



K22U 0376

Reg. No. :

Name :

VI Semester B.Sc. Degree (CBCSS – OBE – Regular) Examination, April 2022
(2019 Admission)CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B16CHE/PCH : Physical Methods in Chemistry

Time : 3 Hours

Max. Marks : 40

Instruction : Answer the questions in English only.

SECTION – A

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

1. Bands appear at the multiples of fundamental frequency in IR spectrum are called
2. Internal standard used in NMR spectroscopy is
3. Point group of trans-N₂F₂ is
4. Quantum dots are an example for _____ dimensional material.

SECTION – B

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

5. What is chemical shift in NMR spectroscopy ? How it is measured ?
6. State and explain mutual exclusion principle.
7. Differentiate between auxochrome and chromophore.
8. What is McLafferty rearrangement ? Explain with an example.
9. Calculate rotational constant of HCl molecule. The HCl bond length is 136 pm.
10. What is ab initio studies in computational chemistry ?
11. Differentiate between top down and bottom up methods used in the synthesis of nanomaterials.

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12. Explain the symmetry element improper axis of rotation.
13. Explain the terms base peak and molecular ion peak in mass spectrometry ? How they differ from each other ?
14. What are Schoenflies notations ?

SECTION – C

Answer **any four** questions. **Each** question carries **3** marks.

15. Explain the quantum theory of Raman scattering.
16. State and explain the Woodward-Fieser rules for the determination of the λ_{\max} of conjugated dienes. Compare the λ_{\max} of 1, 3 – butadiene and 2, 4 – hexadiene.
17. Predict and draw the proton NMR peak positions of the following molecules
 - i) CH₃ – CO – CH₃
 - ii) CH₃ – CO – C₆H₅
 - iii) C₆H₅ – CH₃
18. Write a short note on the classifications (based on dimensions) of the nanomaterials.
19. Write a short note on the synthesis and applications of graphene.
20. Explain how SEM can be used for the characterization of nanomaterials.

SECTION – D

Answer **any two** questions. **Each** question carries **5** marks.

21. Briefly explain any four methods used for the synthesis of nanomaterials.
22. Write a short note on :
 - i) Hatree-Fock theory.
 - ii) Semi empirical methods.
23. Why NMR spectroscopy is used as one of the best methods for the structural elucidation of the organic molecules ?
24. What is the principle of microwave spectroscopy ? How it can be used for finding the bond length of molecules ?