22230

22223

3 Hours / 70 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.

(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 'Tg' Glass transition Temperature.

Marks

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 lanzoyl 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.

Marks

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°C, tg_2= 8°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.