

**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) Course & Branch: B. Tech - ME
Year & Sem : II-B. Tech & I-Sem Regulation: R23

UNIT - I					
1	(a)	Write the Gibb's rule? Explain it.	L1	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	05M
	(b)	Draw a neat sketch of BCC crystal structure and calculate its packing factor, coordinate number.	L4	CO1	05M
6		Describe the various imperfections in crystals and their effects on properties.	L2	CO1	10M
7	(a)	What is necessity of alloy?	L1	CO1	05M
	(b)	What is the Hume Rothery's rules? Discuss in detail	L2	CO1	05M
8	(a)	Construct a phase diagram and explain briefly and list out different types of phase diagrams.	L6	CO1	05M
	(b)	Define invariant reactions in phase Diagram with examples.	L1	CO1	05M
9	(a)	Evaluate Gibbs Phase rule, what are the uses of phase diagram?	L5	CO1	05M
	(b)	List out Transformations in the Solid State, Explain allotropic change with diagram	L1	CO1	05M
10	(a)	Draw an equilibrium diagram for an isomorphism system.	L1	CO1	05M
	(b)	Draw and Correlate the Fe-Fe ₃ C phase diagram invariant reactions.	L4	CO1	05M
11	(a)	Evaluate Lever rule with tie line.	L5	CO1	05M
	(b)	Analyze are the eutectoid and eutectic reactions in Cu-Ni binary phase diagram?	L4	CO1	05M

UNIT - II

1	(a)	Which cast iron is called as tempered carbon? Why?	L2	CO2	2M
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	(b)	What are the properties of tool and die steels?	L1	CO2	2M
	(c)	Differentiate steel and cast iron? Write any two types of steels and cast irons.	L4	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.	L5	CO2	10M
4.	(a)	What is steel? What are the classifications of the steels?	L1	CO2	05M
	(b)	Explain the structure and properties of Spheroidal graphite cast iron.	L2	CO2	05M
5.	(a)	What is Effect of alloying elements on Iron – Iron carbon system?	L1	CO2	05M
	(b)	What are the overall factors influencing the mechanical properties of a cast iron?	L1	CO2	05M
6.	(a)	Give a composition of malleable cast iron. List out applications of malleable cast Iron.	L1	CO2	05M
	(b)	Classify the ferrous metals and Identify ductile cast iron composition and its properties.	L3	CO2	05M
7.	(a)	Which steel is called Hadfield steels? Evaluate it.	L5	CO2	05M
	(b)	Compare the difference between steel and tool steel? List out its applications.	L4	CO2	05M
8.	(a)	What are the properties of stainless steel?	L1	CO2	05M
	(b)	List out nonferrous and precious nonferrous metals. Describe the use of nonferrous metals alloys.	L1	CO2	05M
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.		Identify 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)	L3	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?	L1	CO3	2M
	(e)	Explain hardening process?	L2	CO3	2M
2.		Name the various methods of heat treatment of steel. Explain in detail About Annealing process.	L1	CO3	10M
3.	(a)	Explain the toughness. How it is measured and explain their types?	L2	CO3	05M
	(b)	Define heat treatment. List out the stages in the heat treatment.	L1	CO3	05M

4.		Distinguish Tempering and Surface hardening	L4	CO3	10M
5.	(a)	Discus in details about heat treatment process of steel.	L2	CO4	05M
	(b)	Construct a diagram of critical cooling rate on TTT diagram and briefly explain it.	L6	CO4	05M
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.	L4	CO4	05M
	(b)	Explain about various Hardening process for alloys.	L2	CO4	05M
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)	Enumerate Normalizing method of Heat Treatment.	L1	CO4	05M
	(b)	Explain in details about age hardening process.	L2	CO4	05M

UNIT-IV

1.	(a)	What are the powder compaction methods?	L1	CO5	2M
	(b)	Why powder metallurgy is required for ceramics?	L4	CO5	2M
	(c)	What are cermets? Give examples.	L1	CO5	2M
	(d)	Why pre-sintering is needed?	L4	CO5	2M
	(e)	Differentiate between crystalline and non-crystalline ceramics.	L2	CO5	2M
2.		Explain the methods of Producing metal powders.	L2	CO5	10M
3.	(a)	Illustrate process of milling Atomization.	L3	CO5	05M
	(b)	Why granulation process required in powder metallurgy?	L1	CO5	05M
4.		Briefly explain compacting method in Powder metallurgy.	L2	CO5	10M
5.	(a)	Give a note on reduction in powder metallurgy.	L2	CO5	05M
	(b)	Interpret the electrolytic deposition in powder metallurgy.	L3	CO5	05M
6.		What are the basic processes in powder metallurgy?	L1	CO5	10M
7.	(a)	Explain Sintering and their types.	L2	CO5	05M
	(b)	Why pre- sintering is required before Sintering process?	L2	CO5	05M
8.		Demonstrate the methods of manufacturing sintered parts.	L2	CO5	10M
9.		Briefly explain, what are the secondary operations in powder metallurgy?	L2	CO5	10M
10.		Express the applications of Powder metallurgical Products.	L2	CO5	10M
11.	(a)	Evaluate is the need of powder metallurgy?	L5	CO5	05M
	(b)	What are the Advantages and disadvantages of Powder metallurgy?	L1	CO5	05M

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 example.	L1	CO6	2M
2.	(a)	Compare the particle and Reinforced composites.	L4	CO6	05M
	(b)	What is ceramic material? Explain crystalline ceramics.	L2	CO6	05M
3.	(a)	What are the glasses? How are they manufactured?	L2	CO6	05M
	(b)	Discuss about the Glass micro structure and properties.	L2	CO6	05M
4.		What are the various methods of component manufacture of composites? Briefly explain any one method.	L2	CO6	10M
5.	(a)	Differentiate between composites and alloy.	L4	CO6	05M
	(b)	Justify are fiber glass reinforced composites used extensively?	L5	CO6	05M
6.		Briefly explain about Nano materials and Smart materials.	L2	CO6	10M
7.		Explain the Ceramic matrix composite. Discuss about their properties.	L2	CO6	10M
8.	(a)	Classify the composites based on reinforcements and matrix materials.	L2	CO6	05M
	(b)	Define composite material. Explain the function of matrix, reinforce phases.	L1	CO6	05M
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	10M
11.	(a)	What is the polymer? Explain the polymer matrix composite?	L1	CO6	05M
	(b)	What are the applications of fiber reinforced composites?	L1	CO6	05M

Prepared By: Mr P Vikram