

Second Semester B.E./B.Tech. Degree Examination, June/July 2025

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.	Describe the classification of nanomaterials with examples.		08	L3	CO4
	b.	Explain the synthesis of nanomaterial by hydrothermal method.		08	L2	CO1
	c.	Write a note on surface to volume ratio.		04	L2	CO1
OR						
Q.2	a.	Explain the synthesis of nanomaterial using laser ablation technique with neat diagram.		08	L2	CO1
	b.	Explain the synthesis of nanomaterial using SILAR method.		08	L2	CO1
	c.	Explain the confinement of electron in 0D, 1D, 2D and 3D system.		04	L3	CO4
Module – 2						
Q.3	a.	Explain the basic principle, working and instrumentation of transmission electron microscope with diagram.		08	L2	CO2
	b.	Explain the basic principle, working and instrumentation of atomic force microscope with diagram.		08	L2	CO2
	c.	Mention any 4 applications of UV-visible absorption spectroscopy.		04	L2	CO2
OR						
Q.4	a.	Explain the basic principle, working and instrumentation of XRD with diagram.		08	L2	CO2
	b.	Explain the working and instrumentation of IR spectroscopy with diagram.		08	L2	CO2
	c.	In a X-ray diffraction experiment peak width half maxima (PWHM) is 0.7° and its bragg angle (θ) is 26° . Calculate the crystallite size using Scherrer equation. Given wavelength used in XRD experiment is 1.54 \AA . $K = 0.94$.		04	L2	CO2
Module – 3						
Q.5	a.	Explain the synthesis of graphene by chemical vapor deposition. Mention its application.		08	L3	CO4
	b.	Explain the classification of carbon nanotubes. Mention their electrical and chemical properties.		08	L2	CO2
	c.	Write a note on carbon nanocomposite.		04	L3	CO4

OR

Q.6	a.	Explain the synthesis of fullerene by arc discharge method with diagram.	08	L2	CO1
	b.	Explain the properties of graphene and mention its applications in various fields.	08	L2	CO3
	c.	Write a note on Carbon nanofibers.	04	L3	CO4
Module – 4					
Q.7	a.	Define solar cells. Describe briefly 1 st , 2 nd and 3 rd generation of solar cells.	08	L4	CO5
	b.	Explain the construction and working of Dye Sensitized Solar Cell (DSSC) with diagram?	08	L4	CO5
	c.	Mention the requirements of anode materials in lithium ion battery.	04	L4	CO5
OR					
Q.8	a.	Describe the construction and working of Fuel Cell.	08	L4	CO5
	b.	Describe the construction and working of Lithium ion battery.	08	L4	CO5
	c.	Mention the advantages and disadvantages of Lithium ion battery.	04	L4	CO5
Module – 5					
Q.9	a.	Explain the application of nanotechnology in medical and healthcare sector.	08	L2	CO3
	b.	Define nanoelectronics. Explain the application of nanotechnology in electronics and memory storage devices.	08	L2	CO3
	c.	Write a note on nano fertilizers.	04	L2	CO3
OR					
Q.10	a.	Explain any 5 applications of nanotechnology in agricultural and food industry.	08	L2	CO3
	b.	Explain any 2 nanotechnology applications in healthcare.	08	L2	CO3
	c.	Define following terms: i) Nano biotechnology ii) Nano computing iii) Nano chemistry iv) Nano photonics	04	L2	CO3
