(6 pages) Reg. No. : .....

Code No. : 20077 E Sub. Code : AECH 51

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2025.

Fifth Semester

Chemistry

Major Elective — POLYMER CHEMISTRY

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A polymer that softens on heating and hardens on cooling is called a
   (a) Thermoset
   (b) Thermoplastic
   (c) Elastomer
   (d) Biopolymer

2. Which of the following is an example of a homopolymer?
   (a) Styrene-butadiene rubber
   (b) Nylon 6
   (c) Polypropylene
   (d) Polyurethane

3. Which factor increases the glass transition temperature (Tg)?
   (a) Higher molecular weight
   (b) Flexible polymer chains
   (c) Low cross-linking
   (d) Presence of plasticizers

4. What happens during polymer hydrogenation?
   (a) Double bonds in the polymer are reduced
   (b) The polymer chains are cross-linked
   (c) Monomer units are added to the polymer
   (d) The polymer is converted into a network structure

5. In emulsion polymerization, the monomer is dispersed in which of the following?
   (a) Organic solvent (b) Water
   (c) Oil (d) Glycerin

6. In blow moulding, what is used to shape the molten polymer into hollow forms?

(a) A vacuum (b) A die

(c) Compressed air (d) Rotating molds

7. Polystyrene is widely used in which of the following applications?

(a) Insulation and packaging

(b) Textile production

(c) Construction materials

(d) Automobile tires

8. Which of the following is a thermosetting plastic?

(a) Polyethylene

(b) Nylon

(c) Phenol formaldehyde resin

(d) Polyvinyl chloride

9. Which polymer is commonly used in contact lenses?

(a) Polypropylene (b) Silicone hydrogel

(c) Polyethylene (d) Polystyrene

10. Which of the following is a conducting polymer?

(a) Polyvinyl chloride (b) Polypyrrole

(c) Polyethylene (d) Polypropylene

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Differentiate between thermoplastics and thermosetting polymers.

Or

(b) Explain ring-opening polymerization with example.

12. (a) Define number average molecular weight (Mn) and give the formula.

Or

(b) Discuss the relationship between molecular weight and the degree of polymerization.

13. (a) What is suspension polymerization? How does it differ from bulk polymerization?

Or

(b) Explain rotational casting and its applications.

14. (a) Explain the properties and common uses of polystyrene.

Or

(b) Discuss the preparation and properties of polyacrylonitrile (PAN). What are its applications?

15. (a) What are fire-resistant polymers? Give examples and uses.

Or

(b) What are silicones, and what are their main applications?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Classify polymers based on their structure.

Or

(b) Define and differentiate addition polymerization and condensation polymerization with examples.

17. (a) Discuss the factors that affect the glass transition temperature (Tg).

Or

(b) What is cross-linking in polymers and why is it important? Discuss.

18. (a) Explain interfacial polycondensation.

Or

(b) Describe the steps involved in injection moulding.

19. (a) Describe the preparation, properties and uses of polyvinyl chloride (PVC).

Or

(b) Explain the preparation and uses of phenol formaldehyde resin.

20. (a) Describe the role of biomedical polymers in artificial organs.

Or

(b) Explain the concept of conducting polymers. Give examples.

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