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

PAPER ID : 1262   **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2013-14

MATERIAL SCIENCE IN ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note :— Attempt questions from each Section as per directions.

SECTION—A

Answer all questions.   (2×10=20)

1. Enlist various types of atomic models. Enlist various types of chemical bondings.

2. What is 'Motif' ? What is the difference between crystal and lattice ?

3. There is no unit cell of end centered cubic crystal structure in the list of Bravais lattices. Why ?

4. Write the relationship between lattice parameter and atomic radius for the unit cell of FCC crystal structure.

5. Define the term 'packing efficiency'. Also give the formula for the same.

6. Differentiate between toughness and resilience.

7. What is solid solution ? Enlist types of solid solutions.

8. Differentiate between ferrous and non-ferrous materials with suitable examples.

9. Enlist various heat treatment process variables. What is quenching process ?

10. What is the difference between composite and alloy ?

SECTION—B

Answer any **three** questions. (10×3=30)

1. Draw the plane (111), (100) and (110), and the directions [100], [111] and [010] in a unit cell of cubic crystal with separate diagrams for each.

2. Draw and explain Iron-Carbon equilibrium diagram.

3. Enumerate different methods of steel manufacturing stating the type of furnaces used with them and explain one method in detail.

4. Explain in detail various types of semiconductors with their properties and applications. Explain the principle and working of p-n junction.

5. Discuss various types of plastics in detail along with their properties and applications.

SECTION—C

Answer all questions. (10×5=50)

1. What is Bragg's law ? Explain in detail about X-ray diffraction method for determination of crystal structure with neat diagrams.

OR

What do you mean by engineering materials ? Give a detailed classification of engineering materials with suitable examples.

2. What is phase diagram ? Classify phase diagrams in detail with neat sketches. What do you mean by degree of freedom ?

OR

What do you mean by destructive testing ? Explain 'tensile test' in detail with diagrams. Also draw the stress-strain curve for mild steel and explain various points on this diagram.

3. What is annealing ? What are the objectives of annealing ? Explain various types of annealing in detail.

OR

What is the contribution of aluminium in automobile and aerospace industries ? Enlist any three alloys of each aluminium and copper. Write their chemical composition, properties and applications.

4. What are semi conductors ? Differentiate between intrinsic and extrinsic semi conductors in detail with diagrams and examples. Also explain their properties and applications.

OR

What is Meissner effect ? Distinguish between Type-I and Type-II super conductors with suitable curves and examples.

5. What is ceramic ? Explain the classification of ceramics in detail with their examples, properties and applications.

OR

Write a short note on composite materials. Give a detailed classification of composite materials along with their properties and applications.