BETCK105C/205C

VisvesvarayaTechnologicalUniversity,Belagavi.

Model Question Paper-II with effect from 2022-23(CBCS Scheme)

First/Second Semester B.E. Degree Examination

USN:

Introduction to Nanotechnology

TIME: 03 Hours **Max.Marks:**100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **Module**.

QNo.		Module– 1	Marks
Q1	a	Describe the laser ablation technique for the preparation of nanomaterials with diagram.	8
	b	Explain the synthesis of nanomaterial (ZnO) by solution combustion method.	8
	c	Explain the chemical bath deposition method.	4
		OR	
Q2	a	Explain ball milling method to synthesize the nanoparticles with diagram.	8
	b	Explain synthesis of nanomaterial by SILAR method.	8
	c	Write a note on surface to volume ratio.	4
		Module– 2	
Q3	a	Explain the basic principle, working and instrumentation of transmission electron microscope with diagram.	8
	b	Derive expression for Debye-Scherer equation. In a X-ray diffraction experiment peak width half maxima (FWHM) is 0.8^{o} and its Bragg angle (θ) is 32^{o}. Calculate the crystallite size using Scherrer equation. Given wavelength used in X-ray diffraction experiment is 1.54 Å. Given, k =0.94	8
	c	Mention the differences between AFM & STM.	4
		OR	
Q4	a	Explain the basic principle and instrumentation of atomic force Microscope(AFM).	8
	b	Explain the principle and instrumentation of the UV-visible spectroscopy. Mention its application in the measurement of functional group.	8
	c	Mention the differences between SEM and TEM.	4
		Module– 3	
	a	Explain the synthesis of graphene by chemical vapor deposition. Explain any one of the property of the graphene. Mention its applications.	8

Q5	**b**	Explain the electricaland mechanical properties of single walled carbon nanotubes (SWCNT's) & multi walled carbon nanotubes (MWCNT's).	**8**
	c	Write a note on carbon nanofibers.	**4**
		OR	
Q6	**a**	Write a note on a) carbon nanocomposites b) nanodiamonds	**8**
	b	Explain the Synthesis, electrical, mechanical properties of fullerenes. Mention its applications.	**8**
	c	Explain the applications of SWCNT's & MWCNT's.	**4**
		Module-4	
Q7	**a**	Define Solar cells. Describe briefly 1^{st}, 2^{nd}& 3^{rd} generations of Solar cells.	**8**
	b	Explain the construction and working of Fuel cells.	**8**
	c	Mention the limitations of graphite anodes.	**4**
		OR	
Q8	**a**	Describe the construction and working of Quantum dot solar cells solar cells.	**8**
	b	Describe the construction and working of Lithium-ion battery	**8**
	c	Write a note on advances in anode, cathode materials for the Lithium-ion battery.	**4**
		Module-5	
Q9	**a**	Explain the application of nanotechnology in biological, biochemical & biosensing application.	**8**
	b	Define Nano electronics. Explain the application of nanotechnology in electronics and memory storage devices.	**8**
	c	Write a note on nano fertilizers.	**4**
		OR	
Q10	**a**	Explain the nanotechnology application in contact lenses, detector for Heart Attacks, tiny 3-D Printed Batteries, creating Biodegradable Electrodes.	**8**
	b	Explain the application of nanotechnology in agricultural and food field.	**8**
	c	Define the following terms: a. Nanobiotechnology b. Nanocomputing c. Nanophotonic c. Nano chemistry	**4**