

B TECH
(SEM-III) THEORY EXAMINATION 2018-19
MATERIAL SCIENCE

Time: 3 hrs

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

- a) What do you understand by crystal structure?
- b) What is the concept of unit cell in describing crystal structures?
- c) Why Yield points occurs in low carbon steel what are ferrous materials?
- d) What is Curie temperature?
- e) What is the packing factor of diamond cubic structure?
- f) What is creep failure of materials?
- g) What do you mean by smart materials?

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

- a) What do you mean by Miller Indices? Explain the procedure for finding Miller Indices.
- b) What do you mean by engineering materials? Write a note on the importance of materials. Explain why covalently bonded materials are generally less deeming than ionically or metallicly bounded materials?
- c) Toughness is a measure of the ability of a material to absorb energy up to fracture. Comment on it.
- d) What is the principle of case hardening of steel? Briefly explain various case hardening process.
- e) Explain the mechanism of conduction in semiconducting materials. Briefly describe the construction diode.

SECTION C

3. Attempt any one part of the following:

7 x 1 = 7

- a) "Every electron in action in characterized by four parameters, called quantum numbers." Explain this statement.
- b) NaCl structure has FCC structure. The density of NaCl is 2.18cm^3 . Calculate the distance between two adjacent atoms.

4. Attempt any one part of the following:

7 x 1 = 7

- a) What do you understand by elastic deformation? Sketch and explain the stress-strain diagram showing linear elastic deformation for loading and unloading cycles.
- b) What is hardness? What is the purpose of minor load used in Rockwell hardness test? How does the Rockwell hardness test differ from the Brinell hardness test?

5. Attempt any one part of the following:

7 x 1 = 7

- a) Draw a neat sketch of the Iron-Carbon equilibrium diagram and explain its salient feature.
- b) Distinguish between full annealing and process annealing.

6. Attempt any *one* part of the following:

7 x 1 = 7

- a) Describe the phenomenon of magnetic hysteresis. Why does it occur for ferromagnetic and ferrimagnetic materials?
- b) What do you understand by fracture of engineering materials? What is ductile fracture of metal alloys? Explain various stages in cup-and cone fracture.

7. Attempt any *one* part of the following:

7 x 1 = 7

- a) Classify composite materials. Write their advantages, limitations and salient application.
- b) Discuss different types of ceramics structures. Write the properties of concrete and wood.

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