



**B.Tech III Semester Supplementary Examinations, December 2024**

**Metallurgy & Material Science**  
(Mechanical Engineering)

Maximum Marks: 70

Date: 09.12.2024

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks (10X2M=20) Marks)		CO	Bloom Tx
1	Distinguish between Unit cell and space lattice.	1	L1
2	Lattice parameter of a FCC crystal is $3.42\text{\AA}$ . Calculate atomic density in (110) and (100) planes.	1	L1
3	Write Lever rule with an example.	2	L1
4	Distinguish between Intermetallic Compound and Electron compound.	2	L1
5	Differentiate between annealing and normalizing.	3	L1
6	Define allotropy and give examples.	3	L1
7	Write malleable cast iron.	4	L1
8	Draw microstructure of grey cast iron.	4	L1
9	Write the classification of polymers.	5	L1
10	Write a short note on alloys?	5	L1

**Part-B**

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	a) Write about crystallization of metals. [5M] b) What is the role of grain size on the properties of materials? [5M]	1	L2
OR			
12	State Hume-Rothery's rules for the formation of substitutional solid solution. [10M]	1	L2
13	Apply the Lever rule to phase equilibrium in an alloy of 15% B and 85% A when a liquid of 45% B is in equilibrium with a solid solution of 95% A. [10M]	2	L2
OR			
14	Draw and explain the phase diagram where two components are completely soluble in both liquid and solid state with suitable examples. [10M]	2	L2
15	Explain TTT diagram with neat sketch. [10M]	3	L2

	OR		
16	Define Surface hardening and explain its methods. [10M]	3	L2
17	Explain brass with equilibrium diagram and mechanical properties. [10M]	4	L2
	OR		
18	Explain Grey cast iron with equilibrium diagram and mechanical properties. [10M]	4	L2
19	Write the classification, properties, applications and advantages and disadvantages of composite materials? [10M]	5	L2
	OR		
20	Write the classification and application of ceramics? [10M]	5	L2