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Paper Id: 140301 Roll No:

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 Bravai'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^3. 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.

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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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