

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
PLASTICS & POLYMERIC MATERIALS
(Metallurgy & Material Technology)**

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

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Name a few
 - i. Synthetic organic materials
 - ii. Natural polymers and give a brief explanation of them. [8](b) Explain the mechanism of polymerization that occurs in
 - i. The monomers of ethylene
 - ii. In the formation of Bakelite. [4+4=8]
2. (a) Explain how does the degree of crystallinity affect a polymer.
(b) On the basis of their structures describe how Elastomers are different from the other long chain polymers. [6+10]
3. (a) Name the polymers which can be used without additives
(b) Explain the purpose of adding additives to polymers.
(c) Name the two types of Fillers and give 2 examples for each one of them
(d) What are the properties that are sought in a filler. [3+5+4+4]
4. Explain about the following additives
 - (a) Anti-oxidants
 - (b) Limitations
 - (c) Cross linking additives. [6+4+6]
5. (a) Certain long chain polymers such as polypropylene and many biological polymers, assume a helical chain conformation because of geometric hindrance of the side groups is crystallinity favored or disfavored because of this? Why?[8]
(b) The degree of polymerization of poly tetra Fluoroethylene is 1500. If all the polymer chains are the same length, calculate.
 - i. The molecular weight of the chains
 - ii. The total number of chains in 1000 gm of the polymer. [4+4=8]
6. (a) What are some of the advantages of thermosetting plastics for Engineering design applications? What is the major disadvantage of thermosets which thermo plastics do not have?
(b) What are the major processing methods used for thermo sets. Explain[10+6]

7. (a) What makes an unsaturated polyester resin unsaturated?
(b) How are linear unsaturated polyesters cross linked? Write a structural formula chemical reaction to illustrate cross linking of an unsaturated polyester.
(c) What part of the structures of the acetals provides high strength? Explain. [5+6+5]
8. (a) What materials are used in the compounding of rubber? Explain the function of each.
(b) How can oxygen atoms cross link the rubber molecules? How can the cross linking of rubber molecules by oxygen atoms be regarded. [8+8]

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
PLASTICS & POLYMERIC MATERIALS
(Metallurgy & Material Technology)**

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

**Answer any FIVE Questions
All Questions carry equal marks**

1. Explain different types of condensation polymerization techniques. Discuss their advantages and limitations. [16]
2. A polymer is said to be plasticized if it is made more pliable. Copolymerization can serve this purpose. Alternatively, additives called plasticizers can be used. A plasticizer is lower molecular weight substances added to the polymer usually a nonvolatile solvent that partially remains in the system in the ultimate use.
 - (a) What effect should a plasticizer have on T_g? Why.
 - (b) How will a plasticizer effect crystallinity? Why?
 - (c) Can a network polymer be plasticized? Explain. [6+5+5]
3.
 - (a) Why are additives added to polymers.
 - (b) Discuss various types of additives used in polymers, with examples and their function. [6+10]
4.
 - (a) What is 'ageing' or weathering of polymers?
 - (b) How the ageing process in polymers either be retarded or stopped? Explain the mechanism.
 - (c) Give the mechanism of the thermal degradation of polystyrene into monomer. [3+6+7]
5.
 - (a) What are some advantages and disadvantages of the injection molding process for molding thermoplastics.
 - (b) Describe with the help of a neat sketch the extrusion process for processing thermoplastics. [8+8]
6.
 - (a) What are the 2 major ingredients of thermo setting molding components.
 - (b) What are the major advantages of phenolic plastics for industrial applications.
 - (c) Using structural formulae. Write the reaction for phenol with formaldehyde to form a phenol formaldehyde molecule. (use 2 phenol molecules and one formaldehyde molecule). What kind of molecule is condensed off in this reaction [4+4+8]
7.
 - (a) What are some of the Engineering applications of Nylons.

(b) What part of the polycarbonate structure makes the molecule stiff? What part of the poly carbonate molecule provides molecular flexibility?

(c) What are some Engineering applications of polycarbonates. [4+8+4]

8. Explain in detail, as applied to rubber.

(a) Plasticization

(b) Compounding

(c) Calendaring

(d) Vulcanization [4x4=16]

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
PLASTICS & POLYMERIC MATERIALS
(Metallurgy & Material Technology)**

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

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Explain the following in detail.
 - i. Polymerization conditions
 - ii. Tacticity. [5+5](b) Differentiate Zeigler Natta polymerization from normal addition polymerization. [6]
2. (a) Explain the differences between sidegroups and branching.
(b) Explain what is polymerized plastics.
(c) Explain the various factors that determine the crystallinity of polymers. [6+5+5]
3. (a) What is calendering? What shapes of plastics are produced by this process.
(b) Draw a schematic diagram of a calendering machine and Explain how the bulk compounded polymeric material is calendared in to sheets.
(c) How Embossed sheets are produced in this process.
(d) What are the advantages and disadvantages of this method. [4+6+3+3]
4. Discuss the functions of the following additives on polymerization reaction.
 - (a) Inhibitors
 - (b) Cross link
 - (c) Blowing agents
 - (d) Colorants. [4x4=16]
5. (a) How is PVC prepared? How is it characterized? Give the major applications of PVC polymer.
(b) How is PT FE is prepared from their raw materials? [8+8]
6. Give and Explain the polymerization reactions for the following thermo setting plastics along with their properties and applications
 - (a) Phenol
 - (b) Urea- Formaldehyde resin. [8+8]
7. (a) What are some of the Engineering applications of Nylons.

- (b) What part of the polycarbonate structure makes the molecule stiff? What part of the poly carbonate molecule provides molecular flexibility?
- (c) What are some Engineering applications of polycarbonates. [4+8+4]
- 8. (a) Explain the types of structure and molecular arrangement desired for producing synthetic rubbers.
- (b) What are the various additives added to raw rubber to get desired properties? Explain them. [8+8]

★ ★ ★ ★ ★

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
PLASTICS & POLYMERIC MATERIALS
(Metallurgy & Material Technology)**

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

**Answer any FIVE Questions
All Questions carry equal marks**

1. Explain various polymerization mechanisms. Differentiate between addition and condensation polymerization mechanisms. [16]
2. (a) Describe the merits and demerits of isotactic and atactic synthesis in formation of long chains.
(b) What type of polymers are characterized by cross linking?
(c) What is the effect of cross linking of polymer chains. [6+5+5]
3. (a) What is calendering? What shapes of plastics are produced by this process.
(b) Draw a schematic diagram of a calendering machine and Explain how the bulk compounded polymeric material is calendared in to sheets.
(c) How Embossed sheets are produced in this process.
(d) What are the advantages and disadvantages of this method. [4+6+3+3]
4. Explain the following:
(a) Oxidative degradation of polymers
(b) Photodegradation of polymers
(c) Autoxidation. [5+6+5]
5. (a) What are some of the properties which make polyethylene such an industrially important plastic material?
(b) What are the important industrial applications of poly ethylene.
(c) How is the flexibility of bulk polyvinyl chloride increased. [6+5+5]
6. (a) What are some advantages and disadvantages of transfer molding process.
(b) Describe the transfer molding process for the thermosetting plastics with the help of a neat sketch. [8+8]
7. (a) What are the important Engineering applications of Acetals
(b) What type of materials have acetals commonly replaced? Why.
(c) Explain carother's Equation. [5+6+5]
8. What is a synthetic rubber? Why synthetic rubbers are becoming more and more popular. How are they manufactured? Explain any two types of synthetic rubbers [16]
