

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

Time: 3 Hours

Total Marks: 70

Notes: Assume any Missing Data.

**SECTION-A****1. Attempt all questions in brief.****(2x7 = 14)**

- a) Define recrystallization temperature?
- b) Define 'critical cooling rate' in TTT diagram with neat sketch.
- c) What are refractory materials? Give some examples.
- d) Define the term strain hardening.
- e) Differentiate between toughness and resilience. Also define the endurance limit.
- f) Why hardening is followed by tempering?
- g) What are Bravais's space lattices?

**SECTION B****2. Attempt any three parts of the following :****(7x3=21)**

- a) Define the term diffusion. Explain Fick's law in case of steady state diffusion.
- b) What is non-destructive testing (NDT)? Explain in detail any two NDT methods.
- c) What is phase diagram? Draw a neat sketch of iron-carbon diagram and explain the various phases present in it and the important reactions occurring.
- d) What do you mean by heat treatment process? Name various types of hardening processes and explain in detail Nitriding process with its merits and demerits.
- e) What are Ceramics? What are different types of ceramics? Also write their properties.

**SECTION C****3. Attempt any one part of the following :****(7x1=7)**

- a) How many atoms per square millimeter are there on the (1 0 0) plane of lead. Lead has FCC structure. Assume the interatomic distance to be 3.499 Å.
- b) NaCl structure has FCC structure. The density of NaCl is 2.18 cm<sup>3</sup>. Calculate the distance between two adjacent atoms.

**4. Attempt any one part of the following :****(7x1=7)**

- a) What is a dislocation? What are different types of dislocation? Explain. Draw their neat sketches and mark burger vector in each case.
- b) Explain the term creep, its mechanism and stages.

**5. Attempt any one part of the following :****(7x1=7)**

- a) Write short notes on Solid solution and its types.
- b) What do you understand by lever rule? Determine the mass fraction of the phases present at 184°C in a sample of lead & tin with 45% tin in it.

6. Attempt any one part of the following :

(7x1=7)

- a) Draw and explain the TTT diagram for eutectoid steel. Explain important transformations taking place in it on cooling.
- b) What are brasses and bronzes? How are they classified? Give the composition, properties, microstructure and applications of any two of each.

7. Attempt any one part of the following :

(7x1=7)

- a) What are various methods of plastic processing?
- b) Explain in detail classification and applications of composite materials.

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