

F.F. Sem-II - NEP.

26/5/25

Time: 1hr and 30 min

Max. Marks: 45

- NOTE:**
- 1) Question No.1 is compulsory.
  - 2) Attempt any two questions from the remaining four questions.
  - 3) Figures to the right indicate the marks allotted to that question.
  - 4) Draw well-labelled diagrams wherever necessary.
  - 5) Assume suitable data wherever necessary.

- Q1. Answer any five of the following:** 15
- (a) An alloy consists of 70% copper (Cu) and 30% zinc (Zn) by weight. (Density of copper = 8.96 g/cm<sup>3</sup>, Density of zinc = 7.14 g/cm<sup>3</sup>). Calculate the density of the alloy.
  - (b) What are ceramics? State the properties and uses of any one type of Natural Ceramics.
  - (c) What are the emerging applications of biocomposites?
  - (d) Explain the synthesis of PMMA and discuss its properties. Mention at least two important uses.
  - (e) Define Liquid Crystal Polymer and explain how its properties make it useful in electronics or automotive industries.
  - (f) What are carbon nanotubes? Differentiate between Single-Walled and Multi-Walled Carbon Nanotubes.
  - (g) A polymer fiber with a cross-sectional area of 5 mm<sup>2</sup> is subjected to a force of 125 N before failure. Find the tensile stress at the point of failure.
- Q2**
- (a) Define optical fibers and explain their construction with a labeled diagram and write any two applications of it. 6
  - (b) Explain the structure and unique properties of graphene. Give any two applications of nanomaterials in the medicinal field. 5
  - (c) Define smart polymers. Discuss their important characteristics and list some of their applications. 4
- Q3**
- (a) Define compounding of plastics. What is the significance of each component added during compounding? Explain their roles with examples. 6
  - (b) Explain the various types of Particulate reinforced composite? Mention their applications. 5
  - (c) Explain the properties and uses of Borosilicate and Soda-lime glass. 4
- Q4**
- (a) State the composition, properties and uses of
    - i. Dutch metal
    - ii. Woods metal6
  - (b) Explain classification of various types of nanostructured materials in detail. 5
  - (c) Calculate the Degree of Polymerization of a polystyrene molecule with a molecular weight of 150,000 g/mol, given that the molecular weight of a styrene monomer is 104 g/mol. 4
- Q5**
- (a) Define Composite. Explain properties and application Biocomposite. 6
  - (b)
    - i. State the effects of the Co and W elements on special steels. 2
    - ii. An alloy is made of 60% iron (Fe) and 40% carbon (C) by weight. Calculate the atomic percentage of each element in the alloy. (Given: Atomic mass of Fe = 55.85 g/mol, Atomic mass of C = 12.01 g/mol) 3
  - (c) What are conducting polymers? Explain Intrinsic polymer in detail with example. 6

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