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TME-301

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

PAPER ID : 4068

Roll No.

B. Tech.

(SEM. III) EXAMINATION, 2007-08

MATERIALS SCIENCE

Time : 3 Hours]

[Total Marks : 100

- Note :
- Answer all five questions.
 - All questions carry equal marks and are indicated therein.

1 Answer any two parts of the following : $10 \times 2 = 20$

- What do you mean by primary and secondary bonding ? Cite differences between ionic, covalent and metallic bondings and give suitable examples of each. Why covalently bonded materials are generally less dense than ionically or metallically bonded ones ?
- Distinguish between atomic structure and crystal structure. Name various crystals (Bravais Lattices) giving their axial relationships, inter axial angles, unit cell geometry.
- Differentiate between line and surface defects. Write notes on edge and screw dislocations giving suitable sketches. What is the burger's vector ? Explain its significance.



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

(a) Define the following terms and briefly explain the different testing techniques used to measure them :

- (i) Hardness
- (ii) Toughness
- (iii) Impact strength
- (iv) Fatigue strength.

(b) What is a phase diagram ? Discuss their various types and significance. Draw a neatly labeled eutectic type phase diagram of Cd-Bi system and explain it.

(c) Write a descriptive note on grain size determination : Draw stress - strain diagrams and microstructures of gray cast iron and mild steel.

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

(a) Why cast iron is so called ? What are the differences in properties of gray and white cast iron ? Explain the reasons for these differences. What are the applications of nodular and malleable cast iron ?

(b) What do you mean by heat treatment ? Explain the processes of annealing, normalizing, quenching and tempering. Discuss the properties attained after these processes.

(c) What are the typical properties a material should possess for bearing applications ? Name some of the bearing materials and their specific properties. What are the typical properties and applications of aluminium alloys ?

4 Write brief notes on any **four** of the following : **5×4=20**

- (i) Wave-Particle Duality and de-Broglie hypothesis
- (ii) Magnetism and Hysteresis
- (iii) Semi conductor devices and applications
- (iv) Diffusion of solids
- (v) Super conducting devices and applications
- (vi) Type I and II super conductors.

5 Write brief notes on any **four** of the following : **5×4=20**

- (i) Fe-C equilibrium diagram
- (ii) Glasses : Forming and tempering
- (iii) Plastics : Processing and applications
- (iv) Corrosion : Types and prevention
- (v) Ceramics : Properties and applications
- (vi) Composite materials : Properties and applications.

