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BTECH
(SEM III) THEORY EXAMINATION 2023-24
MATERIALS ENGINEERING

TIME: 3HRS

M.MARKS: 100

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

SECTION A

1. Attempt all questions in brief.

Q no.	Question	Marks
a.	Define crystal structure and crystal system.	2
b.	Differentiate between edge dislocation and screw dislocation.	2
c.	How fatigue load is different from creep load?	2
d.	Define the endurance limit of a specimen.	2
e.	Define Nucleation.	2
f.	Define the allotropy behavior of pure iron.	2
g.	What are the purposes of Heat treatment?	2
h.	What is the difference between salt bath cooling and water cooling?	2
i.	Write short notes on Nanomaterials and their application.	2
j.	What is the difference between alloy and Composite material?	2

SECTION B

2. Attempt any three of the following:

a.	What do you mean by engineering materials? Give a detailed Classification of engineering materials with suitable examples.	10
b.	What is Fatigue failure? Show in detail the step-by-step process of fatigue fracture.	10
c.	What is a phase diagram? Classify Eutectic phase diagrams in detail with neat sketches. Also write invariant Eutectic reaction in the diagram.	10
d.	Explain the TTT diagram with a neat, detailed sketch	10
e.	What are ferrous and nonferrous materials? Explain the properties of Cu, Al, and Ni and also explain its application	10

SECTION C

3. Attempt any one part of the following:

a.	What are the steps to calculate the Miller Indices of plane of cubic crystal?	10
b.	What are the applications of diffusion in solids and briefly explain Fick's first and second law?	10

4. Attempt any one part of the following:

a.	Draw the engineering stress vs. engineering strain diagram for mild steel and explain why it shows upper and lower yield point	10
b.	Define the following (a) Stress, (b) Resilience, (c) Proof Resilience, (d) modulus of resilience, (e) plasticity.	10

5. Attempt any one part of the following:

a.	Draw an iron-carbon equilibrium diagram and show their salient features.	10
b.	What you understand by lever rule, determine the mass fraction of the phases present at 184 degree Celsius in a sample of lead & tin with 45% tin in it.	10

6. Attempt any one part of the following:

a.	How heat treatment processes are beneficial for steel and briefly explain the different heat treatment processes of steel samples.	10
b.	Differentiate between Martempering & Austempering. Describe Austempering with the help of the "C" curve.	10

7. Attempt any one part of the following:

a.	What do you mean by superalloys? Explain different types of superalloys with its application	10
b.	Define ceramic materials and briefly explain the processing of ceramic material.	10