

Roll No.

Total No. of Pages : 2

BT-4/M11

8452

Material Science (w.e.f. 2006 onwards)

Paper : ME-204E

Time : Three Hours]

[Maximum Marks : 100

Note :— (1) Attempt any *five* questions selecting at least *one* question from each unit.

(2) All questions carry equal marks.

UNIT-I

1. (a) Find out Packing Fraction and Coordination number for following :
- (i) Primitive unit cell structure.
 - (ii) BCC structure.
 - (iii) FCC structure. 6
- (b) Write down a short note on Crystallography. 6
- (c) Copper has FCC structure and an atomic radius of 1.278 Å. Calculate its density. 6
- Atomic wt. of Cu = 63.5 g/mol
- Avogadro number = 6×10^{23} . 8
2. Explain the following with neat diagrams :
- (a) Point and Line defects. 6
 - (b) Edge and Screw dislocations. 7
 - (c) Slip and Slip planes. 7

UNIT-II

3. (a) Explain the TTT curve with its main applications. 8
- (b) Derive the phase rule $F = C - P + 2$, symbols having their usual meaning. 6
- (c) Differentiate between Eutectic and Eutectoid Systems with same examples. 6

4. (a) What is meant by Heat Treatment ? Also mention its main objectives. 8
- (b) Explain the following terms in brief :—
- (i) Annealing
 - (ii) Tempering
 - (iii) Hardening
 - (iv) Cyaniding. 12

UNIT-III

5. (a) Explain the mechanism of Fatigue. Also discuss the factors affecting the fatigue. 12
- (b) Differentiate clearly between Brittle and Ductile Fracture with the help of suitable examples. 8
6. (a) Explain Bauschinger effect in detail with same examples. 10
- (b) What is the process of plastic deformation ? Also discuss the deformation by Twining effect. 10

UNIT-IV

7. (a) Discuss dry and wet corrosion. Also explain various methods of corrosion prevention. 10
- (b) What are Ceramics ? Explain in brief. Also discuss their properties and forming techniques. 10
8. (a) Draw a typical creep curve and also label its important areas. 8
- (b) What are main objectives of Creep Test ? How it is carried out ? 6
- (c) Discuss the effect of time, temperature and metallurgical variables on creep. 6