

Material Technology

UNIVERSITY OF MUMBAI

Examination summer 2022

Time: 2 hour 30 min

Max Marks:80

Q1 Choose the correct option for following questions All questions are compulsory and carries equal marks. (2*10=20)		
1		Following is not the 2-dimensional imperfection
	A	Surface
	B	Twin boundary
	C	Dislocation
	D	Grain boundary
2		Beneficial property of foreign particles
	A	Reduces Density
	B	Act as stress raisers
	C	Obstructs dislocation motion
	D	None
3		Number of slip systems in FCC lattice
	A	12
	B	6
	C	8
	D	10
4		Described as γ iron with FCC structure
	A	ferrite
	B	austenite
	C	cementite
	D	pearlite

5		TTT diagrams are drawn for
	A	steel
	B	iron
	C	iron- iron carbide diagram
	D	manganese
6		While normalizing the steel should be cooled
	A	In still air to room temperature
	B	In oil
	C	By forced air
	D	In water
7		18-4-1 High speed cutting tool steels contain about
	A	18% tungston
	B	18% Chromium
	C	18% Carbon
	D	18% Magnese
8		The heat treatment process to remove extreme brittleness caused by hardening to an extent
	A	normalising
	B	quenching
	C	annealing
	D	tempering
9		Usually softer constituent of a composite is
	A	Matrix
	B	Both are of equal strength
	C	Reinforcement
	D	Can't define
10		Failure of material is due to cyclic stresses in

	A	brittle fracture
	B	ductile fracture
	C	creep
	D	fatigue
Q 2	A	SOLVE ANY TWO questions (2X5=10)
	i	Explain the shape memory alloys and what are its applications.
	ii	What are the effects of alloying elements on phase transformation
	iii	Discuss carburizing in details
	B	SOLVE ANY ONE (1X10=10)
	i	Draw iron carbide diagram. Label all notations like temperatures, phases, etc. Also write the invariant reactions.
	ii	Define strain hardening and discuss its importance. State and explain in detail dislocation theory of strain hardening.
Q3		SOLVE ANY TWO questions (2X5=10)
	i	Draw TTT diagram for eutectoid steel.
	ii	Define creep. Draw & explain classical creep curve.
	iii	Explain interstitial point defect
	B	SOLVE ANY ONE (1X10=10)
	i	Draw and explain subzero heat treatment process
	ii	What is fatigue of metals? Explain the methods of fatigue testing. Discuss the methods to increase the life of fatigue.
Q4		SOLVE ANY TWO questions (2X5=10)
	i	With the help of neat sketch explain composite materials
	ii	What are nano materials.
	iii	Write short note on manganese steels.

	B	SOLVE ANY ONE (1X10=10)
	i	What is hardenability? What are the factors affecting hardenability? Explain Jominy end quench test.
	ii	Differentiate between elastic and plastic deformation