**Printed pages: 02** **Sub Code: CH404**

**Paper Id:** **151204** **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 Alloy?
**b)** Explain the concept of nucleation.
**c)** Define the concept of magnetism.
**d)** What are Atomic models?
**e)** What is the importance of plastics in engineering applications?
**f)** Define Nano composites.
**g)** What is superconductivity?
**h)** Describe the term metallic glass? Give examples.
**i)** What are the advantages of phase diagram?
**j)** Define the term hardness and hardenability.

**SECTION-B**

**2. Attempt any *three* of the following:** **10 x 3 = 30**

**a)** Explain slip mechanism of plastic deformation. Derive expression for deformation of slip.
**b)** Explain various types of plastics with their applications.
**c)** Explain the following :
(i) Tempering
(ii) Quenching
(iii) Case Hardening
**d)** Explain the term corrosion and its types and mechanism. Also discuss methods of prevention and control of corrosion.
**e)** Discuss plain carbon steel. Explain in detail its classification, properties and applications.

**SECTION C**

**3. Attempt any one part of the following:** **10 x 1 = 10**

**a)** What is stainless steel? Explain different types of stainless steel.
**b)** Draw the creep curve and explain various stages of creep.

**4. Attempt any one part of the following:** **10 x 1 = 10**

**a)** Discuss the factors affecting the selection of materials for engineering purposes.
**b)** Discuss the transformation of austenite when cooled at various cooling rates based on TTT diagram.

**5. Attempt any one part of the following: 10 x 1 = 10**

**a)** What is diffusion coating? Name its different methods. Discuss in detail any one process of diffusion coating.

**b)** Write a short note on-

i. Ausforming

ii. Thermal fatigue of metal

iii. Yield point phenomenon

iv. Hardenability test

v. Normalizing

**6. Attempt any *one* part of the following: 10 x 1 = 10**

**a)** Draw a neat and labelled Fe-$Fe_3C$ diagram.

**b)** Discuss the general principle of heat treatment and explain in detail the various methods.

**7. Attempt any *one* part of the following: 10 x 1 = 10**

**a)** Explain elastic deformation and plastic deformation in detail in engineering materials in detail.

**b)** Explain the following properties with neat sketches :
(i) Stiffness (ii) Hardness (iii) Ductility (iv) Brittleness (v) Fatigue.