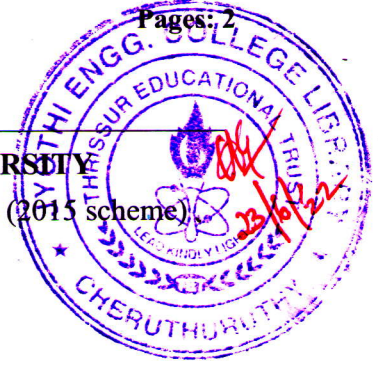


Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree (S,FE) Examination June 2022 (2015 scheme)



Course Code: ME210

Course Name: METALLURGY AND MATERIALS ENGINEERING (MC)

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any three questions, each carries 10 marks.*

Marks

- |   |  |            |
|---|--|------------|
| 1 | What are co-ordination number and atomic packing factor? Determine these for simple cubic, B.C.C and F.C.C crystals.               | (10)       |
| 2 | a) Enumerate and sketch the unit cells of Bravais lattices.<br>b) Explain the procedure for determining Miller indices for a plane | (5)<br>(5) |
| 3 | List the mechanism of diffusion in solids and explain any two of them with sketches  | (10)       |
| 4 | a) Why surface preparation is required for optical microscope<br>b) Write short notes on crystal defects                           | (5)<br>(5) |

**PART B***Answer any three questions, each carries 10 marks.*

- |   |  |            |
|---|--|------------|
| 5 | a) Explain the 'lever rule' with reference to equilibrium diagram<br>b) Differentiate between a pure metal and an alloy. Give an example of binary and ternary alloy | (4)<br>(6) |
| 6 | a) Explain eutectoid reaction with examples.<br>b) Draw the iron carbon equilibrium diagram and explain the heating and cooling of hypo eutectoid steel              | (3)<br>(7) |
| 7 | a) Why surface of a metal or alloy needs to be hardened?<br>b) Explain the TTT diagram with neat sketch  | (5)<br>(5) |
| 8 | What are the important properties, composition and uses of various types of steels   | (10)       |

**PART C***Answer any four questions, each carries 10 marks.*

- |   |   |      |
|---|---|------|
| 9 | Draw and explain S-N curves for ferrous and non ferrous metals. Explain various way to improve fatigue resistance | (10) |
|---|---|------|

- 10 Explain the fatigue failure and factors affecting the fatigue failure with neat sketch (10)
- 11 Distinguish between ductile and brittle fracture and explain the factors influencing the process. (10)
- 12 How composite materials are important in aerospace industry? What properties make them suitable for the above? (10)
- 13 a) Sketch the creep curve and explain different stages of creep (6)  
b) Give an account on maraging steel (4)
- 14 a) Write brief notes on (10)  
i) Super alloys  
ii) Smart metals  
iii) Types of ceramics  
iv) Bio materials

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