TE/VI/chem/CBGS/(2)

16/15

Sub: Mass Transfer Operations-II CHEM/VI/CBGS

29

QP Code : 5149

MTO-II

(3 Hours) [Total Marks : 80

N.B. : (1) Question no. 1 is **compulsory**.
(2) Attempt **any three** from the remaining **five** questions.
(3) **Use** graph paper, if **required.**

1. Explain
   (a) Boiling point diagram. 05
   (b) Adsorption isotherm. 05
   (c) Properties of extraction solvent. 05
   (d) Bollmann extractor. 05

2. (a) Describe Swenson-walker crystallizer. 06
   (b) 100kg/h acetic acid of 30% concentration is countercurrently extracted with 20kg/h solvent to a raffinate composition 2%. Find the no. of stages. Equillibrium data in wt% are 14

Acid	solvent	water	acid	solvent	water
1.4	97	1.6	0.37	0.7	98.03
13.3	84	2.7	4.8	2	93.2
36.7	59	4.3	21.6	7	71.4
46.4	37	16.5	36	15	48.7

3. (a) Explain steam distillation. 06
   (b) Halibut oil is extracted from granulated livers by countercurrent extraction using ether. The feed rate of livers is 350kg/h with 20% oil. The solvent rate is 250kg/h with 2% oil. The residue after separation contains 1% oil on solvent free basis. Find the no. of stages. The equillibrium data 14

kg oil/kg solution	0	0.1	0.2	0.3	0.4	0.5	0.6
kgsolution/kgresidue	0.28	0.34	0.4	0.47	0.55	0.66	0.8

4. (a) Describe Mc cabe Thiele method of calculating no. of theoretical plates in rectification. Explain the effect of feed conditions. 12
   (b) 100 moles of benzene-toluene mixture with 50 mole% benzene is fed to simple distillation. After distillation, the residue contains 33 mole% benzene. Find the quantity of distillate. Take relative volatility = 2.4. 08

5. (a) Explain break through curve in adsorption. 06
   (b) Elaborate the various membrane separation methods. 14

6. (a) Describe material & enthalpy balance for crystallization. 08
   (b) Write the applications of adsorption. describe any 4 adsorbents 08
   (c) Comapare minimum & maximum boiling azeotropes. 04

JP-Con. : 9334-15.