



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2015

CH 3952 - CHEMISTRY OF NANO MATERIALS

Date : 11/11/2015
Time : 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2 = 20)

1. Mention the stages involved in spin coating method.
2. What are soft pattern transfer elements? Mention its advantages.
3. Why does the luminescent yield increase in metal nanoparticles?
4. What are Wannier-Mott and Frenkel exciton?
5. Define electron phonon relaxation.
6. What are quantum dots?
7. Name the tools to characterize the size distribution, surface charge and aggregation of nanoparticles.
8. A peak due to 16.3 nm crystallite in an XRD spectrum is observed with 0.00873 radian integral breadth. Calculate Bragg angle of the observed peak (wavelength of x-ray is 0.154 nm).
9. Mention the components of a photovoltaic system.
10. What are the criteria of magnetic nanoparticles for biomedical applications?

Part-B

Answer any EIGHT questions.

(8 × 5 = 40)

11. Discuss the hydrothermal method of synthesizing nanomaterials.
12. What is CVD? Explain MOCVD.
13. How is solvent assisted micromoulding technique applied in nanofabrication?
14. Discuss the selection rules for direct and indirect band gap absorption.
15. Write the application of quantum dots in biological labeling.
16. What are superparamagnetic nanoparticles? Mention their applications.
17. How is silica nanoparticle synthesized by Stober method?
18. What are dendrimers? Discuss the convergent synthetic methodology of dendrimers.
19. What are the strengths and limitations of SEM? Mention its applications.
20. Explain the working principle of scanning tunneling microscope.
21. Write a brief note on dye-sensitized solar cell.
22. Discuss the role of dendrimers as carrier of agents.

Part-C

Answer any FOUR questions.

(4 × 10 = 40)

- 23a. Explain the inert gas condensation of synthesizing nanomaterials. **(5)**
b. Describe the sol-gel method of synthesizing nanomaterials. **(5)**
- 24a. Explain the self-assembly of nanoparticles using organic molecules. **(5)**
b. How does ferromagnetic resonance arise in ferromagnetic materials? **(5)**
25. Explain spectral absorbance bands due to surface plasmon resonance in nanoparticles and nanorods.
26. What are carbon nanotubes? How are carbon nanotubes synthesized? Mention their properties.
27. How do you index a powder diffraction pattern of simple cubic crystal system?
- 28a. Mention the advantages and applications of nanofluids. **(5)**
b. Write the mechanism of Heck reaction. **(5)**
