Code - 2005

G. S. Mandal’s

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

END SEMESTER EXAMINATION

Second Year B. Tech (PPE) – Feb/Mar-2023

Course Code: PPE202 **Course Name: Introduction to Polymer Engineering**

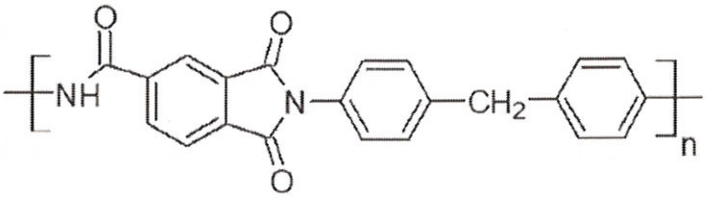
Duration: 2 Hrs **Max. Marks: 50** **Date: 03/01/2023**

Instructions:

- **i) All questions are compulsory**
- **ii) Assume suitable data wherever necessary and clearly state it**
- **iii) Figures to right indicate full marks**
- **iv) Use of non-programmable calculators are allowed**
- **v) Draw flow charts/diagrams wherever relevant and necessary.**

Q. 1	**Answer any five (Marks:10)**				
		Marks	**CO**	**BL**	**PI**
a)	What is a polymer?	2	1	1	1.4.1
b)	Name one polymeric material each for rubber and fiber.	2	1	1	1.4.1
c)	Define copolymer.	2	1	1	1.4.1
d)	Why are some polymers referred to as semi crystalline as opposite to amorphous polymers.	2	1	1	1.4.1
e)	Define glass transition temperature for polymers. Write the value for any one polymer.	2	1	1	1.4.1
f)	Choose the right monomer for polyethylene while stating the what is wrong with the other two. i. $(CH_2{=}\,CH_2)_n$ ii. $CH_2{=}\,CH_2$ iii. $CF_2{=}\,CN_2$	2	1	1	1.4.1
g)	Define a macromolecule. Give an example	2	1	1	1.4.1
h)	What are commodity plastics. Give two examples.	2	1	1	1.4.1
Q.2	What do you mean by optical properties of a polymer. Evaluate the effect of polymer structure on any two optical properties.	8	6	5	1.4.1

<table>
<tr><td>Q.3
a)

b)</td><td>Answer any one:
What do you mean by molecular weight and polydispersity index of a polymer? Consider LLDPE, which contains six molecular weight polymers as given below.
<table>
<tr><th>Polymer entity</th><th>No. of unit in each entity</th><th>Weight of each entity (grams)</th></tr>
<tr><td>Poly 1</td><td>33</td><td>343</td></tr>
<tr><td>Poly 2</td><td>43</td><td>2223</td></tr>
<tr><td>Poly 3</td><td>22</td><td>4563</td></tr>
<tr><td>Poly 4</td><td>432</td><td>5543</td></tr>
<tr><td>Poly 5</td><td>56</td><td>462</td></tr>
<tr><td>Poly 6</td><td>340</td><td>9</td></tr>
</table>
Determine the number average molecular weight, weight average molecular weight & Polydispersity index for LLDPE.
Explain the co-relationship of any two electrical properties such on polymer structure with one example each.</td><td>8</td><td>3</td><td>4</td><td>1.1.1</td></tr>
<tr><td>Q.4</td><td>What do you mean by degree of polymerization? If the molecular weight of the polymer given below is 224562, calculate the degree of polymerization.

Explain in short, any two structure-based properties for the above polymer.</td><td>8</td><td>4</td><td>4</td><td>1.1.1</td></tr>
<tr><td>Q.5
a)

b)</td><td>Answer any one:
Classify polymers based on internal molecular and chain structures and give at least one example of each arrangement.
Classify polymers based on synthesis methods and give at least one example of each type.</td><td>8</td><td>2</td><td>2</td><td>1.4.1</td></tr>
<tr><td>Q.6</td><td>Explain the procedure of determination of dilute solution viscosity for determination of viscosity average molecular weight. Give diagram of the instrument and formula involved in the procedure.</td><td>8</td><td>3</td><td>3</td><td>1.4.1</td></tr>
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