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2903N1169

Candidate's Seat No :_____

M.Sc. Sem.-3 Examination

505

Polymer Science

March-2025

Time : 2-30 Hours] **[Max. Marks : 70**

General Instructions

1. ***All question is compulsory***
2. ***Draw neat figure wherever necessary***

Q-1(a) Classify polymer membranes based on driving forces with one example of each type. **[7 Marks]**

OR

Q-1(a) Explain mechanical and thermal properties for selection of polymer for membrane development. **[7 Marks]**

Q-1(b) Define asymmetric and symmetric membrane, write its structures and properties. **[7 Marks]**

OR

Q-1(b) What are the different types of ion exchange membranes? Explain ion exchange process. **[7 marks]**

Q-2(a) Write significance of crosslinking of polymer membrane for different applications **[7 marks]**

OR

Q-2(a) Explain TMA: Working principle, process and applications. **[7 marks]**

Q-2(b) Define UF, and discuss various application of UF membrane. **[7 Marks]**

OR

Q-2(b) Define MF, and discuss various application of MF membrane. **[7 Marks]**

Q-3(a) Explain SEM working principle and its applications for polymer membrane characterization. **[7 Marks]**

OR

Q-3(a) What is electrodialysis? Discuss working principle and applications of ED. **[7 Marks]**

Q-3(b) Discuss solvent-activated polymers for controlled drug release. **[7 Marks]**

OR

Q-3(b) Explain biodegradable polymers for controlled drug release. **[7 Marks]**

Q-4(a) Define biodegradable and bioerodable polymer system. **[7 Marks]**

OR

Q-4(a) Define self-assembly. Write various type of self-assemblies with one example. **[7 Marks]**

Q-4(b) Explain soluble polymers for drug release via pinocytosis. **[7 Marks]**

OR

Q-4(b) What is biocompatibility? Write characteristics of biocompatible polymers for controlled drug delivery. **[7 Marks]**

QUESTION –5 ANSWER ANY SEVEN QUESTIONS OUT OF TWELVE

[Max. marks: 7×2=14 MARKS]

(i) DSC is stand for_____, and TGA is stand for_____. (Fill in the blank).

(ii) _____ block copolymers is generally used to form micelle. (Fill in the blank).

(P.T.O)

(iii) Polymers that are naturally present in organisms and polymers that can be safely used in biological applications are called biopolymers. (True or False).

(iv) What are the different signals emitted when electron beam interacts with a sample in SEM?

(v) Drug loading refers to the process of incorporating a therapeutic agent into a delivery system e.g., nanoparticles, microspheres, or hydrogels to achieve a desired concentration. (True or False).

(vi) Mechanisms of controlled release include

A) Diffusion
B) Degradation
C) Swelling
D) Stimuli-responsive systems

Correct option is: (i) A and B only, (ii) C and D only, (iii) A, B, C and D

(vii) Define membrane.

(viii) For RO and gas separation membrane, according to solution-diffusion model permeability directly proportional to _____ and _____.

(ix) What are the different signals emitted when electron beam interacts with a sample in SEM?

(x) Define biodegradable polymer:

(xi) Which of the following membrane process occurs via phase change?

A) Nanofiltration B) Gas separation C) Donnan dialysis D) Pervaporation

(xii) Membrane processes based on operating pressure can be arranged as:

A) MF < UF < NF < RO
B) MF > UF > NF < RO
C) UF < MF < RO > NF
D) MF > UF > NF > RO

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