(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0428 Roll No.

B.Tech

(SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10

MATERIALS SCIENCE IN ENGINEERING

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt all five questions, there are choices within. Marks are indicated therein.*

1 Attempt any **four** parts of the following : **5×4=20**

(a) State and explain Bohr's model of an electron in atom.

(b) What are Miller indices? How are they determined?

(c) Show that the atomic packing factor of FCC crystal is 0.74.

(d) Draw neat sketches of unit cells of simple cubic, BCC crystal structures.

(e) Differentiate between edge dislocation and screw dislocation. Illustrate with sketches.

(f) Briefly describe X-ray crystallography methods.

2 Attempt any **four** parts of the following : **5×4=20**

(a) Define creep. Explain its phases and mechanism.

(b) Differentiate between toughness and hardness.

(c) Explain how is fatigue test performed in the laboratory.

(d) Explain the term percentage elongation and proof stress.

(e) Define and specify recrystallization temperature (s).

(f) Draw a neat labelled sketch of iron-carbon equilibrium diagram.

3 Attempt any **two** parts of the following : **10×2=20**

(a) What is 'heat treatment'? Why are the steels heat treated? Describe various heat-treatment processes.

(b) Explain the effects of

(i) carbon and

(ii) various alloying elements added to

(a) carbon steels

(b) alloy steels respectively.

Also, write its applications.

(c) What is duralumin? Give its composition and application. Also explain age-hardening.

4 Attempt any **two** parts of the following : **10×2=20**

(a) Compare the properties of diamagnetic and ferromagnetic materials. Also write what are hard and soft magnetic materials. Explain with reference to hysteresis loop.

(b) Describe various types of semiconductors, its devices and its applications.

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(c) What is superconductor and explain its importance and application. Also differentiate between Type I and Type II superconductors.

5 Attempt any **two** parts of the following : **10×2=20**

(a) What are refractory materials? State their basic properties and uses. Also write what do you understand by

(i) Glass and

(ii) RCC (building).

(b) List various types of polymers (plastics) and its past, present and future possible applications. Also, briefly describe the plasting-processing techniques.

(c) Write short notes on any **two** of the following :

(i) Composite materials and its applications

(ii) Smart-materials and its applications

(iii) Corrosion and its prevention.