

M.E. / M.TECH. DEGREE EXAMINATIONS, DEC 2020 (Held during April, 2021)

First Semester

CL18102 Advanced Separation Process

Chemical Engineering

(Regulation 2018)

Time: Three hours

Maximum : 80 Marks

Answer ALL questions

**PART A - (8 X 2 = 16 marks)**

1. \_\_\_\_\_ separation techniques DO NOT use a solid agent?  
a) Adsorption                      b) Ion-exchange                      c) Chromatography      d) Stripping
2. Some surface-active chemicals that do not stabilize the foam can displace the surfactants that do stabilize the \_\_\_\_\_  
a) Surfactants                      b) Foams                      c) Agents                      d) Carboxy Methyl Cellulose
3. Osmosis is not a good separation process and can be overcome by \_\_\_\_\_  
a) changing the membrane type                      b) transferring solvent from opposite direction  
c) inducing movement of solute particles                      d) operating at high temperatures
4. Pervaporation method involves \_\_\_\_\_  
a) Removal of ions                      b) Production of potable water  
c) Purification of aqueous streams      d) Separation and concentration of liquid mixture.
5. Compare thin film chromatography and paper chromatography.
6. Note the basic properties of membrane and solutions.
7. There is an increasing importance to separate polyphenols from seeds and skins of grapes. Choose an appropriate and best separation method. Justify your answer.
8. List all the adsorbents used in pressure swing adsorption?

**PART B - (4 X16 = 64 marks)**

09. (a) Discuss any one case study of industrial separation processes using conventional methods. **(16)**

**(OR)**

- (b) (i) Compare extractive and azeotropic distillation. **(12)**  
(ii) Name the different driving forces in membrane processes with examples. **(4)**
10. (a) Explain in detail how a foam fractionator is used in industrial applications. **(16)**

**(OR)**

- (b) Evaluate the process of treatment of renal insufficiency by artificial kidney by (16)  
mentioning and explaining the different parameters to design the process.
11. (a) India's Chennai Petroleum Corporation Limited has commissioned its (16)  
seawater desalination plant at Kattupalli. Evaluate the various stages of the  
project and choose the best practices that can optimize the project and increase  
the product quality.

**(OR)**

- (b) (i) Explain in detail about the characteristics of organic and inorganic (8)  
membranes.
- (ii) Elucidate any two types of membranes and different modules used in (8)  
industry.
12. (a) Analyze the process of pressure swing adsorption to separate gas mixtures by (16)  
using moving-bed adsorber and fixed-bed adsorber and highlight the roles of  
separation mechanism in their design.

**(OR)**

- (b) (i) How can a material be separated using zone refining? Explain the (8)  
process
- (ii) Compare membrane distillation and pervaporation when used for the (8)  
separation/ removal of ethanol.