



PAPER ID-

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Subject Code: KOE032

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

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief.****2 x 10 = 20**

| Q no. | Question | Marks | CO |
|-------|--|-------|----|
| a. | Define solid solution strengthening. | 2 | 1 |
| b. | Explain concept of magnetism. | 2 | 1 |
| c. | Write down % composition of carbon in steel and cast iron. | 2 | 2 |
| d. | What is the purpose of Tempering? | 2 | 2 |
| e. | Explain the properties of stainless steel with application | 2 | 3 |
| f. | What do you mean by superconductivity? | 2 | 3 |
| g. | Differentiate annealing vs normalizing. | 2 | 4 |
| h. | Define creep with example. | 2 | 4 |
| i. | Explain matrix and reinforcement of composite materials. | 2 | 5 |
| j. | What are the objectives of heat treatment? | 2 | 5 |

SECTION B**2. Attempt any three of the following:**

| | | | |
|----|---|----|---|
| a. | State and explain the Hume-Rothery rule for the formation of a solid solution. | 10 | 1 |
| b. | Explain in brief creep test and what is its importance? | 10 | 2 |
| c. | What are dielectric materials? Explain the application of dielectrics. | 10 | 3 |
| d. | Draw and explain TTT diagram for eutectoid steel. Explain important transformation taking place in it on cooling. | 10 | 4 |
| e. | Draw Stress – Strain Curve for any metal. Elaborate all points associated with explanation. | 10 | 5 |

SECTION C**3. Attempt any one part of the following:**

| | | | |
|----|---|----|---|
| a. | Draw neat Iron carbon equilibrium diagram with explanation of each phase, compositions, and temperature. Explain the microstructure of pearlite and Eutectoid Steels. | 10 | 1 |
| b. | Differentiate between Rockwell, Brinell and Vickers Hardness testing. | 10 | 1 |

4. Attempt any one part of the following:

| | | | |
|----|--|----|---|
| a. | Explain:(i) Ferromagnetism ii) Diamagnetism (iii) shape memory alloys | 10 | 2 |
| b. | What is solid solution? Enlist types of solid solution and explain it. | 10 | 2 |

5. Attempt any one part of the following:

| | | | |
|----|---|----|---|
| a. | Define composites? Write down the types of composites and explain them briefly. | 10 | 3 |
| b. | What is diffusion? Illustrate the Fick's laws of diffusion. | 10 | 3 |

6. Attempt any one part of the following:

| | | | |
|----|--|----|---|
| a. | What is polarization? Discuss the frequency effects on polarization. | 10 | 4 |
| b. | Draw the hysteresis curve and explain it in detail. | 10 | 4 |

7. Attempt any one part of the following:

| | | | |
|----|--|----|---|
| a. | What is nanomaterials? State the potential application of nanomaterials. | 10 | 5 |
| b. | Explain the types, properties and applications of carbon nanotubes. | 10 | 5 |