T.E.(CHEMICAL)(Sem VI) (CBSGS) / 36602 - MASS TRANSFER OPERATIONS -II (MTO -II)

[3 Hours] [Total Marks: 80]

(1) Q.1 is compulsory.
(2) Attempt any 3 from the remaining 5 questions.
(3) Use graph paper, if required.
(4) Assume suitable data if required and justify the same

1. a) Explain solubility curves for Crystalisation . 5
   b) Explain principle of liquid liquid extraction. 5
   c) Mention common adsorbents & explain the properties. . 5
   d) Explain Reverse Osmosis. 5

2. a) What is flash distillation? Derive equation of operating line for it. 10
   b) 1000 kgmoles/hr of a binary mixture contains 40 mole% light component is fed to a distillation column.The output concentrations are x_D=0.92 & x_W=0.07.The feed is saturated vapor. Reflux ratio=3 & relative volatility 2.1. Find the no.of theoretical plates. 10

3. a) Explain(i)Optimum reflux ratio(ii)Minimum reflux ratio(iii)Tray efficiency(iv)Fenske Equation(v)Advantages and disadvantages of batch distillation 10
   b) With neat diagram explain the location of q line for typical feed conditions. 10

4. a) Explain with suitable diagram Ballman extractor. 08
   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 equilibrium data 12

Kg oil/kg solution	0	0.1	0.2	0.3	0.4	0.5	0.6
Kgsolution/kg residue	0.28	0.34	0.4	0.47	0.55	0.66	0.8

5 a) Explain break through curve for adsorption in fixed bed. Derive equation for length of unused bed(LUB). 10
   b) A waste stream of alcohol vapours in air from a process was adsorbed by activated carbon particles in a packed column having diameter of 4 cm and length of 14 cm containing 79.2 grams of carbon. The inlet gas stream having a concentration C_0 of 600 ppm and density of 0.00115 g/cm^3 entered the bed at flow rate of 754 cm^3 per sec. The breakpoint C/C_0 =0.01.Determine the breakpoint time, the fraction of total capacity used 10

upto breakpoint and length of unused bed. Also determine the saturation loading capacity of carbon.

Time, hrs	0	3	4	5	6	6.5	6.8
C/C_0	0	0	0.03	0.396	0.93	0.975	0.993

6. a) Explain: Describe Swenson walker crystalliser 7
   b) Explain the nucleation in crystallization. 07
   c) Explain steam distillation 06
