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# B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

## February / March 2023 Semester End Main Examinations

**Programme: B.E.**

**Semester: VII**

**Branch: ES – Cluster Elective**

**Duration: 3 hrs.**

**Course Code: 19EEE7CE2EM**

**Max Marks: 100**

**Course: Electrical and Electronics Engineering Materials**

**Date: 28.02.2023**

**Instructions:** 1. Answer any FIVE full questions, choosing one full question from each unit.  
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
Revealing of identification, appeal to evaluator will be treated as malpractice.

### UNIT - I

1	a) Discuss briefly the classification of engineering materials with examples.	10
	b) The concept of stability is easily understood by considering a mechanical analog. Explain the stability and metastability with the help of a tilting rectangular block.	10

### UNIT - II

2	a) What is ionic bonding? Explain the various steps involved in the formation of an ionic bond between sodium and chlorine. Mention the properties of ionic bonding.	10
	b) Distinguish ionic and covalent solids.	06
	c) Discuss the structure of silica and silicates.	04

### OR

3	a) Define bond energy and bond length? What is their significance?	05
	b) Draw the following planes and directions inside a cubic unit cell. (i) (1 0 1) (ii) (101) (iii) [1 1 0] (iv) [0 0 1]	05
	c) Summarize ionic and covalent solids.	10

### UNIT - III

4	a) Explain free electron theory.	10
	b) What are superconductors? Describe type-I and type-II superconductors.	05
	c) Define polarization and dielectric constant. Classify the types of polarizations in dielectric material?	05

### UNIT - IV

5	a) What are intrinsic semiconductors? Obtain an expression for the density of carriers in an intrinsic semiconductor.	06
	b) Discuss briefly the various steps involved in the fabrication of integrated circuits.	10
	c) Explain working of a photoconductor and mention applications.	04

## **UNIT - V**

6	a) Explain the terminology and classification of magnetic materials.	<b>10</b>
	b) Explain the method of measurement of electrical conductivity in materials.	<b>10</b>

## **OR**

7	a) Write short note on soft and hard magnetic materials.	<b>10</b>
	b) Explain with a neat sketch, the origin of hysteresis loop in ferromagnetic materials.	<b>05</b>
	c) Briefly discuss the properties of ferromagnetic and antiferromagnetic materials.	<b>05</b>

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B.M.S.C.E. - ODD SEM 2022-23