

Q6) a) What is the significance of studying the kinetic model in autoclave processing? **[4]**

b) Draw a typical pressure and temperature curve during an autoclave process and discuss the purpose of supplying heat & applying pressure during the process. Discuss the resin flow submodel when resin flow is normal to the tool plate w.r.t autoclave cure process. **[8]**

c) Discuss the process of pultrusion. Give its merits and demerits. **[4]**

SECTION - II

Q7) a) Discuss the thermomechanical model in case of filament winding. **[6]**

b) Discuss the winding techniques in filament winding process. Give a few applications of the same. **[6]**

c) Discuss the process parameters that control the fiber wet-out in filament winding. **[6]**

OR

Q8) a) What are the reasons for residual stress in laminates? Discuss the stress sub-model in case of a symmetric laminate. **[6]**

b) Discuss the process of thermoplastic tape winding w.r.t. material, tooling part making, methods of applying heat and pressure. State the advantages and disadvantages of the same process. **[8]**

c) Give a few applications made by tape winding process. **[4]**

Q9) a) What are the advantages of adhesive bonding over mechanical joints.**[6]**

b) Discuss the different types of adhesives used with composites. **[6]**

c) Discuss the modes of failure in adhesive bonding. **[4]**

OR

Q10) a) What are the different methods for surface preparation to inprove bond strength in case of composites. **[6]**

b) What are the objectives of machining of composites? Why cutting tools for composite machining coated with diamond or some othersubstance.**[4]**

c) Discuss waterjet cutting used for machining composites. What are the process parameters affecting the cutting performance w.r.t. composites.**[6]**

Q11) a) What are polymer nano composites? Classify polymer nano composites on the basic of number of dimensions. **[4]**

b) What is intercalation? Explain the different ways to intercalate clay particles. **[6]**

c) What is exfoliation? How does it differ from intercalation? How is exfaliation carried out? **[6]**

OR

Q12) a) What are the different steps involved in manufacturing of clay polymer nanocomposites? **[8]**

b) Write a short note on polymer nano-composites with CNTs in a thermoplastic matrix. **[4]**

c) Compare polymer nanocomposites with normal composites based on composition, mechanical and thermal properties. **[4]**

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[4164]-688

B.E. (Polymer)

SPECIALTY POLYMERS AND APPLICATIONS

(2008 Pattern) (Elective - III) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to section-I and section-II should be written on separate answer book.*
2) *Solve 3 questions from section-I and three questions from section-II.*
3) *Neat diagrams should be drawn whenever necessary.*
4) *Figures to right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) On the basis of molecular ordering explain how liquid crystalline phase is different from solid and liquid phase? **[4]**

b) W.r.t molecular orientation explain why aromatic polyamide fibers have higher moduli and strength as compared to aliphatic polyamides? **[4]**

c) Enlist various characteristics of Liquid crystalline phase. **[6]**

d) Give two examples and two applications of Thermotropic and Lyotropic LCPs. **[4]**

OR

Q2) a) Referring to the figure below identify various phases of liquid crystalline polymers. Comment on the peculiar characteristics of these phases. **[8]**

b) With neat sketch explain the effect of solution concentration and shear rate on the viscosity of Lyotropic Solutions. Also, explain its importance in fiber/film formation. **[6]**

P.T.O.

c) What do you understand by Isotropic phase and Anisotropic Phase? Explain their role in liquid crystalline phase formation. **[4]**

Q3) a) With suitable example explain the development of band structure in Conducting Polymers. **[6]**

b) Write the note on Solvents and Electrolytes used in Electrochemical Synthesis route of conducting polymers. **[4]**

c) Explain in detail, alongwith various reactions involved, the application of conducting polymers in Lithium Rechargeable Batteries. **[6]**

OR

Q4) a) Explain Template Polymerization technique and its significance with suitable example. **[6]**

b) What do you understand by Solvatochromism, Thermochromism and Electrochromism? **[6]**

c) Write a short note on Use of Conducting Polymers in Light Emitting Diodes (LEDs). **[4]**

Q5) a) An isothermal TGA thermogram is given in Figure 1. Comment of the usefulness of given polymers in heat resistant application. **[5]**

Isothermal weight loss of polyheterocyclics in air at 370 °C.
Atmosphere : circulating air; Sample form : > 0.1 mm (,140 mesh) powder
A : Polybenzimidazole; B : Poly(N-phenylbenzimidazole); C : Polybenzothiazole;
D : Polyquinoxaline; E : Polybenzoxazole; F : Polyimide

b) Enumerate and explain in brief various structural features responsible for building heat resistance in polymers. **[7]**

c) Explain the terms Ablation and Ablative Polymers. Explain the role of ablative polymers in spacecraft applications. **[4]**

OR

Q6) a) Write a short note on "Heat Resistant Polymers as Structural Resins in Aerospace Applications". **[6]**

b) Although the primary bond strength of most inorganic polymers are high, very few are useful as heat resistant polymers. Explain. **[4]**

c) Enlist the Polymeric Properties and Characteristics which affect the performance of Ablative Polymers. **[6]**

SECTION - II

Q7) a) Enlist various types of polymeric coating additives. **[3]**

b) What do you understand by the term "Membrane"? What are the advantages of membrane technology compared to other unit operations in chemical engineering? **[6]**

c) Explain working of photosensitive polymers? Give two examples of materials used as positive and negative photoresists? **[7]**

OR

Q8) a) What are the various requirements for polymer to work as coating additive? **[3]**

b) Enlist the parameters which act as driving force to cause trans-membrane gradient, thereby, passive transport through membranes. **[3]**

c) Classify the membranes and membrane processes used for separations via passive transport. **[4]**

d) Write a short note on "Photolithography". **[6]**

Q9) a) Alongwith the reactions involved explain in detail synthesis of poly (lactic acid). **[8]**

b) Compare between Poly (lactic acid), Poly (caprolactone) and Poly (glycolic acid) w.r.t. the following properties - Tg, Tm and degradation time. Which of these polymers will be preferred for degradable sutures on the basis of degradation time? **[8]**

OR

Q10) a) Is poly (glycolic acid) a Natural or Synthetic biopolymer? Justify your answer. Write a short note on Synthesis of poly (glycolic acid). **[8]**

b) What are the structural criteria required to classify the given polymer under Biodegradable category? **[8]**

Q11) Write short note on following (any three) : **[18]**

• Polymers used in -

a) Mulches and Green Houses;

b) Food Contact Applications;

c) Drug Delivery;

d) Aerospace applications.

Q12) Write short note on following (any three) :　　　　　　　　　　　　**[18]**

- Applications of Polymers in -

a) Building and Construction;

b) Cosmetics;

c) Optics;

d) Seed-coating (Agricultural).

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[4164]-509

B.E. (Electrical)

EMBEDDED SYSTEM

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any 3 questions from each section.
2) Answer 3 questions from Section I and 3 questions from Section II.
3) Answers to the two sections should be written in separate books.
4) Neat diagrams must be drawn wherever necessary.
5) Figures to the right indicate full marks.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is an Embedded System? Explain challenges faced in embedded system. What are different categories of embedded system? Give example of each category. **[8]**

   b) Differentiate General purpose operating system and Embedded systems. Explain Design process in Embedded system with waterfall model. **[8]**

OR

Q2) a) Explain RISC and CISC processor with examples and explain the characteristics and features of ARM7 processor. **[8]**

   b) What is digital signal processing processor, its application and architecture of any DSP processor family with block diagram? **[8]**

Q3) a) Explain types of ADC, its microprocessor interfacing with diagram. **[6]**

   b) Explain interfacing of switches to the microcontroller. **[6]**

   c) Explain motion sensor. **[6]**

OR

Q4) a) Explain interfacing of 4 × 4 matrix keypad to microcontroller with diagram. **[6]**

   b) Explain strain gauge and their interfacing with micro controller through ADC. **[6]**

   c) Explain working of Temperature sensor with diagram. **[6]**

Q5) a) Define solenoids and relays. Explain relay control and clamping. **[8]**

b) Explain the LED with constant - current drive. **[8]**

OR

Q6) a) Explain stepper motors and its bipolar versus unipolar operation of stepper motors. **[8]**

b) Explain BLDC motor and its driving. **[8]**

SECTION - II

Q7) a) Explain difference between process, tasks and threads with example.**[8]**

b) What is semaphores & explain in detail different types of semaphores.**[6]**

c) What is ISR? And it's interrupt latency? **[4]**

OR

Q8) a) Explain in detail following scheduling algorithms. **[8]**
   i) First in first out.
   ii) Round robin.
   iii) Round robin with priority.
   iv) Shortest job first.

b) What is device driver and explain device drivers for embedded devices.**[6]**

c) What is difference between mailbox and message queues? What is application of each? **[4]**

Q9) a) What is kernel? Explain architecture of kernel. **[8]**

b) Explain Real time operating system services. Explain types of RTOS.**[8]**

OR

Q10) a) Explain memory management functions of RTOS. **[4]**

b) When is an RTOS necessary and when is it not necessary in the Embedded system? **[4]**

c) Explain the features of RT Linux. What are the application areas where it is used? **[8]**

Q11) With respective to block diagram, memory processor explain a smart card design. **[16]**

OR

Q12) a) Explain Digital camera with functional block diagram. **[8]**

b) Design a control system for a prototype aircraft attitude control. **[8]**

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[4164]-641

B.E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(2008 Pattern) (Elective - II) (Sem. - I)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6 from Section -I and Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12 from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is carbon credit? Discuss, how carbon credit is important for the economical development of a country and various industrial sectors.**[10]**

b) Explain CO_2 transportation in brief.   **[8]**

OR

Q2) a) Which are the Green House Gases? Write their role in global warming.**[12]**

b) Explain Kyoto protocol.   **[6]**

Q3) a) How the emission of gases from various Industrial Operations may affect the environment and life on the earth? Explain.   **[10]**

b) Write a note on, emission estimation.   **[6]**

OR

Q4) Which are the major and minor industrial sectors responsible for carbon emission? List the general operations and names of gases emitted from these industries. For the Petrochemical Industry, write and discuss,   **[16]**

a) Sources of emission.

b) Various ways of carbon management.

P.T.O.

Q5) a) Discuss CO_2 storage in brief. [6]

b) Describe in brief carbon sequestration. [10]

OR

Q6) What is Sustainable Development? Discuss it in detail. [16]

SECTION - II

Q7) Write the various resources of renewable energy generation. How the renewable energy contribute to reduce CO_2 emissions? Draw the process flow diagram and explain any two methods of electricity generation using renewable resources. Show various components and features of these methods in the diagram. [18]

OR

Q8) Describe in brief any one case study regarding, carbon management in any one of the Industry from the point of objectives, challenges involved in it and techniques or processes that were implemented. Also write the merits and demerits of this Methodology. [18]

Q9) a) Write a note on, biological approach in carbon sequestration. [6]

b) Draw and explain the process flow diagram of, 'bio-gas generation'. [10]

OR

Q10) Write their general advantages and disadvantages of biomass energy. Explain methods and sources of chemicals and energy generation from biomass. [16]

Q11) a) Write the methods of carbon credit generation? Discuss the scope of carbon credit generation in Petroleum Industry. [8]

b) Describe Clean development mechanism in brief. [8]

OR

Q12) Write short notes on : [16]

a) Safety requirements in energy sector.

b) Carbon trading.

c) Energy savings.

d) Environmental issues of carbon capture.

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[4164]-456
B.E. (Mech. Sandwich)
AUTOMOBILE ENGINEERING
(2008 Pattern) (Elective - III) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve three questions from section-I and three questions from section-II.*
2) *Figures to the right indicate full marks.*
3) *Use separate answersheet for each section.*

SECTION - I

Q1) a) Sketch and explain the following layouts. **[10]**
   i) Transverse front mounted engine and front wheel drive.
   ii) Longitudinal front mounted engine and rear wheel drive.

   b) Explain "aerodynamic drag". **[6]**

OR

Q2) a) Sketch and explain the construction of a typical truck chassis frame. Also explain different types of loading situations on frame. **[10]**

   b) Explain the term "Rolling resistance" with the help of a neat a sketch.**[6]**

Q3) a) What are different desirable features of a four wheeler clutch from design and performance view point? **[6]**

   b) Describe the synchronization mechanism used in synchromesh gear box. **[7]**

   c) Explain the need of universal joints in propeller shafts. **[5]**

OR

Q4) a) Explain the functioning of a multiple clutch. **[6]**

   b) What are the advantages of a synchronized gear train over a constant mesh gear train. **[6]**

   c) Explain with neat sketch the function of differential in rear axle. **[6]**

Q5) a) Explain the necessity of "Wheel alignment". **[4]**

b) What do you understand by **[4]**
   i) Over steer.
   ii) Under steer.

c) What are the advantages of tubeless tyre over tubed tyre? **[4]**

d) What are the facters which constitute and govern the heating load of an automobile AC system? **[4]**

OR

Q6) a) What do you understand by **[6]**
   i) Castor.
   ii) Camber.
   iii) Toe-in.
   iv) Toe-out.

b) What are a different desirable characteristics of tyres for better performance? **[4]**

c) What are different considerations for selecting **[6]**
   i) A refrigerant.
   ii) Refrigeration oil

   for an automobile AC system.

SECTION - II

Q7) a) Why is maintenance of an automobile necessary? **[8]**

b) What are different kind of maintenance required for cars? Explain. **[8]**

OR

Q8) a) Differenciate between following : **[8]**
   i) Periodic maintenance and breakdown maintenance.
   ii) Servicing and repairing.

b) Describe the maintenance required for **[8]**
   i) Steering system.
   ii) Tyres.

Q9) a) Explain with suitable examples various safety measures encorporated in modern cars. **[8]**

b) Describe crash, what are various types of crashes? Vehicles undergo in case of accidents? Explain. **[8]**

OR

Q10) a) Explain with neat sketch the following : **[8]**

    i)   Safety belt used for passenger.

    ii)   Airbags.

    b) What is the role of automobile Headlamp? Explain construction and working the Headlamp. **[8]**

Q11) a) Explain various electronically controlled system used in todays cars.**[6]**

    b) What do you understand by sensors and actuators? Explain various sensors used in automobiles. **[6]**

    c) Explain working of antilock breaking system used in vehicles. **[6]**

<p align="center">OR</p>

Q12) Write short notes on the following (any three) : **[18]**

    a) Basic electronic engine control.

    b) Microprocessor application in automobiles.

    c) Ergonomics in Automotive Safety.

    d) Pedestrian safety.

    e) Speedometer.

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B.E. (Petroleum)

PETROLEUM PRODUCTION ENGINEERING - II

(2008 Pattern) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

    1)   *Answer Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No.4, Q.No. 5 or Q.No. 6, from Section - I and Q.No. 7 or Q.No.8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12 from Section - II.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Which type of separator you will recommend in following conditions? Explain the necessary features useful for this.   **[9]**

    i)   Offshore processing facility, large amount of solids expected.

    ii)   Cost effective for given gas capacity.

    iii)   For better liquid-liquid separation and to handle foaming crudes.

    b)   Write and explain the four principal mechanisms governing the separation process inside a two or three phase separator.   **[9]**

<div align="center">OR</div>

Q2) a)   Design a two phase horizontal separator using the following data: **[9]**

Gas flow rate (Qg) = 10 MMscf/day

Oil flow rate (Qo) = 2100 bbls/day for 42° API

Operating Pressure = 960 psia

Operating Temperature = 60°F

Specific Gravity of Gas = 0.6

Gas Compressibility = Z = 0.83

From graph, value of k = 0.284 (Constant based on liquid gas properties)

Liquid drop to be separated = dm = 100 micron

Assume slenderness ratio of 3 & 4. Retention time 2, 2.5, & 3 minutes.

b)   To obtain a desired oil pad height inside a three phase separator, water weir should be set a distance below the oil weir. Derive an equation to calculate this. Also draw the neat schematic sketch of a bucket and weir arrangement inside a three phase separator.   **[9]**

Q3) What is a Group Gathering Station? Discuss various operations and stages of separation that takes place in it. Draw the schematic of layout of this separation facility (block diagram) and show the various features.   **[16]**

OR

Q4) a)   Write the necessary elements required for an emulsion to exist. What is the role of an emulsifying agent in it? Explain.   **[6]**

b)   Draw the neat schematic sketch of a vertical treater or horizontal heater treater indicate various components and explain the working of it in brief.**[10]**

Q5) a)   Explain the corrosion process in brief.   **[4]**

b) Write the various forms and causes of oil field corrosion in brief. **[4]**

c) How will you identify potential sources of corrosion? Write the role of following factors that contribute to corrosion process. **[8]**

    i) presence of air.

    ii) dissimilar metal in physical contact.

    iii) fluid velocity and turbulence.

    iv) different types of water.

    v) presence of acidic gases.

OR

Q6) a) Describe in brief various methods / steps to prevent and reduce or control the corrosion of oil field equipments in a production facility. **[10]**

b) Discuss in brief Cathodic protection. **[6]**

SECTION - II

Q7) a) Write any three flow assurance related problems and give their solution in brief. **[8]**

b) Assume typical grain size distribution / pattern of produced sand on a graph of Cumulative weight percentage Vs Grain diameter. Given that Mean grain size is 0.0116 inch. Cumulative weight fraction of 40% sand has a diameter of 0.036 inch. Use Saucier and Shwartz's correlations and describe the method of optimum gravel and screen sizing for a sand control job to this distribution. Draw and show the schematic of relevant finding using these correlations on a graph paper. Refer **the given table 1** of standard sieve sizes. **[10]**

OR

Q8) a) What do you mean by problem well analysis? What are the various ways and methods to know decline in well productivity? Draw typical sketches, production logs, DST chart, IPR or nodal analysis curves and show or explain in brief how you will you identify, evaluate and handle any two well production problems. **[12]**

b) Calculate pressure drop in the skin damaged zones for a vertical well and a 2000 ft long horizontal well and give your comments on it. Following reservoir properties are known.

Skin factor = +2 for both the wells, Pay thickness = 40 ft, Horizontal well production rate = 3000 bbls/day, Vertical well production rate = 1100 bbls/day, Permeability, $K_v = K_h = 40$ md, $B_o = 1.07$ rbbl/STB, Oil viscosity = 0.9 cp. **[6]**

Q9) a) Write the advantages of side tracking from old vertical wells and horizontal well technology with reference to, **[8]**

    i) reservoir aspect.

    ii) decline in field production.

    iii) low permeability and formation damage problem.

b) A 400 acre lease is to be developed using 10 vertical wells. It was proposed to consider horizontal well application for this field development. If a vertical well effectively drains 40 acres, what will be the drainage area for a 1000 ft and 2000 ft long horizontal well in the same field? How many horizontal wells will be required to drain this sand effectively? **[8]**

OR

*Q10)*If the production of 'ABC' field is on its declining stage, discuss in detail your step by step approach and general strategy for the following field conditions to improve the overall productivity of 60 wells from two different productive formations. Other field properties are as given below. **[16]**

a) Offshore deviated wells, low to medium API gravity.

b) Anticline structure having solution gas drive.

c) Consolidated thick sand.

d) Depth around 10,000 ft, HPHT wells.

e) High pressure, low permeability.

f) High GOR, pressure less than bubble point.

g) High water cut along with some sand production.

h) Target of primary recovery component achieved.

i) Scale and wax problem experienced.

*Q11)*a) What is completion? Draw a neat schematic sketch and describe any one completion techniques for a Multilateral well trajectory. **[8]**

b) What are the components of an intelligent well completion technique. Draw the schematic sketch and explain the function of each for the overall optimization of field production. **[8]**

*Q12)*Describe the objectives and challenges or field data in brief and discuss any one case study or field methodology of, (attempt any three)   **[16]**

   a)   Down hole separation and processing of produced fluid.

   b)   Heavy oil recovery.

   c)   Offshore production.

   d)   Intelligent completion.

Q 7) b) Table 1

Standard Sieve Sizes[a]

U.S. Standard Mesh Size	Sieve Opening (in.)	(mm)
2 1/2	0.315	8.00
3	0.265	6.73
3 1/2	0.223	6.68
4	0.187	4.76
5	0.157	4.00
6	0.132	3.36
7	0.111	2.83
8	0.0937	2.38
10	0.0787	2.00
12	0.0661	1.68
14	0.0555	1.41
16	0.0469	1.19
18	0.0394	1.00
20	0.0331	0.840
25	0.0280	0.710
30	0.0232	0.589
35	0.0197	0.500
40	0.0165	0.420
45	0.0138	0.351
50	0.0117	0.297
60	0.0098	0.250
70	0.0083	0.210
80	0.0070	0.177

Standard Sieve Sizes[a]

U.S. Standard Mesh Size	Sieve Opening (in.)	(mm)
100	0.0059	0.149
120	0.0049	0.124
140	0.0041	0.104
170	0.0035	0.088
200	0.0029	0.074
230	0.0024	0.062
270	0.0021	0.053
325	0.0017	0.044
400	0.0015	0.037

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B.E. (Industrial Electronics)

DIGITAL SIGNAL PROCESSING

(1997 Course)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:-

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is Sampling theorem? Explain Antialiasing filter in detail.   **[9]**

b)   Define following signals and give example of each.   **[9]**

   i)   Power Signal and Energy Signal.

   ii)   Even Signal and Odd Signal.

   iii)   Deterministic and Non-deterministic Signal.

Q2) a)   Find Z-transform of the following signal and plot ROC.   **[8]**

   i) $x(n) = \{1, 2, 3, 2, 1\}$

   ii) $x(n) = \left(-\dfrac{1}{4}\right)^n u(n) + \left(\dfrac{1}{3}\right)^n u(n)$

b)   Find Inverse Z-Transform of following. Assume causal sequence.   **[8]**

   i) $X(z) = \dfrac{\left(1 + 2z^{-1}\right)}{\left(1 + 2z^{-1} + 3z^{-2}\right)}$

   ii) $X(z) = \dfrac{\left(2 - 4z^{-1} + 3z^{-2}\right)}{\left(1 - 2z^{-1}\right)^2 + \left(1 + 2z^{-1}\right)}$

Q3) a) Find the response of the system [8]

$y(n) - 2y(n - 1) = x(n)$ for

   i) $x(n) = u(n)$

   ii) $x(n) = 2^n u(n)$

b) Define Fourier Transform (FT), Discrete Fourier Transform (DFT) and Discrete Time Fourier Transform (DTFT). Also calculate DFT for the following sequence

$x(n) = \{0, 2, 4, 6\}$ [8]
      $\uparrow$

Q4) a) What is FFT? Explain Decimation in frequency (DIF) FFT algorithm in detail. [8]

b) Find out circular convolution of

$h(n) = \{1, 2, 4\}$ and $x(n) = \{1, 2, 4\}$ [8]

Q5) a) Obtain the Direct form I and II realization of the following: [8]

   i) $y(n) = 0.1\, y(n-1) + 0.4\, y(n-2) + 0.3\, x(n) + 0.5\, x(n-1) + 0.55\, x(n-2).$

   ii) $y(n) + \dfrac{1}{2}\, y(n-1) + \dfrac{1}{4}\, y(n-2) = x(n) + x(n-1).$

b) i)   Derive the relation between Z-Transform and Fourier Transform.[4]

    ii)   State and Prove Convolution Property of Z-Transform. [4]

SECTION - II

Q6) a) Explain Impulse Invariance Transformation in detail? What are its drawback. [9]

b) What is Analog and Digital filter? Compare? Also explain the concept of linear and non-linear phase filter. [9]

Q7) a) Draw a typical diagram of DSP processor and explain in detail? [8]

b) Explain Goertzel Algorithm in detail? [8]

Q8) a) Design a second order Low Pass Digital Butterworth filter with cutoff frequence of 5 kHz and sampling frequency of 104 samples/sec by Bilinear Transformation. [8]

b) What is Finite Word Length Effect? What are the different sources of errors, explain in detail with a small system. [8]

Q9) a)   What is DTMF? Explain using DFT in detail?   [8]
   b)   Explain Gibb's Phenomenon in FIR filter in detail?   [8]

*Q10)*a)   Determine whether the following system is time invariant.   [8]
        $y(n) = x(n^2)$
   b)   Define cross correlation and Auto-correlation? Determine cross correlation
        between sequences   [8]
        $x(n) = \{1, 2, 3, 4\}$ and $h(n) = \{2, 2, 2, 2\}$

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B.E. (Production)

FINITE ELEMENT ANALYSIS

(2008 Pattern) (Elective - III) (Sem. - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

    1)   *Answer three questions from section I and three questions from Section II.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Use of electronic pocket calculator is allowed.*

    4)   *Assumptions made should be clearly stated and justified.*

SECTION - I

Q1) a)   Briefly discuss the steps of FEM and peculiarity of FEM in different engineering field. **[6]**

    b)   By using FEM for bar in fig. 1. loaded as shown

        Determine the nodal displacements, elemental stresses, and support reaction using minimum number of elements. E = 200×10^9 N/m^2. **[10]**

Fig.1

OR

Q2) a) Derive stiffness matrix and load vector using potential energy approach.**[6]**

b) Find the deflection at free end under its own weight using 1, 2, 3 elements for taper Bolt (bar) refer fig. 2. **[10]**

Q3) a) Explain the concept of Local and Global co-ordinate system with respect to truss Element. **[6]**

b) Analyze the plane truss completely. E=400 GPa, A = 20 cm² Refer Fig. 3. **[10]**

Fig.3

OR

Q4) a) Explain the assembly of global stiffness matrix for the banded and skyline solutions. **[6]**

b) Consider a four bar truss as shown. It is given that E=200×10⁹ N/m² and A = 400m². **[10]**

i) Determine the element stiffness matrices for each element.

ii) Assemble the structural stiffness matrix 'K' for entire truss.

iii) Using the elimination approach, Solve for the nodal displacement

.   Calculate the reaction forces. Refer Fig. 4

Q5) a) Briefly discuss Isoparametric representation.   **[6]**

    b) Fig.5 shows an indeterminate pin connected plane stress with cross sectional area of diagonal members equal to 2000 mm² and all other members with cross sectional area of 1000 mm². If Young's modulus $E = 200kN/mm^2$

        i)   Assemble global stiffness matrix

        ii)   Determine load vector if temperature of member 1-3 increases by 25°C. Given : $\alpha = 12 \times 10^{-6}/°C$

        iii) Determine load vector if member 1-3 is longer by 0.2 mm.

        iv) Introduce Boundary Conditions.   **[12]**

Fig.5

OR

Q6) a) Discuss problem modeling. **[6]**

b) For a CST element shown in Fig. 6.4. Obtain the strain-displacement matrix. Assume possion's ratio is zero and Young's modulus is constant. **[12]**

   i) Derive stiffness matrix for a CST element by direct approach.

   ii) Differentiate between the terms 'lumped loads' and consistent loads.
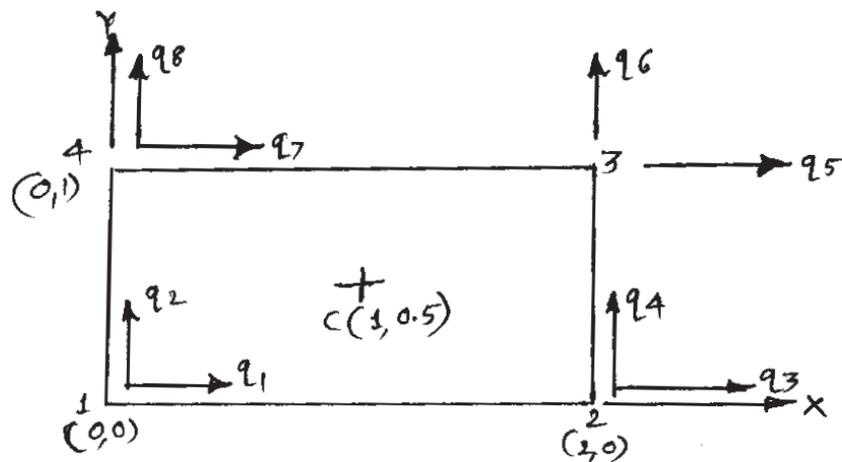
SECTION - II

Q7) a) Give the finite element modeling of the triangular element. **[6]**

b) In fig. a long cylinder of inside diameter 80 mm and outside diameter 120 mm snugly fit in a hole over its full length. The cylinder is then subjected to an internal pressure of 2 MPa. Using two elements on the 10-mm length shown, find the displacement at the inner radius. **[12]**
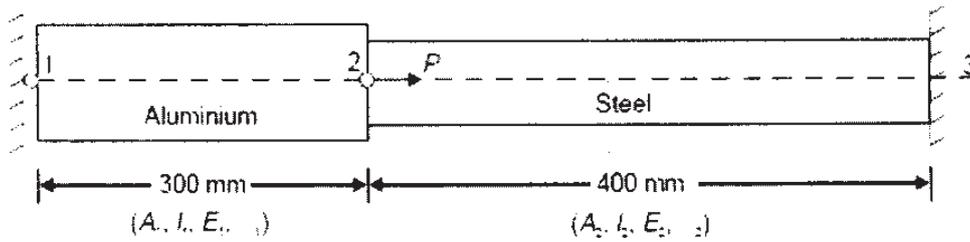
OR

Q8) a) Derive the equation of four-Node Quadrilateral for axisymmetric problems. **[6]**

b) Consider a rectangular element as shown in fig., assume plane stress condition E = 30 × 10⁶ psi, v = 0.3, and q = [0, 0, 0.002, 0.003, 0.006, 0.0032, 0, 0] in, evaluate j,B, and σ at ξ = 0 and η = 0. **[12]**

Q9) a) Give the governing differential equation for steady state heat transfer- 1D & 2 D heat conduction & convention. **[4]**

b) Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Fig. 1. due to applied force P = 400 × 10³ N and temperature rise of 30° C. Given: $A1$ = 2400 mm² $A2$ = 1200 mm² $E1$ = 0.7 × 10⁵ N/mm² $E2$ = 2 × 10⁵ N/mm² and $\alpha1$ = 22 × 10⁻⁶/ C°, $\alpha2$ = 12 × 10⁻⁶ /C° E = 200 × 10⁵ N / cm². **[12]**

OR

Q10)a) Explain Galerkin's approach for heat conduction. **[4]**

b) Determine the temperature distribution in the wall and the heat input at left surface of the wall L = 0. 1m, k = 0.01w/m°C, β = 25 w/m²°C. Solve for nodal temperatures. **[12]**
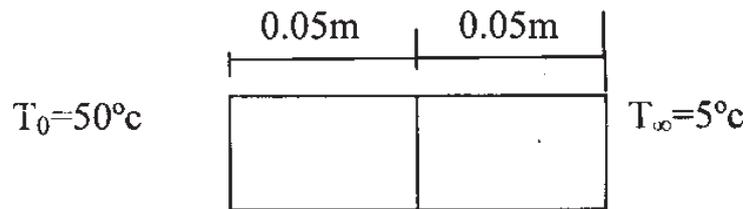

Fig.6.

Q11) Write short notes on : **[16]**

a) Mesh generation

b) FEA packages

c) Boundary conditions

d) Quality checks

OR

*Q12)*Make a flow chart of FEM program for solving the plane stress problem; it should have a provision for adaptively refining the mesh based on the error analysis. **[16]**

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B.E. (Production Engg.)
TOTAL QUALITY MANAGEMENT
(2008 Pattern) (Elective - IV) (Sem. - II)

Time :3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss relation between Quality and Cost.   **[8]**

     b) Comment on following dimensions of quality.   **[8]**

        i)   Performance.

        ii)   Durability.

        iii)   Serviceability.

        iv)   Aesthetics.

<div align="center">OR</div>

Q2) a) Describe :   **[8]**

        i)   Prevention costs.

        ii)   Appraisal costs.

        iii)   Internal failure costs.

        iv)   External failure costs.

     b) Comment on the following definition of quality - "The totality of features and characteristics of a product or service that bear on its ability to satisfy given needs".   **[8]**

Q3) Describe Demings' 14 points for management of quality.   **[16]**

<div align="center">OR</div>

Q4) a) Describe elements of TQM. **[6]**

b) What is PDCA cycle? **[5]**

c) State meaning of 5S. **[5]**

Q5) a) Explain Pareto Analysis with suitable example. **[8]**

b) Explain following : **[10]**
   i) Poka Yoke.
   ii) Bench marking.

OR

Q6) a) What is House of Quality? What is its use. **[8]**

b) Write notes on : **[10]**
   i) TPM.
   ii) FMEA.

SECTION - II

Q7) a) Explain bath tub curve and state distribution used for modeling of debugging phase. **[8]**

b) Derive expression for reliability of a system with identical components connected in series. **[8]**

OR

Q8) a) Compute reliability of a system with four elements connected in parallel whose failure free performance probabilities are :

$p(x_1) = 0.90, \ p(x_2) = 0.91, p(x_3) = 0.94$ and $p(x_4) = 0.92$ **[8]**

b) Write notes on : **[8]**
   i) MTTF.
   ii) MTBF.

Q9) a) Differentiate between "quality policy" and "quality objectives". **[8]**

b) Write concept of "Six Sigma". **[8]**

OR

Q10) a) Differentiate between "Control charts for variables" and "Control charts for attributes. **[8]**

b) What is process capability? What is process capability index. **[8]**

Q11) a) Comment on processes oriented approach in ISO9001: 2000 QMS. **[8]**

b) What are TS 16949: 2002 standards? State applications. **[10]**

OR

Q12) Write short notes on (any four) : **[18]**

a) Malcolm Baldrige Quality Award.

b) QFD.

c) Maintainability.

d) Auditing techniques.

e) ISO 14001 : 2004 standards.

f) CMMI Concepts.

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