

MAJOR ELECTIVE COURSE – II NANO SCIENCE AND NANOTECHNOLOGY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The famous lecture "There's Plenty of Room at the Bottom" was delivered by: (i) Albert Einstein (ii) Richard Feynman (iii) Niels Bohr (iv) Marie Curie	K1	CO1
	2	Which of the following is an example of a One-Dimensional (1D) nanomaterial? (i) Thin film (ii) Nanowire (iii) Quantum dot (iv) Nanoplate	K2	CO1
2	3	In ball milling size reduction occurs mainly due to _____. (i) Chemical reaction (ii) Centrifugal force (iii) Mechanical impact and attrition (iv) Thermal decomposition	K1	CO2
	4	In DC Magnetron Sputtering, the target material is ejected due to _____. (i) Thermal evaporation (ii) Ion bombardment (iii) Chemical reaction (iv) Laser ablation	K2	CO2
3	5	In Scanning Electron Microscope the image is formed mainly using _____. (i) Transmitted electrons (ii) Reflected light (iii) Secondary electrons (iv) X-rays	K1	CO3
	6	The condition for constructive interference in XRD is given by _____. (i) $\lambda = h/p$ (ii) $n\lambda = 2d \sin\theta$ (iii) $E = mc^2$ (iv) $V = IR$	K2	CO3
4	7	Silver nanoparticles are widely used for _____. (i) Superconductivity (ii) Antibacterial applications (iii) Nuclear reactors (iv) Lubricants	K1	CO4
	8	When particle size decreases to nanoscale, mechanical strength generally _____. (i) Decreases (ii) Remains constant (iii) Increases (iv) Becomes zero	K2	CO4
5	9	Nanomembranes used in water purification mainly remove contaminants through: (i) Combustion (ii) Filtration and adsorption (iii) Radiation (iv) Magnetization	K1	CO5
	10	Carbon nanotubes are suitable for transistors because of their _____. (i) High resistivity (ii) Excellent electrical conductivity (iii) Heavy weight (iv) Low melting point	K2	CO5

Cont...

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Write short notes on the emergence of nanotechnology as a multidisciplinary field.	K1	CO1
		(OR)		
	11.b.	Summarize Quantum Dots and their applications.		
2	12.a.	Analyze the working of Spray Pyrolysis technique and list its applications.	K3	CO2
		(OR)		
	12.b.	Examine Reverse Micelles method with a neat diagram.		
3	13.a.	Summarize the principle and applications of Photoluminescence (PL) Spectroscopy.	K3	CO3
		(OR)		
	13.b.	Describe the construction and working of Transmission Electron Microscope (TEM).		
4	14.a.	Explain quantum confinement effect in semiconductor nanoparticles.	K3	CO4
		(OR)		
	14.b.	Write short notes on nanoceramics and nanocomposites with suitable examples.		
5	15.a.	Describe membrane-based water purification in nanotechnology using appropriate examples.	K3	CO5
		(OR)		
	15.b.	Describe the working principle of a Single Electron Transistor (SET) with a neat diagram.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain 1D, 2D, and 3D nanostructured materials with examples and properties.	K4	CO1
2	17	Illustrate the Chemical Vapor Deposition (CVD) process along with its types.	K4	CO2
3	18	Elucidate the working principle and instrumentation of Atomic Force Microscope (AFM) and its modes of operation.	K4	CO3
4	19	Discuss size-dependent optical, thermal, and chemical properties of nanomaterials with suitable examples.	K4	CO4
5	20	Elaborate on nanoparticle-based drug delivery systems for controlled release mechanism and biomedical applications.	K4	CO5

Z-Z-Z END