Total No. of Questions : 6]

SEAT No. :

P4898

[Total No. of Pages : 2

T.E./Insem. - 143

T.E. (Chemical) (Semester - I)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2012 Pattern)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data if necessary.*

UNIT - I

Q1) a) Explain in detail Scientific Management given by FW Taylor. **[6]**

b) Write a note on Partnership deed. **[4]**

OR

Q2) What are Co-operative organizations? Explain in detail each type of Cooperative. **[10]**

UNIT - II

Q3) Define Manpower Planning. Enlist various objectives and requirements of Manpower Planning. **[10]**

OR

Q4) a) Define Wages. Explain Nominal Wages and Living Wages. **[5]**

b) Explain the Non-quantitative methods of Job Evaluation. **[5]**

P.T.O.

UNIT - III

Q5) Enlist various functions of Store Keeper. **[10]**

OR

Q6) Explain in detail five methods of Purchasing. **[10]**

Total No. of Questions : 6]
P4917

SEAT No. :

[Total No. of Pages : 1

T.E./Insem. - 144
T.E. (Chemical)
CHEMICAL PROCESS TECHNOLOGY
(2012 Pattern) (Semester - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*

Q1) a) Discuss the advantages of Dual Process over Solvay process. **[5]**

b) Explain various types of flow diagrams. **[5]**

OR

Q2) a) Describe electrolytic process for production of aluminium. **[5]**

b) Explain major Engineering problems in chemical process industries. **[5]**

Q3) Explain contact process for manufacturing of sulphuric acid in detail. **[10]**

OR

Q4) Explain manufacturing of urea with its major Engineering problems. **[10]**

Q5) a) Discuss production of starch from maize. **[5]**

b) Describe manufacturing of sugar. **[5]**

OR

Q6) Explain manufacturing of penicillin with major Engineering problems. **[10]**

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Total No. of Questions : 6]

SEAT No. TECH 1504

P4860

[Total No. of Pages : 3

T.E./Insem. - 141

T.E. (Chemical)

CHEMICAL ENGINEERING MATHEMATICS

(2012 Pattern) (Semester - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

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

Q1) In a chemical process water vapour is heated to a sufficient high temperature that is sufficient portion of water dissociates to form O_2 and H_2 as

$$H_2O \rightleftharpoons H_2 + \frac{1}{2}O_2$$

It is assumed that this is the only reaction involved, the mole fraction of $H_2O(x)$ that dissociates can be represented by

$$K_p = \frac{x}{1-x}\sqrt{\frac{2P_t}{2+x}}$$

Where K_p = reaction constant = 0.04568

P_t = total pressure = 2 atm.

Determine the value of x that satisfy the above equation using Newton Raphson method (Take initial guess as 0.02). **[10]**

OR

Q2) a) State and explain the graphical interpretation of Secant method. **[5]**

b) Find the real root of equation $x^3 - x - 1 = 0$ using the Bisection method. **[5]**

P.T.O.

Q3) a) Solve following system of equations using L.U decomposition method. [5]

$2x + 3y + z = 9$

$x + 2y + 3z = 6$

$3x + y + 2z = 8$

b) Solve the following system of equations using relaxation method. Perform 3 iterations only. [5]

$10X_1 + X_2 + X_3 = 12$

$2X_1 + 10X_2 + X_3 = 13$

$2X_1 + 2X_2 + 10X_3 = 14$

OR

Q4) a) Solve the following system of equations using Gauss Seidal iterative method. Perform 3 iterations only. [5]

$9x_1 + 2x_2 + 4x_3 = 20$

$2x_1 - 4x_2 + 10x_3 = -15$

$x_1 + 10x_2 + 4x_3 = 6$

b) Explain partial pivoting in case of elimination method with suitable example. [5]

Q5) a) Using Lagrange's formula find a polynomial that satisfies p (1) = 1, p (3) = 27 and p (4) = 64 and hence evaluate p (2). [5]

b) Use Newton's divided difference interpolation formula to evaluate f (3) from the following table. [5]

X	0	1	2	4	5	6
f(X)	1	14	15	5	6	19

OR

Q6) a) A missile is launched from a ground station. The acceleration during its first 80 seconds of flight, as recorded is given by following table [5]

t(S)	0	10	20	30	40	50	60	70	80
$a(m/s^2)$	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

Compute the velocity of the missile when t = 80 sec, using Simpsons 1/3 rule.

b) Using the method of group averages, find a curve of the form $y = a + bx^2$ that fits the following data [5]

x	20	30	35	40	45	50
y	10.0	11.0	11.8	12.4	13.5	14.4

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Total No. of Questions : 6]
P4882

SEAT No. : TECH15065.

[Total No. of Pages : 2

T.E./Insem. - 142
T.E. (Chemical)
MASS TRANSFER - I
(2012 Pattern) (Semester - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data if necessary.*

Q1) a) What is the General Principles of Mass Transfer? Explain importance of Mass Transfer operations? **[4]**

b) A volatile organic compound Benzene costing Rs. 45 per Kg is stored in a tank 10m diameter & open at top. A stagnant air film 10mm thick is covering the surface of the compound beyond which the compound is absent. If the atmospheric temperature is 25°C, vapour pressure of the compound is 150 mm Hg & its molar diffusivity is 0.02 m^2/hr. Calculate the molar flux of Benzene. (R= 0.082058 m^3atm/Kmol. K) **[6]**

OR

Q2) a) State & explain Ficks law of diffusion. **[4]**

b) A tube 1cm in inside diameter that is 20 cm long is filled with carbon dioxide (A) & hydrogen (B) at 2 atm total pressure at 0°C. The diffusion coefficient under these conditions is 0.275 cm^2/sec. If the partial pressure of carbon dioxide is 1.5 atm. At one end & 0.5 atm. at the other end. Find the rate of diffusion for steady state diffusion of carbon dioxide through stagnant hydrogen? **[6]**

Q3) a) Explain Maxwells law of Diffusion. **[5]**

b) In a transfer operation operating at 1 atm. the individual mass transfer coefficients in liquid and gas phases have the following values respectively. k_x= 22 kgmol/m^2h, k_y = 1.07 kgmol/m^2h.

P.T.O.

The equilibrium composition of gaseous and liquid phases are characterized by Henry's law $P_A = 0.08 \times 10^6 x_A$. [5]

i) Determine the overall mass transfer coefficients.
ii) Determine the resistance of liquid and gas phase.

OR

Q4) a) Air flows at velocity of 5 m/s through the cylindrical tube of Naphthalene. The diameter of the tube is 0.1 m and the temperature of the air is 293 k. Calculate the mass transfer coefficient for transfer of naphthalene to air using expression proposed by Gilliand and Sherwood.

$Sh_M = 0.023\ (Re)^{0.83} .\ (Sc)^{0.33}$

Data :

Viscosity of air = $\mu = 1.8 \times 10^{-5}$ kg/m.sec.

Density of air = $\rho = 1.2$ kg/m^3

Diffusivity of Naphthalene in air = $D_{AB} = 4.24 \times 10^{-6}$ m^2/sec. [4]

b) Write short note on any Two : [6]

i) Eddy Diffusion
ii) Two Film Theory
iii) Heat and Mass transfer Analogy

Q5) a) Explain in detail Absorption & Stripping? [5]

b) Derive an equation for operating line for counter current absorption process & show it graphically? [5]

OR

Q6) a) Explain Choice of solvent for Absorption? [5]

b) Explain the process for determination of number of theoretical plates for counter current absorption process? [5]

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Total No. of Questions : 6]

SEAT No. : TECH15024

[Total No. of Pages :2

P4963

TE/In Sem. - 145
T.E. (Chemical)
CHEMICAL ENGG. THERMODYNAMICS - II
(2012 Course) (Semester -I) (309345)

[Max. Marks : 30

Time : 1 Hour]

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
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.*

Q1) a) Explain the effect of temperature and pressure on activity. [5]

b) Show that the fugacity coefficient of a gas obeying Vander Waals equation of state is given by $\ln f = \frac{b}{V-b} - \frac{2a}{RTV} + \ln \frac{RT}{V-b}$ where a and b are Van der Waals constants. [5]

OR

Q2) a) Can we make $0.1 m^3$ of alcohol-water solution by mixing $0.03 m^3$ of ethanol and $0.07 m^3$ of pure water? If not, what volume should have been mixed in order to prepare the mixture of the same strength and of the required volume? The partial molar volumes of ethanol at the desired composition are: Ethanol = 53.6×10^{-6} m^3/mol and Water = 18×10^{-6} m^3/mol. [5]

b) Explain how to derive partial molar properties from molar properties of a system? [5]

Q3) a) Discuss the Van Laar equations. [5]

b) Prove the alternative definition that of chemical potential is $= \mu_i = (\partial U / \partial n_i)_{S,V,nj}$. [5]

OR

P.T.O.

4) a) Derive the relation between excess Gibbs Free Energy and activity coefficient. [5]

b) Give the two-suffix and three-suffix Margules equations for activity coefficients. [5]

5) a) State and explain the modified Raoult's Law. [4]

b) The vapour pressures of A and B are given by [6]

$\ln P_A^S = 14.5463 - \frac{2940.46}{T - 35.93}$ and $\ln P_B^S = 14.2724 - \frac{2945.47}{T - 49.15}$ where T is in K and P is in kPa. Assuming the solution is ideal calculate P and x_1 at 327K and $y_1 = 0.4$.

OR

6) a) Explain the effect of pressure on T-x-y diagram. [4]

b) The activity coefficient of component 1 in a binary mixture is given by $\ln \gamma_1 = ax_2^2 + bx_2^3 + cx_2^4$ where a,b,c are constants. Obtain the expression for $\ln \gamma_2$ in terms of x_1. [6]

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