KUMARAGURU
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Register Number: ……..

B.E DEGREE EXAMINATIONS: DEC 2014

(Regulation 2009)

Third Semester

MECHATRONICS ENGINEERING

MCT102 : Engineering Materials and Metallurgy

Time: Three Hours	**Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.	The ability of a material to resist fracture due to high impact loads, is called			
	a)	Strength	b)	Stiffness
	c)	Toughness	d)	Brittleness
2.	For the pipe fitting like elbow, tee, union, etc.., which of the following is preferred?			
	a)	Pig iron	b)	Malleable iron
	c)	) Spheroidal graphite cast iron	d)	Low carbon steel
3.	The process which improves the machinability of steels, but lowering the hardness and tensile strength is			
	a)	Normalising	b)	Full annealing
	c)	Process annealing	d)	Spheroidising
4.	Hardening the surface of steel with carbon and nitrogen obtained from a bath of liquid cyanide solution which is known as			
	a)	Carburizing	b)	Induction hardening
	c)	Cyaniding	d)	Carbocyaniding
5.	Copper is typically produced by which one of the given process.			
	a)	Low temperature	b)	Copper matte
	c)	Blister copper	d)	Pyrometallurgical
6.	Babbit metal is a			
	a)	Lead-base alloy	b)	Copper base alloy

	c)	Tin-base alloy	d)	Cadmium-base alloy
7.	Which one of the following polymer is used to made the bottles.			
	a)	PE	b)	PVC
	c)	PP	d)	PS
8.	The crystallinity in thermoplastics can be introduced by the temperature as			
	a)	Degradation	b)	High cooling
	c)	Decomposition	d)	Slow cooling
9.	The monomer includes two double bonds between carbon atoms, this type of monomer is known as			
	a)	Isoprene	b)	Geometric isomer
	c)	Diene	d)	Neoprene
10.	When a part is subjected to a constant stress at high temperature for a long period of time, it will undergo a slow and permanent deformation called			
	a)	Fatigue	b)	Plasticity
	c)	Creep	d)	Stiffness

PART B (10 x 2 = 20 Marks)

11.	Differentiate between a phase and micro-constituent
12.	Why is welding of chilled cast irons not recommended?
13.	Define critical cooling rate.
14.	'Bainite can form only during the heat treatment of alloy steel'. State wheather this statement is true or false. Justify your answer.
15.	Give at least four advantages of maraging steels as compared to regular stainless steel.
16.	What effect would addition of 1% chromium have on the properties of a low –carbon steel?
17.	Define Elastomers.
18.	What do you understand by Degree of Polymerization?
19.	Define creep. Why is this properly important for high – temperature application?
20.	List the various stages occurred during the ductile fracture.

PART C (5 x 14 = 70 Marks)

21.	a)	Describe the Iron-Iron carbide equilibrium diagram with a neat sketch	
		(OR)	
	b)	How can you classify the cast iron based on metallographic structure and list the various types of cast iron. Explain the mechanical properties and application of	

		nodular cast iron.		
22.	a)	Define surface heat treatment? Mention the various principal methods and discuss any two methods that cause changes in chemical composition of the steel with a neat diagram		
		(OR)		
	b)	(i)	Differentiate between full annealing and Normalizing.	(8)
		(ii)	Discuss the changes that occur during tempering of steel.	(6)
23.	a)	Explain the various important selection factors to be considered for choosing tool steels.		
		(OR)		
	b)	Write a short notes on		
		(i)	Babbitt metal and Gun metal	(8)
		(ii)	Bearing metal	(6)
24.	a)	State and brief the mechanism of		
		(i)	fatigue failure	(7)
		(ii)	creep failure	(7)
		(OR)		
	b)	Name the various different hardness tests of interest to the testing engineer under various situations? Describe Brinell hardness test.		
25.	a)	(i)	Compare the properties of thermoplastics and thermosetting	(7)
		(ii)	What are the major advantages associated with plastics compared to ceramics, glasses and metallic materials?	(7)
		(OR)		
	b)	List the properties and applications for the following polymers and explain it with their functional units.		
		(i)	PVC	(7)
		(ii)	PMMA	(7)

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