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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

B. Tech Degree Examinations, May – 2021

(Eighth Semester)

BCHPE 8011- MODERN SEPARATION TECHNIQUES

(Chemical Engineering)

Time: 2 hrs

Maximum: 50 Marks

Answer ALL Questions**The figures in the right hand margin indicate marks.****PART – A: (Multiple Choice Questions)****(1 x 10 = 10 Marks)****Q.1. Answer ALL questions**

- a. The parameter that defines how porous the membrane is
- (i) Membrane transport (ii) Membrane retention
(iii) Membrane cut-off (iv) Membrane permeability
- b. Based on the steps followed for casting, choose the correct order
1. Heat treatment of film, 2. Thin film formation of bottom plate, 3. Solvent preparation, 4. Arrange the solvent and place a plate, 5. Remove bottom plate and place in ice bath
- (i) 3, 4, 5, 2, 1 (ii) 1, 2, 3, 4, 5
(iii) 3, 4, 2, 5, 1 (iv) 1, 4, 3, 2, 5
- c. Single gaseous molecules diffuse under rarefied conditions so that the mean free path is longer than the pore diameter is called as
- (i) Molecular (ii) Permeation
(iii) Convection (iv) Knudsen diffusion
- d. The separation process suitable for molecular weight <100 is:
- (i) Nano filtration (ii) reverse osmosis
(iii) Ultrafiltration (iv) Microfiltration
- e. Filtration of clay solution, latex or paint can be achieved using which among the following process
- (i) Nano filtration (ii) reverse osmosis
(iii) Ultrafiltration (v) Microfiltration
- f. Transport of species when the upstream chemical potential of a component is more than that in the downstream is called as
- (i) Passive transport (ii) Facilitated transport
(iii) Active transport (iv) mobility
- g. The stability of colloidal system can be defined by
- (i) Steric stabilization (ii) Colloidal stability
(iii) DVLO theory (iv) Van der waals
- h. What does the reactive distillation process signifies
- (i) Distillation after reaction (ii) Reaction after distillation
(iii) Reaction along with distillation (iv) Automatic distillation by reaction
- i. Reactive distillation is suitable under
- (i) Solid phase (ii) Liquid phase
(iii) Gaseous phase (iv) Solid-liquid phase

- j. Principle of electro dialysis is
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| (i) Magnetic field and permeable membranes | (ii) Electric field and cation selective membranes |
| (iii) Magnetic field and ion selective membranes | (iv) Electric fields and ion selective membranes |

PART – B: (Short Answer Questions)

(2 x 5 = 10 Marks)

Q.2. Answer ALL questions

- Explain different types of motion of molecules through membrane barrier?
- Define the concentration polarization for membrane separation
- Provide industrial examples for electro dialysis
- What are the factors affecting the zeta potential?
- What is difference between steric stabilization and electrostatic stabilization

PART – C: (Long Answer Questions)

(6 x 5 = 30 Marks)

Answer ANY FIVE questions

Marks

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| 3. Derive the phenomenological equation for solvent flux through reverse osmosis membrane. State the assumptions | (6) |
| 4. What are the various important characteristics of the membrane? | (6) |
| 5. Explain the process of reverse osmosis and Nano filtration process | (6) |
| 6. Develop the model for a dialysis process | (6) |
| 7. Explain the process involved in ion exchange chromatograph using a schematic | (6) |
| 8. Explain in detail the electrophoretic separation method | (6) |
| 9. What are the various steps involved in cryogenic air separation? | (6) |
| 10. Explain the basic design of membrane-based gas separation method and application of membrane gas separation techniques | (6) |

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