Class : II M.Sc., (Physics)

Title of the paper : Nano physics

SHORT ANSWER TYPE QUESTIONS

UNIT I

1. Define nanotechnology.
2. What are nanomaterials?
3. What is the size range of nanomaterials?
4. Mention some effects of size reduction of nano particles.
5. Write a short note on top down method.
6. What is called bottom up approach?
7. Write different modes of classification of nanomaterials.
8. Write a short note on quantum dot.
9. What is called quantum wire?
10. Define quantum well.
11. State the differences between quantum wire and quantum well.
12. What is meant by quantum confinement?

UNIT II

13. Write a short note on the discovery of C_{60}.
14. Define the structure of C_{60}.
15. Give a short note on C_{60} crystal.
16. How superconductivity is obtained in C_{60}.
17. What is a carbon nano tube?
18. Give the types of CNTs.
19. Define Bucky ball.
20. Write any two properties of CNTs.
21. Give the applications CNTs.

UNIT III

22. What is sol-gel method?
23. What do you mean by electrochemical method?
24. Write the principle of electrospinning method.
25. What is lithography?
26. Give the principle of atomic layer deposition technique.
27. What is Langmuir-Blodgett film?
28. Give any two applications of Langmuir-Blodgett films.
29. What are called zeolite cages?
30. Define core shell structure.
31. What are organic and inorganic hybrids?
32. State the applications of organic and inorganic hybrids.

UNIT IV

33. State the principle of SEM.
34. Give the advantages and disadvantages of SEM.
35. Write the principle of TEM.
36. State the differences between SEM and TEM.
37. Give the principle of STM.
38. Write the principle of SPM.
39. Give the advantages of SPM.
40. What is the difference between STM and SPM?

UNIT V

41. List out the applications of nanomaterials in electronics.
42. What is a nanorobot?
43. State the application of nanoparticles in biology.
44. Give a short note on band gap engineered quantum devices.
45. What is a carbon nano tube emitter?
46. State the uses of carbon nano tube emitter.
47. List out the nanomaterials used in photoelectron chemical cells.
48. What is a photonic crystal?
49. Give the applications of photonic crystals.
50. Write a short note on Plasmon waveguide.

LONG ANSWER TYPE QUESTIONS

(FIVE MARKS AND TEN MARKS QUESTIONS)

UNIT I

51. Briefly explain top down and bottom up approaches for producing nanomaterials.
52. Write a note on nano structured matrerials and their importance and applications.
53. Describe about 1D, 2D and 3D nanostructured materials.
54. Discuss the fabrication and applications of quantum dots and quantum wires.
55. Explain: exciton confinement in quantum dots.

UNIT II

56. Explain how C60 is discovered and give the structure of C60.
57. Discuss the fabrication the carbon nanotubes and explain its structure.
58. Explain in detail Electrical, vibrational and mechanical properties of CNTs.
59. Discuss the applications of CNTs.

UNIT III

60. Explain how oxide nanoparticles can be obtained by sol gel method.
61. Describe the principle and experimental set up of electrochemical deposition method.
62. Explain the lithography method to fabricate nanomaterials.

63. Write short notes on (i) Langmuir-Blodgett films
(ii) Zeolite cages
64. Explain in detail about core shell structures.
65. Explain how organic and inorganic hybrids are formed. Discuss its advantages and disadvantages.

UNIT IV

66. Explain with a neat diagram SEM setup and its use in analysing nanostructures.
67. Explain with a neat diagram TEM setup and its use in the characterization nanomaterials.
68. Explain the STM setup and discuss its advantages and disadvantages.
69. Describe the principle of SPM and its experimental procedure in analysing nanostructures.

UNIT V

70. Discuss the advantages and basic principles of nanomaterials in electronics.
71. Explain nano drug delivery system with reference to pore and other special structures.
72. Make short notes on (i) Band gap engineered nano materials.
(ii) Photoelectro chemical cells
(iii) Photonic crystals