(3 Hours) **Total Marks: 80**

N.B.: (1) Question No.1 is compulsory.
(2) Attempt any THREE questions from remaining five questions.
(3) Figures to the right indicate full marks.
(4) illustrate the answers with neat sketches wherever required.
(5) Answers to questions should be grouped and written together.

1 a) What is material science and engineering and explain what is material science broadly? 10
b) Explain various types of defects in materials and their influence on properties. 10

2 a) Explain the principle of strain hardening. Does this mechanism work at high Temperatures? 10
And explain the principle of dispersion hardening.
b) Explain the following with stress strain relations 10
- Fracture toughness
- wear
- Abrasion

3 a) Explain the term AMS in engineering perspective. Explain the types of materials and what 10
are the recent advances in material science?
b) How are stainless steel classified? Explain each type in detail with alloying elements 10
added and their role, properties created and applications.

4 a) Explain the thermoplastic materials like crystalline and amorphous plastic and structured 10
foam.
b) Explain Mechanical behaviour of Composite Materials.

5 a) Explain the following in Ceramics 10
i) Toughening Mechanism
ii) Fatigue in Ceramics
b) Explain the structure of plastics. Distinguish between polymers and plastics 10

6 a) Write Short note on any Four. 20
1. Shape memory alloy
2. Difference between monomers and polymers
3. Engineering applications of ceramics
4. Types of Composites
5. HSS