AI—244—2017
FACULTY OF SCIENCE
M.Sc. (Second Year) (Third Semester) EXAMINATION
NOVEMBER/DECEMBER, 2017
(CBCS Pattern)
ANALYTICAL CHEMISTRY
Paper CH-534/4
(Instrumental Method of Chemical Analysis—I)

(Friday, 17-11-2017)   **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three *Hours*   *Maximum Marks*—75

N.B. :— (i) Attempt *All* questions.

(ii) Figures to the right indicate full marks.

(iii) Use of logrithmic table and calculator is allowed.

(iv) Multiple choice questions (MCQs) should be attempted only once on page No. 3 of answer-book with complete answer.

1. Attempt any *three* of the following :   15

(a) Describe an optical rotatory dispersion theory with its diagram.

(b) Give the applications of DTA and DSC in detail.

(c) Explain principle and working of Pulfrich refractometer with its schematic diagram.

(d) Discuss the nature of electromagnetic radiation in detail.

(e) Explain in detail principle and working of turbidimetry.

2. Answer any *three* of the following :   15

(a) Give an account of nephlometry with its schematic diagram.

(b) Discuss the applications of polarimetry in detail.

(c) The frequency of strong yellow line in the spectrum of sodium is 5.09×10^{-14} and 7.08×10^{-14} s^{-1}, calculate the wavelength in nanometer. ($c = 3.0 \times 10^8$ m/sec.)

(d) Describe Dapple shift and give the sources of line broadning.

(e) A sample of raffinose with specific rotation are 47.23°A and 67.32°A and angle of rotation are 16.23 and 35.20 and length of tube is 10 cm, 20 cm calculate the concentration separately.

P.T.O.

3. Answer any *one* from (*a*) and *one* from (*b*) :

(*a*) Describe the principles and working of atomic absorption spectroscopy with its neat labelled diagram. 7

Or

Discuss the types of thermogravimetry and give the principle of differential scanning calorimetry.

(*b*) What are the different types of thermometric titrations ? Explain in detail. 8

Or

Calculate the energy in joules per quantum, calories per mole at wavelength 3500°A and 2800°A.

Given :

$$[c = 3.0 \times 10^8 \text{ cm/sec}]$$
$$[N = 6.02 \times 10^{-23} \text{ mol}^{-1}]$$
$$[h = 6.62 \times 10^{34} \text{ J/sec}]$$

4. Answer any *one* from (*a*) and *one* from (*b*) :

(*a*) Explain atomic fluorescence spectra and give applications of AAS in detail. 7

Or

The refractive index of ethyl alcohol is found to be 1.3482 and 1.2241. If the density is 1.484 and 1.362, calculate molar refraction.

(Given : mol. wt = 46)

(*b*) Convert the following absorbance values into % transmission : 8

(*i*) 1.07

(*ii*) 1.05

(*iii*) 1.04

(*iv*) 1.78.

Or

Draw a schematic diagram of DTA and explain its working.

5. (A) Select the correct answer from given options for each of the following : 5

(*i*) In the rotation n_D^{2O} D stands for ....

(*a*) Density (*b*) D-line of sodium

(*c*) D-wave number (*d*) Velocity of light

(*ii*) The emission spectra are of ....

    (*a*) Two types   (*b*) Single types

    (*c*) Three types   (*d*) Four types

(*iii*) The AAS arises due to transition in ....

    (*a*) Rotational level   (*b*) Transition level

    (*c*) Electronic level   (*d*) Vibrations level

(*iv*) The technique of nephelometry and turbidimetry are employed in ....

    (*a*) Water treatment plants

    (*b*) Sewage works

    (*c*) Power and steam generation plants

    (*d*) All of the above

(*v*) An optically active organic compound must possess ....

    (*a*) At least one asymmetric carbon atom

    (*b*) No asymmetric carbon atom

    (*c*) Neither symmetric nor asymmetric

    (*d*) Symmetric or asymmetric

(B) Write short notes on any *two* :   2×5=10

(*i*) Applications of AAR

(*ii*) Continues automizer

(*iii*) Flame structure.