R09

Code No: 58044

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, May - 2017
MEMBRANE TECHNOLOGY
(Common to Chem, PTM)

Time: 3 Hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) Discuss the important objectives and benefits of membrane separation processes in industries.
b) Explain the significance of following parameters in membrane process: selectivity, permeation rate, retention and separation factor. [7+8]

2.a) With schematic diagram, describe the preparation of synthetic membranes using sintering method.
b) What is phase inversion? Discuss the preparation of phase inversion membranes by solvent evaporation method. [8+7]

3.a) Enumerate the technique and principle for characterizing the largest active pores in microfiltration membranes using bubble – point method.
b) Discuss the gas permeability method for analyzing the chemical nature and morphology of the non – porous polymeric membranes. [8+7]

4.a) Discuss the factors affecting the magnitude of following driving forces in membrane process: pressure, electrical potential and concentration potential.
b) Derive an expression for 'Donnan equilibrium' of charged solutes in the presence of a charged membrane possessing a fixed charge density 'R'. [6+9]

5.a) Explain the principle of operation and industrial applications for microfiltration membrane process.
b) Describe the mechanism involved in the separation of pure water from a salt solution using reverse osmosis method. [7+8]

6.a) Draw the schematic representation of an asymmetric membrane for gas separation and explain the electrical circuit analogue for this process.
b) What is pervaporation? Explain the applications of pervaporation. [7+8]

7.a) Explain the basic concepts of boundary layer resistance model and discuss the calculation for volume flux through the boundary layer and resistance offered by the layer.
b) What are the reasons for membrane fouling? Mention its demerits and suggest few preventive measures. [10+5]

8.a) Qualitatively compare the characteristics of various membrane configurations with respect to investment, fouling tendency and cleaning of membrane.
b) Discuss the constructional and operational difference between a capillary module and hollow fiber module. [10+5]

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