CBCS SCHEME

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BETCK105C/BETCKC105

First Semester B.E./B.Tech. Degree Examination, June/July 2023
Introduction to Nano Technology

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	a.	Discuss the construction and working of Ball milling method of preparing nano materials. Mention any two advantages of Ball milling technique.	8	L2	CO1
	b.	Discuss the thin film synthesis using chemical bath deposition and SILAR method.	8	L2	CO1
	c.	Calculate the SAVR for cubic particle of side length (i) 1 cm and (ii) 1 nm	4	L3	CO1
		OR			
Q.2	a.	Explain the synthesis of nano material using solution combustion method.	8	L2	CO1
	b.	Explain the different steps involved in the synthesis of nanoparticles of silica using sol-gel method.	8	L2	CO1
	c.	Discuss the basic steps involved in the precipitation method of synthesis of nano particle.	4	L2	CO1
		Module – 2			
Q.3	a.	Explain the basic principles of X-ray diffraction and derive Debye-Scherrer equation.	10	L3	CO2
	b.	Discuss the principle, construction, working and different modes of operations of STM.	10	L2	CO2
		OR			
Q.4	a.	Explain with suitable diagram, the construction and working of SEM.	8	L2	CO2
	b.	Discuss the working and instruction of UV-visible spectroscopy. Explain how one can determine band gap of material from UV-visible data.	8	L2	CO2
	c.	The X-ray undergoes diffraction from a crystallite plane at an angle (θ) of 32.5°. Full width at half maximum is measured to be 0.75°. Calculate the crystallite size assuming wavelength of X-ray as 1.54 A° and the Scherrer constant as unity	4	L3	CO2
		Module – 3			
Q.5	a.	Explain the structure synthesis, properties and application of Fullerenes.	10	L2	CO3
	b.	Discuss the applications of Graphene.	6	L2	CO3
	c.	Write a note on nano diamond.	4	L2	CO3
		OR			
Q.6	a.	What is CNT? Discuss any one of the method of synthesis of CNT with neat diagrams of experimental set up.	8	L2	CO3
	b.	Discuss the synthesis of Graphene by chemical vapour deposition and explain any three properties of Graphene.	8	L2	CO3
	c.	Write a note on Carbon nano composites.	4	L2	CO3
		Module – 4			
Q.7	a.	What is Solar cell? Explain in brief the different generation of Solar Cells.	8	L2	CO4
	b.	Explain the construction and working of Lithium-ion battery.	8	L2	CO4
	c.	Mention any four basic requirements of a good cathode material.	4	L1	CO4

		OR			
Q.8	**a.**	Describe the construction and working of Dye-sensitized Solar Cells.	**8**	**L2**	**CO4**
	b.	Explain the construction and working of Fuel cell.	**8**	**L2**	**CO4**
	c.	Mention any four disadvantages of graphite anode.	**4**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain any four applications of nanotechnology in agriculture and food industry.	**8**	**L2**	**CO5**
	b.	Describe the applications of nanotechnology in (i) detection of heart attack (ii) 3D – Printed battery (iii) Contact lenses.	**6**	**L2**	**CO5**
	c.	Write a note on (i) Nano fertilizers (ii) Nano electronics	**6**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the applications of nono technology in optics.	**8**	**L2**	**CO5**
	b.	Explain the applications of nano technology in drug delivery and diagnosis.	**8**	**L2**	**CO5**
	c.	Write a note on Nano computing.	**4**	**L2**	**CO5**

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