Code No : **19MET302**

R19

II B. Tech I Semester Regular Examinations, March - 2021

METALLURGY AND MATERIAL SCIENCE

(Mechanical Engineering)

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

Note : Answer **ONE** question from each unit **(5 × 12 = 60 Marks)**

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UNIT-I

1. a) Define Atomic Packing Factor. Calculate the atomic Packing Factor for BCC Structure. [6M]

   b) Explain the types of crystal structures. [6M]

(OR)

2. a) Enumerate and explain the Hume Rothery rules of solid solutions. [6M]

   b) Discuss the intermediate alloy phases. [6M]

UNIT-II

3. a) Explain the procedure of constructing phase diagrams. [6M]

   b) Derive the lever rule as applied to phase diagrams. [6M]

(OR)

4. a) Explain why variation in composition is observed as we move from inside to outside of a grain within an alloy. [6M]

   b) Construct the phase diagram and explain the transformations which occur in an alloy system in which the two metals are completely soluble in liquid state and insoluble in solid state. [6M]

UNIT-III

5. a) Sketch Fe-Fe_3C equilibrium diagram and explain the reactions that occur in it. [6M]

   b) Enumerate and explain the types of steels. [6M]

(OR)

6. a) Differentiate annealing and normalizing. [6M]

   b) Define Hardenability. Explain how the Hardenability of steels is determined. [6M]

UNIT-IV

7. a) Differentiate gray cast iron with malleable cast iron. [6M]

   b) Explain the structure and properties of white cast iron. [6M]
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(OR)

8.	a)	Enumerate the properties and applications of aluminum and its alloys.	[6M]
	b)	Explain the structure and properties of any two copper alloys.	[6M]

UNIT-V

9.	a)	Define cermets. Enumerate the properties and applications of cermets.	[6M]
	b)	Enumerate the properties and applications of polymers.	[6M]

(OR)

10.	a)	On what basis the composites are classified. Explain.	[6M]
	b)	Explain the properties and applications of carbon-carbon composites.	[6M]

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