



Roll No:

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BTECH
(SEM IV) THEORY EXAMINATION 2021-22
MATERIAL SCIENCE

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If you require any missing data, then choose suitably.**SECTION A**

1. **Attempt all questions in brief.** **2x10 = 20**

| Q.NO | Questions | CO |
|------|--|----|
| (a) | State Lever Rule and explain its significance? | 1 |
| (b) | Explain why solubility of Carbon in Austenite is more than ferrite? | 1 |
| (c) | Explain Sherardizing Annealing? | 2 |
| (d) | State the difference between TTT Diagram and CCT Diagram for any composition of steel? | 2 |
| (e) | Distinguish between low, medium and high carbon steels? | 3 |
| (f) | Write the composition of High-Speed Steel (HSS)? | 3 |
| (g) | Define the terms: Annealing and Normalizing. | 4 |
| (h) | Write different types of steel and their carbon percentage | 4 |
| (i) | What is superconductivity? Give suitable example | 5 |
| (j) | What do you understand by composite material? | 5 |

SECTION B

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

| Q.No | Questions | CO |
|------|--|----|
| (a) | Draw a neat sketch of iron carbon equilibrium diagram and briefly explain it. | 1 |
| (b) | Draw and explain Time-Temperature-Transformation (TTT) curve. | 2 |
| (c) | Explain the phenomenon of yielding and yield strength and also state the σ - ϵ diagram for a ductile and brittle material respectively | 3 |
| (d) | What is the importance of material in engineering? Explain it with suitable example. | 4 |
| (e) | What are the properties and applications of ceramics? | 5 |

SECTION C

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

| Q.No | Questions | CO |
|------|--|----|
| (a) | What are the four Hume Rothery rules for solid solutions? Explain with example. | 1 |
| (b) | Explain etching and why it is necessary before microscopic study. Name some of them? | 1 |

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

| Q.No | Questions | CO |
|------|---|----|
| (a) | Sketch Pb-Sn Phase diagram with all its salient points. | 2 |
| (b) | Explain Austempering and martempering process with suitable sketch. | 2 |



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

| Q.No | Questions | CO |
|------|--|----|
| (a) | Explain Strain Hardening. Sketch Stress – Strain Curve for mild steel and elaborate all points with explanation. | 3 |
| (b) | Explain Hardness? Explain Rockwell, Brinell and Vickers's Hardness Testing with diagram? | 3 |

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

| Q.No | Questions | CO |
|------|---|----|
| (a) | Differentiate between conductors, semi-conductors and insulators based on the energy band concept. How does the conductivity of semi-conductors increase by doping? | 4 |
| (b) | Explain the domain theory of magnetism. Also explain ferromagnetism, anti-ferromagnetism and ferrimagnetism. | 4 |

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

| Q.No | Questions | CO |
|------|--|----|
| (a) | Write short note on composite materials. Give a detailed classification of composite materials along with their properties and applications. | 5 |
| (b) | What is BH curve and hysteresis loop? Explain with neat sketch. | 5 |