Name:

Enrolment No:

UPES

End Semester Examination, May 2024

Course: Polymers, Ceramics and Composites **Semester : VI**

Program: B.Tech AMNT **Time : 03 hrs.**

Course Code: MEMA3013 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Explain how does molecular weight change with degree of polymerization?	**4**	**CO2**
Q 2	Define the term composites materials. What properties are to be satisfied by these sophisticated materials?	**4**	**CO1**
Q 3	Name the major varieties in which fused silica glass available? Describe their charactertics and uses.	**4**	**CO2**
Q 4	Analyze the concepts of 'Isostress' and 'Isostrain' and compare how they differ from each other.	**4**	**CO4**
Q 5	With the help of example illustrate addition polymerization. Give some examples of additional polymers.	**4**	**CO1**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	Would you expect a particle-strengthened material to be stronger than the fiber-strengthened materials? What are the different parameters that decide the strengthening in particulate materials?	**10**	**CO3**
Q 7	Explain the primary objective of producing ceramic matrix composites. Analyze and compare the tensile behavior of monolithic ceramics to that of ceramics reinforced with particulate and continuous fibers.	**10**	**CO2**
Q 8	Define Ferrimagnetism? How can you classify ceramic magnets? What name is given to materials which exhibit the phenomenon?	**10**	**CO3**
Q 9	Explain how highly polar atoms bonded to the main carbon chain strengthen a thermoplastic. Illustrate with suitable examples. **OR** Discuss the basic principles behind the use of fiber reinforcement composites.	**10**	**CO2**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	A continuous and aligned glass fiber reinforced composite consists of 40 vol% of glass fibers having a modulus of elasticity of 69 GPa and 60 vol% of a polyester resin that, when hardened, displays a modulus of 3.4 GPa.	**20**	**CO4**

<table>
<tr><td></td><td>(a) Compute the modulus of elasticity of this component in the longitudinal direction.
(b) If the cross-sectional area is 250 mm^2 and a stress of 50 MPa is applied in this longitudinal direction, compute the magnitude of the load carried by each of the fiber and matrix phases.
(c) Determine the strain that is sustained by each phase when the stress in part (b) is applied.</td><td></td><td></td></tr>
<tr><td>Q 11</td><td>Set a comparison between thermoplastics and thermosetting plastics. What are plasticisers? What is the purpose of adding them in a polymer? In what way do plasticisers act and affect the processibility and properties of a polymer? Name some common plasticisers.

OR

Define the term Polydispersity Index (PDI). Molecular weight data for a hypothetical polymer material are tabulated below:
<table><tr><th>Molecular weight range (g/mol)</th><th>Weight Fraction, Wi</th></tr><tr><td>5000-25000</td><td>0.1</td></tr><tr><td>25000-50000</td><td>0.4</td></tr><tr><td>50000-100000</td><td>0.3</td></tr><tr><td>100000-500000</td><td>0.2</td></tr></table>Determine the weight average molecular weight of the polymer as well as PDI for the above polymer.</td><td>20</td><td>CO4</td></tr>
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