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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

Ph.D. (Second Semester-Summer) Examinations, May – 2025

23SPPECY2011 –Nanomaterials & Their Applications

(Chemistry)

Time: 3 hrs Maximum: 70 Marks

The figures in the right hand margin indicate marks.

	Answer *ANY FIVE* Questions. **(14 x 5 = 70 Marks)**	**Marks**
1.a.	Discuss the common types of crystal structures observed in nanomaterials.	7
b.	Discuss physical and optical properties of nanomaterials.	7
2.	What are the advantages of using carbon nanotubes and graphene in nanoelectronics?	14
3.a.	Write notes on carbon nanotubes.	7
b.	How do defects and grain boundaries affect the mechanical properties of nanomaterials?	7
4.a.	What are the major synthesis techniques for carbon nanotubes?	7
b.	What are the main chemical synthesis techniques used for nanomaterials?	7
5.a.	Explain how X-ray photoelectron spectroscopy (XPS) is useful in nanomaterials characterization.	14
6.a.	How are nanoparticles used in targeted drug delivery systems? What are the advantages of using gold and silver nanoparticles in medical diagnostics?	8
b.	Evaluate the suitability of different nanomaterial synthesis techniques for industrial-scale production.	6
7.	Explain what extent nanotechnology is being useful in fuels and batteries.	14
8.a.	Why do nanoscale materials often exhibit enhanced mechanical flexibility and toughness?	8
b.	Highlight the applications of nanomaterials in daily life, including textiles, sporting goods, cosmetics, and household products.	6

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