QPC: RN18001264 AR - 18 Reg. No.

GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

B. Tech Degree Examinations, November – 2021

(Seventh Semester)

BCHPE7040 - MODERN SEPARATION TECHNIQUES

(Chemical Engineering)

Time: 3 hrs Maximum:100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) (2 x 10 = 20 Marks)

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. Which of the following is not an application of transport in membranes? CO1 PO1
(i) Microfiltration (ii) Reverse osmosis
(iii) Dialysis (iv) Fractional distillation

b. What cannot be a size of membrane? CO2 PO1
(i) Nano porous (ii) Microporous
(iii) Macroporous (iv)Non porous

c. At what temperature is film stretching done? CO1 PO1
(i) Room temperature (ii) Melting point of polymer
(iii) 100^0C (iv) 200 ^{0}C

d. Which method is not employed in preparation of asymmetric membrane? CO2 PO2
(i) Precipitation by cooling (ii) Track etching
(iii) Precipitation by evaporation (iv) Precipitation by immersion in a solvent

e. What is a composite membrane? CO3 PO1
(i) Same as symmetric membrane (ii) Same as asymmetric membrane
(iii) Asymetric membrane cast on a support (iv) Two types of membrane are together

f. What is the driving force in Dialysis? CO3 PO2
(i) Pressure difference (ii) Concentration Difference
(iii) Difference in fugacity (iv) Temperature difference

g. Separation effected by in non-porous membranes? CO1 PO1
(i) Differences In solubility in the membrane (ii) Pervaporation
(iii) Amount of feed to the membranes (iv) Concentration difference

h. What is the use of cross flow in plate and frame module? CO1 PO1
(i) Reduces fouling (ii) Reduces loss
(iii) Reduces efficiency (iv) Increases efficiency

i. Electrodialysis process is suitable to purify brackish water having salt concentration in the range _____ ppm.
(i) 200-500 (ii) 500-5000
(iii) 5000-20000 (iv) 20000-50000

j. Which type of membrane is required for water permeation? CO2 PO1
(i) Hydrophobic (ii) Hydrophilic
(iii) Semipermeable (iv) Permeable

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. Define rate governed process.	CO1	PO1
b. Classify the membrane separation process based on driving force.	CO1	PO1
c. Write the membrane separation process based on pressure difference.	CO1	PO1
d. Write the advantages of membrane separation process.	CO1	PO1
e. What is concentration polarization?	CO1	PO1
f. Define the term fouling in membrane.	CO1	PO1
g. Differentiate dead end and cross end filtration.	CO1	PO1
h. What do you mean by Knudson diffusion?	CO1	PO2
i. What do you mean by Molecular Weight Cut Off? What is its value for UF?	CO1	PO1
j. What are the factors affecting the performance of ultrafiltration	CO1	PO1

PART – C: (Long Answer Questions) **(15 x 4 = 60 Marks)**

Answer ***ALL*** questions	Marks	[CO#]	[PO#]
3. a. Discuss about the area of industrial application of membrane separation process	7	CO1	PO1
b. Discuss about track etch method of preparation of membrane.	8	CO3	PO1
(OR)			
c. Write the importance of membrane module.	5	CO2	PO2
d. Describe about the spiral wound and tubular membrane module with diagram.	10	CO1	PO1
4. a. Explain about the basic principle and industrial application of Reverse Osmosis.	10	CO3	PO2
b. Write the industrial application of reverse osmosis process.	5	CO2	PO1
(OR)			
c. What are the parameters affecting the performance of nanofiltration? Explain briefly.	8	CO2	PO1
d. Discus about the basic principle of ultrafiltration	7	CO1	PO1
5. a. What is the basic principle of electrodialysis process? Explain its process by drawing a neat diagram.	8	CO2	PO1
b. Explain briefly about the area of application of electrodialysis.	7	CO1	PO2
(OR)		CO1	PO2
c. Write short note on ion exchange membrane process.	7		
d. What is zeta potential? Write its importance in separation process.	8	CO1	PO1
6. a. Write about the basic principle of gas separation and its application.	8	CO1	PO1
b. What are factors affecting the gas permeation?	7	CO1	PO1
(OR)			
c. Describe about the basic principle of pervaporation and its advantages	8	CO3	PO2
d. Explain about the Bulk liquid membrane with diagram	7	CO1	PO1

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