Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: ME210

Course Name: METALLURGYAND MATERIALS ENGINEERING (MC)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three questions, each carries 10 marks.

			Marks
1	a)	Explain the steps for determining Miller indices for crystallographic planes.	(4)
	b)	Describe Bravais lattice systems. Comment on the concept of a unit cell.	(6)
2	a)	Differentiate between polymorphism and allotropy with examples.	(4)
	b)	Copper (FCC) has density of 8.96gm/cc. Calculate the unit cell dimension and radius of copper atom. Given atomic mass of Copper 63.54 amu.	(4)
	c)	Show that resolved shear stress reaches maximum value when $\lambda=\varphi= 45^0$.	(2)
3	a)	Illustrate Edge and Screw dislocation in reference with Burgers Vector.	(7)
	b)	Describe Frank Read Source.	(3)
4	a)	With suitable sketches explain point defects in a crystal structure.	(8)
	b)	Determine the ASTM grain size number if 25 grains per square inch are measured at a magnification of 200.	(2)

PART B

Answer any three questions, each carries 10 marks.

5	a)	Explain microstructure evolution of slowly cooled 0.6% C steel.	(6)
	b)	List the four types of invariant reactions in general.	(4)
6		Enumerate the surface treatments done on steels? Explain any two processes.	(10)
7		Explain the process of recovery, recrystallisation and grain growth in a strain hardened material.	(10)
8	a)	Describe about grey cast iron and nodular cast iron.	(4)
	b)	Comment on high speed steels? Explain the effect of alloying elements in HSS.	(6)

PART C

Answer any four questions, each carries 10 marks.

9		Distinguish between ductile fracture and brittle fracture. Explain the factors influencing the processes.	(10)
10		Draw and explain S-N curve for ferrous and non-ferrous metals. Explain various ways to improve fatigue resistance.	(10)
11	a)	Differentiate between thermal fatigue and thermal shock.	(2)
	b)	Define Fracture toughness. Mention the expression for stress intensity factor in	(3)

connection with fracture toughness.

c) Explain the appearance of typical fatigue fracture surface with a neat sketch. (5)

12 Discuss about the structural changes that occur during the process of creep. (10)

13 a) Comment on the desired characteristics for the matrix and fiber phase in preparation of fibrous composite. Enumerate the functions of matrix phase. (6)

b) Explain about hybrid composite. (4)

14 Write short notes on a) Maraging steels b) Smart materials. c) intermetallics d) super alloys. (10)

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