



Name: Roll No.:

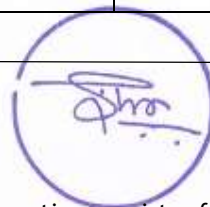
Branch: Signature of Invigilator:

Semester: VIth Date: 28/04/2022 (MORNING)

Subject with Code: CH317 POLYMER CHEMISTRY

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE



1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. Candidates should write their roll no. in each page of the booklet.
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to submit the question paper cum answer sheets before leaving the examination hall.

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc
BRANCH:
Chemistry

SEMESTER :VI
SESSION : SP/22

SUBJECT: CH 317 Polymer Chemistry

TIME: 2
Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q1.(a) (i) Which of the following is a branched polymer?

- a. low density polymer
- b. polyester
- c. high density polymer
- d. nylon

(ii). The process of heat softening, moulding and cooling to rigidity can be repeated for which plastics?

- a. thermoplastics
- b. thermosetting plastics
- c. both (a) and (b)
- d. neither (a) nor (b)

(iii). Which of the following statements is not correct for fibres?

- a. Fibres possess high tensile strength and high modulus
- b. Fibres impart crystalline nature
- c. Characteristic features of fibres are due to strong intermolecular forces like H-bonding
- d. All are correct

(iv). Which of the following is a co-polymer?

a) Polythene

b) Bakelite

c) PVC

d) Polyacrylonitrile

(v). Which of the following does not undergo additional polymerization?

a. vinyl chloride

b. butadiene

c. styrene

d. all of the above undergoes addition polymerizations

(vi) In addition polymer, monomer used is

a. unsaturated compounds

b. saturated compounds

c. bifunctional saturated compounds

d. trifunctional saturated compounds

Q1(b). Describe the difference between chain and step polymerization. (2)

Q.1.(c). What do you mean by primary structure of polymers? What are the factors affecting the conformations of a polymer molecule? (2)

Q.2 (a) (i). On the basis of mode of formation polymers can be classified:

a. as addition polymers only

b. as condensation polymers only

c. as copolymers

d. as addition and condensation polymers

(ii). Polymer formation from monomer starts by

- a. the condensation reaction between monomers
- b. the coordinate reaction between monomers
- c. conversion of monomer to monomer ions by protons
- d. hydrolysis of monomers

(iii). The compound $[-\text{CH}_2-\text{CH}(\text{C}_6\text{H}_5)-]_n$ is a

- a) homopolymer
- b) co-polymer
- c) condensation polymer
- d) network polymer

(iv). Which choice is correct for synthetic polymer substance ?

- (a) $M_n = M_w$
- (b) $M_n \geq M_w$
- (c) $M_w > M_n$
- (d) $M_w < M_n$

(v). Which functional group is present in polyester?

- (a) $-\text{COO}-$
- (b) $-\text{CH}_2-\text{CH}_2-$
- (c) $-\text{CONH}-$
- (d) $-\text{CH}_2-\text{CN}$

(vi). Which of the following two monomers are used in preparation of nylon-6,6 ?

- (a) Hexamethylene diamine and ethylene glycol
- (b) Adipic acid and hexamethylene diamine
- (c) Dimethyl terphthalate and ethylene glycol
- (d) Adipic acid and ethylene glycol

Q.2(b). How does rate of addition radical polymerization depend on the concentration of initiator and monomer (give arbitrary plot)? (2)

Q.2 (c). What is the kinetic chain length? Describe the reasons and solutions for a polymerization that yields a molecular weight lower than needed. (2)

Q.3(a) (i) What is DLS technique used for: (2x3)

- (a) Measurement of absorbance of sample
- (b) Measurement of Concentration of metals
- (c) Measurement of light scattering
- (d) Measurement of molecular weight

(ii) Osmometer is used for:

- (a) Measurement of absorbance of sample
- (b) Measurement of Concentration of metals
- (c) Measurement of light scattering
- (d) Measurement of molecular weight

(iii) DSC gives information about:

- (a) Measurement of colour of sample
- (b) Measurement of Concentration of metals
- (c) Measurement of heat content of sample
- (d) Measurement of molecular weight

Q.3 (b) Define Tg value? Explain graphically how do you expect it to vary for different polymeric materials? (4)

Q.4(a) (i) The expression for Flory Huggins theory may be based on: (2x3)

- (a) enthalpy and entropy term
- (b) temperature and pressure term

(c) Mixing and solubility patterns

(d) None of the above

(ii) Crosslinking and temperature rise will affect the solubility as follows:

(a) Increase both ways

(b) Decrease both ways

(c) Increase, Decrease

(d) Decrease, Increase

(iii) Following factors affect solubility of polymers:

(a) Temperature

(b) Molecular structure

(c) Solute-solvent miscibility

(d) All the above

Q.4 (b) Discuss Flory Huggins theory? (4)

Q. 5 (a) (i) Write the synthesis, structure, property & applications of following: (6)

(a) Phenol Formaldehyde resins

(b) Fluoro polymers

(c) Acrylic polymers

(b) What are conducting Polymers? Explain the mechanism of conduction giving example of any one of the following: polyacetylene, polyaniline, poly(p-phenylene sulphide polypyrrole, polythiophene (4)