**18ME403**

**Hall Ticket Number:**

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| **II/IV B.Tech (/Supplementary) DEGREE EXAMINATION** | | | |
| **August, 2021** | **Mechanical Engineering** | | |
| **Fourth Semester** | **Materials Engineering** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Define coordination number | CO1 | |  |
|  | b) | Define hardness | CO1 | |  |
|  | c) | Name any two factors effecting the solubility of alloys | CO1 | |  |
|  | d) | What is an isomorphous system | CO2 | |  |
|  | e) | Draw the microstructure of spheroidal cast iron | CO2 | |  |
|  | f) | Name the test used to determine the hardenability | CO2 | |  |
|  | g) | Write any two applications of flame hardening | CO3 | |  |
|  | h) | Write the hall petch equation | CO3 | |  |
|  | i) | Name the different types of compaction used in PM process | CO4 | |  |
|  | j) | What is the density of Aluminum | CO4 | |  |
| **Unit - I** | | | | | |
| 2. | a) | Show that FCC has highest packing factor among the cubic systems | CO1 | **5M** | |
|  | b) | State Hume Rothery’s rules for the formation of substitutional type of solid solutions. | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | Write briefly about crystal defects? | CO1 | **5M** | |
|  | b) | Write about slip and twinning types of crystal deformation behavior. | CO1 | **5M** | |
| **Unit - II** | | | | | |
| 4. |  | Draw Fe -Fe3C meta stable equilibrium diagram and explain all the invariant reactions | CO2 | **10M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | Explain rule 1 and rule 2 to find compositions and relative amount of phases on two phase regions | CO2 | **5M** | |
|  | b) | Explain eutectic system with help of an example | CO2 | **5M** | |
| **Unit - III** | | | | | |
| 6. | a) | Explain the procedure for construction of TTT diagrams | CO3 | **5M** | |
|  | b) | Classify and explain the composite materials based on matrix and reinforcements. | CO3 | **5M** | |
|  |  | **(OR)** |  |  | |
| 7. | a) | Explain Nitriding of steels? State the advantages and disadvantages of Nitriding treatment over carburizing treatment | CO3 | **5M** | |
|  | b) | Explain the solid solution strengthening and its applications | CO3 | **5M** | |
| **Unit - IV** | | | | | |
| 8. | a) | Write about any two methods of producing metal powders | CO4 | **5M** | |
|  | b) | What is Nano material. Give some applications | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | Explain various steps in the preparation of powder parts | CO4 | **5M** | |
|  | b) | Write about any two types of alpha brasses and their applications | CO4 | **5M** | |

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