T – 2536

Reg. No. : ....

Name : ....

Fourth Semester B.Sc Degree Examination, July 2024

First Degree Programme under CBCSS

Chemistry

Complementary Course for Physics

CH 1431.1 : SPECTROSCOPY AND ADVANCED MATERIALS

(2020 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. What is Faraday's divided metal?

2. What is super conductivity? Give one examples.

3. What is artificial transmutation?

4. Give two examples of biodegradable polymers.

5. What are high and low spin complexes? Give one example for each.

6. What is the selection rule for rotational spectrum?

7. What are the nuclear spin energy levels of hydrogen atom?

8. Give the equation for frequency of vibration.

P.T.O.

9. What is used as a standard in MMR spectroscopy? Why?

10. What is meant by pyroelectricity? Give examples.

<div align="right">(10 × 1 = 10 Marks)</div>

SECTION – B

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

11. What are the different classifications of magnetic materials?

12. Write down the expression for rotational energy and explain the terms.

13. What is a harmonic oscillator?

14. What is mutual exclusion principle?

15. Why stocks lines are more intense than anti-stock lines in Raman spectrum?

16. Comment on the optical properties of Nanomaterials.

17. What is the difference between a double salt and a complex compound?

18. How does chemical shift arise in NMR spectroscopy?

19. What is the principle of neutron activation analysis?

20. What is colloidal precipitation for nano material synthesis?

21. What is AFM and its basic principle?

22. What are the different types of liquid crystals?

<div align="right">(8 × 2 = 16 Marks)</div>

SECTION – C

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

23. Explain the spacing of rotational spectral lines for a linear diatomic molecule.

24. What are the different types of electronic transitions in molecules?

25. What is the quantum theory of Raman spectroscopy?

26. Explain the valance bond theory of bonding in tetrahedral complexes.

27. Write a short note on Radio carbon dating.

28. Explain the different mechanical properties of Nano materials.

29. Explain the principle of Application of TEM.

30. Discuss the synthesis and application of poly acetylene.

31. What do you mean by top-down and bottom-top approach in synthesis of nano materials.

$(6 \times 4 = 24$ **Marks**$)$

SECTION – D

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

32. (a) Briefly explain the application of radioactivity in agriculture and medicine.
    (b) Give a brief account of the medical application of nano particles.

33. (a) Explain the principle of NMR spectroscopy.
    (b) What are the advantages and disadvantages of Raman spectroscopy?

34. Briefly explain the different types of liquid crystals and its applications.

35. Explain the application of co-ordination compounds in qualitative and quantitative analysis.

$(2 \times 15 = 30$ **Marks**$)$

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