16172

3 Hours / 100 Marks   Seat No.

Instructions :   (1)   All Questions are *compulsory.*

(2)   Answer each next main Question on a new page.

(3)   Illustrate your answers with neat sketches wherever necessary.

(4)   Figures to the right indicate full marks.

(5)   Assume suitable data, if necessary.

Marks

1.   **(A)**   **Answer any FIVE :**   **10**

(a)   Differentiate between thermoplastics with thermosetting polymer on basis of thermal response and hardness.

(b)   Define :

(i)   Homopolymer

(ii)   Copolymer

Why are copolymers popular ?

(c)   What is Ziegler Natta catalyst ? How is co-ordination polymerisation carried out ?

(d)   State merits and demerits of suspension of polymerisation.

(e)   Explain the mechanism of chain transfer reactions.

(f)   Explain method of solution polymerisation.

(g)   Explain polycondensation polymerisation with an example.

(B)   **Answer any TWO :**   **10**

(a)   Explain mechanism of free radical polymerisation with the help of different steps involved.

(b)   Differentiate between commodity plastics with engineering plastics on basis of characteristics and properties. Name any three engineering plastics material.

(c)   Define degradation of polymer. Explain with an example, thermal degradation of a polymer.

2.   **Answer any FOUR :**   **4 × 4 = 16**

(a)   Compare : Addition polymerisation and condensation polymerisation.

(b)   Explain anionic polymerisation.

(c)   Define functionality. Explain the role of functionality in condensation polymerisation.

(d)   Explain the classification of polymer on the basis of origin. Give examples.

(e)   (i)   Define Auto acceleration.   **(1)**

      (ii)   State merits and demerits of bulk polymerisation technique.   **(3)**

(f)   Elaborate the terms with examples :

      (i)   polymer

      (ii)   fibre

3. **Answer any FOUR :** 4 × 4 = 16

   (a) Explain cationic polymerisation.

   (b) Describe co-ordination polymerisation.

   (c) Differentiate between chain growth and step growth polymerisation.

   (d) State merits and demerits of emulsion polymerisation over bulk polymerisation.

   (e) Represent schematically :

       (i) Block

       (ii) Craft

       (iii) Alternate

       (iv) Random-copolymer

   (f) What do you mean by CMC ? Explain its significance.

4. **Answer any FOUR :** 4 × 4 = 16

   (a) Explain in pearl polymerisation.

   (b) Define viscosity. Draw a labelled diagram of an Ostwald viscometer.

   (c) Why do polymer show average molecular weight ? Write mathematical expression for $\overline{M}_w$ and $\overline{M}_n$. Which is higher ?

   (d) Explain K-value concept.

   (e) Define Glass Transition Temperature (T_g). Explain in general effect of MW and plasticisation on T_g.

   (f) How will you determine average molecular weight of a polymer by using cryscopic method ?

5. **Answer any FOUR :** 4 × 4 = 16

   (a) State the principle of end group analysis. How is it used for determining molecular weight ?

   (b) Explain various factors that affect Tg. Define degree of polymerisation.

   (c) Explain relationship between degree of polymerisation with average molecular weight.

   (d) Write in general, about glassy, viscoelastic and viscofluid state of polymers.

   (e) Explain mechanical degradation of polymers.

6. **Attempt any FOUR :** 4 × 4 = 16

   (a) Explain importance of T_g temperature.

   (b) Explain general oxidative degradation reaction of a polymer. How can it be controlled ?

   (c) Describe method of ultracentrifugation.

   (d) How will you prevent polymer degradation ?

   (e) Define :

       (i) Osmosis

       (ii) Osmotic pressure

       (iii) Semipermeable membrane

       Draw a labelled diagram of a simple osmometer.

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