Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14ME2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATERIAL SCIENCE AND ENGINEERING** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define packing fraction. Calculate the atomic packing factor for SC, BCC, FCC and HCP unit cells. | CO1 | 15 |
| b. | Distinguish amorphous from non amorphous materials. | CO1 | 5 |
| **(OR)** | | | | |
| 2. | a. | Explain the working of scanning electron microscope with a neat sketch in detail. Give its advantages and limitations. | CO1 | 15 |
| b. | List the various properties of engineering materials. | CO1 | 5 |
|  |  |  |  |  |
| 3. | a. | Differentiate between substitutional and interstitial solid solutions. | CO2 | 12 |
| b. | Discuss the various point defects in detail. | CO2 | 8 |
| **(OR)** | | | | |
| 4. | a. | Elaborate on edge dislocation and Burgers vector. | CO2 | 10 |
| b. | Explain the three stages of annealing (recovery, recrystallisation and grain growth). | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Elaborate on fatigue failure and SN curve. | CO2 | 12 |
| b. | Define the following terms:  i) Full annealing ii) Process annealing. | CO3 | 8 |
| **(OR)** | | | | |
| 6. | a. | Explain the various stages in ductile fracture with neat sketches. | CO2 | 12 |
| b. | What are the various stages in creep? | CO2 | 8 |
|  |  |  |  |  |
| 7. |  | What are the common applications of (a) austenitic (b) ferritic and  (c) martensitic steels? | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Explain Fe-C equilibrium diagram with neat sketches. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Define hardenability. How it differs from hardness of a material? | CO2 | 10 |
| b. | Explain the various heat treatment done on steel with their uses. | CO3 | 10 |