

**B.Tech. – VIEP – MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2015

00856

BIME-005 : MATERIAL SCIENCE

Time : 3 hours

Maximum Marks : 70

Note : There are seven questions. Attempt any five questions. All questions carry equal marks.

1. (a) Describe briefly Rutherford's Atomic Model. Discuss the major deficiencies in this model. 7
- (b) Describe briefly about the simple classification of materials. Distinguish between an alloy and a compound. 7
2. (a) Explain the phenomenon of yielding in mild steel. Why is the yield point in copper not distinct? 7
- (b) Define plasticity. Describe the elastic or inelastic behaviour of materials with the help of stress – strain diagram and strain – time diagram. 7

3. (a) Draw neat sketches of (i) an edge dislocation and (ii) screw dislocation. Derive the relationship between the Burgers vector and dislocation line in each case. 7
- (b) Explain the mechanism of crack initiation and growth when a metal is subjected to cyclic process. 7
4. (a) Distinguish between Cast iron and Plain carbon steel. Can the same material exist in crystalline and amorphous form ? Give examples. 7
- (b) Briefly describe Iron-Carbon phase diagram with the help of a neat sketch. 7
5. (a) Describe the phenomenon of superconductivity. Discuss the features of Type-I and Type-II superconductors. 7
- (b) What is meant by metal fatigue ? How does it differ from creep? 7
6. (a) Explain T-T-T curves for eutectoid steel. 7
- (b) Write the general properties of polymeric materials. 7

7. Write short notes on any *four* of the following : 14

- (a) Cold working process
 - (b) Soft and hard magnetic materials
 - (c) Nano-materials and their applications
 - (d) Toughness and Hardness
 - (e) Annealing
 - (f) Non-destructive testing
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