Roll No. .....

Total Pages : 3

8452

BT-4/M-12

MATERIAL SCIENCE

Paper–ME-204-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt only five questions, selecting one question from each Unit.

UNIT–I

1. (a) Calculate the Ionic packing fraction of NaCl having FCC structure. The Ionic radii of Sodium and Chlorine are 0.98Å and 1.81 Å respectively. 8

   (b) Determine the coordination number for

   (i) BCT

   (ii) ECO

   (iii) SR

   (iv) ECM unit cells. 12

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2. (a) Explain the following in brief :

   (i) Frankel & Schottky defects.

   (ii) High & Low Angle Boundary defects. 12

   (b) Discuss the various effects of imperfections on metal properties. 8

UNIT–II

3. (a) Explain the Iron-Carbon equilibrium diagram with the help of all salient features. 10

   (b) Discuss the importance of Lever rule. Which information of a Phase-diagram can be known from the idea of Lever rule. 10

4. (a) Explain the importance of Grain-Growth phenomenon. 10

   (b) Discuss the following Heat treatment process in brief :

   (i) Carburizing

   (ii) Normalizing. 10

UNIT–III

5. (a) Explain the mechanism of Plastic deformation in brief. 10

   (b) Why does yielding occur in the ductile materials ? How does it influence the behaviour of metal ? 10

6. (a) Discuss the limitations of Griffith's theory of brittle feacture. Also state its salient features. 10

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(b) Compare linearly elastic and non-linearly elastic materials. State the situations when a designer should adopt secant modulus and tangent modulus. 10

UNIT–IV

7. (a) Compare the damping capacity of grey cast iron with bronze mild-steel and plastics. Suggest a suitable material for making machine tool beds. Also justify your answer. 10

(b) Discuss the mechanism and effect of Corrosion process. Also suggest some examples of Corrosion associated with mechanical deformation. 10

8. (a) Explain the mechanical behaviour of Plastics. Discuss their properties and applications. 10

(b) Discuss the various methods of Ceramics processing in brief. Also mention their salient features. 10