K21P 0190

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree (C.B.S.S. – Reg./Suppl. (Including Mercy Chance/Imp.) Examination, April 2021
(2014 Admission Onwards)
CHEMISTRY
CHE4E.05 : Nanomaterial Chemistry

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **one** mark.

1. What are nanomaterials ?
2. _____ nature of electrons is used to obtain image in electron microscope.
3. What are the two approaches in nanomaterial synthesis ?
4. Give the full name of STM and HRTEM.
5. What are nanocomposites ?
6. State Moore's law.
7. Why catalytic activity of nanomaterials are high ?
8. How fuel gives energy in fuel cell ? **(8×1=8)**

SECTION – B

Answer **any eight** questions in **two** or **three** sentences. **Each** question carries **two** marks :

9. What is meant by Auger emission ?
10. Write Bragg equation and how it is used in X-ray diffraction technique in crystal structure analysis.

P.T.O.

11. What are organic electronic devices ?

12. How SEM differ from TEM ?

13. What is the use of UV-vis spectroscopy in quantum dot and metal nanoparticle analysis ?

14. Which properties of nanoparticles are used in designing nanosensors ?

15. How can nanotechnology be used for sustainable development ?

16. What are magnetic nanomaterials ?

17. How can we achieve band gap tuning in semiconductor nanoparticles ?

18. Give the applications of fullerenes.

19. Write a note on metal oxide nanoparticles.

20. What are self-assembled monolayers and how it is useful in nanoparticles synthesis ?

21. Describe Electron beam Lithography.

22. What is meant by elipsometry ?

23. What are core-shell nanoparticles ?

24. Write down the working of scanning ion conducting microscopy. **(8×2=16)**

SECTION – C

Short paragraph question. Answer **any four**. **Each** question carries **3** mark :

25. Explain the principle behind XPES.

26. What are the different processes that takes place on the electron interaction with matter in scanning electron microscope ?

27. Explain the colloidal method of nanomaterial synthesis.

28. Discuss on the harnessing of nanotechnology in safe drinking water.

29. Discovery of CNT is a landmark in the history of nanomaterial research. Justify.

30. What are quantum confined nanoparticles ? How they are classified on the basis of dimensionality ?

31. What are the different physical methods of nanoparticles synthesis and grouped them into ?

32. Explain the image formation confocal microscopy. **(4×3=12)**

SECTION – D

Essay type question. Answer **any four**. **Each** question carries **6** mark :

33. Explain the application of nanomaterials in energy conversion and energy storage.

34. What are quantum dots and describe its dimensionality ? Give examples. Explain its application in Light induced processes.

35. What are polymer based and non-polymer based nanocomposites ? Explain with examples.

36. Explain any two Electron microscopic techniques in surface analysis of nanomaterials.

37. Explain any two Spectroscopic techniques for the study of nanomaterials.

38. How HOMO-LUMO gap in semiconductors like nanoTiO_2 are manipulated. How this manipulation affects their optical properties ?

39. Describe various chemical methods for the nanomaterial synthesis.

40. Explain the physical methods for nanomaterial synthesis.

41. Explain the magnetic properties of metal nanoparticles.

42. Write notes on nanoparticles, quantum confined particles and Clusters.

43. How nanomaterials helps in eliminate pollution as well as causes pollution ?

44. Write notes on :

    a) Chemical sensing using nanoparticles

    b) Size dependent properties of nanomaterials. **(4×6=24)**
