



# MARRI LAXMAN REDDY

## INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

II B.Tech I Sem Supplementary Examination, February-2022

### Material Science and Metallurgy

(MECHANICAL)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- |   |  |         |     |    |
|---|--|---------|-----|----|
| 1 | a) Explain dislocation theory and slip phenomenon  | 7M      | CO1 | L2 |
|   | b) What are crystal defects? Explain   | 7M      | CO1 | L1 |
| 2 | Give four differences between edge and screw dislocations  | 14<br>M | CO1 | L1 |
| 3 | a) Write a short note on substitutional solid solution and interstitial solid solution                                     | 7M      | CO2 | L2 |
|   | b) Explain the following invariant reactions eutectic and eutectoid  | 7M      | CO2 | L4 |
| 4 | Illustrate Iron Iron-carbide (Fe-Fe <sub>3</sub> C) phase diagram schematically, label liquidus, solidus, all phases in it | 14<br>M | CO2 | L1 |
| 5 | a) Describe heat treatment of metals   | 7M      | CO3 | L2 |
|   | b) Write the effect of tempering temperature on hardness of the steel  | 7M      | CO3 | L4 |
| 6 | Name different types of heat treatment processes for steels? explain them briefly  | 14<br>M | CO3 | L1 |
| 7 | a) Distinguish between austempering and martempering   | 7M      | CO4 | L2 |
|   | b) With neat sketch explain the process of Induction hardening heat treatment process                                      | 7M      | CO4 | L2 |
| 8 | Explain at least 4 cast irons with microstructures, properties, compositions and applications                              | 14<br>M | CO5 | L1 |