Total number of printed pages: **5** **Programme(PG)/2nd/PFET2122**

2025

Nanomaterial Synthesis and Characterization Techniques

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What do you understand by Nanotechnology, Nanoscale and Nanoparticles?	10
	b)	Write a few sentences on history of nanoscience and nanotechnology.	10
2.	Write notes on **any four (4)** of the followings		4*5=20
	a)	Nanoscale	
	b)	Graphene	
	c)	Optical properties of NPs	
	d)	Electrical properties of NPs	
	e)	Quantum Dots	
3.	a)	Write the names of various bottom-up and top-down approaches of nanoparticles synthesis.	10
	b)	Write a note on the applications of Ag and Au nanoparticles.	10
4.	a)	With the schematic diagram describe the microbial synthesis of gold nanoparticles.	10
	b)	With the schematic diagram describe the plant-mediated synthesis of silver nanoparticles. Discuss the mechanism of synthesis.	10
5.	a)	Explain the size dependent properties & surface to volume ratio behavior of nanomaterials.	10
	a)	How a thin film is fabricated by Sputtering Techniques? Explain by giving suitable examples.	10

6.	a)	What is the difference between UV-Vis and FT-IR spectroscopy? How one can make sample for FT-IR for liquid and solid sample?	10
	b)	Explain how to characterize a material with scanning electron microscope (SEM) with neat sketch.	10
7.	a)	What do you mean by green synthesis of nanomaterials? Describe the various biological ingredients used for synthesis of nanomaterials.	10
	b)	Differentiate among 0D, 1D, 2D and 3D nanomaterials by giving suitable examples.	10