PAPER ID-311281

Subject Code: BOE303

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2023-24
MATERIAL SCIENCE

TIME: 3HRS **M.MARKS: 70**

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

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define the tie-line rule?
b.	Write down % composition of carbon in steel and cast iron.
c.	Explain the properties of stainless steel with application
d.	Define creep with example.
e.	Mention the salient features of Cup and Cone type of fracture.
f.	Differentiate annealing vs normalizing.
g.	What are the objectives of heat treatment?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

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.	Differentiate between ferrous and non-ferrous material with suitable examples
c.	Draw a neat diagram and explain behaviour of specimens under brittle and ductile fractures.
d.	What is the difference between Eutectic and Eutectoid phase diagrams? Explain with suitable example.
e.	What is some method by which processing of ceramic material is carried out? What are the applications of ceramic materials?

SECTION C

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

a.	What is solid solution? Enlist types of solid solution and explain it
b.	Define free energy composition curves for binary systems? Also define microstructural change during cooling?

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

a.	Draw neat Iron carbon equilibrium diagram with explanation of each phase, compositions, and temperature. Explain the microstructure of pearlite and Eutectoid Steels.
b.	What do you mean by engineering materials? Give a detailed classification of engineering materials with suitable examples.

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

a.	What is solid solution strengthening? What is precipitation hardening?
b.	Why is creep 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.

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

a.	Explain:(i) Ferromagnetism ii) Diamagnetism (iii) shape memory alloys
b.	Define superconducting materials and their properties.?

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

a.	What are glass ceramics? How are they formed? What are desirable characteristics of glass ceramics?
b.	What are nanomaterials? State the potential application of nanomaterials