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D. K. M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

SEMESTER EXAMINATIONS

JUNE - 2022 19CCH6D

ELECTIVE - IV: SPECTROSCOPY

Time: 3 Hours **Max. Marks: 75**

SECTION – A (10 x 2 = 20)

Answer ALL the questions.

1. Define wavelength.
2. Define frequency.
3. What are chromophores? Give an example.
4. What are auxochromes? Give an example.
5. State Hooke's law.
6. Why H_2 is Raman active whereas IR inactive?
7. Why TMS is a good reference compound in NMR spectroscopy?
8. Differentiate butane and cyclobutane based on NMR spectroscopy.
9. Define 'g' factor.
10. Predict the m/e value for the base peak in the mass spectrum of the following.
    i) Ethylcyclopentane ii) Methylcyclohexane

SECTION – B (5 x 5 = 25)

Answer ALL the questions.

11. (a) Describe the rotational spectra of diatomic molecules.

    (Or)

    (b) i) What is the wave number of the radiation whose wave length is 275 nm?
    ii) Calculate the frequency of a radiation whose wavelength is 420 nm.

12. (a) Explain bathochromic and hypsochromic shift.

    (Or)

    (b) Discuss the factors governing the absorption maximum and intensity in UV spectroscopy.

13. (a) Explain which of the following compounds are IR active
    i) 1-butene ii) 2,3-dimethyl-2-butene iii) 2,3-dimethyl-2-hexene

    (Or)

    (b) Discuss Rayleigh, stokes and anti-stokes lines in the Raman spectrum.

14. (a) How many signals are expected in the NMR spectrum of the following compound? Give reason.
    i) 1,1,2 – tribromoethane ii) acetophenone

    (Or)

    (b) Explain the applications of NMR spectroscopy with example.

15. (a) Explain the principle of ESR spectroscopy.

. (Or)

(b) Discuss the principle and instrumentation of mass spectroscopy.

SECTION – C (3 x 10 = 30)

Answer any THREE of the following questions.

16. (a) Write notes on electromagnetic radiations.

    (b)Describe Born-Oppenheimer approximation and its limitation.

17. Describe the instrumentation, block diagram and applications of UV spectroscopy.

18. (a) Discuss the significance of the fingerprint region in IR spectroscopy.

    (b) Write notes on mutual exclusion principle.

19. Explain the following with example:

    i) Chemical Shift ii) Shielding and Deshielding iii) Coupling Constant.

20. Discuss different type of peaks in mass spectroscopy.

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