

Reg.No. _____



Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14ME2003

Sub. Name : Material Science and Engineering

Semester : 2016-17 ODD

Duration : 3hrs

Max. marks : 100

Q. No.	Questions				Course outcome	Marks
PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)						
1.	Atomic number equals				CO1	
	a. The number of protons in the nucleus	b. The number of electrons in a cation	c. The number of neutrons in the nucleus	d. The number of atoms in a mole of atoms		(1)
2.	A metallic bond forms by				CO1	
	a. Transferring of an electron from one atom to another	b. Sharing an electrons between two atoms	c. Sharing electrons among all atoms	d. None		(1)
3.	Malleability is the property of the material due to which it				CO1	
	a. Can be rolled or hammered into thin sheets	b. Can be drawn into wires	c. Breaks with little permanent distortion	d. Can cut another material		(1)
4.	Repeatable entity of a crystal structure is known as				CO1	
	a. Crystal	b. Lattice	c. Unit cell	d. Miller indices		(1)
5.	Scanning electron microscopy (SEM) is best used to study				CO1	
	a. Small internal cell structures.	b. Surface morphology.	c. All	d. None		(1)
6.	Transmission electron microscopy is best for high magnification viewing of				CO1	
	a.Internal structure of fixed cells.	b. Internal structure of live, motile cells.	c. Surface structure of fixed cells.	d. Surface membranes of live, motile cells.		(1)
7.	"TEM" refers to a photomicrograph taken by a _____.				CO1	
	a. Light microscope	b. Triple emission microscope	c.Telephoto electroplating machine	d. Transmission electron microscope		(1)
8.	The ability of a given substance to assume two or more crystalline structure is called				CO2	

	a. Polymorphism	b. . Isomorphism	c. Amorphous	d. Isomerism		(1)
9.	A photograph which is taken from a microscope is called				CO2	
	a. Photograph	b. Micrograph	c. Diagraph	d. Graph		(1)
10.	Resolution of electron microscope is				CO2	
	a. 0.1 nm	b. 0.2nm	c. 10nm	d. 20nm		(1)
11.	Fick's II law explains				CO2	
	a. Dislocation movement	b. Defects in solids	c. That under non-steady state conditions flux changes with time and position along the diffusion direction	d. How diffusion happens from larger to smaller concentration		(1)
12.	Brass is an alloy of_____				CO2	
	a. Copper and Tin	b. Copper, Zinc	c. Zinc and Tin	d. None		(1)
13.	Smaller grains will make the material				CO2	
	a. Weaker	b. Stronger	c. Smaller	d. Defective		(1)
14.	Slip planes get disoriented at the grain boundaries. This -----dislocations				CO2	
	a. Reduces the number of	b. Changes the direction of motion of	c. Destroys	d. Does not affect		(1)
15.	Work hardening_____				CO2	
	a. Enhances yield strength of the material	b. Decreases ductility of the material	c. Decreases the cross sectional area of the material	d. All		(1)
16.	Larger solute atoms cause				CO2	
	a. Tensile stresses	b. Compressive stresses	c. No effect	d. Both 'A' and 'B' are correct		(1)
17.	Steel generally contains				CO2	
	a. 0.05-2.0 wt. % carbon	b. More than 2 wt. % carbon	c. Up to 6.67 wt % carbon	d. No carbon		(1)
18.	Tool steels contain				CO2	
	a. 0.9 to 2.0 % Carbon	b. 0.6 to 0.8 % Carbon	c. 0.25 to 0.55 % Carbon	d. < 0.20 % Carbon		(1)
19.	Addition of impurities to pure metals				CO1	
	a. Improves properties	b. Should be avoided	c. Weakens the metal	d. Is not a feasible process		(1)
20.	Addition of chromium to steel				CO1	
	a. Increases corrosion and oxidation resistance	b. Makes steel brittle	c. Improves magnetic properties	d. All		(1)
21.	Boundary line between (liquid) and (liquid + solid) region is				CO1	
	a. Liquidus	b. Phase diagram	c. Solidus	d. Eutectic line		(1)
22.	A liquid phase produces two solid phases during				CO1	

	a.Eutectic	b.Peritectic	c.Monotectic	d.Eutectoid		(1)
23.	Gibbs phase rule is				CO1	
	a. $p+f=c+2$	b. $p+f=c+1$	c. $p+f=c-2$	d. $p+f=c-1$		(1)
24.	Complete solubility occurs between Cu and Ni. It is an example of				CO1	
	a.Isomorphous	b. Homologous	c. Heterologous	d. Homogenous		(1)
25.	Upon equilibrium, melting begins at				CO1	
	a. Solidus line	b. Liquidus line	c. Interline	d. Melting line		(1)
26.	Horizontal line drawn from liquid phase boundary to solid phase boundary is				CO1	
	a. Boundary line	b. Tie line	c. Closed line	d. Phase line		(1)
27.	Solder is an alloy of				CO2	
	a. Pb and Sb	b. Pb and Sn	c. Ti and Sn	d. Ti and Pb		(1)
28.	Weight fraction of phase is given by the formula				CO2	
	a. Same phase distance /total tie line length	b. Opposite phase distance/total tie line length	c. Total tie line length/same phase distance	d. Total phase distance/opposite phase distance		(1)
29.	Which rule represents the condition under which elements could dissolve in a metal?				CO2	
	a. Lever	b. Hume Rothery	c. Gibbs	d. Phase		(1)
30.	If number of components is 3,number of phases is 2 then what is the degree of freedom?				CO2	
	a. 2	b. 1	c. 3	d. 4		(1)
31.	The process of formation of new grains is known as				CO2	
	a. Pre-crystallization	b. Re-crystallization	c. Crystallization	d. Post-crystallization		(1)
32.	The hot working of metal, is accomplished at				CO2	
	a. Below recrystallization temperature	b. Above recrystallization temperature	c. Recrystallization temperature	d. All		(1)
33.	The units for diffusivity, D, are				CO2	
	a. m^2sec	b. m^2/sec	c. $1/m^2sec$	d. sec/m^2		(1)
34.	Diffusion can occur in _____ materials.				CO2	
	a. Solid	b. Liquid	c. Gaseous	d. All		(1)
35.	Cleavage fracture appears				CO2	
	a. Bright	b. Dull	c. Difficult to identify	d. None		(1)
36.	Usually materials with following crystal structure fail in ductile mode				CO2	
	a. FCC	b. BCC	c. HCP	d. None		(1)
37.	Fracture toughness is measured in terms of				CO2	
	a. Strain energy release rate	b. Stress concentration factor	c. Both	d. None		(1)
38.	Most often machine components fail by				CO2	
	a. Buckling	b. Creep	c. Fatigue	d. All		(1)
39.	Fracture voids usually form at				CO2	
	a. Inclusions	b. Second phase particles	c. Grain boundary triple points	d. All		(1)
40.	In fracture mode-II, fracture surfaces				CO1	
	a. Shear parallel to edge of crack	b. Shear perpendicular to edge of crack	c. Displace normal to each other	d. None		(1)

PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)			
41.	Define metallography. Explain the various steps in metallographic analysis.	CO1	(5)
42.	Explain polymorphism with examples	CO1	(5)
43.	How do 'Imperfections' come about in metallic structure? Are they desirable?	CO1	(5)
44.	Would you allow the 'dislocations' in a crystal structure to move about or slide freely? Justify your answer.	CO1	(5)
45.	Illustrate with neat sketches the theory governing the movement of dislocations	CO1	(5)
46.	Why strain hardening also called cold working?	CO1	(5)
47.	Explain recrystallization in detail.	CO2	(5)
48.	Draw the plastic deformation by slip	CO2	(5)
49.	Define the Fatigue failure with suitable example.	CO2	(5)
50.	What are the factors affecting the Creep characteristics of metals	CO2	(5)
PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)			
51.	Sketch neatly a metallurgical microscope. Explain its construction and operation	CO1	(10)
52.	Define the term "Hardanability" and briefly explain "The Jominy End-Quench Test"	CO2	(4+6)
53.	Explain creep in ceramic and polymeric materials	CO2	(10)

ALL THE BEST