

MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-IV AC :SUMMER- 2022
SUBJECT : ADVANCED ANALYTICAL TECHNIQUES

Day : Saturday
Date : 02-07-2022

S-20179-2022

Time : 03:00 PM-06:00 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the right indicate **FULL** marks.
 - 3) Draw neat and labelled diagram **WHEREVER** necessary.
 - 4) Use of log table / non – programmable scientific calculator is **ALLOWED**.
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SECTION – I

- Q.1** Attempt **ANY THREE** of the following: **(15)**
- a) Discuss liquid phase chemiluminescent titrations.
 - b) Give an account of applications of Turbidometry and Nephelometry in detail.
 - c) Explain MID IR reflection spectrometry with suitable diagram.
 - d) Explain theory of Raman spectroscopy.
 - e) Explain in detail the qualitative and quantitative analysis of IR spectroscopy.
- Q.2** A) Attempt **ANY TWO** of the following: **(10)**
- i) Describe fluorimetry apparatus in brief with suitable sketch.
 - ii) Explain any two detectors used in IR instruments.
 - iii) Explain the stretching and bending vibrations of a polyatomic molecular.
- B) Solve **ANY ONE** of the following: **(05)**
- i) What is the energy possessed by a radiation of wave number 1050 cm^{-1} ?
 - ii) The fundamental frequency of C = O is 2075 cm^{-1} , then calculate the force constant of this bond.
(Given: Atomic weights - C = 12.05, O = 15.99, $c = 3 \times 10^{10}\text{ cm/s}$)

SECTION - II

- Q.3** Attempt **ANY THREE** of the following: **(15)**
- a) Explain the interaction of X – rays with matter.
 - b) Explain FT – NMR spectrometer with suitable sketch and its applications in various industries.
 - c) Give a sketch of electron microscopy with diagram and explain applications of it.
 - d) Why ESCA give satellite peak? Explain all the possible reasons in detail.
 - e) Discuss the advantages and disadvantages of X – ray fluorescence method.
- Q.4** A) Attempt **ANY TWO** of the following: **(10)**
- i) Describe Auger electron spectroscopy with suitable diagram.
 - ii) Describe the construction & working of Coolidge tube which is used for production of X – rays.
 - iii) Explain the use of MRI in medicinal chemistry.
- B) Solve **ANY ONE** of the following: **(05)**
- i) Calculate the frequency of ESR line for an unpaired electron at magnetic flux density of 0.3572 T.
(Given: $g = 2.16$, $n = 6.626 \times 10^{-34}\text{ Js}$)
 - ii) Calculate the NMR absorption frequency in Hz for ${}^9\text{F}$ nucleus in a magnetic fields.
(Given : $\lambda = 2.52 \times 10^8\text{ rad T}^{-1}\text{ s}^{-1}$)
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