

Code No.: ME302PC

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**CMR ENGINEERING COLLEGE: HYDERABAD  
UGC AUTONOMOUS**

**II-B.TECH-I-Semester End Examinations (Regular) - January- 2022  
MATERIAL SCIENCE AND METALLURGY  
(MECH)**

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART-A**

**(20 Marks)**

1. a) Define Crystalline and Non-Crystalline Materials. [2M]
- b) What is ASTM-grain size number? And what is its importance? [2M]
- c) Give the typical eutectic and eutectoid reactions. [2M]
- d) Define Phase, System and Phase Diagram. [2M]
- e) What is the purpose of Normalizing and Hardening? [2M]
- f) What are the objectives of Hardening? [2M]
- g) Mention few applications of induction hardening system. [2M]
- h) Give the classification of surface hardening treatments. [2M]
- i) What is Gunmetal? Indicate its composition and applications. [2M]
- j) Write short notes on HSS. [2M]

**PART-B**

**(50 Marks)**

2. How do you determine the Miller Indices? Explain it with suitable example. [10M]
- OR**
3. Define unit cell and give the atomic packing factors for simple cubic, BCC, FCC and HCP structures with suitable sketches. [10M]
4. Draw the Fe-Fe<sub>3</sub>C Diagram and label all the points, lines, temperatures and reactions. [10M]
- OR**
5. State and explain Hume Rothery rules for the formation of solid solutions. [10M]
6. Explain in detail the different transformations (Pearlitic, Baintic and martensitic) of a eutectoid steel with a suitable T-T-T diagram. [10M]
- OR**
7. Distinguish between Annealing and Tempering? [10M]
8. What are CCT curves? Explain CCT curves of eutectoid steels. [10M]
- OR**
9. Explain in detail the flame and induction hardening with neat sketches. [10M]
10. Explain the heat treatment of Al-Cu alloys. Brief on the mechanism of ageing treatment of Al-Cu alloy. [10M]
- OR**
11. How are the cast irons classified? Write the characteristics of Cast Irons as compared to steels. [10M]

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