

DEPARTMENT OF CHEMISTRY, SCLS

M.Sc. CHEMISTRY

SEMESTER-IV EXAMINATIONS-2022

PAPER CODE: MCHDCE-404

PAPER TITLE: POLYMER CHEMISTRY

(Write your Roll No. at the top immediately on receipt of this question paper)

Time: Three Hours

Maximum Marks: 75

Attempt all questions. All parts of the questions must be attempted in continuation. Start answer of a question on a fresh page. Cite examples and draw labeled diagrams wherever necessary.

Q1. Attempt all

1X15

- i. Define initiator using a suitable example.
- ii. Define cationic polymerization.
- iii. What is the definition of reduced viscosity?
- iv. Discuss the meaning of reactivity ratio.
- v. What is the meaning of first-order polymerization?
- vi. What is the meaning of cross-linking? Discuss with a suitable example.
- vii. What is the temperature at which dehydration of a polymer takes place in TGA?
- viii. How is Nylon-66 prepared?
- ix. Define ceiling temperature in a polymerization process.
- x. What do you understand by isotactic polypropylene?
- xi. What do you understand by initiator efficiency?
- xii. Discuss the concept of kinetic chain length.
- xiii. What is the meaning of chemical processing? Cite some appropriate examples.
- xiv. Discuss end group analysis.
- xv. Name UV stabilizers as additives in polymer processing.

Q2. Attempt any three of the following;

3X5

- A. Discuss the changes in physical properties of any polyolefin after modification by sulfonation.
- B. A polymer undergoes higher glass transition temperature. Discuss the reason.
- C. Why does polyacrylamide swell in the water while polystyrene does not swell?
- D. What are the criteria for a polymer to be called a copolymer?
- E. What is the difference between a branched and graft copolymer?

Q3. Attempt any three of the following;

3X5

- A. Discuss various steps in the polymerization of ethylene monomer.
- B. Discuss the mechanism of gel effect in chain growth polymerization.
- C. Derive Carothers equation.
- D. What will be the difference in the chemical nature of the copolymers based of styrene-vinyl acetate and ethylene-vinyl acetate and why?
- E. Discuss the steps in the graft polymerization of acrylic acid on polypropylene backbone.

Q4. Attempt **any three** of the following

3X5

- A. Discuss the DSC thermogram of polypropylene and the importance of each transition.
- B. What is the difference between number average and weight average molecular weight?
- C. Discuss the principle of the GPC in molecular weight determination of a polymer.
- D. Describe in brief the processes of fiber spinning? How is wet spinning different from dry-jet-wet spinning?
- E. Discuss the process of thermoforming of a polymer.

Q5. Attempt **any three** of the following;

3X5

- A. How is Nylon-6 prepared from caprolactam? Discuss the mechanism.
 - B. Discuss the PTA route of polyester synthesis.
 - C. Discuss the vulcanization of natural rubber.
 - D. Discuss the preparation of the phenol-formaldehyde polymer.
 - E. Discuss the preparation of any cellulose derivative.
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