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Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, May 2021

First Degree Programme under CBCSS

Chemistry

Complementary Course For Physics

CH 1431.1 : SPECTROSCOPY AND MATERIAL CHEMISTRY

(2019 Admission Regular)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions, each question carry 1 mark.

1. What is Rayleigh scattering?

2. What are the ores of Titanium?

3. Name the nano materials used in semiconductor

4. Define the process roasting.

5. What are nano shells?

6. What is Wilkinson' s catalyst?

7. What is the reference materials in NMR spectroscopy?

8. What is the selection rule in vibrational spectroscopy?

9. Name one example for liquid crystals.

10. What is the condition for a molecule to be Microwave active?

(10 × 1 = 10 Marks)

PART – B

Answer **any eight** questions, each question carry 2 marks.

11. Differentiate stokes and anti stokes lines.

12. How Rotational spectroscopy can be used to determine bond length of a molecule?

13. Explain tetrahedral complex with example.

14. What are the different types of energy in a molecule?

15. Explain the principle in NMR spectroscopy.

16. What is zone refining?

17. What are types of electronic transitions?

18. Explain one bottom up method for synthesis of nano materials

19. Write two medical application of nano materials

20. What are the types of liquid crystals?

21. What are polyacetylenes?

22. What are optical properties of nano materials?

23. Explain the principle behind SEM.

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24. What are the types of magnetic materials?

25. What is the historical aspect of Nano science?

26. What is Faraday's divided metal?

(8 × 2 = 16 Marks)

PART – C

Answer **any six** questions, each question carry **4** marks.

27. Explain the process froth flotation and zone refining.

28. Describe super conducting materials with example.

29. What is the principle of STM?

30. What are application of nano materials in robotics and computers?

31. Explain Bathochromic shift and Hypsochromic shift with examples.

32. Discuss Werner's theory of coordination compounds.

33. Explain the formation of high spin complex with example.

34. Briefly explain principle and application of rotational spectroscopy.

35. Describe advantages and disadvantages of Raman spectroscopy.

36. Explain the terms Chemical shift and spin-spin coupling.

37. What are the application of coordination complexes?

38. Explain the vibration spectra in the case of harmonic oscillator.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions, each question carry **15** marks.

39. Explain postulates of valance bond theory of coordination complexes. Also explain the drawback of the theory.

40. (a) Describe on application of coordination complexes.

    (b) Discuss Quantum theory of Raman spectroscopy.

41. Discuss various process in purification of metals.

42. (a) Give an account on synthesis and application of conducting polymers.

    (b) Explain medical application of Au, Ag and ZnO.

43. Describe on various methods for the preparation of nano materials.

44. (a) Explain the selection rule in rotational spectroscopy for a diatomic molecule.

    (b) Give a description on NMR spectroscopy.

$(2 \times 15 = 30 \text{ Marks})$

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