Name:

Enrolment No:

UPES

End Semester Examination, December 2023

Course: Polymer Characterization & Testing **Semester: VII**

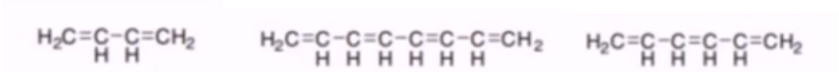
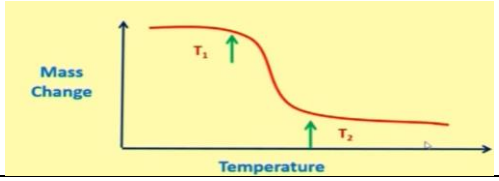
Program: BSc by Research **Time : 03 hrs.**

Course Code: CHEM 4018P **Max. Marks: 100**

Instructions:

1. **Write your enrolment number on the top left of the question paper.**
2. **Do not write any thing else on the question paper except your enrolment number.**
3. **Attempt all part of a question at one place only.**
4. **Internal choice is given for question number 9of Section B and question number 11 of Section C only.**

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Explain, DSC, method to determine glass transition temperature.	**4**	**CO1**
Q2	How the tensile strength varies with the molecular weight of the polymer and how to choose appropriate molecular weight polymer from the graph?	**4**	**CO2**
Q3	Giving reason, arrange the following in increasing order of wavelength of U.V absorption. 	**4**	**CO1**
Q4	What interpretation can be done form the given TGA Curve? How it is helpful? 	**4**	**CO1**
Q5	Discuss the Fire retardant property of polymer. PE blended with cellulose will be considered biodegradable or not? Justify your answer with suitable reason	**4**	**CO3**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Discuss the effect of elemental composition, molecular structure, crosslinking on COF? Why PE have low COF than PS?	**10**	**CO2**

<table>
<tr><td>Q7</td><td>A polymeric mixture is prepared by mixing three different polymers A, B, C having number average and weight average molecular weight and weight as given below
Calculate the number average and weight average molecular weight of the Polymeric mixture.

<table><tr><th>Polymer</th><th>Mn</th><th>Mw</th><th>Wt. in mixture</th></tr><tr><td>A</td><td>2.2 X10^6</td><td>4.8 X 10^6</td><td>400</td></tr><tr><td>B</td><td>6.6 X 10^6</td><td>8.6 X 10^6</td><td>400</td></tr><tr><td>C</td><td>10 X 10^6</td><td>10 X 10^6</td><td>200</td></tr></table></td><td>10</td><td>CO2</td></tr>
<tr><td>Q8</td><td>Discuss the biodegradation process in Polylactic acid (PLA).</td><td>10</td><td>CO3</td></tr>
<tr><td>Q9</td><td>What is your understanding about design for recycling? Give different ways by which chemical upcycling can be done.
OR
Discuss the different factors that affects the degradation of polymers .</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-C
(2Qx20M=40 Marks)</td></tr>
<tr><td>Q10</td><td>Explain the morphology of polymer with temperature variation mentioning glass transition temperature and the various other stages involved during transition. Also Discuss the importance of Tg and its relationship with Tm.</td><td>20</td><td>CO2</td></tr>
<tr><td>Q11</td><td>a) Taking example, discuss any two applications of U.V in Polymeric materials.

b) How to calculate the degree of crystallinity in polymer sample? Also discuss the variation of toughness and density with degree of crystallinity.

c) Comment on the type of peak obtained in crystalline, amorphous and semicrystalline polymers in XRD.

OR

a) Giving example, diagrammatically explain the different type of possible electronic transitions.

b) Explain friction in polymers using two term model.

c) Why in Polymer we have surface resistivity and volume

resistivity? What is tracking resistance?</td><td>6

8

6</td><td>CO1</td></tr>
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