

Total No. of Questions : 12]

SEAT No. :

P868

[4659]-292

[Total No. of Pages : 3

B.E. (Chemical Engineering)
b - MEMBRANE TECHNOLOGY
(Elective - I) (Semester - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Classify membrane separation processes and state their advantages over conventional separation processes. [8]
b) Explain the criteria for selection of a separation process. [8]

OR

- Q2)** a) State materials used for preparation of membranes and state characteristics of each. [8]
b) Explain historical background of membranes. [8]

- Q3)** Explain characteristics of the following types of polymeric membranes: Branched chain type (random copolymers, block copolymers), cross-linked polymers. [16]

OR

- Q4)** Explain the following properties of polymeric membrane materials: Chain flexibility, molecular weight, chain interactions. Also state the factors affecting these characteristics. [16]

- Q5)** Write short notes on the following: [18]
a) Phase inversion methods of preparation of membranes.
b) Wet spinning method of preparation of tubular membranes.
c) Track etching method of preparation of membranes.

OR

P.T.O.

Q6) Write short notes on the following: [18]

- a) Composite membranes.
- b) Interfacial polymerization method of preparation of composite membranes.
- c) Plasma polymerization method of preparation of composite membranes.

SECTION - II

Q7) a) Explain the effects of pore geometry and surface porosity on flux across the membrane. [8]

- b) Explain the SEM and TEM methods of characterization of MF membranes. [8]

OR

Q8) a) Explain the following methods of characterization of UF membranes: Gas adsorption and desorption method, permoporometry method. [8]

- b) Explain permeability method of characterization of non-porous membranes. [8]

Q9) a) Distinguish between solution diffusion theory and pore flow theory of transportation through membranes. [8]

- b) Starting from the expression for change in chemical potential across non-porous membrane, derive the expression for flux of species across it under concentration gradient. [8]

OR

Q10)a) Explain use of membrane reactors for reaction and separation in esterification process. [8]

- b) What are ion exchange membranes? Explain use of these membranes in electro dialysis process. [8]

Q11) Write short notes on the following:

[18]

- a) Pervaporation.
- b) Concentration polarization and fouling of membranes.
- c) Spiral wound membrane module.

OR

Q12) Write short notes on the following:

[18]

- a) Plate and frame membrane module.
- b) Gel layer model for concentration polarization.
- c) Methods for reduction of membrane fouling.

