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Sixth Semester B.Sc. Degree Examination, April 2024

First Degree Programme under CBCSS

Physics

Elective Course

PY 1661.4 : NANOSCIENCE AND TECHNOLOGY

(2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences; Each question carries **1** mark.

1. What is nanotechnology?
2. What is the importance of energy band?
3. What are excitons?
4. What is nanosheets? Give an example?
5. What is a molecular beam epitaxy system?
6. What is ball milling method?
7. What is the Hall-Petch relationship?
8. What are the properties of nano diamond?
9. How are nanobiomatrices used in drug delivery?
10. What are the applications of nanotechnology in the food industry?

(10 × 1 = 10 Marks)

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SECTION – B

Answer any **eight** questions, not exceeding a paragraph. Each question carries **2** marks.

11. What are the dimensions of 2D nanomaterials?

12. Explain the different types of electron emissions.

13. What is Schottky defect and its consequences?

14. Explain quantum confinement effect in nanomaterials.

15. Write a note on electron moving in 1D nanowire?

16. What do you mean by nanobelt? How it is synthesized?

17. Explain Sputtering techniques?

18. How does grain size affect material properties? Why is grain size important?

19. Obtain Debye Scherrer equation.

20. Explain the application of Carbon nanotubes.

21. How is nanotechnology used in environmental remediation?

22. Write a note on Nano electronics.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Explain electron transport in semiconductors. What are the factors influenced in electron transport?

24. Explain pulsed laser deposition techniques? Discuss its applications.

25. How does electron beam lithography work?

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26. Explain the working of scanning tunneling microscope.

27. Derive the density of states for 2D structure.

28. Explain the application of nanotechnology in medical field.

29. How is nanotechnology used in defense and security?

30. Briefly explain sol gel techniques.

31. Briefly explain Buckminster fullerene.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Explain briefly the free electron model of metals. How conduction does takes place in insulators semiconductors and metals?

33. What are the quantum behaviors of nanoparticles?

34. With labelled diagram, explain chemical vapour deposition technique.

35. Discuss in detail about atomic force microscope.

(2 × 15 = 30 Marks)

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