QPC: R262M024 AR 24 Reg. No | | | | | | | | | | |

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)

Ph.D. (Second Semester-Summer) Examinations, April – 2026

23SPPEPH2013 –Emerging Nano Materials and Their Applications

(Physics)

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.	What do you mean by Nano scale? Classify the benefits of Nano material over micro/macro sized material.	8
b.	What is the difference between conductor, semiconductor, insulator?	6
2.	What is CNT? Represent briefly any two synthesis routes of CNT.	14
3.a.	What is graphene? Represent a brief note on mechanical, electronic and optical properties of graphene?	7
b.	How many ways are there for classifying the synthesis routes of Nano structured materials? Discuss several bottom up techniques?	7
4.	What is the requirement of energy storage device? Discuss the application of carbon material in Li ion battery and super capacitor?	14
5.a.	Discuss different synthesis of nanostructure materials? Explain the Ball-milling method of synthesis of nanomaterials,	7
b.	Discuss about AFM, FESEM, STM, SEM & TEM?	7
6.a.	What is elastic and plastic deformation. Mention the difference between elastic and plastic deformation of the materials?	7
b.	Briefly discuss UV- spectroscopy. Describe various application of UV-spectroscopy?	7
7.	Write short notes **a)** Ball milling method of synthesis of nanomaterial **b)** Chemical vapour deposition method **c)** Physical vapour deposition method d) Nano material synthesis	14
8.a.	What is Raman spectroscopy. Write down the advantages of Raman spectroscopy?	7
b.	Write short notes on any three **a)** Nano rod **b)** Vander wall bonding **c)** Nano tube **d)** Ceramic material	7

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