

II B. Tech I Semester Supplementary Examinations, September - 2021
MATERIAL SCIENCE & METALLURGY
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

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|----|----|-------------------------------------------------------------------------------------------------------------------------------|------|
| 1  | a) | What is atomic packing factor (APF)? Calculate APF for SC, BCC and FCC?                                                       | [8M] |
|    | b) | What are the three basic methods for grain size estimation? Explain.                                                          | [7M] |
|    |    | Or                                                                                                                            |      |
| 2  | a) | What are the invariant reactions that take place in Fe -Fe <sub>3</sub> C diagram? Explain.                                   | [8M] |
|    | b) | How does grain size affect the mechanical properties? Explain                                                                 | [7M] |
| 3  | a) | Explain structure and properties of White cast iron?                                                                          | [8M] |
|    | b) | Write the properties and applications of tool and die steels?                                                                 | [7M] |
|    |    | Or                                                                                                                            |      |
| 4  | a) | What are bronzes? How are they classified? Give the properties and applications of any three of them?                         | [8M] |
|    | b) | Discuss the alpha and beta phases of a Ti alloy?                                                                              | [7M] |
| 5  | a) | Compare annealing and normalizing? Give their industrial applications?                                                        | [8M] |
|    | b) | Describe the effect of alloying elements on Fe-Fe <sub>3</sub> C system?                                                      | [7M] |
|    |    | Or                                                                                                                            |      |
| 6  | a) | Draw TTT diagram for eutectoid steel? Explain its features.                                                                   | [8M] |
|    | b) | What is hardenability? Explain the factors effecting hardenability of steels?                                                 | [7M] |
| 7  | a) | Discuss any two methods of powder production?                                                                                 | [8M] |
|    | b) | What is sintering in powder metallurgy? Explain.                                                                              | [7M] |
|    |    | Or                                                                                                                            |      |
| 8  | a) | Explain different stages of manufacturing of powder metallurgy components?                                                    | [8M] |
|    | b) | Discuss about Sintering Secondary operations (i) sizing (ii) coining (iii) machining.                                         | [7M] |
| 9  | a) | What are ceramics? Why do they possess high hardness, brittleness and high melting points? Explain.                           | [8M] |
|    | b) | Distinguish between matrix and dispersed phase in composite materials? Explain how they effect the strength of the composite. | [7M] |
|    |    | Or                                                                                                                            |      |
| 10 | a) | Explain the importance and applications of C-C composites?                                                                    | [8M] |
|    | b) | Explain what is meant by chemical bonding and mechanical bonding as it relates to a fiber-matrix interface?                   | [7M] |

