

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2016**Sixth Semester****Choice Based Course—NANOSCIENCE AND NANOTECHNOLOGY****(Common for B.Sc. Physics Model I and Model II)****[2013 Admissions]****Time : Three Hours****Maximum Marks : 80****Part A***Answer all questions.**1 mark each.*

1. Nanomaterials have a relatively larger surface area when compared to the same _____ of material produced in large scale.
2. Bottom-up technology starts with small components, always individual _____ which are assembled to make the desired structure.
3. Buckminster fullerene is a perfect sphere made from sixty _____ atoms.
4. Nanohorns are _____ walled nanotubes with an irregular horn-like shape.
5. Fermi level lies in the middle of the energy gap for _____.
6. Electrical characteristics of carbon nanotubes can act as _____.
7. Scanning probe microscopy uses a _____ that is scanned over a surface.
8. Tunnelling conductance increases as local density of states _____.
9. A dendrimer is a tree like highly branched _____ molecule.
10. Carbon based nano diamonds are soluble in _____.

(10 × 1 = 10)**Part B***Answer any eight questions.**2 marks each.*

11. What are carbon nanotubes ?
12. List a few applications of nanotubes.
13. What do you mean by deep traps ?
14. What is photo fragmentation ?
15. What are chemical sensors ?

Turn over

16. Explain STM.
17. What are photonic crystals ?
18. Write a note on magnetoresistance.
19. Give the features of quantum wells.
20. What do you mean by density of states ?
21. State the principle of quantum dot lasers.
22. What is NEMS ? Explain.

(8 × 2 = 16)

Part C

*Answer any six questions.
4 marks each.*

23. Explain the fabrication of carbon nanotubes.
24. Discuss on the crystallographic method of characterisation.
25. Bring out the dynamics of nanomagnets.
26. Explain the size dependence of properties of crystal structure.
27. Explain transmission electron microscopy.
28. Give an account on superfluid clusters.
29. Explain the preparation of quantum nanostructures.
30. Write a note on nanocarbon ferromagnets.
31. Briefly explain single electron tunnelling.

(6 × 4 = 24)

Part D

*Answer any two questions.
15 marks each.*

32. Describe the physical properties of nanostructures.
33. Discuss the electron transport in semiconductors.
34. Give an account on nanomachines and nanodevices.
35. Describe the applications of nanomaterials in medicine and energy.

(2 × 15 = 30)