

1127
M.Sc. (Applied Chemistry/Pharmaceutical)
3rd Semester
Paper-304: Spectroscopic Instrumentation Techniques

Time allowed: 3 Hours

Max. Marks: 60

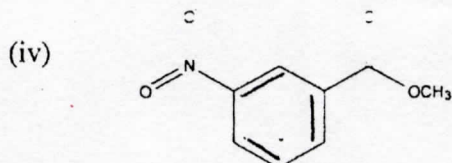
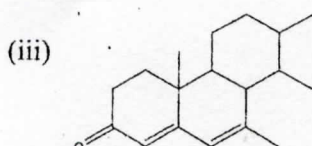
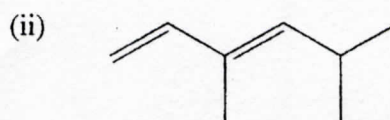
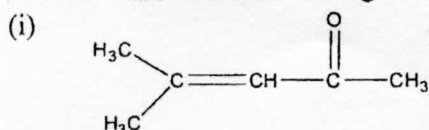
NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit.

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1. a) Discuss the various factors affecting fluorescence.
b) What is the effect of hybridization of carbon on the stretching frequency of C-H bonds? Explain.
c) In the mass spectrum of Toluene, strong peaks are formed at m/e 91 and m/e 65 and a broad peak at 46.4. Justify these signals.
d) What is TMS? Why is it employed as a reference in NMR spectrum? (3x4)

UNIT I

2. a) Discuss the various sources of radiation used in UV spectrophotometer.
b) Calculate λ_{max} for the following compounds:



(7,8)

3. a) Derive Beer-Lambert Law.
b) Differentiate between Turbidity and Nephelometry.
c) Discuss the theory behind Fluorescence and Phosphorescence. (5,4,6)

UNIT II

4. a) What are the conditions for a molecule to be IR active? Explain the principle in detail.
b) Derive the expression for fundamental vibrations in IR.
c) Calculate the degrees of freedom for a non linear molecule. (7,6,2)
5. a) Explain the transducers used in IR spectroscopy.
b) Explain the dispersive IR spectrophotometer in detail. (8,7)

UNIT III

6. a) Give details of the ionization sources used in mass spectrometers.
b) Explain the resolution of mass spectrometer. (10,5)
7. a) Write details of quadrupole mass analyzer.
b) Explain the working of double focussing mass spectrometer. (7,8)

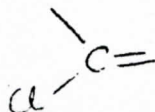
P.T.O.

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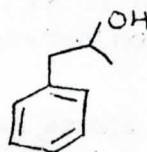
UNIT IV

8. a) Why is TMS used as reference in NMR? Give details.
b) What is chemical shift in NMR? Explain the factors affecting chemical shift in detail.
c) Explain the number of different protons present in

(i)



(ii)



(4.6.5)

9. a) Give the quantum description of NMR in detail.
b) Write the applications of NMR spectroscopy.

(8.7)

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