



Printed Pages : 3

TME-301

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

**PAPER ID : 4068**

Roll No.

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**B. Tech.**

**(SEM. III) EXAMINATION, 2008-09  
MATERIAL SCIENCE**

*Time : 3 Hours]*

*[Total Marks : 100*

**Note :** *Attempt all questions.*

**1** Answer any **two** of the following : **10×2=20**

- (a) What is a dislocation ? What are different kinds of dislocations ? Draw their neat sketches and mark Burger vector in each case. What role does dislocations play in the mechanical properties of metals ?
- (b) Explain the metallic bonding. How does it explain their high electrical and thermal conductivity as well as lusture ?
- (c) List and describe briefly different kinds of X-ray crystallography.

**2** Answer any **two** of the following : **10×2=20**

- (a) Define the term microstructure. What are different steps involved in the study of microstructure of metals and alloys and what is information obtained from this study ?

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(b) Describe the (i) Hardness testing (ii) Impact testing.

(c) Describe the Fe-C diagram with neat sketch and explain its importance.

3 Answer any **two** of the following :  $10 \times 2 = 20$

(a) List classification of carbon steels. Describe briefly their properties and typical applications.

(b) Explain the heat treatments : (i) Tempering and (ii) Quench hardening with reference to steel.

(c) What are general characteristics of (i) Ni-Cu alloys known as Monels and (ii) Phosphor bronze ?

4 Answer any **two** of the following :  $10 \times 2 = 20$

(a) Define the term magnetic domain. How can you explain the hysteresis loop of ferromagnetic materials on the basis of domains ? What is the cause of the hysteresis ?

(b) Draw logarithm of conductivity versus inverse of absolute temperature plot of an extrinsic (donor doped) semiconductor. Label the various regions and explain them. What information can you get from such a plot ?



- (c) What is Meissner Effect ? Draw magnetization (M) vs applied magnetic field (H) for type I and type II superconductors. Sketch magnetic lines of forces around a superconducting material in the presence of magnetic field below and above its superconducting transition temperature. Explain the term critical current density with regard to superconductors.

5 Answer any **four** of the following :  $5 \times 4 = 20$

- (a) Why porous ceramic bricks are used for insulation in furnaces ?
- (b) Why steel reinforcement is given in the concrete buildings ?
- (c) Explain the term 'degradation' with regard to polymers.
- (d) Describe how are buried water pipe lines are protected from corrosion.
- (e) Distinguish between large particles and dispersion strengthened composites.
- (f) What is the difference between noble and sacrificial coating on metals ?
- (g) Griffith's formula for brittle fracture.

