

Registration No :

--	--	--	--	--	--	--	--	--	--

Total Number of Pages: 01

B.Tech
PECE5406

8th Semester Back Examination 2018-19
MODERN SEPARATION TECHNIQUES

BRANCH: CHEM

Time : 3 Hours

Max Marks : 70

Q.CODE : F092

Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

- Q1** Answer the following questions : (2 x 10)
- a) Apart from allowing permeation, what are the other roles of a membrane?
 - b) Name a membrane process in which phase change takes place.
 - c) Give one example each of a ceramic and metallic inorganic membrane.
 - d) How much pressure is required to desalinate water?
 - e) What are the selection criteria of a reverse osmosis membrane?
 - f) Name some common fouling agents in reverse osmosis.
 - g) Why the prevailing osmotic pressure in UF and MF are low enough than RO and NF?
 - h) State the MWCO range of UF membranes.
 - i) What is the driving force in dialysis? State the size range of the retained species in dialysis.
 - j) In which state of polymer, more sorption of gas takes place?
- Q2** a) Mention major advantages of membrane separation processes over the conventional processes. (4)
b) Write details about the classification of synthetic membranes. (6)
- Q3** a) Write the design and operating parameters of Reverse Osmosis. (5)
b) Write the construction and advantage of spiral wound module of membrane element. (5)
- Q4** a) Write the advantage, disadvantage and major application of membrane process. (5)
b) Write the different methods of membrane manufacture. (5)
- Q5** a) Write the advantage, disadvantage and applications of Reverse Osmosis. (5)
b) Discuss the mathematical model of Reverse Osmosis. (5)
- Q6** a) Write the principles, limitations and industrial application of Nano-Filtration. (5)
b) Write the important parameter that affects the performance of Nano-Filtration. (5)
- Q7** 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 $85.85 \times 10^{-3} \text{m}^3/\text{m}^2 (\text{day})$ (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 (C_g) 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)
- Q8** a) Write the principles, advantage and applications of Pervaporation. (4)
b) What are the basic difference between dialysis and Electrodialysis? Write the working principles, advantages and applications of Electrodialysis. (6)