

# CBCS SCHEME

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BETCK205C

**Second Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026**  
**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.*

### Module – 1

			M	L	C
Q.1	a.	Explain the sputtering technique for the preparation of Nano materials with diagram.	8	L2	CO1
	b.	Explain the chemical bath deposition method for the synthesis of Nano materials.	8	L2	CO1
	c.	Write a short note on Surface to Volume ratio.	4	L2	CO1

### OR

Q.2	a.	Explain the Sol – gel method for the synthesis of silica nano particles.	8	L2	CO1
	b.	Explain the synthesis of zinc oxide nano materials by Solution combustion method.	8	L2	CO1
	c.	Illustrate how optical and catalytic properties vary from bulk to nano materials.	4	L2	CO1

### Module – 2

Q.3	a.	Explain the principle , working and instrumentation of Transmission Electron Spectroscopy (TEM) with diagram.	8	L2	CO2
	b.	Explain the principle , instrumentation and different modes of Atomic Force Microscopy (AFM).	8	L2	CO2
	c.	Explain the basic principles of working of X – ray diffraction.	4	L2	CO2

### OR

Q.4	a.	Explain principle , working and instrumentation of Scanning Electron Microscope (SEM).	8	L2	CO2
	b.	Explain principle and instrumentation of Scanning Tunneling Microscope (STM).	8	L2	CO2
	c.	In a X – ray diffraction experiment , peak width half Maxima (FWHM) is $0.8^\circ$ and its Bragg angle ( $\theta$ ) is $32^\circ$ . Calculate the crystallite size using Scherrer equation. Given wavelength used in X – ray diffraction experiment is $1.54\text{Å}$ . Given $K = 0.94$ .	4	L3	CO2

## Module – 3

Q.5	a.	Explain the synthesis of Graphene by chemical vapour deposition method.	8	L2	CO3
	b.	Explain the Electrical and Mechanical properties of Fullerenes. Mention its applications.	8	L2	CO3
	c.	Write a short note on carbon nano composites.	4	L2	CO3
<b>OR</b>					
Q.6	a.	Explain the synthesis of Multi Walled Carbon Nano Tubes (MWCNT) and Single Walled Carbon Nano Tubes (SWCNT).	8	L2	CO3
	b.	Explain the Electrical and Mechanical properties of Graphene. Mention its applications.	8	L2	CO3
	c.	Write a short note on Carbon nanofibres.	4	L2	CO3
<b>Module – 4</b>					
Q.7	a.	Explain briefly First and Second generation of solar cells.	8	L2	CO4
	b.	Explain the construction and working of fuel cells.	8	L2	CO4
	c.	Discuss the limitations of Graphite anodes.	4	L2	CO4
<b>OR</b>					
Q.8	a.	Explain the construction and working of Quantum dot solar cells.	8	L2	CO4
	b.	Explain the construction and working of Lithium ion battery.	8	L2	CO4
	c.	Explain the Nanotechnology in hydrogen storage and proton exchange membranes.	4	L2	CO4
<b>Module – 5</b>					
Q.9	a.	Explain the applications of Nanotechnology in Agriculture and Food field.	8	L2	CO5
	b.	Explain the applications of Nanotechnology in Biological and Biochemical field.	8	L2	CO5
	c.	Write a short note on Nanophotonics.	4	L2	CO5
<b>OR</b>					
Q.10	a.	Explain the applications of Nanotechnology in diagnosis and drug delivery.	8	L2	CO5
	b.	Explain the applications of Nanotechnology in Computing (Nano computers) and Electronics (Nano electronics) area.	8	L2	CO5
	c.	Write a short note on Nano Chemistry.	4	L2	CO5

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