

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

Autonomous Institute Affiliated to VTU

## February / March 2023 Semester End Main Examinations

**Programme: B.E.**

**Branch: ES – Cluster Elective**

**Course Code: 19EE7CE2EM**

**Course: Electrical and Electronics Engineering Materials**

**Semester: VII**

**Duration: 3 hrs.**

**Max Marks: 100**

**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.

### 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. **05**  
(i)  $(1\ 0\ \bar{1})$  (ii)  $(101)$  (iii)  $[\bar{1}\ 1\ 0]$  (iv)  $[0\ 0\ 1]$   
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**

**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 - 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