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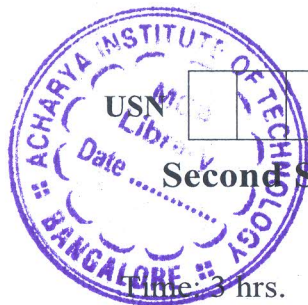
BETCK205C/BETCKC205

Second Semester B.E./B.Tech. Degree Examination, June/July 2023
Introduction to Nanotechnology

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.	Describe the Sputtering technique for the preparation of nanomaterials. Mention its advantages and drawbacks.		8	L2	CO1
	b.	Explain the synthesis of nanomaterials (ZnO) by solution combustion method.		8	L2	CO1
	c.	Explain how electrical and optical properties vary from bulk to nanomaterials.		4	L2	CO1
		OR				
Q.2	a.	Explain the steps involved in synthesis of silica nano particles by using sol gel method.		8	L2	CO1
	b.	Explain ball milling method to synthesize the nano particles with diagram.		8	L2	CO1
	c.	Explain the electron confinement in 0D, 1D, 2D, 3D systems with examples.		4	L2	CO4
		Module – 2				
Q.3	a.	Explain the principle, working and instrumentation of scanning electron microscope with diagram.		8	L2	CO2
	b.	Explain the principle and instrumentation of the UV-visible spectroscopy. Mention its one application.		8	L2	CO2
	c.	In a X-ray diffraction experiment, peak width half maxima (FWHM) is 5° and its Bragg angle (θ) is 30°. Calculate the crystallite size using Scherrer equation. Given wavelength used is 1.54 A°, K = 0.94.		4	L2	CO2
		OR				
Q.4	a.	Explain the principle, working and instrumentation of transmission electron microscope with diagram.		8	L2	CO2
	b.	Explain the principle and working of X-ray diffractometer with neat diagram.		8	L2	CO2
	c.	Mention the difference between AFM and STM.		4	L2	CO2
		Module – 3				
Q.5	a.	Explain the synthesis of graphene by chemical vapour deposition method. Mention electrical, electronic and mechanical properties of graphene.		8	L2	CO2
	b.	Explain the electrical and mechanical properties of single walled carbon nanotubes (SWCNT's) and multi walled carbon nanotubes (MWCNT's).		8	L2	CO2
	c.	Write a note on carbon nanofibres.		4	L2	CO4
		OR				
Q.6	a.	Explain the synthesis, electrical and mechanical properties of fullerenes and mention its applications.		8	L2	CO2
	b.	Write notes on: (i) Carbon nano composites (ii) Nano diamonds		8	L3	CO4
	c.	Explain any four applications of graphene.		4	L4	CO5
		Module – 4				
Q.7	a.	Define solar cells. Describe briefly 1st, 2nd and 3rd generation of solar cells.		8	L2	CO3
	b.	Explain the construction and working of Lithium-ion battery.		8	L2	CO3
	c.	Write a note on quantum dot solar cell.		4	L2	CO3

		OR			
Q.8	a.	Describe the construction and working of fuel cell.	8	L2	CO3
	b.	Describe the construction and working of Dye-sensitized solar cell.	8	L2	CO3
	c.	Explain the limitations of graphite anodes.	4	L2	CO3
		Module – 5			
Q.9	a.	Explain the application of nanotechnology in diagnosis and drug delivery.	8	L4	CO5
	b.	Explain the application of nanotechnology in agricultural and food field.	8	L4	CO5
	c.	Write a note on: (i) Nano computers (ii) Bio-chemical applications	4	L4	CO5
		OR			
Q.10	a.	Explain the applications of nanotechnology in biological, biochemical and biosensing application.	8	L4	CO5
	b.	Define nanoelectronics. Explain the application of nanotechnology in electronics and memory storage devices.	8	L4	CO5
	c.	Explain any two applications of nanophotonics.	4	L4	CO5

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