**20ME401**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular\Supplementary) DEGREE EXAMINATION** | | | |
| **July/August, 2023** | **Mechanical Engineering** | | |
| **Fourth Semester** | **Materials Engineering** | | |
| **Time:** Three Hours | | **Maximum:**70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | Define brittleness of a material | CO1 | L1 | 1 |
|  | b) | Define coordination number | CO1 | L1 | 1 |
|  | c) | What are Bravis Lattice? | CO1 | L1 | 1 |
|  | d) | What is meant by Solid Solution | CO2 | L1 | 1 |
|  | e) | What is Isomorphous system | CO2 | L1 | 1 |
|  | f) | Explain Gibb’s phase rule | CO2 | L2 | 1 |
|  | g) | Explain the purpose of tempering | CO3 | L2 | 1 |
|  | h) | How do you measure the grain size? | CO3 | L2 | 1 |
|  | i) | Outline the purpose of compacting of powders. | CO4 | L2 | 1 |
|  | j) | Illustrate applications of composite materials | CO4 | L2 | 1 |
|  | k) | Where the Hume-Rothery principles are applied? | CO1 | L1 | 1 |
|  | l) | Show purpose of Miller indices | CO1 | L2 | 1 |
|  | m) | Differentiate crystalline and non- crystalline materials. | CO1 | L1 | 1 |
|  | n) | Explain two component system | CO2 | L2 | 1 |
| **Unit-I** | | | | | |
| 2 | a) | Illustrate the names of important point defects, line defects and write about each one of them. | CO1 | L2 | 7M |
|  | b) | Explain the various important mechanical properties of materials briefly. | CO1 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 3 | a) | Draw seven basic crystal structures and explain? | CO1 | L2 | 7M |
|  | b) | Show that FCC is closely packed than that of BCC. | CO1 | L2 | 7M |
| **Unit-II** | | | | | |
| 4 | a) | Explain about Iron – Iron carbon equilibrium diagram and explain about all critical points. | CO2 | L2 | 7M |
|  | b) | Classify iron-carbon alloys based on carbon percentage? | CO2 | L2 | 7M |
| **(OR)** | | | | | |
| 5 | a) | What is TTT diagram and explain the various Iron-Carbon phases on TTT with a neat sketch? | CO2 | L1 | 7M |
|  | b) | Explain the following terms with examples i) eutectoid ii) peritectoid systems | CO2 | L2 | 7M |
| **Unit-III** | | | | | |
| 6 | a) | What is Heat Treatment? Write the various stages of Heat Treatment Process. | CO3 | L1 | 7M |
|  | b) | Explain carburizing methods in detail? | CO3 | L2 | 7M |
| **(OR)** | | | | | |
| 7 | a) | What are the differences between normalizing and annealing? | CO3 | L1 | 7M |
|  | b) | Explain grain boundary strengthening, dispersion strengthening mechanisms | CO3 | L2 | 7M |
| **Unit-IV** | | | | | |
| 8 | a) | Illustrate the merits and demerits of composite materials over conventional materials. | CO4 | L2 | 7M |
|  | b) | What are the applications of the Powder Metallurgy | CO4 | L1 | 7M |
| **(OR)** | | | | | |
| 9 | a) | Classify copper and its alloys and write applications for each of them. | CO4 | L2 | 7M |
|  | b) | Illustrate a short note on: (i) Fibre Reinforced Composite Materials  (ii) Metal - Matrix Composites | CO4 | L2 | 7M |

