TB146700A   Reg. No…………………………

Name………………………....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
SEMESTER VI - PHYSICS

PHY6NN – NANOSCIENCE AND NANOTECHNOLOGY

Time: Three Hours   **Maximum Marks: 80**

PART A

I.   Answer all questions. Each question carries 1 mark.

1.   What is Fermi energy?
2.   What is called locked moment magnetism?
3.   Define photofragmentation.
4.   Define dislocations in a crystal lattice.
5.   Write two methods used for the fabrication of nanostructured multilayers.
6.   Differentiate between fluorescence and phosphorescence.
7.   What is antiferromagnetism?
8.   What is a fuel cell?
9.   What are quantum wires?
10. What is known as Frenkel defect?

                                                                (10x1=10)

PART B

II.   Answer any eight questions. Each question carries 2 marks.

11. Sketch the energy bands in conductors, semiconductors and insulators.
12. Write a note on excitons.
13. What are ferrofluids?
14. What are fullerenes?
15. What are the various kinds of carbon nanotubes?
16. What are natural nanocrystals?
17. Explain hybridization in methane.
18. What is meant by density of states?
19. What is meant by single electron tunneling?
20. What do you mean by a molecular switch?
21. What is nano imprint Lithography?
22. What is the advantage of using carbon nanotube on STM tip attached to a cantilever in an atomic force microscope?

                                                                (8x2=16)

PART C

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

23. What are superfluid clusters?
24. Describe theoretical modelling of nanoparticles.

25. Briefly explain the role of carbon nanotubes in chemical sensors.
26. Briefly explain photonic crystals.
27. Write a note on metal nanocluster composite glasses.
28. What are nano carbon ferromagnets?
29. Write a note on infra red detectors.
30. Compare MEMS to NEMS.
31. Briefly explain quantum dot lasers.

(6x4=24)

PART D

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

32. With the help of suitable diagrams explain the working of SEM,STM and AFM.
33. How can we calculate the grain size of a nanoparticle from X Ray Diffraction pattern?
34. Write in detail the concept of Giant and Colossal Magnetoresistance.
35. Explain the preparation of quantum nanostructures. Also mention the size and dimensionality effect of nanostructures.

(2x15=30)