(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0931 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2010-11

POLYMER SCIENCE AND TECHNOLOGY

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt ***all*** questions.

(2) Be precise in your answer.

1. Attempt any ***four*** parts of the following :— **(5×4=20)**

(a) Define and give examples for

(i) Atactic

(ii) Monomer

(iii) Plastics

(iv) Composite.

(b) 216 gm butadiene is copolymerized with 104 gm of styrene. What is the molecular formula of the copolymer ?

(c) A particular sample of a polymer contains 200 molecules with molecular mass 10^3, 300 molecules with molecular mass 10^4 and 500 molecules with molecular mass 10^5. Calculate the number average and mass average weight.

(d) Write short notes on :

(i) Vulcanization

(ii) Elastomer.

(e) Name few pigments and organic colourants used as polymer additives. What colour they impact to the polymer ?

(f) How would you identify whether a sample is poly (vinyl acetate) or poly (vinyl alcohol) on the basis of IR spectroscopy ?

2. Attempt any ***two*** parts of the following :— **(10×2=20)**

(a) Describe kinetics of Cationic Polymerization.

(b) Discuss the mechanism of anionic polymerization. Why is this process also called "Living Polymerization" ? Explain.

(c) What is a plasticizer and how does it function ? What plasticizer would you use with (i) Poly (vinyle chloride), (ii) Nitrocellulose and (iii) Cellulose acetate ?

3. Attempt any ***four*** parts of the following :— **(5×4=20)**

(a) What are Silicones ? Explain the special properties of silicones which have resulted in silicones being used in varied engineering and medical fields.

(b) Write short notes on the following :

(i) Initiators

(ii) High performance polymers.

(c) Define rubber elasticity. What conditions must be fulfilled by a material to show rubber elasticity ?

(d) (i) Give comparison of properties of HDPE and LDPE.

(ii) Distinguish between thermoplastic and thermosetting polymers.

(e) What are copolymers ? How does Buna-S differ from Buna-N ?

(f) Why monomers used in step growth polymerization yield long chain polymers ? What polymer is formed when :

(i) adipic acid reacts with 1, 6—diamino hexane ?

(ii) terephthalic acid reacts with ethylene glycol ?

Discuss important applications of the above polymers.

4. Attempt any ***two*** parts of the following :— **(10×2=20)**

(a) What are the characteristics of polymers ? Why do polymers have an average mol. wt ? Define terms weight average mol. weight and no. average mol. wt. Give their mathematical equation also.

(b) Write a brief note on :

(i) Emulsion polymerization

(ii) Application of polymers in medicine.

(c) What thermal instrument technique would you use to determine Tg ? Explain. What is the general relationship observed between Tg and Tm of polymers ? Use Tm = 11°C and Tg = – 72°C for natural rubber to predict the temperature T (max rate) at which this elastomer should show the maximum rate of crystallization ?

5. Attempt any ***four*** parts of the following :— **(5×4=20)**

(a) Write a brief note on the application of polymers in building construction and aerospace.

(b) Write preparation, properties and applications of PVC and PVA.

(c) (i) How are polymers classified according to (a) their structure, (b) physical properties (c) their mode of formation ?

(ii) What is meant by degree of polymerization ?

(d) (i) Describe the preparation and applications of Bakelite.

(ii) What is synthetic fibre ?

(e) (i) How is Teflon obtained ? What are its uses ?

(ii) Write down the structures of the following polymers : (a) Cellulose (b) Natural Rubber (iii) Polymethylmeth acrylate.