Reg. No. : ..................................

Name : ..................................

**VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.)**
**Examination, April 2021**
**(2014-2018 Admissions)**
**CORE COURSE IN CHEMISTRY**
**6B16CHE : Physical Methods in Chemistry**

Time : 3 Hours

Max. Marks : 40

## SECTION – A

(Answer **all** questions. **Each** question carries **one** mark.)

1. Give the number of fundamental vibrations for $CO_2$.

2. What are auxochromes ?

3. Give one example for $C_{2v}$ point group.

4. Name the internal standard in nmr.

(1×4=4)

## SECTION – B

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

5. State and explain the rule of mutual exclusion.

6. What is the principle of AAS ?

7. Sketch the nmr spectrum of acetaldehyde and identify the peaks.

8. State Frank condon principle.

9. What is surface plasmon resonance ?

10. Write Ilkovic equation and explain the terms.

P.T.O.

11. What is meant by diffusion current ?

12. What is an inversion center ?

13. What is micro emulsion method ?

14. What do you mean by meta stable ion ?

15. Write two advantages of Raman spectra over IR spectra.

16. Identify the mirror planes present in $BF_3$.

17. Give the point group of $NH_3$ and $N_2O_4$.

18. Explain the effect of hybridization on the frequency of vibra. $(2\times7=14)$

## SECTION – C

(Answer **any 4** questions. **Each** question carries 3 marks.)

19. Using Woodward Feiser rule calculate $\lambda_{max}$ for :

    a) 3,4-dimethylpent-3-ene-2-one.

    b) p-chloroacetophenone.

20. Discuss two chemical methods for nano particle synthesis.

21. What are the advantages of amperometric titration ?

22. What are the factors affecting chemical shift ?

23. Give three applications of carbon nanotubes.

24. Explain the terms proper and improper rotation with suitable example.

25. Explain the Mc Lafferty rearrangement.

26. Discuss the significance of group frequency concept in IR spectroscopy.

$(3\times4=12)$

## SECTION – D

(Answer **any 2** questions. **Each** question carries **5** marks.)

27. a) Explain the selection rules for Raman spectroscopy.

    b) Discuss the quantum theory of Raman scattering.

28. Explain the different kinds of symmetry elements and symmetry operations.

29. Describe the theory and instrumentation of spectrophotometry.

30. Explain the construction and working of dropping mercury electrode. What are the advantages of it ?

31. Discuss any two methods for the characterisation of nanoparticles.

32. a) Explain the term force constant on the basis of simple harmonic oscillator model of a diatomic molecule.

    b) The force constant of HI IS 283.4 N m$^{-1}$ .Calculate the fundamental frequency in cm$^1$. [H=1.008; I=126.9]. $(5\times2=10)$

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