Exam. Code: 0433
Sub. Code: 3456

2123

M.Sc. (Applied Chemistry/Pharmaceutical)
3rd Semester
Paper-304: Spectroscopic Instrumentation Techniques

Time allowed: 3 Hours | Max. Marks: 60

NOTE: *Attempt five questions in all, including Question No. IX (Unit-V) which is compulsory and selecting one question each from Unit I-IV.*

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UNIT – I

I. (a) Explain various radiation sources used in UV and visible absorption spectroscopy.

(b) Derive and discuss Lambert Beer's Law. (8+4)

II. (a) Differentiate between Nephelometry and Turbidity.

(b) Discuss effect of concentration on fluorescence. (6+6)

UNIT – II

III. (a) Derive the expression for vibrational frequency.

(b) What will be the force constant for the bond in HCl if the fundamental vibrational frequency is $8.667\times10^{-13}S^{-1}$. (7+5)

IV. (a) Discuss the concept of hydrogen bonding on the frequency of absorption of different compounds.

(b) Discuss the following concepts of IR spectroscopy:

(i) Fermi resonance

(ii) Overtones (6+6)

UNIT – III

V. Discuss the following in NMR spectroscopy:

(a) Spin-spin coupling

(b) Chemical shift and various factors affecting chemical shift (6+6)

VI. (a) Explain NMR spectrum of the following:

(*i*) $C_6H_5-CH_3$ (*ii*) $CH_3-CO-CH_3$ (*iii*) CH_3-CH_2-CHO

(b) Discuss equivalent and non-equivalent protons in detail. (6+6)

P.T.O.

UNIT-IV

VII. (a) Discuss completely time of Flight Analyzer.

(b) Explain C-13 NMR spectroscopy briefly. (6+6)

VIII. Explain the following:-

(a) Quadrupole analyzers

(b) Single focusing mass analyzer system (6+6)

UNIT-V

IX. Attempt the following:-

(a) Write about combination bands.

(b) Why H_2O is not used as a solvent in IR spectroscopy?

(c) Brief note on Spark source spectrometry.

(d) Differentiate Auxochromes and Chromophores. (4×3)

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