Printed Pages: 02 **Sub Code: EOE 047/ NOE 047**

Paper Id: 199231 **Roll No.** | | | | | | | | | | |

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

Time: 3 Hours *Total Marks: 100*

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What do you mean by bonding in solids?
b. Define atomic packaging factor.
c. Define Creep.
d. Write Gibb's Phase rule.
e. Write the effect of alloying element on steel.
f. What is duralumin? Give the composition
g. Define Curie temperature.
h. Write the properties of superconductors.
i. Define Refractoriness.
j. Compare between Sandwich and off axis composites

SECTION B

2. Attempt any *three* of the following: **10x3=30**

a. Derive the expression for relation between atomic radius and lattice constant in case of (i) BCC (ii) FCC and (iii) ST.
b. Differentiate between destructive and non-destructive testing. Enlist their various types.
c. Sketch and explain the TTT diagram for eutectoid steel.
d. Explain the following in superconductors:-
   i. Meissner Effect
   ii. Type II Superconductor
e. What do you mean by the term "Composite material". Explain its properties and applications.

SECTION C

3. Attempt any *one* part of the following: **10x1=10**

a. Volume of a FCC unit cell is 67.42×10^{-30} m^3.Calculate the atomic diameter of its atom. Guess as which metal it can be. Determine the number of unit cell in 2 mm^3 volume of this metal.
b. Derive the expression which relates interplaner spacing, Miller indices and dimension of the (i) cubic unit cell and (ii) tetragonal unit cell.

4. Attempt any *one* part of the following: **10x1=10**

a. What is fatigue? What is its effect on properties of materials? Describe fatigue limit.
b. How do the unary, binary and ternary phase diagrams differ from each other? Describe the phase diagram of iron.

5. Attempt any *one* part of the following: 10x1=10

a. Compare low carbon steel, medium carbon steel and high carbon steel from different view points. Also discuss the ultra high carbon steel.

b. Explain following
   i. Cyaniding
   ii. Nitriding
   iii. Carbon nitriding of steel
   iv. Flame hardening

6. Attempt any *one* part of the following: 10x1=10

a. Classify magnetic materials. Write examples, salient features and applications of each of them

b. What are different types of semiconductor materials? Enumerate their uses.

7. Attempt any *one* part of the following: 10x1=10

a. Write classifications of corrosion in metals. What common factors are always involved in corrosion?

b. Write the comparison between Thermosets and thermoplasts.