

2023-24

Time - 3 hours

Full Marks - 60

Answer all groups as per instructions.

Figures in the right hand margin indicate marks.

*Candidates are required to answer
in their own words as far as practicable.*

GROUP - A

1. Answer all questions and fill in the blanks as required. [1 × 8]

(a) Functionality of ethylene glycol is _____.

(b) Natural rubber is basically a polymer of :

(i) ethylene

(ii) isobutylene

(iii) isoprene

(iv) vinyl alcohol

(c) Ziegler-Natta catalyst is _____.

(i) $\text{ZnCl}_2 + \text{AlCl}(\text{C}_2\text{H}_5)_2$

(ii) $\text{FeCl}_3 + \text{AlBr}_3$

(iii) $\text{TiCl}_4 + \text{Al}(\text{C}_2\text{H}_5)_3$

(iv) $\text{KCl} + \text{Al}_2\text{O}_3$

(d) What is condensation polymerisation ?

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- (e) Polydispersity index is equal to _____.
- (f) The relationship between weight average molecular weight M_w^- and number-average molecular weight, M_n^- can be related as :
- (i) $M_w^- > M_n^-$ (ii) $M_w^- < M_n^-$
- (iii) $M_w^- = M_n^-$ (iv) None of these
- (g) What are the monomers of Nylon 6, 6 ?
- (h) Which of the following is thermosetting plastic ?
- (i) Nylon (ii) Polyethylene
- (iii) Bakelite (iv) PVC

GROUP - B

2. Answer any eight of the following within two or three sentences each. [1½ × 8]
- (a) Write the IUPAC name of PVC.
- (b) What are thermoplastic polymers ? Give an example.
- (c) What is meant by degree of polymerisation.
- (d) What is photopolymerization ?

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- (e) Discuss the various factors influencing the glass transition temperature of polymers.
- (f) What is radical or vinyl polymerisation ?
- (g) Derive expression for X_n^- in free radical polymerisation.
- (h) What are resins ?
- (i) Write the difference between HDPE and LDPE.
- (j) What is natural rubber ?

GROUP - C

3. Answer any eight of the following within 75 words each. [2 × 8]
- (a) Write the IUPAC name of the following polymers.
- (i) Polystyrene
- (ii) Polyvinyl alcohol
- (b) Find the functionality of benzene and phenol.
- (c) Distinguish between addition and condensation polymerisation.
- (d) What do you mean by the average molecular weight of polymers ?

[4]

- (e) What do you mean by poly-dispersity of the polymer ? How it is expressed ?
- (f) Write a short note on co-ordination polymerisation.
- (g) Write a note on Degree of Crystallinity.
- (h) What is relationship between glass transition temperature and melting point ?
- (i) Write a short note on 'Teflon'.
- (j) Distinguish between Nylon 6 and Nylon 6, 6.

GROUP - D

4. Answer any four of the following.

- (a) Write short notes on : [2 × 3
 - (i) Bulk polymerisation
 - (ii) Solution polymerisation
 - (iii) Suspension polymerisation
- (b) Write the different forces acting between the polymer molecules with examples. [6
- (c) (i) What do you mean by a copolymer ? [2
 - (ii) Discuss the kinetics of co-polymerization and derive an expression for the rate of co-polymerisation. [4

[5]

- (d) What is the crystalline melting point, T_m of a polymer ? What are the factors that influence the crystalline melting point ? [6
- (e) Discuss the concept of molecular weight in high polymers. Discuss the end group analysis method for the determination of the molecular weight of a condensation polymer. [6
- (f) Write short notes on : [3 × 2
 - (i) Polystyrene
 - (ii) Silicone polymers
- (g) How can we prepare polyacrylamides ? Write its properties and uses of different polyacrylamides. [6