SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

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(An ISO 9001:2008 Certified Institution)
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QUESTION BANK

Subject with Code: Materials Science (20ME0309) **Course & Branch: B. Tech - ME**
Year &Sem : II-B. Tech &II-Sem **Regulation: R20**

		UNIT - I			
1	(a)	What is Material science? List out classification of materials	L1	CO1	06M
	(b)	Explain the primary type of Bonds in solids with neat sketches	L2	CO1	06M
2		Discuss about the Mechanical and Technological Properties of Engineering Materials?	L2	CO1	12M
3		Define the following terms: (i) Space lattice (ii) Unit cell iii)primitive cell iv) Bonding energy v) Atomic packing factor (vi) crystal structure	L1	CO1	12M
4		How does grain size effect on the properties of alloys, also determine the grain size.	L2	CO1	12M
5		What are the various types of solid solutions? Explain with examples.	L1	CO1	12M
6	(a)	Differentiate between composite and alloy?	L2	CO1	06M
	(b)	Evaluate metallic bond and list out characteristics compound.	L5	CO1	06M
7		Evaluate the cooling curve of solidification of a pure metal with diagram	L5	CO1	12M
8	(a)	Describe with a neat sketch of FCC crystal structure and calculate its packing factor, coordinate number	L2	CO1	06M
	(b)	Draw a neat sketch of BCC crystal structure and calculate its packing factor, coordinate number	L4	CO1	06M
9		Describe the various imperfections in crystals and their effects on properties.	L2	CO1	12M
10	(a)	What is necessity of alloy?	L1	CO1	06M
	(b)	What is the Hume Rothery' s rules? Discuss in detail	L2	CO1	06M
		UNIT - II			
1	(a)	Construct a phase diagram and explain briefly and list out different types of phase diagrams.	L6	CO2	06M
	(b)	Define invariant reactions in phase Diagram with examples.	L1	CO2	06M
2	(a)	Evaluate Gibbs Phase rule, What are the uses of phase diagram	L4	CO2	06M
	(b)	Define single and multiphase solids with examples	L1	CO2	06M
3	(a)	What is single component phase diagram? Explain with suitable neat diagram	L1	CO2	06M
	(b)	List out Transformations in the Solid State, Explain allotropic change with diagram	L1	CO2	06M
4	(a)	Define congruent-melting alloys, Estimate components for following systems (i) Au-Cu System, (ii) Ice –water system,(iii) Al_2O_3-Cr_2O_3	L6	CO2	06M
	(b)	Evaluate cooling curve of binary eutectic system	L4	CO2	06M

5	(a)	Tabulate types of reactions in binary phase diagrams	L6	CO2	06M
	(b)	Explain and draw the equilibrium cooling and heating diagrams of pure metals and alloy systems.	L2	CO2	06M
6	(a)	Draw an equilibrium diagram for an isomorphism system	L1	CO2	06M
	(b)	Construct binary phase diagram of Al-Cu and show eutectic point temperature and wt% of Cu.	L2	CO2	06M
7		Draw and explain the Fe-Fe3c phase diagram invariant reactions?	L1	CO2	12M
8		Draw the Eutectoid system diagram and label all points, lines and areas. Explain its important features.	L1	CO2	06M
9	(a)	Evaluate Lever rule with tie line.	L4	CO2	06M
	(b)	What are the eutectoid and eutectic reactions in Cu-Ni & Al-Cu binary phase diagram?	L1	CO2	12M
10		From the data given below for Cu-Ni system, plot the equilibrium diagram to scale and label the diagram Weight %Ni: 0, 20, 40, 60, 80, 100 Liquid Temp ^{o}C: 1084, 1200, 1275, 1345, 1440, 1455 SolidTemp^{o}C: 1084, 1165, 1235, 1310, 1380, 1455 Answer the following for 70% Ni alloy a) What is the composition of first solid crystallizing out from liquid? b) What is the composition of last solid formed at the end of solidification? What are the amounts of solid and liquid at 1360^{o}C?	L4	CO2	12M

UNIT-III

1.		Explain the structure and properties of white cast iron	L2	CO3	12M
2.		Evaluate Grey cast iron structure and properties.	L4	CO3	12M
3.	(a)	What is steel? What are the classifications of the steels?	L1	CO3	06M
	(b)	Explain the structure and properties of Spheroidal graphite cast iron?	L2	CO3	06M
4.	(a)	What is Effect of alloying elements on Iron – Iron carbon system?	L1	CO3	06M
	(b)	What are the overall factors influencing the mechanical properties of a cast iron?	L1	CO3	06M
5.	(a)	Give a composition of malleable cast iron. List out applications of malleable cast Iron.	L1	CO3	06M
	(b)	Classify the ferrous metals and explain ductile cast iron composition and its properties	L2	CO3	06M
6.	(a)	Which steel is called Hadfield steels? Evaluate it	L2	CO3	06M
	(b)	Compare the difference between steel and tool steel? List out its applications	L4	CO3	06M
7.	(a)	What are the properties and characteristics of stainless steel?	L1	CO3	06M
	(b)	List out nonferrous and precious nonferrous metals. Describe the use of nonferrous metals alloys	L1	CO3	06M

8.		What are the notable properties of Copper and its alloys? And Draw copper-zinc equilibrium diagram explain it.	L1	CO3	12M
9.		Explain the structure and properties of Aluminum and its alloys?	L2	CO3	12M
10.		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	CO3	12M

UNIT-IV

1.		Name the various methods of heat treatment of steel. Briefly explain any one method.	L1	CO4	12M
2.	(a)	Explain the toughness .How it is measured and explain their types?	L2	CO4	06M
	(b)	Define heat treatment. List out the stages in the heat treatment.	L1	CO4	06M
3.		Distinguish Tempering and Surface hardening	L4	CO4	12M
4.	(a)	Discus in details about heat treatment process of plastic.	L2	CO4	06M
	(b)	Draw a diagram of critical cooling rate on TTT diagram and briefly explain it.	L1	CO4	06M
5.		What are TTT diagrams? How they prepared? What is their significance?	L1	CO4	12M
6.	(a)	Compare the purpose of using normalizing, Annealing and Hardening?	L2	CO4	06M
	(b)	Explain about various Hardening process use for alloys?	L2	CO4	06M
7.		What is Fracture Mechanism? Explain the mechanical properties of materials and Fracture	L1	CO4	12M
8.		Define fracture? Explain effect of material properties on fracture.	L2	CO4	12M
9.		Evaluate the following fractures (i) Ductile fracture (ii) Brittle fracture	L5	CO4	12M
10.	(a)	What are heat treatment processes? Explain briefly.	L1	CO4	06M
	(b)	What determines fracture toughness? List out what factors are effecting fracture toughness.	L1	CO4	06M

UNIT-V

1.	(a)	Compare the particle and Reinforced composites.	L4	CO5	06M
	(b)	What is ceramic material? Explain crystalline ceramics	L2	CO5	06M
2.	(a)	What are the glasses? How are they manufactured?	L1	CO5	06M
	(b)	Discuss about the Glass micro structure and properties.	L2	CO5	06M
3.		What are the various methods of component manufacture of composites? Briefly explain any one method.	L1	CO5	12M
4.	(a)	Differentiate between composites and alloy	L5	CO5	06M
	(b)	Why are fiber glass reinforced composites used extensively?	L1	CO5	06M
5.		Explain formation of polymers. Distinguish between Thermoplastics, Thermosetting plastics and list out its applications.	L2	CO5	12M
6.		Explain the Ceramic matrix composite. Discuss about their	L2	CO6	06M

		properties.			
7.	(a)	Classify the composites based on reinforcements and matrix materials.	L2	CO6	06M
	(b)	Define composite material. Explain the function of matrix, reinforce phases.	L1	CO6	06M
8.		Compare the following composite material properties and its applications (i) Polymer matrix composites (ii) Metal matrix composites	L4	CO6	12M
9.		Explain carbon – carbon composites. Discuss about their properties.	L2	CO6	06M
10.	(a)	What is the polymer? Explain the polymer matrix composite?	L1	CO6	06M
	(b)	What are the applications of fiber reinforced composites?	L1	CO6	06M

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