U.S.N.										

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: Institutional Elective **Duration: 3 hrs.**
Course Code: 21CY7IEFME **Max Marks: 100**
Course: Functional Materials for Engineering Applications **Date: 22.02.2023**

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)	Explain the significance of functional materials in engineering aspects and provide appropriate examples.	**8**
	b)	Discuss the properties and importance of CNTs in Biomedical applications.	**6**
	c)	Describe the carbon allotropes and their significance.	**6**

OR

2	a)	Describe the steps involved in production of CNTs using Laser Ablation technique.	**8**
	b)	What are the characteristics of CNTs and brief their applications in energy storage.	**6**
	c)	Justify the statement: In-situ polymerization improves the properties of CNTs.	**6**

UNIT - II

3	a)	What is Graphene? Brief its structural aspects and importance.	**8**
	b)	Discuss the Electrical and Mechanical properties of Fullerene.	**6**
	c)	Appraise the statement: Yttrium Barium copper oxide is a superconducting oxide material.	**6**

UNIT - III

4	a)	Describe the characteristics and significance of Metal-Organic Frameworks.	**8**

	b)	Describe the process of $Cu(acac)_2$ synthesis and confirm the formation by various characterization methods.	**6**
	c)	Brief the technological importance of Metal-Matrix nanocomposites.	**6**

UNIT-IV

5	a)	Demonstrate the properties of semiconductors based on CB and VB and describe their significance.	**8**
	b)	Brief the preparation of GaAs thin film by MOCVD method.	**6**
	c)	Discuss the importance of Perovskite materials and their properties.	**6**

OR

6	a)	Brief the photovoltaic applications of perovskite materials.	**8**
	b)	Justify the statement: GaAs is a semiconductor material.	**6**
	c)	Appraise the structural aspects of $LaYbO_3$.	**6**

UNIT-V

7	a)	Explain the preparation of ZrO_2 as a ceramic material and discuss its importance.	**8**
	b)	Illustrate the optical properties of ceramic materials.	**6**
	c)	Discuss the importance of biomaterials, brief the importance of self-assembly in biomaterials aspects.	**6**

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