



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - CHEMISTRY

THIRD SEMESTER – NOVEMBER 2013

CH 3952 - CHEMISTRY OF NANO MATERIALS

Date : 12/11/2013

Dept. No.

Max. : 100 Marks

Time : 9:00 - 12:00

Part-A

Answer all questions. Each question carries two marks.

1. Differentiate aerogels from cryogels.
2. Mention the stages involved in spin-coating method.
3. What are the advantages of hard mold in nanofabrication?
4. Mention any one of the cases of photofragmentation observed in nanoparticles.
5. Why do we need photonics instead of electronics?
6. Compare the structures of SWCNT and MWCNT.
7. What are metal-matrix composites? Give an example.
8. Mention the differences between AFM and STM.
9. What are piezoelectric materials? What is the common piezoelectric material used in AFM scanners?
10. What are the three major steps in the function of a solar cell?

Part-B

Answer eight questions. Each question carries five marks

11. Describe laser ablation method of synthesising nanomaterials.
12. Explain solvothermal synthesis of nanomaterials.
13. How does replica molding technique applied in nanofabrication.
14. Explain the following. (a) photoluminescence (b) electroluminescence.
15. Differentiate between spontaneous and stimulated emission.
16. Discuss the energy bands and gaps in semiconductors.
17. How are carbon nanotubes classified on the basis of their chirality?
18. Explain Stober method of synthesising silica nanoparticles.
19. Explain the fundamental principles of scanning electron microscopy.
20. Explain the principle of operation of the AFM.
21. Discuss the photoelectrochemical decomposition of water.
22. Explain how gold nanoparticles are used in the diagnosis of cancer.

Part-C

Answer four questions. Each question carries ten marks

23. (a) Write the chemical reactions involved in CVD technique with suitable examples. (6)
(b) What is the role of stabilisers in the synthesis of metal nanoparticles. (4)
24. Describe non-templated and templated self-assembly for nanofabrication.
25. Explain in detail the quantum confinement in semiconductors. (10)
26. What are core-shell nanoparticles? Explain their classification with suitable examples. (10)
27. (a) How do you index a powder diffraction pattern? (6)
(b) Explain how you would determine whether the unit cell of a sample is primitive or FCC or BCC. (4)
28. What are the challenges and advantages of nanofluids in cooling technology? Explain their applications.
