Code No: 07A7EC31 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,NOVEMBER 2010
POLYMERIC MATERIALS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Give an account of the commercially important thermosetting resins based on formal dehyde raw material, highlighting their method of production and application. [16]

2. (a) Cationic polymerization proceeds through carbonium ion mechanism. Explain.
   (b) Why the anionic polymers are called living polymers.
   (c) Chain transfer termination gives low molecular weight polymers in cationic polymerization. [6+5+5]

3. (a) List out the methods of polymerization of thermosetting materials. Explain any one method of polymerization.
   (b) Explain the structure of PVC and how it is prepared. [10+6]

4. (a) Explain the effect of molecular weight, long chain branching and short chain branching on the physical properties of LDPE.
   (b) Explain 'Vacuum forming' process to produce thermoplastic sheets.
   (c) The density of poly propylene is 0.85 gm/cc. Determine the number of poly propylene repeat units, in each unit cell of crystalline polypropylene. [6+6+4]

5. (a) Define and give mathematical expressions for the following:
      i. Inherent viscosity
      ii. Specific viscosity
      iii. Limiting viscosity.
   (b) State the Mark-Houwink equation and discuss how would apply this equation for the determination of molecular weight of a polymer. [9+7]

6. (a) Indicate the natural and synthetic fibers from the following
      i. Wood
      ii. Cotton
      iii. Silk
      iv. Cellulose
      v. Hair
      vi. Starch
      vii. Paper

viii. Nylon
ix. Bakelite.

(b) What are the characteristics and applications of transfer molding process? [10+6]

7. (a) Explain the various steps in the refining of crude rubber.
(b) What is Thiokol. How is produced? Give properties and applications of Thiokol. [8+8]

8. List out the commonly used techniques for producing reinforced plastics. Explain any two methods in detail. [16]

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Code No: 07A7EC31 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,NOVEMBER 2010
POLYMERIC MATERIALS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write an essay on the various types of synthetic rubbers with brief description of the preparation, properties and uses of any three of them. [16]

2. (a) Write the reactions for the stepwise polymerization of two phenol molecules with one of formal - dehyde to produce a phenol formal - dehyde molecule and explain.
   (b) In general, how does the processing of thermosets into the desired shape differ from the processing of thermoplastics. Discuss. [7+9]

3. (a) Explain weight-average molecular weight concept with an example.
   (b) How z-average molecular weight and viscosity-average molecular weight is calculated? [8+8]

4. (a) What do you mean by foamble polymers? Give the names of some of the foamble polymers. Give some of the important applications of foamed plastics.
   (b) What type of articles are produced by blow moulding process? Give examples.
   (c) Explain the importance of 'Parison' in the molding process. [8+4+4]

5. Write short notes on the following.
   (a) Stabilizers
   (b) Plasticizers
   (c) Inhibitors
   (d) Blowing agents. [4×4]

6. (a) A nylon 6,6 has an average molecular weight of 10,000 g/m. Calculate the average degree of polymerization.
   (b) In the designation of nylon 6,6 what does 6,6 stand for.
   (c) What is the repeating structural unit for nylon 6,6? Describe. [7+4+5]

7. (a) What is extrusion moulding? List out the components produced by this process.
   (b) Explain the zones prevailed in the extrusion machine during its operation. [6+10]

8. Differentiate between thermosetting and thermoplastic materials with respect to their ingredients, manufacture, behavior and applications. [16]

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Code No: 07A7EC31 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,NOVEMBER 2010
POLYMERIC MATERIALS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write a detailed essay on natural rubber.
   (b) What is styrene-Butadine rubber (SBR)? What weight percentage of it is styrene? What are the repeating chmical structural units for SBR? Discuss. [10+6]
2. (a) Why blowing agents are added during polymer production? Give some examples.
   (b) What are the materials used as lubricants in the production of polymers? Why lubricants are added? [8+8]
3. (a) Define a polymer. Explain different types of polymeric products.
   (b) What is an initiator? Explain the role of initiator in free radical polymerization with atleast three examples. [8+8]
4. (a) Discuss about high and ultrahigh molecular weight polyethylenes.
   (b) Explain about chemical cross linking and radiation cross linking of polyethylenes. Discuss what is the purpose of such cross linking. [8+8]
5. (a) Explain why thermosetting plastics have in general high strengths and low ductilities?
   (b) What are the two methods by which a linear chain polymerization reaction can be terminated. Explain them.
   (c) Explain what do you mean by plasticizing. [6+8+2]
6. (a) What are the Characteristics and applications of laminating process?
   (b) What is meant by a matched mold plunger and cavity?
   (c) In what way is blow molding a combination operation? [6+5+5]
7. (a) What is the importance of average molecular weight and dispersion pattern in the polymers?
   (b) How monodispersed system and polydispersed system are distinguished?
   (c) What is Polydispersity? Explain about the molecular weight distribution for a polydispersed polymer sample. [6+5+5]
8. (a) Explain the manufacture of
      i. Wood pulp and

ii. Cotton pulp.

(b) What is scweitzer reagent used in the manufacture of Rayons? Explain.

(c) Explain the various raw materials used, and the necessary chemical reactions among the raw materials used, during the manufacture of cuprammonium Rayon. [8+2+6]

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Code No: 07A7EC31 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,NOVEMBER 2010
POLYMERIC MATERIALS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write short notes on properties and applications of: Plastics, Elastomers and Fibres. [16]

2. (a) What is the importance of "Ring opening polymerization" reaction? Explain.
   (b) What is redox polymerization? What are the advantages of using redox polymerization? [8+8]

3. What are synthetic rubbers? What are the various types of synthetic rubbers? Sketch and explain the mer structures of the various types of synthetic rubbers.[16]

4. (a) Compare and contrast low density polythene and high density polythene (LDPE & HDPE).
   (b) Explain why the tensile strength of polystyrene is greater than PVC. Explain.
   (c) What are the various physical states that a polymer can exist. Which physical state gives the polymer the maximum strength. [8+4+4]

5. (a) Discuss in detail the protein-based biodegradable plastics. Write down the names of some proteins to be used as biodegradable plastics.
   (b) It is said that the biodegradable plastics will revolutionise the twenty first century. Comment with reasoning. [8+8]

6. (a) What are the raw materials used, to produce cellulose acetate?
   (b) Name the plasticisers used for plasticising of cellulose acetate.
   (c) What are the typical applications & properties of cellulose acetate?
   (d) Illustrate the bonding between polymer chains of nylon 6,6. [3+3+5+5]

7. Describe the various schemes of classification of polymers. Explain the underlying causes of differential behavior as exhibited by elastomer, a plastic and a fiber. [16]

8. (a) How much of formaldehyde is required to completely cross link 10 kg of phenol to produce a thermosetting polymer? How much by product is produced?(Assume any required data)
   (b) Discuss about carothers equation.
   (c) What is the difference between the number average molecular weight and weight average molecular weight? [8+4+4]

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