MODEL QUESTION PAPER

2 Mark Questions

1. Explain minimum reflux ratio in fractional distillation.
2. What is steam distillation and write its application.
3. What are azeotropes ?
4. What is difference between azeotropic distillation and extractive distillation?
5. What is mean by absorption in mass transfer operation?
6. Write different types of absorption.
7. Define Ficks law.
8. What is diffusivity and its unit?
9. Define the term Adsorption.
10. What is HETP.

6 Marks Questions.

1. Explain McCabe Theile method for finding out the number of theoretical trays
2. What are the different packing materials used in packed tower. Write their advantage and disadvantage.
3. What are the different types of packing in absorption tower.
4. Write short notes about a) Coning b) Priming c)Flooding d) Loading e) Weeping
5. Write briefly about wetted wall column and spray tower.
6. Prove that Dab=Dba for ewquimolar counter diffusion.
7. What different types of trays and re-boilers used in distillation column.
8. What is plate efficiency and Murphee's efficiency?
9. What is steam distillation and its application
10. What is relative volatility. Derive the relation of Y and X using relative volatility definition.

10 Marks Questions

1. Derive Rayleigh's equation for differential distillation.
2. A feed containing 40 mole percent methanol and 60 mole percent water at its boiling point is to be separated into an overhead product with 95% methanol and a residue of 6% methanol. The reflux ratio is 30% in excess of the minimum. The column is provided with a total condenser and a partial reboiler. Calculate the number of trays required if the overall efficiency is 70%. Equilibrium data:

x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
y	0.42	0.58	0.67	0.73	0.78	0.83	0.87	0.92	0.96	1.0

3. A total of 100 gm-mol feed containing 40 mole percent n-hexane and 60 percent n-octane is fed per hour to be separated at one atm to give a distillate that contains 92 percent hexane and the bottoms 7 percent hexane. A total condenser is to be used and the reflux will be returned to the column as a saturated liquid at its bubble point. A reflux ratio of 1.5 is maintained. The feed is introduced into the column as a saturated liquid at its bubble point. Use the Ponchon-Savarit method and determine the following:

(i) Minimum number of theoretical stages

 (ii) The minimum reflux ratio

(iii) The quantities of the distillate and bottom streams using the actual reflux ratio.

VLE Data, Mole Fraction Hexane, 1 atm

x	0	0.1	0.3	0.5	0.55	0.7	1
y	0	0.36	0.7	0.85	0.9	0.95	1

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i) A liquid mixture containing 50 mol% n-heptane (A), 50 mol% n-octane (B), at 30 °C, is to be continuously flash vaporized at 1 std atm pressure to vaporize 60 mol% of the feed. What will be the composition of the vapor and liquid in the separator for an equilibrium stage ?

The boiling point at 1 std atm of the substances are n-heptane (A), 98.4 °C and n-octane (B) 125.6 °C. The equilibrium data is as follows :

T, °C	X	y
98.4	1.0	1.0
105	0.655	0.810
110	0.487	0.674
115	0.312	0.492
120	0.1571	0.279
125.6	0	0

5. Clearly differentiate between Chemisorption and Physisorption. What are the different adventage and disadvantage in both the cases.