

M.Sc DEGREE EXAMINATION, APRIL 2019
II Year IV Semester
Analytical Techniques in Chemistry

Time : 3 Hours

Max.marks :75

Section A ($10 \times 2 = 20$) Marks

Answer any **TEN** questions

1. State Beer-Lambert's law.
2. Write the basic components of IR spectrophotometer.
3. Why anti-Stoke's lines are weaker than Stoke's lines?
4. What is TMS? Give its application.
5. How many ^1H NMR signals will be obtained for the following compounds?
(a) *p*-xylene (b) cyclobutane.
6. Compare the basic principles of ESR and NMR techniques.
7. Draw the block diagram of ESR spectrometer.
8. What are thermometric titrations?
9. Indicate the quantities measured and sketch a model DTA curve.
10. Write the role of atomiser in atomic absorption spectroscopy.
11. What is photoelectron spectroscopy? Cite the basic difference between uv-PES and XPS.
12. Mention any two applications of atomic absorption spectroscopy.

Section B ($5 \times 5 = 25$) Marks

Answer any **FIVE** questions

13. Explain the appearance of Rayleigh and Raman lines based on quantum theory.
14. Describe how Mossbauer spectra is helpful in distinguishing Fe(II) and Fe(III) complexes.
15. Explain ESR spectrum of *bis*-salicylaldehyde copper(II) complex.
16. Discuss the applications of DTA.
17. Explain McLafferty rearrangement with an example.
18. With the help of block diagram describe ^1H NMR spectrum.
19. Explain chemical and spectral interferences in atomic absorption spectroscopy.

Section C ($3 \times 10 = 30$) MarksAnswer any **THREE** questions

20. (a) Describe briefly how an electronic spectrum scanned for an organic compound by double-beam uv-visible spectrophotometer.
- (b) How will you distinguish the following pair of compounds by IR spectroscopy?
- (i) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3OCH_3 (ii) $\text{CH}_3\text{CH}_2\text{CHO}$ and CH_3COCH_3
21. (a) Explain the principle of ^{13}C NMR spectroscopy. Mention its advantages over ^1H NMR spectroscopy.
- (b) A compound with molecular formula $\text{C}_8\text{H}_8\text{O}$ gives the following ^1H NMR spectrum.
- (i) Multiplet (δ 7.28) 5H (ii) Doublet (δ 2.8) 2H (iii) Triplet (δ 9.78) 1H
- Find the structural formula of the compound.
22. What is meant by magnetic susceptibility? How it is determined by Gouy method?
23. (a) Describe the instrumentation of TGA.
- (b) Explain the fragmentation patterns of alcohols in mass spectrometry.
24. Discuss the applications of photoelectron spectroscopy.

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