Printed Pages:02 **Sub Code:KOE-032**

Paper Id: 233300 **Roll No.** | | | | | | | | | | |

B.TECH
(SEM III) THEORY EXAMINATION 2022-23
MATERIAL SCIENCE

Time: 3 Hours ***Total Marks: 100***

Note: 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 are equilibrium diagrams? What are their advantages and limitations?
(b) Define phase. State the conditions for unlimited solid solubility for an alloy system.
(c) What is the significance of TTT diagram?
(d) Write the alloying elements in stainless steel.
(e) Define creep and creep fracture.
(f) Mention the salient features of Cup and Cone type of fracture.
(g) Explain the magnetic materials with suitable examples.
(h) What is superconductivity?
(i) Distinguish between ceramics and composites.
(j) How is a glass distinguished from other ceramic materials?

SECTION B

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

(a) Discuss the Hume-Rothery rules that govern the extension substitutional solid Solubility.
(b) Draw and explain Fe Fe3C phase diagram Indicate the carbon percentage range of steel.
(c) Discuss in brief various mechanisms of strengthening in metals and Alloys.
(d) Explain the practical importance of hysteresis curve for ferromagnetic materials?
(e) What is tempered glass and how can it be produced?

SECTION C

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

(a) State Gibb's phase rule. Mention the number of variables and the degree of freedom at the eutectic temperature of a binary phase diagram.
(b) Draw eutectic phase diagram and explain it.

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

(a) State ficks laws of diffusion in details.
(b) Explain Time-Temperature Transformation diagram in detail.

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

(a) Why creep is considered to be a high temperature property? Enumerate the metallurgical variables affecting the creep behavior of a material. Explain the effect of grain size on the creep strength of a material.

(b) Draw a neat diagram and explain behaviour of specimens under brittle and ductile fractures.

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

(a) Explain magnetism, diamagnetism, paramagnetism, and ferromagnetism.

(b) In terms of electron energy band structure, discuss the difference in Electrical conductivity between metals, semiconductors and insulators.

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

(a) What are glass ceramics? How are they formed? What are desirable characteristics of glass ceramics?

(b) What are nano materials? Discuss their engineering applications.

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