S. NO.: 36 BATCH: 2003 – 2016 Reg. No.:

END OF SEMESTER EXAMINATIONS, APRIL / MAY – 2019
MOLECULAR SPECTROSCOPY
SUBJECT CODE : 08UACH09

MAJOR : B.Sc (Chemistry) SEMESTER : VI
TIME : 3 HOURS MAX. MARKS: 75

SECTION A – (10 X 1 = 10)

Answer All the Questions:

1. The wave length of radiation is 400nm. Calculate its frequency in S.I units?
2. Give the names of two compounds which will show rotational spectra?
3. Write the selection rule for IR spectra.
4. How many fundamental vibrational frequencies are possible for a non-linear molecule of *n* atoms.
5. Give the name of a molecule which is IR inactive but Raman active?
6. What is required for a molecule to become Raman active.
7. How many PMR signals would you expect for Di Ethyl ether?
8. Mention the number of peaks given by ethanol in PMR.
9. Predict the number of lines in the esr spectrum of $\cdot CH_2F$.
10. Which will be the highest peak in the mass spectrum?

SECTION B – (5 X 4 = 20)

Answer All the Questions:

11. a) Distinguish between atomic and molecular spectra.

[OR]

b) What are different types of molecular spectra?

12. a) Give an account on zero point energy.

[OR]

b) Discuss IR spectrum of H_2O and CO_2 molecules.

13. a) Explain IR mutual exclusion principle with suitable examples.

[OR]

b) Define chromophores and auxochromes with examples.

14. a) How many kinds of PMR protons are there in

i) CH_3-CH_3 ii) $CH_2-CH_2-CH_3$

iii) $(CH_3)_2-CH-CH_2-CH_3$ iv) $C_6H_5-CH_3$.

[OR]

b) Write the various factors affecting the chemical shift.

15. a) Discuss the principles of ESR.

[OR]

b) State and explain nitrogen rule.

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SECTION C – (5 X 9 = 45)

Answer All the Questions:

16. a) Hydrogen Iodide molecule exhibits rotational spectrum with an interval of $13cm^{-1}$. Calculate the moment of Inertia and band length in S.I units.

[OR]

b) How will you calculate isotopic mass from rotational spectra.

17. a) *HBr* molecule absorbs IR radiation at the wave length of $3.77\times10^{-6}m$. Calculate the force constant of *HBr*. Given that $c=2.998\times10^{8}ms^{-1}$; $H=1amu$ and $Br=80amu$.

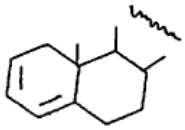
[OR]

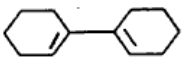
b) Discuss the instrumentation of IR spectra.

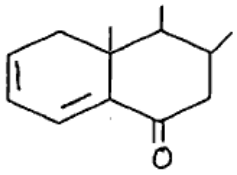
18. a) How do you explain Rayleigh's line, strokes line and antistrokes lines in Raman spectra.

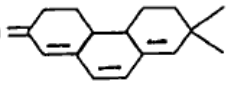
[OR]

b) Calculate λ max for the following compounds.

i) 

ii) 

iii) 

iv) 

19. a) Describe PMR instrumentation.

[OR]

b) Discuss the PMR spectra of iso propyl chloride and benzoic acid.

20. a) Illustrate instrumentation of ESR Spectrometer.

[OR]

b) i) Explain Mclafferty rearrangement with examples.

ii) Write different fragmentation patterns in mass spectra.

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