Printed Pages : 4

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* 1 5 1 8 5 1 *   **ECH051**

| (Following Paper ID and Roll No. to be filled in your Answer Book) |
| PAPER ID : 151851 |
| Roll No. | | | | | | | | | | |

B.Tech

(SEM. VIII) THEORY EXAMINATION 2014-15
ADVANCE SEPARATION TECHNOLOGY

Time : **3** Hours]   [Total Marks : **100**

Note: Attempt all questions. Assume suitable data, if required. All questions carry equal marks.

1   Attempt any **four** parts of the following: **5x4=20**

(a)   Write notes on characteristics of membrane.

(b)   What is the difference between equilibrium governed separation processes and governed separation processes?

(c)   Explain the uses and characteristics of separation processes.

(d)   What are the practical applications of liquid membranes?

(e)   Define silt density index.

(f)   Write the separation processes used in chemical and biochemical industries.

151851]   **1**   **[Contd...**

2 Attempt any **four** parts of the following: 5×4=20

   (a) Explain the characteristics of ideal cascade.

   (b) How polymeric membranes are characterized?

   (c) Give at least four examples of the applications of per vaporation.

   (d) Write a note on energy requirement for separation process.

   (e) On which principle does the reverse osmosis work? Give few applications of reverse osmosis.

   (f) Write the phenomenon of membrane separation processes.

3 Attempt any **two** parts of the following: 10x2=20

   (a) Describe the different kinds of liquid membranes in details. Mention the areas where these membranes are used.

   (b) Describe the principle and operation of molecular sieves for separation process. Also discuss some mathematical parameters of importance related to molecular sieves.

   (c) A liquid containing dilute solute A at a concentration $c_1 = 3 \times 10^{-2}$ kgmol/m^3 is flowing rapidly by a membrane of thickness L=3×10^{-5}m. The distribution coefficient K'=1.5 and $D_{AB} = 7 x 10^{-11}$ m^2/s in the membrane. The solute diffuses through the membrane and its concentration on the other side

151851] 2 **[Contd...**

is $c_2 = 0.5 \times 10^{-2}$ kgmol/m^3. The mass transfer coefficient kc$_1$ is large and can be considered as infinite and $kc_2 = 2.02 \times 10^{-5}$ m/s.

(i) Derive the equation to calculate the steady-state flux N_A and make a sketch.

(ii) Calculate the flux and the concentration at the membrane interfaces.

4 Attempt any **two** parts of the following: **10x2=20**

(a) Give few examples of electro dialysis. What are the advantages and disadvantages of having electro dialysis?

(b) A solution containing 0.9 wt% protein is to undergo ultra filtration using a pressure difference of 5 psi. The membrane permeability is $Aw = 1.37 \times 10^{-2}$ kg/m^{-2}.s. atm .Calculate the flux for ultra filtration process. Assume no effect of polarization.

(c) What is reverse osmosis? Explain the effect of concentration polarization on the process.

5 Attempt any **two** parts of the following: **10x2=20**

(a) Explain Gas -Liquid chromatography in detail.

(b) Differentiate between liquid permeation membrane separation and gaseous permeation membranes separation and discuss its limitations and uses.

(c) Write the short notes on the following:
    (i)   Dialysis

    (ii)   Ultrafiltration

    (iii)   Partial coefficient and permeability

    (iv)   Polymeric membranes

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