



Printed Pages : 3

TME301

(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) ODD SEMESTER THEORY EXAMINATION 2009-10
MATERIAL SCIENCE

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions :

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

(a) Describe following types of primary and secondary bonding :

- (i) Ionic
- (ii) Covalent
- (iii) Metallic
- (iv) Fluctuating dipole
- (v) Permanent dipole

(b) Find for SC, BCC and FCC crystals; number of atoms per unit cells, relationship between atomic size and lattice parameter and atomic packing fraction.

(c) Enlist Bravais crystal system. Also briefly describe X-ray crystallography methods.

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[Contd...

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

- (a) Enumerate the purpose for which a microscopic examination is required. Describe the method of determining grain size of a metal.
- (b) Briefly describe :
- (i) Hardness testings and
 - (ii) Impact testings
- (c) Describe Griffith's theory of brittle fracture. Obtain the expression for fracture stress in glass.

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

- (a) Draw Fe-Fe₃C phase (equilibrium) diagram and label the phase fields. Discuss in brief the different reactions that take place in this system.
- (b) Describe Heat-treatment processes and its usefulness.
- (c) Mention the composition, properties and applications of the following :
- (i) Stainless steels
 - (ii) HSS
 - (iii) Gun metal
 - (iv) Duralumin
 - (v) Ferritic
 - (vi) Martensitic



- 4 Answer any **two** of the following : 10×2=20
- (a) Briefly describe the types of semiconductors, its devices and its applications.
 - (b) What is superconductivity ? What are the properties of superconductors. Draw the curve of resistivity versus temperatures for normal metal and superconductors. Also, write applications of superconductors.
 - (c) Define magnetostatic energy. How can be magnetostatic energy of a ferromagnetic material be minimized with respect to magnetic dipole alignment ?

- 5 Write short notes on any **four** : 5×4=20
- (a) Addition polymerization and condensation polymerization
 - (b) Particulate composites
 - (c) Mechanical behaviour of ceramics
 - (d) Future of plastics
 - (e) Creep curve
 - (f) Corrosion and its control.

