



# MAKE-UP EXAM

BETCKC105/BETCK105C

First Semester B.E./B.Tech. Degree Examination, Nov./Dec. 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.*

Module – 1			M	L	C
Q.1	a.	Define Nanotechnology. Explain any three changes in physical properties of materials as it is converted from Bulk to nanomaterials.	8	L2	CO1
	b.	Define Top down approach of synthesis of nanomaterial. Explain Ball milling technique for the synthesis of nanomaterials with neat diagram.	8	L2	CO1
	c.	Write a short note on Synthesis of Nanomaterial Laser Ablation.	4	L2	CO1
<b>OR</b>					
Q.2	a.	Define Bottom up approach to synthesis of nanomaterial. Explain Sol – gel technique for the synthesis of nanomaterials with neat diagram. write few advantages and disadvantages of sol – gel synthesis technique.	8	L2	CO1
	b.	Explain 0D, 1D, 2D and 3D system and write a short note on the confinement of electrons in the above systems.	8	L2	CO1
	c.	Explain Successive Ionic Layer Adsorption and Reaction (SILAR) method of synthesis of nanoparticles with neat diagram.	4	L2	CO1
<b>Module – 2</b>					
Q.3	a.	Explain the principle , construction and working of Scanning Tunneling Microscope (STM).	8	L2	CO2
	b.	Write down the basic principle of X – ray diffraction. Derive Scherer formula to calculate the particles size of nanomaterial.	8	L2	CO2
	c.	Write down the comparison between Scanning Electron Microscopes (SEM) and Tunnelling Electron Microscope (TEM).	4	L2	CO2
<b>OR</b>					
Q.4	a.	Explain the principle , construction and working of Scanning Electron Microscope (SEM). Explain its few advantages and disadvantages.	8	L2	CO2
	b.	Explain the principle , instrumentation and working of Optical Spectroscopy. How the devices is used for band gap measurement?	8	L2	CO2
	c.	In X – ray diffraction experiment, peak width at half maximum is 0.60 and its corresponding Bragg's angle is 24°. Calculate the crystallite size using Scherer's equation if the X – ray of wavelength 1.54Å has been used in the X – ray diffraction. Given K = 0.91.	4	L2	CO2
<b>Module – 3</b>					
Q.5	a.	Explain the Chemical Vapour Deposition (CVD) technique for the synthesis of carbon nanomaterials, with a neat diagram.	8	L2	CO3

	b.	Explain the Carbon nano – tubes. Describe its Mechanical , Electrical and Electronics properties.	8	L2	CO3
	c.	What is Fullerence? Write down few physical and chemical properties of fullerene and its applications.	4	L2	CO3
<b>OR</b>					
Q.6	a.	Write short notes on the following : i) Carbon nano composites      ii) Carbon nanofibers.	8	L2	CO3
	b.	What is Graphene? Explain the Electronics , Mechanical and Electrical applications of Graphene.	8	L2	CO3
	c.	Explain the applications of Single Wall Carbon Nanotube (SWCNT) and Multi Wall Carbon Nanotube (MWCNT).	4	L2	CO3
<b>Module – 4</b>					
Q.7	a.	What is Solar Cell? Explain 3 generation of solar cells with some advantages and disadvantages of each generation.	8	L3	CO4
	b.	Describe the construction and working of Fuel cell with a suitable diagram. What are some of the advantages and disadvantages of fuel cell?	8	L3	CO4
	c.	Write a short note on Proton Exchange Membrane (PEM).	4	L3	CO4
<b>OR</b>					
Q.8	a.	Describe the construction and working of Dye Sensitized Solar Cell with a suitable diagram.	8	L3	CO4
	b.	Write the construction and Lithium Ion battery with neat diagram. Explain its working in both charging and discharging mode.	8	L3	CO4
	c.	Write a short note on benefits of Nanotechnology in Lithium Ion Battery.	4	L3	CO4
<b>Module – 5</b>					
Q.9	a.	Explain the rols or nanotechnology in the following : i) Computing Applications (Nano Computers) ii) Optical Applications (Nano Photonics).	8	L3	CO5
	b.	Explain the role of nanotechnology in Medicine and Healthcare applications.	8	L3	CO5
	c.	Describe the significant Impact of Nanotechnology and Nanomaterials in Science and Technology.	4	L3	CO5
<b>OR</b>					
Q.10	a.	Explain the role of nanotechnology in Agriculture and Food Applications.	8	L3	CO5
	b.	Explain the role of nanotechnology in following : i) Biological and Biochemical Applications (Nanobiotechnology). ii) Electronic Applications (Nano electronics).	8	L3	CO5
	c.	Write a short note on Significant Impact of Nanotechnology and Nanomaterial in various fields.	4	L3	CO5

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