22230

11920

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) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define natural and synthetic polymer with suitable examples of each.

b) Define polymer and co-polymer.

c) Define polymerization and state its types.

d) Define co-ordination and chain transfer reaction.

e) Determine the molecular weight of $R(CH_2 - CH_2)_{200}R$

f) State the factors affecting the glass transition temperature.

g) Define photo degradation.

Marks

2. Attempt any THREE of the following: **12**

a) Define elastomers and fibers with suitable examples.

b) Explain termination mechanism in free radical polymerization.

c) Calculate the number average and weight average molecular weight of the polymer.

Molecular weight range (g/mol) x_i w_i

Mol. wt range (g/mol)	x_i	w_i
8000 - 20,000	0.05	0.02
20,000 - 32,000	0.15	0.08
32,000 - 44,000	0.21	0.17
44,000 - 56,000	0.28	0.29

d) Write one reactions of each from cationic and anionic initiation reaction.

3. Attempt any THREE of the following: **12**

a) Explain classification of polymers based on the structure with neat sketches.

b) Compare suspension and emulsion polymerization techniques.

c) Explain initiations in step polymerization.

d) Explain the concept of numbers average and weight average molecular weight.

4. Attempt any THREE of the following: **12**

a) Explain termination step in ring opening polymerization.

b) Write any four merits and demerits of bulk polymerization.

c) For number average molecular weight show that
$M_n = \sum_{ni} Mi / \sum_{ni}$

d) Explain the effect of plasticizers on glass transition temperature.

e) Describe thermal degradation of polymer. Also state the method of prevention for the same.

Marks

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

a) Classify co-polymers with suitable examples from each category.

b) Describe the following :

(i) Electrochemical polymerization.

(ii) Propagation mechanism in free radical polymerization.

c) Explain the factors affecting the glass transition temperature.

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

a) Compare bulk and solution polymerization with suitable examples of both (min six points).

b) Describe - oxidative and mechanical polymer degradation with a neat sketch.

c) If a polymer sample has the population as follows:

1 Molecule of molecular weight each = 8,000

3 Molecules of molecular wight each = 7,500

5 Molecules of molecular wight each = 7,000

8 Molecules of molecular wight each = 6,500

10 Molecules of molecular wight each = 6,000

13 Molecules of molecular wight each = 5,500

20 Molecules of molecular wight each = 5,000

Calculate its member average molecular weight.
