

22230

22223

3 Hours / 70 Marks

Seat No.

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- 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.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (8) Abbreviations used, convey usual meaning.

Marks

1. Attempt any FIVE of the following:

10

- a) Classify polymer on basis of origin.
- b) State typical 'characteristics' of an 'elastomer'.
- c) State role and example of inhibitor.
- d) 'Compare': cationic-and anionic polymerisation,
- e) State in general, 'applications' of 'bulk-polymerised'.
- f) Define 'Degree of polymerization'. Polythene has MW 11200. Find its 'Degree of polymerization'.
- g) Define :
 - i) Relative viscosity
 - ii) Specific viscosity
- h) Define 'T_g' Glass transition Temperature.

P.T.O.

2. Attempt any THREE of the following: 12
- a) Explain with a schematic diagram, 'block copolymer'.
 - b) Explain 'Solution Polymerisation' Technique.
 - c) 'Compare' emulsion- and suspension polymerisation.
 - d) 'Polymers are often represented by average MW and softening range'. State reason.
3. Attempt any THREE of the following: 12
- a) i) Define 'stereo-specific (regular) polymer'.
ii) Describe and schematically represent structure of an 'atactic' polymer.
Is it capable of crystallisation ?
 - b) Describe addition polymerisation with example.
 - c) Describe 'step polymerisation'
 - d) i) Draw a labelled 'diagram' of a simple 'osmometer'.
ii) Explain the process of osometry for molecular weight determination
4. Attempt any THREE of the following: 12
- a) i) Define 'commodity plastics'.
ii) Explain with examples, 'applications of commodity plastics'.
 - b) Explain thermoplastics and thermosetting plastics with example.
 - c) i) Define a 'free radical'. Write 'decomposition reaction of benzoyl peroxide and its usual decomposition temperature'.
ii) State usual 'dosage' of an initiator and its 'effect' on 'MW' of the polymer produced.
 - d) State usual notations 'mathematical expression' for $\overline{M}_w$ and $\overline{M}_n$.
 - e) i) Define 'heat distortion temperature'.
ii) Explain its significance.

5. Attempt any TWO of the following:**12**

- a) i) Describe 'autoacceleration' as observed in 'mass-polymerisation'.
- ii) Compare 'mass-polymerisation' with 'solution polymerisation'.
- b) i) In a particular type of a polymer consider two hypothetical cases :
 - 1) 70 weight% of a fraction has $M_1 = 50000$ and remaining has $M_2 = 80000$.
 - 2) 60 weight% of a fraction has $M_1 = 70000$ and remaining has $M_2 = 42500$.Find average molecular weight in the two cases.
- ii) Explain if they will show similar or different properties.
- c) i) Explain with reaction, type of degradation in PVC.
- ii) Metallic compounds are often used in PVC composition. Explain with examples their purpose.

6. Attempt any TWO of the following:**12**

- a) i) Explain 'CMC' w.r.t. emulsion polymerisation.
 - ii) Define an 'emulsifier' graphically represent effect of its concentration on particle size of emulsoid produced.
 - iii) Explain with an example, role of 'coalescing agent'.
 - b) i) Explain effect of plasticizer addition on glass transition temperature.
 - ii) Two homopolymers have $tg_1 = 105^\circ\text{C}$, $tg_2 = 8^\circ\text{C}$. A copolymer is made from corresponding monomers, such that the plasticising monomer is 25 weight%. Find Tg of the copolymer. Name equation used.
 - c) i) Define an 'antioxidant'. Give two examples.
 - ii) Explain giving two examples, 'mechanical degradation' of polymers.
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