G – 4093

Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, July 2019

(First Degree Programme under CBCSS)

Complementary Course for Physics

CH 1431.1 : SPECTROSCOPY AND MATERIAL CHEMISTRY

(2017 Admn.)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. What is the unit of wave number?

2. What range of wavelength is utilized in IR spectroscopy?

3. For NMR spectroscopy, ——————— region of electromagnetic radiations are used.

4. What is specific selection rule for rotational spectrum?

5. Identify a functional group where $\pi - \pi^*$ transition occurs?

6. Define the term Ligands.

7. The ore of calcium is ——————.

8. What is an Ores?

9. Mechanical grinding is ————— approach in Nanomaterial synthesis.

10. The cantilever which probes the surface has an atomically sharp tip which is brought into contact with the surface are used in ————— Microscopy.

$(10 \times 1 = 10$ Marks)

P.T.O.

SECTION – B

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

11. Discuss Splitting pattern in NMR spectra of Ethanol.

12. What is the expression for Quantized rotational energy level of diatomic molecule?

13. The stokes lines in Raman spectra are more intense than anti-stokes line. Why?

14. Give one example each for low spin complexes and high spin complexes.

15. Define the term metallurgy.

16. What is zone refining?

17. What is mean by Crystal field stabilization energy?

18. What is Nanoscience?

19. Discuss in brief about Sol Gel Process.

20. What are Quantum dots?

21. What is the principle involved in Scanning Tunnelling Microscopy?

22. What is Superconductivity?

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

SECTION – C

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

23. What kind of molecule gives Microwave spectra?

24. What are the types of Electronic transition occurs in Electronic spectroscopy and what range of wavelength they get absorbed?

25. What are the important postulates of Werner's coordination theory?

26. Describe the splitting of d-orbitals in Tetrahedral complexes by Crystal field theory.

27. Write a short note on Van Ankel Method.

28. Describe how the Titanium metal is extracted from its Ores.

29. Give an account of top-down approach in preparation of Nanomaterials.

30. Write a short note on Optical properties of Nanomaterials.

31. Describe what are the types of Liquid crystals.

<div align="right">(6 × 4 = 24 Marks)</div>

SECTION – D

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

32. What are the basic factors that affect Chemical Shift in NMR spectroscopy?

33. What are the basic postulates of valence bond theory? Give an account of how the Crystal field theory differs from Valence Bond Theory.

34. (a) State and Illustrate Frank-Condon principle.

    (b) Give short note on following terms :
       (i)   Bathochromic shift,
       (ii) Hypsochromic shift,
       (iii) hyperchromic shift and
       (iv) Hypochromic shift.

35. Discuss the various applications of Nanomaterials.

<div align="right">(2 × 15 = 30 Marks)</div>

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