R. V. COLLEGE OF ENGINEERING, BENGALURU-560059
Autonomous Institution affiliated to Visvesvaraya Technological University
Model Question Paper

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Certified that this Question Paper has been set as per guidelines and covers the entire syllabus. There are no out of syllabus questions and are no missing data.		Question Paper			
		Accepted		Rejected	
Signature of the Paper setter		Signature of the Scrutinizer			

B E April/May-2024 Examinations **Sem: 3**

Course Code with Title: **MATERIALS SCIENCE FOR ENGINEERS- ME232AT**

Duration of paper: 03 Hrs. 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, and 9 and 10.

PART A

Question No.			Marks
1	1.1	What is the maximum number of electrons that can occupy the second energy level?	01
	1.2	The size and energy level of an orbital are referred by_____	01
	1.3	What is the basic repeating unit in a crystal lattice?	01
	1.4	In which type of bond do atoms share electrons?	01
	1.5	Thermal stresses in a constrained body will be of _____nature if it is heated.	01
	1.6	Ability of the material to have a spontaneous electric polarization is known as _____	01
	1.7	Highest value of stress on the stress strain diagram is known as____	01
	1.8	Extensive plastic deformation before fracture is seen in _____materials	01
	1.9	Mention any two applications of laser diodes.	02
	1.10	_____is one of the most commonly used semiconductors.	01
	1.11	Give an example for structural materials.	01
	1.12	Mention any two reasons why baking of electronic devices is necessary.	02
	1.13	Name the cooling media used in normalizing.	01

1.14	Which heat treatment process is used to reduce the brittleness in hardened steel.	01
1.15	List any two-surface heat treatment processes.	01
1.16	Name the microscopy technique to detect nanoscale structures by transmitting electrons through ultra-thin specimen.	01
1.17	Mention a significant characteristic of a nanoporous material.	01
1.18	Mention key difference between multi-walled carbon nanotubes (MWNT) and single-walled carbon nanotubes (SWNT).	01

PART B

2a	Describe all the primary and secondary bonds with examples.	10
2b	Define the following with respect to solid materials: i) space lattice, ii) unit cell iii) Atomic Packing Factor.	06
3a	Illustrate the temperature dependence of the dielectric constant for engineering materials.	06
3b	Explain the following thermoelectric effects: i) Seebeck effect ii) Thomson effect.	10
	OR	
4a	Define hardness and enumerate Brinell and Rockwell harness testing methods to test the hardness of a material.	08
4b	With the help of a stress strain diagram explain Plastic properties of a ductile material.	08
5a	Describe the following materials and list their applications. i) Light emitters ii) Light receptors	08
5b	Explain the properties and applications of the following materials with examples. i) Polymers ii) Aggregate composites	08
	OR	
6a	Discuss the processing methods for structural materials.	08
6b	Write the classification of cast iron and steel giving examples. State their applications.	08

7a	With a neat sketch explain Rapid thermal processing of electronic devices	08
7b	Explain the following post processing heat treatment processes for electronic devices highlighting their importance: i) Solder reflows ii) Baking	08
	OR	
8a	Identify the heat treatment process used to relieve internal stresses and explain it in detail.	08
8b	With the help of a neat, labelled diagram explain Carburizing and flame hardening heat treatment processes	08
9a	With a neat sketch explain Sol-gel process used for synthesis of nanomaterials.	08
9b	Distinguish top-down and bottom -up approaches in nanomaterial synthesis. Give examples of each method.	08
	OR	
10a	With a neat sketch explain the X-Ray Diffraction method used to characterize nanomaterials	08
10b	Write a note on the following: Nano porous materials, zeolites,	08

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