RV College of Engineering®
Mysore Road, RV Vidyaniketan Post,
Bengaluru - 560059, Karnataka, India

NBA Accredited (UG - 6Years)

hod.me@rvce.edu.in
www.rvce.edu.in
Tel: 080-68188143 / 8144

Department of Mechanical Engineering

CIE – I

Date	22nd October 2024	Maximum Marks	50
Course Code	ME242AT	Duration	90 Min
Course Name	Material Science for Engineers	USN:	

Q. No.	Questions	M	BT	CO
1	How many electrons can occupy a P orbital?	1	1	1
2	The principal quantum number (n) refers to the _____ and _____ of the orbital.	1	1	1
3	In which type of bond do atoms share electrons?	1	1	1
4	A large energy gap between valence and conduction bands is the characteristic of which type of materials	1	1	1
5	What is the basic repeating unit in a crystal lattice?	1	1	1
6	Single atom or ion missing or occupying an irregular position is _____ type of defect in a crystal structure	1	1	1
7	The fractional increase in the length per unit rise in temperature in solids is known as _____	1	1	2
8	Identify the thermoelectric effect in which the temperature difference between two different materials or junctions in a circuit leads to the generation of an electric voltage	1	2	2
9	Define dielectric strength.	2	1	2
	PART B			
1	a) Describe Pauli Exclusion Principle and Aufbau principle. b) With the help of neat sketches explain the Secondary bonds with examples.	05 05	2	1
2	Classify solid materials based on the band gaps. Explain them briefly giving examples	10	2	1
3	a) Calculate Atomic packing factor for HCP unit cell. b) Differentiate Edge dislocation and Screw dislocation	05 05	3 2	1
4	Explain the properties and applications of metals and ceramics. Give two examples each.	10	3	1
5	a) Illustrate the temperature gradient along a conductor resulting in the absorption or release of heat in Thomson thermoelectric effect using appropriate sketches. b) Write a note on Insulating materials highlighting their applications	05 05	3 2	2

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	TEST	Marks	46	14	-	-	9	31	20	-	-	-

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Department of Mechanical Engineering

CIE – II

Date	3rd December 2024	Maximum Marks	50+10
Course Code	ME232TB	Duration	120 Min
Course Name	Material Science for Engineers	**USN:**	

Part A (Quiz)

Sl. No.	Questions	M	BT	CO
1.	Semiconductor device with a p-n junction which produces current by absorption of light in the depletion region is termed as _____	1	L1	2
2.	_____ is the metal joining process in which parent metal pieces are heated either to plastic or molten state.	1	L1	2
3.	If the emission of radiation occurs longer than 10^{-8} seconds is known as_____	1	L1	2
4.	Alloying elements of HSS are _____	1	L1	2
5.	Lightest of commonly used metals is _____	1	L1	2
6.	Define young's modulus of a material with equation.	2	L2	2
7.	_____ is the type of glass that cannot allow heat through it because of air between the layers and acts as good insulators.	1	L1	2
8.	Concrete is a composite material made up of _____ and _____	2	L1	2

Part-B (Test)

Sl. No.	Questions	M	BT	CO
1 a)	What is piezoelectric effect? Explain the applications of piezoelectric materials.	05	L2	2
b)	Distinguish between ductile and brittle fracture.	05	L2	2
2	With the stress strain diagram explain the mechanical properties of a ductile metal.	10	L2	2
3 a)	Discuss the applications of semiconductors.	05	L3	2
b)	Explain four different types of cast iron based on microstructure, properties and applications.	05	L2	2
4 a)	With a neat sketch describe the steps to be followed in metal casting process.	05	L2	2
b)	Compare thermoplastics with thermosetting plastics.	05	L3	2
5 a)	Justify the need for composite materials. Classify composite materials.	05	L3	2
b)	What is a biomaterial? List the desirable properties of biomaterials.	05	L2	2

USN | 1 | R | V | 2 | 3 | C | D | 0 | 0 | 3 |

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU)

III Semester B. E. Regular / Supplementary Examinations Jan / Feb-2025

Common to All Programs

MATERIAL SCIENCE FOR ENGINEERS

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

PART-A

			M	BT	CO
1	1.1	Atomic Packing Factor (APF) is _____.	01	1	1
	1.2	Effective number of atoms in one unit cell for Hexagonal close packed structure is _____.	01	1	1
	1.3	Two basic types of dislocations in crystal structure are _____ and _____.	02	1	1
	1.4	_____ is the vacancy in a crystal structure.	01	1	1
	1.5	True stress is _____.	01	1	1
	1.6	In stress-strain diagram elastic region, mechanical properties can be classified as _____ and _____.	02	1	1
	1.7	Ultimate tensile strength, σ_u = _____.	01	1	2
	1.8	Malleability is defined as _____.	01	1	1
	1.9	_____ is the property of Thermoplastics.	01	1	1
	1.10	Based on orientation, fibre reinforcements in composite materials can be _____ and _____.	02	1	1
	1.11	Heat treatment processes can be broadly classified as _____ & _____.	02	1	1
	1.12	Two types of surface hardening are _____ & _____.	02	1	1
	1.13	Ball milling is used for _____.	01	1	1
	1.14	Spectroscopy is used for _____.	01	1	1
	1.15	Zeolites are used for _____.	01	1	1

PART-B

2	a	List and explain different crystal imperfections.	08	1	1
	b	Define the following:- i) Space Lattice ii) Co-ordination Number. iii) Atomic packing factor iv) Unit cell	08	1	1
3	a	With the help of stress strain diagram explain plastic properties of a material.	08	2	2
	b	Define dielectric constant. Give the detailed description for dielectric behavior of a material.	08	1	2
		OR			
4	a	With appropriate sketches, explain the following: i) Seebeck effect ii) Peltier effect	08	1	1

	b	What is the importance of measuring hardness of a material? List and explain different hardness tests used in material characterization.	08	1	1
5	a	List and explain different types of plastics with its properties and applications.	08	2	1
	b	Categorize non-ferrous alloys based on the method of processing and material properties.	08	2	2
		OR			
6	a	Give the characteristics and applications of: i) Fibre reinforced composites ii) Ceramics	08	1	2
	b	Write a note on processing structural materials.	08	1	2
7	a	List and explain different methods of heat treatment used for material processing.	10	2	3
	b	With a neat sketch explain Grain Growth.	06	1	3
		OR			
8	a	With an appropriate schematic explain *TTT* curve and discuss its characteristics.	10	1	3
	b	List and discuss the causes for defects in heat treatment.	06	1	3
9	a	Discuss about vapour deposition Growth as applicable to Nano-materials.	08	2	4
	b	List and explain different spectroscopic techniques with their applications.	08	1	4
		OR			
10	a	Describe different testing methods used to characterize Nano-materials.	06	1	4
	b	Discuss processing, characterization, properties and applications of : i) Zerolites ii) Carbon Nanotubes	10	2	4