2015-16
M.Sc. (III SEMESTER) EXAMINATION
POLYMER SCIENCE & TECHNOLOGY
POLYMER MATERIALS-I
AC-711

Maximum Marks: 70
Credits: 04
Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.    Questions    M.M.
1(a)   What are olefin copolymers? Describe the preparation, general properties and uses   [9]
       of acrylonitrile-styrene and butadiene-styrene copolymers.
1(b)   Write explanatory notes on any three of the followings:    [3×3]
       (i) Polyvinyl acetate
       (ii) Polyvinyledene
       (iii) Polytetrafluoroethylene
       (iv) Polyacrylics
2(a)   What are polyamides? Write the preparation, properties and uses of nylon 6,6.   [7]
2(b)   Write notes on any two of the followings:    [5×2]
       (i) Preparation of silicones
       (ii) Structure and properties of Kevlar.
       (iii) Polyethylene terephthalate (PET)
3(a)   Describe the method of manufacture, properties and applications of any two of the    [7×2]
       followings:
       (i) Styrene-butadiene rubber (SBR)
       (ii) Polychloroprene rubber
       (iii) EPDM
3(b)   What are the drawbacks of natural rubber? Mention the advantages of synthetic     [4]
       rubber over natural rubber.

Contd.....2.
4(a) Describe the preparation and structure of epoxide resins.

4(b) Discuss the manufacture of Phenol-Formaldehyde and Melamine Formaldehyde resins.

4(c) Write short notes on any two of the followings:

(i) Cellulose
(ii) DNA
(iii) Differentiate between thermoplastics and thermosets
2015-2016
M.Sc. III SEMESTER EXAMINATION
(Polymer Science & Technology)
SPECIAL TOPICS IN POLYMER CHEMISTRY AND TECHNOLOGY
(AC – 712)
Maximum Marks: 70
Credits: 04
Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

1. Select the polymer from the given pairs having high T_g value? Give reasons to justify your answer.
   (a) \[\text{structure} \]
   and \[\text{structure} \]
   (b) \[\text{structure} \]
   and \[\text{structure} \]

2. (a) Discuss four mechanisms of fire retardancy in polymers.

3. (a) Explain electrical conductivity in polymers. Describe the determination of electrical conductivity of a solid semiconductor by four-in-line probe method.
   (b) Write the steps involved in the free radical polymerization mechanism of aniline.
   (c) Explain the band theory of metals, semiconductors and insulators.

OR

(e') Explain the hopping and tunnelling mechanisms of conduction. Write the necessary conditions for hopping to occur.

4. (a) What are the thermoplastic elastomers? Give the advantages and disadvantages of thermoplastic elastomers. Write the preparation and uses of polyurethane and polyester.

Contd.....2.
(b) Write brief notes on the applications of polymers in the following fields:
   
   (i) Orthopaedic
   
   (ii) Dental and

   (iii) Drug delivery

Q. 5 (a) What are the piezoelectric polymers? How are they classified? Discuss the structural features of different types of piezoelectric polymers.

(b) Give an account of applications of piezoelectric polymers in sensors and electricity generation.

(c) Discuss the methods for the preparation of bulk piezoelectric material.

OR

(c’) What is Poling process? Explain static action in piezoelectric materials.
2015-2016

M.Sc. (III SEMESTER) EXAMINATION
(POLYMER SCIENCE AND TECHNOLOGY)
(AUTUMN SEMESTER)
POLYMER RHEOLOGY
(AC-713)

Maximum Marks: 70
Credits: 04
Duration: Two Hours

Answer all the questions.

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Questions</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.1.(a)</td>
<td>Define viscoelasticity. Discuss the four component model of viscoelastic materials.</td>
<td>(9)</td>
</tr>
<tr>
<td>(b)</td>
<td>What is an ideal elastomer? Describe the requirements to be met by a polymer to behave as an elastomer.</td>
<td>(8)</td>
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<tr>
<td>(b)'</td>
<td>Write notes on:</td>
<td></td>
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<td></td>
<td>i) WLF equation</td>
<td></td>
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<tr>
<td></td>
<td>ii) Maxwell and Voigt models</td>
<td></td>
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<td>Q.2.(a)</td>
<td>Write short notes on any two of the followings:</td>
<td>(6)</td>
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<tr>
<td></td>
<td>i) Crazing</td>
<td></td>
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<td></td>
<td>ii) Modulus</td>
<td></td>
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<tr>
<td></td>
<td>iii) Cold drawing</td>
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<td>(b)</td>
<td>What do you mean by impact testing of polymers? Discuss any two impact tests.</td>
<td>(6)</td>
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<tr>
<td>(c)</td>
<td>Explain brittle and ductile fractures and give their associated characteristics.</td>
<td>(6)</td>
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<tr>
<td>(c)'</td>
<td>Describe elastic-plastic fracture mechanism. Discuss the two parameters which characterize crack tip toughness for elastic-plastic materials.</td>
<td></td>
</tr>
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</table>

Contd......2.
Q.3.(a) What do you understand by Newtonian and non-Newtonian fluids? Explain with the help of suitable examples.

(b) Explain the principle and working of capillary rheometer.

OR

(b)' Explain the principle and working of coaxial cylinder viscometer.

Q.4.(a) What are composite materials. Discuss any two examples.

(b) What is wettability? Explain its importance in relation to composite materials.

(c) Define coupling agents and their function in making polymer composites.

OR

(c)' Explain Melt Flow Index (MFI) and its importance in polymer processing.