PAPER ID-411799

Subject Code: NME301

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

BTECH
(SEM III) THEORY EXAMINATION 2021-22
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.	Draw the crystal plane of (111) miller indices
b.	Explain the importance of miller indices? How does it help in the study of crystallography
c.	Discuss (i) Resilience (ii) Toughness.
d.	Explain etching and why it is necessary before microscopic study. Name some of them?
e.	Define 'Critical cooling rate' in TTT diagram.
f.	Explain the surface hardening process of any specimen and state its importance also.
g.	Define the terms magnetization and curie constant.
h.	Discuss superconductivity? Mention its important properties.
i.	Discuss refractory material.
j.	Explain the term Polymer and classify it with examples.

SECTION B

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

a.	What is Bragg's law? Explain any one method used in X-ray diffraction to study the crystal structure.
b.	Explain the phenomenon of yielding and yield strength and also state the σ- ϵ diagram for a ductile and brittle material respectively
c.	Draw a neat sketch of iron carbon equilibrium diagram and briefly explain it.
d.	Draw and explain Time-Temperature-Transformation (TTT) curve.
e.	Discuss the following, stating their applications 1.Cyaniding 2. Nitriding 3. Flame Hardening 4. Induction Hardening

SECTION C

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

a.	Differentiate between conductors, semi-conductors and insulators based on the energy band concept. How does the conductivity of semi-conductors increase by doping?
b.	Explain the domain theory of magnetism. Also explain ferromagnetism, anti-ferromagnetism and ferrimagnetism.

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

a.	Write short note on composite materials. Give a detailed classification of composite materials along with their properties and applications.
b.	Define APF; find out APF for SC, FCC and BCC crystal structures.

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

a.	Explain the mechanical behavior of plastic and explain processing of plastics with neat sketch.
b.	Enumerate various methods of ceramics processing. Discuss their salient feature in detail. Explain any one processing in detail.

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

a.	Discuss crystallography? List some crystallography techniques and explain any one with neat diagram.
b.	Define concept of superconductors with their properties and classification. Explain Meissner effect. Distinguish between Type I and Type II superconductors with example

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

a.	Explain Austempering and martempering process with suitable sketch
b.	Discuss various differences between thermoplastics and thermosets with example.