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

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21CY7OENMA **Max Marks: 100**
Course: Nanomaterials - Synthesis, Characterization and Applications

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.

				CO	PO	Marks
			UNIT - I			
1	a)	Discuss the classification of nanomaterials based on its dimension with suitable examples.		*CO1*	*PO1*	**6**
	b)	Explain the history and future scope of nanomaterials.		*CO1*	*PO1*	**7**
	c)	Analyze the following size dependent properties of nanomaterials: (i) Optical properties (ii) surface area		*CO2*	*PO5*	**7**
		UNIT - II				
2	a)	Explain the synthesis of metal oxide nanoparticles through bottom-up approach. Mention any two disadvantages of it.		*CO1*	*PO1*	**6**
	b)	What are carbon nanotubes? Explain the classification of CNTs. Give any two applications of CNTs.		*CO1*	*PO1*	**7**
	c)	Describe magnetron sputtering technique with a neat sketch.		*CO2*	*PO5*	**7**
		OR				
3	a)	Explain the synthesis of Al_2O_3 nanoparticles through combustion method.		*CO2*	*PO5*	**6**
	b)	Discuss the principle and synthesis of nanomaterials through Co-Precipitation method with a suitable example.		*CO2*	*PO5*	**7**
	c)	Explain photolithography technique for the synthesis of nanomaterials. Mention the disadvantages of this method.		*CO2*	*PO5*	**7**
		UNIT - III				
4	a)	Analyze and explain the effect of quantum confinement on bandgap in nanoparticles.		*CO2*	*PO5*	**6**
	b)	Explain the effect of size on thermal and magnetic properties.		*CO3*	*PO2*	**7**
	c)	Elaborate on the effect of size on the lattice parameters in materials.		*CO2*	*PO5*	**7**

			UNIT-IV			
	5	a)	Explain the interpretation of X-ray diffraction data to solve the crystal structure of a solid material.	*CO2*	*PO5*	**6**
		b)	Describe the working principle of SEM with a neat block diagram.	*CO2*	*PO5*	**7**
		c)	Elaborate on the application of TEM for the identification of imperfections and grain boundary in solid materials.	*CO2*	*PO5*	**7**
			OR			
	6	a)	Describe the particle size calculation using XRD.	*CO2*	*PO5*	**6**
		b)	Sample charging is a problem in SEM imaging. Explain the technique to mitigate sample charging in SEM. Mention any two applications of SEM.	*CO2*	*PO5*	**7**
		c)	Explain the working of TEM with a neat sketch.	*CO2*	*PO5*	**7**
			UNIT - V			
	7	a)	Discuss the application of nanotechnology in the field of food and agriculture.	*CO3*	*PO2*	**6**
		b)	Explain the use of nanomaterials in following fields: (i) sports (ii) medicine.	*CO3*	*PO2*	**7**
		c)	Explain the application of nanomaterials in defense sector.	*CO3*	*PO2*	**7**

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