



SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

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(An ISO 9001:2008 Certified Institution) Siddharth Nagar,

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QUESTION BANK

**Subject with Code: Material Science & Metallurgy
(23ME0305)Year &Sem : II-B. Tech &I-Sem**

**Course & Branch: B. Tech - ME
Regulation: R23**

UNIT - I				
1	(a)	Write the Gibb's rule? Explain it.	[L2][CO1]	[2M]
	(b)	Differentiate the solvent and solute? Explain with example.	[L2][CO1]	[2M]
	(c)	What is the unit cell?	[L1][CO1]	[2M]
	(d)	Explain crystallization process.	[L2][CO1]	[2M]
	(e)	Describe the Phase diagram and also Write the types of phase diagrams.	[L2][CO1]	[2M]
2		Discuss about the Mechanical and Technological Properties of Engineering Materials?	[L2][CO1]	[10M]
3		How does grain size effect on the properties of alloys, also determine the grain size.	[L2][CO1]	[10M]
4		What are the various types of solid solutions? Explain with examples.	[L1][CO1]	[10M]
5	(a)	Describe with a neat sketch of FCC crystal structure and calculate its packing factor, coordinate number.	[L2][CO1]	[5M]
	(b)	Draw a neat sketch of BCC crystal structure and calculate its packing factor, coordinate number.	[L4][CO1]	[5M]
6		Describe the various imperfections in crystals and their effects on properties.	[L2][CO1]	[10M]
7	(a)	What is necessity of alloy?	[L1][CO1]	[5M]
	(b)	What is the Hume Rothery's rules? Discuss in detail	[L2][CO1]	[5M]
8	(a)	Construct a phase diagram and explain briefly and list out different types of phase diagrams.	[L6][CO1]	[5M]
	(b)	Define invariant reactions in phase Diagram with examples.	[L1][CO1]	[5M]
9	(a)	Evaluate Gibbs Phase rule, What are the uses of phase diagram?	[L4][CO1]	[5M]
	(b)	List out Transformations in the Solid State, Explain allotropic change with diagram	[L1][CO1]	[5M]
10	(a)	Draw an equilibrium diagram for an isomorphism system.	[L1][CO1]	[5M]
	(b)	Draw and explain the Fe-Fe ₃ C phase diagram invariant reactions.	[L2][CO1]	[5M]
11	(a)	Evaluate Lever rule with tie line.	[L4][CO1]	[5M]
	(b)	What are the eutectoid and eutectic reactions in Cu-Ni binary phase diagram?	[L2][CO1]	[5M]

UNIT - II

1	(a)	Which cast iron is called as tempered carbon? Why?	[L2][CO2]	[2M]
	(b)	What are the properties of tool and die steels?	[L4][CO2]	[2M]
	(c)	Differentiate steel and cast iron? Write any two types of steels and cast irons.	[L2][CO2]	[2M]
	(d)	Explain the plain carbon steel.	[L2][CO2]	[2M]
	(e)	What is the super alloy?	[L1][CO2]	[2M]
2.		Explain the structure and properties of white cast iron.	[L2][CO2]	[10M]
3.		Evaluate Grey cast iron structure and properties.	[L4][CO2]	[10M]
4.	(a)	What is steel? What are the classifications of the steels?	[L1][CO2]	[5M]
	(b)	Explain the structure and properties of Spheroidal graphite cast iron.	[L2][CO2]	[5M]
5.	(a)	What is Effect of alloying elements on Iron – Iron carbon system?	[L1][CO2]	[5M]
	(b)	What are the overall factors influencing the mechanical properties of a cast iron?	[L1][CO2]	[5M]
6.	(a)	Give a composition of malleable cast iron. List out applications of malleable cast Iron.	[L1][CO2]	[5M]
	(b)	Classify the ferrous metals and explain ductile cast iron composition and its properties.	[L2][CO2]	[5M]
7.	(a)	Which steel is called Hadfield steels? Evaluate it	[L2][CO2]	[5M]
	(b)	Compare the difference between steel and tool steel? List out its applications.	[L4][CO2]	[5M]
8.	(a)	What are the properties and characteristics of stainless steel?	[L1][CO2]	[5M]
	(b)	List out nonferrous and precious nonferrous metals. Describe the use of nonferrous metals alloys.	[L1][CO2]	[5M]
9.		What are the notable properties of Copper and its alloys?	[L1][CO2]	[10M]
10.		Explain the structure and properties of Aluminum and its alloys.	[L2][CO2]	[10M]
11.		Give compositions, properties and uses of the following alloys: (i) Cartridge brass (ii) Muntz Metal (iii) Gun metal (iv) Bell metal (v) Coinage bronze (vi) Y-alloy(LM14)	[L2][CO2]	[10M]

UNIT-III

1.	(a)	How is annealing different from normalizing?	[L2][CO3]	[2M]
	(b)	What are TTT diagrams?	[L1][CO3]	[2M]
	(c)	Define the term heat treatment. Write stages of heat treatment.	[L1][CO3]	[2M]
	(d)	What is normalizing? What is its purpose?	[L4][CO3]	[2M]
	(e)	Explain hardening process?	[L2][CO3]	[2M]
2.		Name the various methods of heat treatment of steel. Briefly explain any one method.	[L1][CO3]	[10M]
3.	(a)	Explain the toughness . How it is measured and explain their types?	[L2][CO3]	[5M]

	(b)	Define heat treatment. List out the stages in the heat treatment.	[L1][CO3]	[5M]
4.		Distinguish Tempering and Surface hardening	[L4][CO3]	[10M]
5.	(a)	Discuss in details about heat treatment process of steel.	[L2][CO4]	[5M]
	(b)	Draw a diagram of critical cooling rate on TTT diagram and briefly explain it.	[L1][CO4]	[5M]
6.		What are TTT diagrams? How they prepared? What is their significance?	[L1][CO4]	[10M]
7.	(a)	Compare the purpose of using normalizing, Annealing and Hardening.	[L2][CO4]	[5M]
	(b)	Explain about various Hardening process for alloys.	[L2][CO4]	[5M]
8.		What is hardenability? Explain with examples.	[L1][CO4]	[10M]
9.		Define cryogenic treatment. Explain their applications.	[L2][CO4]	[10M]
10.		Explain the following tempering (i) Low Tempering (ii) Intermediate tempering (iii) High Tempering	[L2][CO4]	[10M]
11.	(a)	What are heat treatment processes? Explain briefly.	[L1][CO4]	[5M]
	(b)	Explain in details about age hardening process.	[L2][CO4]	[5M]

UNIT-IV

1.	(a)	Write the powder compaction methods?	[L2][CO5]	[2M]
	(b)	Why powder metallurgy is required for ceramics?	[L1][CO5]	[2M]
	(c)	What are cermets? Give examples.	[L1][CO5]	[2M]
	(d)	Why pre-sintering is needed?	[L2][CO5]	[2M]
	(e)	Differentiate between crystalline and non-crystalline ceramics.	[L2][CO5]	[2M]
2.		Explain the methods of Producing metal powders.	[L1][CO5]	[10M]
3.	(a)	Write process of milling Atomization.	[L2][CO5]	[5M]
	(b)	Why granulation process required in powder metallurgy?	[L1][CO5]	[5M]
4.		Briefly explain compacting method in Powder metallurgy.	[L4][CO5]	[10M]
5.	(a)	Write a note on reduction in powder metallurgy.	[L2][CO5]	[5M]
	(b)	Elaborate the electrolytic deposition in powder metallurgy.	[L1][CO5]	[5M]
6.		What are the basic processes in powder metallurgy?	[L1][CO5]	[10M]
7.	(a)	Explain Sintering and their types.	[L2][CO5]	[5M]
	(b)	Why pre- sintering is required before Sintering process?	[L2][CO5]	[5M]
8.		Write the methods of manufacturing sintered parts.	[L1][CO5]	[10M]
9.		Briefly explain, what are the secondary operations in powder metallurgy?	[L2][CO5]	[10M]
10.		Elaborate the applications of Powder metallurgical Products.	[L5][CO5]	[10M]
11.	(a)	What is the need of powder metallurgy?	[L1][CO5]	[5M]
	(b)	Write Advantages and disadvantages of Powder metallurgy?	[L1][CO5]	[5M]

UNIT-V

1.	(a)	What is matrix and reinforcement in composite?	[L1][CO6]	[2M]
	(b)	Classify composites.	[L2][CO6]	[2M]
	(c)	Define crystalline ceramics. Give an example.	[L1][CO6]	[2M]
	(d)	What is glass? Write any two properties of it.	[L1][CO6]	[2M]
	(e)	Define smart materials. Give an en example.	[L1][CO6]	[2M]
2.	(a)	Compare the particle and Reinforced composites.	[L4][CO6]	[5M]
	(b)	What is ceramic material? Explain crystalline ceramics.	[L2][CO6]	[5M]
3.	(a)	What are the glasses? How are they manufactured?	[L1][CO6]	[5M]
	(b)	Discuss about the Glass micro structure and properties.	[L2][CO6]	[5M]
4.		What are the various methods of component manufacture of composites? Briefly explain any one method.	[L1][CO6]	[10M]
5.	(a)	Differentiate between composites and alloy.	[L5][CO6]	[5M]
	(b)	Why are fiber glass reinforced composites used extensively?	[L1][CO6]	[5M]
6.		Briefly explain about Nano materials and Smart materials.	[L2][CO6]	[10M]
7.		Explain the Ceramic matrix composite. Discuss about their properties.	[L2][CO6]	[5M]
8.	(a)	Classify the composites based on reinforcements and matrix materials.	[L2][CO6]	[5M]
	(b)	Define composite material. Explain the function of matrix, reinforce phases.	[L1][CO6]	[5M]
9.		Compare the following composite material properties and its applications (i) Polymer matrix composites (ii) Metal matrix composites	[L4][CO6]	[10M]
10.		Explain carbon – carbon composites. Discuss about their properties.	[L2][CO6]	[5M]
11.	(a)	What is the polymer? Explain the polymer matrix composite?	[L1][CO6]	[5M]
	(b)	What are the applications of fiber reinforced composites?	[L1][CO6]	[5M]

Prepared By: Dr. B. Anandan.