3E1412

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B. Tech. (Sem.III) (Main/Back) Examination, January - 2009
(3ME2) Material Science and Engg. (Mechanical Engg.)
(3PI2) Material Science and Engg. (Prod. & Indus. Engg.)
(3AE2) Material Science and Engg. (Automobile Engg.)

Time : **3** Hours] [Total Marks : **80**
[Min. Passing Marks : **24**

Attempt five questions in all. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. Nil 2. Nil

1 (a) Define the following with reference to crystal structure :

(i) Unit cell

(ii) Crystal Symmetry

(iii) Atomic Packing Factor (APF)

(iv) Co-ordination number.

8

(b) Explain Bravac's Lattice space. Explain different types of crystal structures with the help of neat sketches.

8

OR

(a) Draw the planes and directions in a FCC structure for (011) and (001). Calculate the number of atoms per mm^2 in these planes. Given lattice constant a = 3.61 A°. 8

(b) Explain with neat sketch the various types of crystal imperfections. 8

2 (a) Explain Slip and Twinning method of Plastic deformation. 8

(b) Explain Recovery and Recrystallization. 8

OR

(a) Explain the following with reference to deformation of metals :

(i) Burger Vector

(ii) Preferred orientation

(iii) Elastic After effect

(iv) Baurschinger effect. 8

(b) Explain the role of dislocations in Plastic deformation. Identity slip planes in FCC and BCC. 8

3 Write short notes on any **four** of the following :

(a) Classification of Engineering Material.

(b) Mechanism of Crystallization

(c) Binary isomorphous alloy system

(d) Peritectic transformation in equilibrium diagram

(e) Allotropic changes in Iron-Carbon equilibrium diagram

(f) Martensite transformation in steel. 16

OR

(a) Write the classification of Equilibrium diagram. Explain Iron-carbon equilibrium diagram. 8

(b) Explain TTT curve. Explain critical cooling rate. 8

4 (a) Explain Rockwell hardness testing method. Write its advantages and limitations. 8

(b) Explain Annealing and tempering processes. Explain the difference between them. 8

OR

(a) Explain Carburizing and Nitriding processes of heat treatment of steels with their applications. 8

(b) Explain the term Hardenability. Explain the factors affecting hardenability. Explain the causes and remedies of Burnt Steel. 8

5 Explain the classification of steels. Write the effect of following alloying elements on properties of steel :

(a) Nickel

(b) Chromium

(c) Silicon

(d) Tungsten. 16

OR

Write short notes on following :

(a) Composite Materials and their application

(b) Fibre reinforced Plastics.

(c) B/S standard for steel. 16
