

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year II Semester Regular & Supplementary Examinations August-2023**  
**MATERIALS SCIENCE**  
(Mechanical Engineering)

**Time: 3 Hours****Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 Define the following terms: CO1 L1 12M  
(i) Space lattice (ii) Unit cell (iii) primitive cell (iv) Bonding energy  
v) Atomic packing factor (vi) crystal structure

**OR**

- 2 a Differentiate between composite and alloy. CO1 L2 6M  
b Evaluate metallic bond and list out characteristics compound. CO1 L5 6M

**UNIT-II**

- 3 a Define congruent-melting alloys, Estimate components for following CO2 L6 6M  
systems (i) Au-Cu System, (ii) Ice –water system, (iii) Al<sub>2</sub>O<sub>3</sub>-Cr<sub>2</sub>O<sub>3</sub>  
b Evaluate cooling curve of binary eutectic system. CO2 L4 6M

**OR**

- 4 a Evaluate Lever rule with tie line. CO3 L4 6M  
b What are the eutectoid and eutectic reactions in Cu-Ni & Al-Cu binary CO3 L1 6M  
phase diagram?

**UNIT-III**

- 5 a What is steel? What are the classifications of the steels? CO3 L1 6M  
b Explain the structure and properties of Spheroidal graphite cast iron. CO3 L2 6M

**OR**

- 6 a Which steel is called Hadfield steels? Evaluate it. CO3 L2 6M  
b Compare the difference between steel and tool steel? List out its CO3 L4 6M  
applications.

**UNIT-IV**

- 7 a Discuss in details about heat treatment process of plastic. CO4 L2 6M  
b Draw a diagram of critical cooling rate on TTT diagram and briefly CO4 L1 6M  
explain it

**OR**

- 8 a What are heat treatment processes? Explain briefly. CO4 L1 6M  
b What determines fracture toughness? List out what factors are effecting CO4 L1 6M  
fracture toughness.

**UNIT-V**

- 9 a Compare the particle and Reinforced composites. CO5 L4 6M  
b What is ceramic material? Explain crystalline ceramics. CO5 L2 6M

**OR**

- 10 a What is the polymer? Explain the polymer matrix composite. CO6 L1 6M  
b What are the applications of fiber reinforced composites? CO6 L1 6M

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