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SB-3508

M. Sc. (Part - II) Examination

March / April – 2011

Analytical Chemistry : Paper - I

(Intrumental Methods of Analysis)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **M. Sc. (Part - 2)**

Name of the Subject :

☛ **Analytical Chemistry - 1**

☛ Subject Code No. : **3 5 0 8** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Figures to the right indicate full marks to that question.
(4) Spectroscopy data tables can be used.
(5) Answers to all questions to be written in same answer book.

1 (a) Explain the working principle of Michelson Interferometer in FTIR spectrophotometer. **11**

OR

(a) Describe basic principle of pyroelectric and photoconducting transducers used in IR spectrophotometer.

(b) Explain the origin of stoke and antistoke lines in Raman spectra.

OR

(b) State the selection rules of Raman spectroscopy. How is depolarization ratio measured in Raman spectroscopy ?

(c) Arrive at the most probable structure of the compound by assigning the absorption bands to different stretching and bending vibrations for the given data :

Molecular formula : $C_8H_8O_2$

1725cm^{-1}, 1280 cm^{-1} , 1120 cm^{-1}, 1425 cm^{-1}, 710 cm^{-1}.

2 (a) Discuss local diamagnetic effects and magnetic anisotropy in NMR with one example in each. **11**

OR

(a) What is chemical shift ? Give its scale and units for ^{1}H and ^{13}C.

(b) Explain the use of shift reagent in NMR spectroscopy.

OR

(b) State selection rules in ESR spectroscopy. Describe splitting pattern in methyl radical.

(c) Suggest the most probable structure with suitable justification to following NMR data :
Molecular formula : C_7H_8O .

$\delta = 7.2\,(5H)(m),\ \delta = 4.2\,(2H)(d),\ \delta = 3.69\,(1H)(t),$.

3 (a) Explain the principle and working of Time of Flight mass spectrometer. **11**

OR

(a) Describe GC-MS hyphenated technique. Give its advantages.

(b) Describe different sampling methods in mass techniques.

OR

(b) Describe field desorption ionization source of mass spectrometer.

(c) Give fragmentation pattern of any one :
(i) n-butyl benzene
(ii) methyl butyrate.

4 (a) Describe X-ray omission speclra. **12**

OR

(a) Define and explain the terms :
(i) mass absorption coefficient
(ii) absorption edge.

(b) Describe the use of flat crystals as monochromatic device in X-ray methods.

OR

(b) Explain the energy dispersive X-ray spectrometer. Give basic principle of X-ray fluorescence.

(c) Aluminium is to be used as window for a cell of X-ray absorption measurements with $A_g\ K_\alpha$ line source.The mass absorption coefficient for aluminium at this wavelength is 2.74 $cm^2/9$. Its density is $2.79/cm^3$. What maximum thickness of foil could be employed to fabricate window if no more than 2% radiation is to be absorbed by the foil ?

5 (a) Discuss the criteria in selecting flames for FES and AAS. Explain any one flame. **16**

OR

(a) Discuss the working of electrodeless discharge lamp. Give its merits and demerits.

(b) Explain the working of dc plasma source.

OR

(b) What is plasma ? How is it produced in ICP ? Describe different zones of ICP.

(c) Explain the interferences due to atomic line overlap and chemical ionization in AAS.

OR

(c) Compare DC and AC are sources in AES.

(d) Six 5.0 ml sample of raw milk were treated with 0.0, 5.0, 10.0, 15.0, 20.0 and 25.0 μ_g of Zn^{+2} and diluted to 50.0 mL. The absorbances of solutions were 0.255, 0.292, 0.346, 0.392, 0.458 and 0.510. Calculate the ppm of Zn^{+2} in sample of milk [Zn = 65.39] .

6 (a) What are the properties of PN junction ? Explain forward biased and revers biased diodes. **9**

OR

(a) Explain bipolar junction transistors.

(b) Discuss loading errors in voltage measurements.

OR

(b) Distinguish detectors, transducers and sensors. Give examples in each.
