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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Chemical Engineering **Duration: 3 hrs.**

Course Code: 22CH7PELC2 **Max Marks: 100**

Course: Nanomaterial and Characterization

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	*CO*	*PO*	Marks
1	a)		Examine the size-dependent properties of nanomaterials: (i) Optical properties (ii) Surface area.	*CO 1*	*PO1*	**7**
	b)		Using appropriate examples, describe how nanomaterials are classified.	*CO 1*	*PO 1*	**7**
	c)		Discuss about nanocomposites.	*CO 1*	*PO 1*	**6**
			OR			
2	a)		Explain the origins and advancements of nanostructured materials.	*CO 1*	*PO 1*	**7**
	b)		Discuss the origin of distinctly different properties of nanomaterials.	*CO 1*	*PO 1*	**7**
	c)		Discuss the effect of reducing size of material on electrical properties.	*CO 1*	*PO 1*	**6**
			UNIT - II			
3	a)		Highlight the properties and applications of carbon nanotubes.	*CO 3*	*PO 2*	**7**
	b)		Discuss the properties and limitations of inorganic nanoparticles.	*CO 1*	*PO 1*	**7**
	c)		Describe (a) Quantum dots and, (b) Nano-clusters.	*CO 1*	*PO 1*	**6**
			OR			
4	a)		Discuss the key features of carbon-based nanomaterials.	*CO 3*	*PO 2*	**7**
	b)		Explain the properties and limitations of organic-based nanoparticles.	*CO 1*	*PO 1*	**7**
	c)		Discuss the functionalization of nanoparticles.	*CO 1*	*PO 1*	**6**
			UNIT - III			
5	a)		Discuss the CVD method of synthesis of nanomaterials.	*CO 2*	*PO 2*	**7**

		b)	Describe the synthesis of CNTs by Arc discharge method.	*CO 2*	*PO 2*	**7**
		c)	Differentiate between top-down and bottom-up approach methods of nanoparticle synthesis.	*CO 2*	*PO 2*	**6**
			OR			
	6	a)	Discuss the sol-gel method of nanomaterials synthesis.	*CO 2*	*PO2*	**10**
		b)	Highlight the synthesis of metallic nanoparticles by microwave assisted synthesis.	*CO 2*	*PO2*	**10**
			UNIT - IV			
	7	a)	What is the principle of transmission electron microscope (TEM) instrument? Explain the sample preparation for TEM.	*CO 3*	*PO 2*	**10**
		b)	Discuss the importance BET surface area in nanomaterial analysis.	*CO 3*	*PO 2*	**10**
			OR			
	8	a)	Discuss the working principle of scanning electron microscope (SEM) with a neat block diagram.	*CO 3*	*PO 2*	**10**
		b)	What is the working principle of powder X-ray diffraction (XRD) instrument? How is it useful in nanomaterial characterization?	*CO 3*	*PO 2*	**10**
			UNIT - V			
	9	a)	Highlight the importance of nanomaterials in heavy metal removal from water.	*CO 4*	*PO 2*	**10**
		b)	Discuss the futuristic application of nanomaterials in drug delivery system.	*CO 4*	*PO 2*	**10**
			OR			
	10	a)	Mention the disadvantages of consumption excess fluoride. With relevant example describe the application of nanomaterials in removal of excess fluoride ion from drinking water.	*CO 4*	*PO 2*	**10**
		b)	Highlight the applications of nanomaterial in agriculture.	*CO 4*	*PO 2*	**10**

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