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GIET UNIVERSITY, GUNUPUR – 765022

Ph.D. (Second Semester) Examinations, April – 2024

PPECH2015 – Nanotechnology

(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. Compare and contrast top-down and bottom-up approaches in the synthesis of nonmaterials. Provide examples of each approach and discuss their advantages and limitations.	6
b. Discuss the importance of controlling reaction parameters such as temperature, pressure, pH, and concentration in the synthesis of nonmaterial.	8
2.a. Discuss the environmental impact and sustainability considerations associated with the synthesis of nonmaterials.	6
b. Explain the concept of green synthesis in the context of nonmaterial. Discuss the advantages and challenges of using environmentally friendly methods for the synthesis of nonmaterial.	8
3.a. Discuss the principle of operation and applications of Atomic Layer Deposition (ALD) in the fabrication of nonmaterials.	6
b. Compare and contrast the mechanisms and applications of Physical Vapor Deposition (PVD) and Chemical Vapor Deposition (CVD) in nonmaterial synthesis.	8
4.a. Describe the principle and working mechanism of X-ray diffraction (XRD) as a characterization technique for nanostructure materials.	6
b. Compare XRD with other structural characterization techniques, such as scanning electron microscopy (SEM) and atomic force microscopy (AFM), highlighting the unique insights provided by each method in the analysis of nanostructured materials.	8
5.a. Explain how the addition of nanoscale fillers enhances the mechanical, thermal, and barrier properties of polymers.	6
b. Provide examples of commonly used nanofillers and polymer matrices in polymer nanocomposites.	8
6.a. Discuss the challenges and considerations in achieving uniform dispersion and interfacial interactions between the polymer matrix and nanofillers.	6
b. Highlight emerging trends and future directions in the development and utilization of polymer nanocomposites across various industries and applications	8
7.a. Provide specific examples of how nanotechnology has revolutionized each of these fields, highlighting key advancements, challenges, and potential future developments.	6

b.	Explore the role of nonmaterial, nanodevices, and nanotechniques in addressing pressing societal issues and driving innovation in areas such as healthcare, renewable energy, water purification, and sustainable manufacturing.	8
8.a.	Discuss the ethical, safety, and regulatory considerations associated with the widespread adoption of nanotechnology in various sectors.	6
b.	Describe how nanotechnology has revolutionized different fields such as medicine, electronics, energy, and environmental science.	8

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