

(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  $2.814 \text{ \AA}$  corresponding to second order diffraction for x-rays of wavelength  $0.710 \text{ \AA}$ .
- What do you mean by amorphous materials ? Give examples. How do they differ from crystalline materials ?

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(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.

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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.