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Total Number of Pages : 02

B.Tech
PCE6J004

6th Semester Regular Examination 2018-19
SEPARATION TECHNOLOGY

BRANCH : CHEM

Max Marks : 100

Time : 3 Hours

Q.CODE : F782

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- Apart from allowing permeation, what are the other roles of a membrane?
- Name a membrane process in which phase change takes place.
- Give one example each of a ceramic and metallic inorganic membrane.
- How much pressure is required to desalinate water?
- What are the selection criteria of a reverse osmosis membrane?
- Name some common fouling agents in reverse osmosis.
- Why the prevailing osmotic pressure in UF and MF are low enough than RO and NF?
- State the MWCO range of UF membranes.
- What is the driving force in dialysis? State the size range of the retained species in dialysis
- In which state of polymer, more sorption of gas takes place?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Mention major advantages of membrane separation processes over the conventional processes.
- Differentiate between isotropic and anisotropic membrane.
- How does the selectivity of separation change with the increasing membrane thickness?
- Write the design and operating parameters of Reverse Osmosis.
- Write the construction and advantage of spiral wound module of membrane element
- Write the important parameter that affects the performance of Nano-Filtration.
- Write the factor that affects membrane fouling in Microfiltration.
- Define Knudsen diffusion?
- Write the important parameter that affects Pervaporation.
- What are the basic difference between bulk liquid membrane and emulsion liquid membrane?
- Write the basic principle and desirable characteristics of ion exchange membranes.
- Write details about the classification of synthetic membranes.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3
- Write the advantage, disadvantage and major application of membrane process. (6)
 - Write the different methods of membrane manufacture. (10)

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Q4	a)	Write the advantage, disadvantage and applications of Reverse Osmosis.					(6)	
	b)	Discuss the mathematical model of Reverse Osmosis?					(10)	
Q5	a)	Write the principles, limitations and industrial application of Nano-Filtration.					(6)	
	b)	An ovalbumin solution having molecular weight of 500 dalton and concentration of 1 mass% is passed through a tubular UF membrane module of 1 cm internal diameter and 100 cm long at a temperature of 25°C. Membrane water permeability is $85.85 \times 10^{-3} \text{ m}^3/\text{m}^2(\text{day})(\text{psi})$. Rejection coefficient is 0.995, applied pressure difference 2.0 bar; solute diffusivity $8 \times 10^{-11} \text{ m}^2/\text{s}$; viscosity of the solute 3 cP; gel point concentration of solute (Cg) 10.5%. Calculate the flow velocity to be maintained in the tube in order to prevent formation of a gel layer on the membrane surface.					(10)	210
Q6	a)	Write the principles, advantage and applications of Pervaporation.					(6)	
	b)	What are the basic difference between dialysis and Electrodialysis. Write the working principles, advantages and applications of Electrodialysis.					(10)	210

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