

(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 2012-13

MATERIALS SCIENCE IN ENGINEERING

Time : 3 Hours

Total Marks : 100

Note : (1) Attempt *all* questions.

(2) All questions carry equal marks.

(3) Be precise in your answer.

1. Attempt any **FOUR** out of the following :

- Explain how is modern periodic table different from Mendeleev's periodic table.
- Distinguish clearly between primary and secondary type of bonding, giving suitable examples.
- Find the Miller indices of a set of parallel planes which make intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z axis.
- Calculate the glancing angle on the cube (100) of a rock salt of lattice constant 2.814°\AA corresponding to second order diffraction for x -rays of wavelength 0.710°\AA .
- What do you mean by amorphous materials ? Give examples. How do they differ from crystalline materials ?

- (f) Draw the figure showing the structure of a crystal containing a screw dislocation. Also indicate the Burgers circuit.

2. Attempt any **TWO** out of the following :

- (a) What is meant by fracture ? Explain the characteristics of brittle fracture and ductile fracture.
- (b) Explain briefly the procedure for preparing the specimen for micro-examination.
- (c) Define the following terms :
 - (i) pearlite
 - (ii) ferrite
 - (iii) cementite
 - (iv) bainite and
 - (v) martensite.

3. Attempt any **TWO** out of the following :

- (a) Differentiate between grey cast iron and malleable cast iron.
- (b) Explain the working of TTT diagram. What information do you get from this diagram ?
- (c) Name the composition and applications of following alloys :
 - (i) phosphor bronze,
 - (ii) gun metal,
 - (iii) duralumin and
 - (iv) babbit metal.

4. Attempt any **TWO** out of the following :
- (a) Describe the phenomenon of magnetic hysteresis. Why does it occur for ferromagnetic and ferrimagnetic materials ?
 - (b) Classify intrinsic and extrinsic semi-conductors. Give two examples of each type.
 - (c) What is Meisner effect ? What do you mean by
 - (i) persistent current in a superconductor and
 - (ii) type II superconductor ?
5. Attempt any **TWO** out of the following :
- (a) Classify ceramic materials with appropriate examples.
 - (b) Give the general difference in strengthening mechanism between large particle and dispersion strengthened particle reinforced composites.
 - (c) What are linear polymers ? Explain the difference between addition and condensation polymerization.