M. SC. (ANALYTICAL CHEMISTRY) SEM-IV (CHOICE BASED CREDIT & GRADE SYSTEM) : WINTER - 2017

SUBJECT :ADVANCED ANALYTICAL TECHNIQUES

Day : **Wednesday** Time : **03.00 PM TO 06.00 PM**
Date : **01/11/2017** **W-2017-0786** Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer books.
4) Draw neat and labelled diagram **WHEREVER** necessary.
5) Use of log table/non programmable scientific calculator is **ALLOWED**.

SECTION - I

Q. 1 Attempt **ANY THREE** of the following: **(15)**

a) Describe MIDIR absorption spectroscopy and explain application of it.
b) Describe RAMAN instrument in detail with suitable diagram.
c) Explain any two detectors used in INFRA RED spectroscopy.
d) Give an account of applications of Turbidimetry and Nephelometry in detail.
e) Describe fully Michelson interferrometer and its use in FTIR.

Q. 2 **A)** Attempt **ANY TWO** of the following: **(10)**

i) Explain applications of phosphorimetry in industries.
ii) Explain stretching and bending vibrations of a polyatomic molecule.
iii) Discuss liquid phase chemiluminescent titrations.

B) Solve **ANY ONE** of the following: **(05)**

i) Calculate the energy possessed by a radiation of wave number 990 cm^{-1}.
ii) The force constant of the bond in CO is 901×10^6 dynes/cm and reduced mass is 1.135×10^{-23} g.
Compute the frequency of vibration of CO molecule.
Given : $C = 3 \times 10^{10}$ $cm.s^{-1}$.

SECTION - II

Q. 3 Attempt **ANY THREE** of the following: **(15)**

a) Describe NMR spectrometer with suitable diagram.
b) Describe Auger electron spectroscopy.
c) Explain the use of X-ray absorption for chemical analysis.
d) Explain the use of MRI in medical chemistry.
e) Desceibe qualitative analysis by ESR spectroscope.

Q. 4 Attempt **ANY TWO** of the following: **(10)**

i) Describe the construction and working of Coolidge tube which is used for production of X-rays.
ii) Outline the principles of Electron microscopy.
iii) What are satellite peaks? Explain the mechanism that leads to satellite peaks.

B) Solve **ANY ONE** of the following: **(05)**

i) Calculate the frequency of ESR line for an unpaired electron at magnetic flux density of 0.3275 T
(*Given*: $'g' = 2.16$, $n = 6.626 \times 10^{-34}$ *Js*.
Bohr magnetron $= 9.275 \times 10^{-24}\ JT^{-1}$)

ii) Calculate the absorption in a magnetic field of strength 2.4 T for ^{31}P nucleus.
(*Given*: $\upsilon = 1.084 \times 10^8\ rad\,T^{-1}\,s^{-1}$)

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