



Printed Pages : 3

EME301

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

PAPER ID : 0428

Roll No.

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## 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**

- State and explain Bohr's model of an electron in atom.
- What are Miller indices? How are they determined?
- Show that the atomic packing factor of FCC crystal is 0.74.
- Draw neat sketches of unit cells of simple cubic, BCC crystal structures.
- Differentiate between edge dislocation and screw dislocation. Illustrate with sketches.
- Briefly describe X-ray crystallography methods.

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

- Define creep. Explain its phases and mechanism.
- Differentiate between toughness and hardness.

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[Contd...

- (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 :  $10 \times 2 = 20$

- (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 :  $10 \times 2 = 20$

- (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.

- (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 :  $10 \times 2 = 20$

- (a) What are refractory materials? State their basic properties and uses. Also write what do you understand by
- Glass and
  - 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 :
- Composite materials and its applications
  - Smart-materials and its applications
  - Corrosion and its prevention.