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Total number of printed pages - 02

**B.TECH**  
**PECE5406**

**8<sup>th</sup> Semester Regular / Back Examination 2015-16**  
**MODERN SEPARATION TECHNIQUES**

**BRANCH : Chemical**

**Time : 3 Hours**

**Max Marks : 70**

**Question Code :W250**

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

**Assume suitable notations and any missing data wherever necessary.**

**Answer all parts of a question at a place.**

1. Answer the following questions : **2 x 10**
- (a) Name a membrane process in which phase change takes place.
  - (b) Explain concentration polarization effect in Reverse Osmosis.
  - (c) For which type of Reverse Osmosis membrane, Reflection coefficient is zero.
  - (d) What is the basic difference in transport mechanism of a charged and uncharged molecule in nano-filtration?
  - (e) How does the swelling of a membrane affect diffusion of molecules through it?
  - (f) What are the major difference between a tortuous pore and capillary pore membrane?
  - (g) What is the principal driving force of diffusion dialysis?
  - (h) In which state of polymer, more sorption of gas takes place ?
  - (i) What is meant by Donnanexclusion?
  - (j) What is the MWCO value of nano-filtration membranes?
2. (a) Write the principle and industrial applications of microfiltration. **05**  
(b) Briefly discuss about the membranes used for Ultrafiltration. **05**
3. An Ovalbumin solution having molecular weight of 500 dalton & concentration of 1 mass% is passed through a tubular UF membrane module of 1cm internal dia. and 100cm long at a temp. 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 bar, solute diffusivity  $8 \times 10^{-11} \text{ m}^2/\text{s}$ ; viscosity of 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**

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4. (a) Discuss about the principle, advantages, disadvantages, and industrial applications of membrane process. **05**
- 210 210 (b) Explain in details about the membrane types and module configurations of membrane processes. **05**
5. (a) Discuss in details the factors affecting the performance of NF membrane. **05**
- (b) Discuss about the process limitation and industrial application of NF. **05**
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6. (a) Discuss in details about the fouling in microfiltration membrane. **05**
- (b) Discuss in details the factor affecting pervaporation. **05**
7. (a) Briefly discuss about the advantages, disadvantages, and industrial applications of diffusion dialysis. **05**
- (b) Discuss about the principle, membrane materials, and industrial applications of gas separation. **05**
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8. Write short notes on any **TWO**: **5 x 2**
- (a) Kedem-Katchalsky Model
- (b) Hemodialysis
- (c) Knudsen Diffusion
- (d) Phase Inversion Process
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