AG—244—2018

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2018

(CBCS Pattern)

ANALYTICAL CHEMISTRY

(CH-534/4)

(Instrumental Methods of Chemical Analysis-I)

(Monday, 3-12-2018)   **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours*   *Maximum Marks*—75

N.B. :— (*i*)   Attempt *All* questions.

       (*ii*)   Figures to the right indicate full marks.

       (*iii*)   Use of logarithmic 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 molecular electronic levels.

     (*b*)   Explain principle and working of Abbe's refractometer with its diagram.

     (*c*)   Describe circular dichroism theory.

     (*d*)   Explain working of Thermogravimetry with its neat labelled diagram.

     (*e*)   Explain in detail atomic emission spectra.

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

     (*a*)   Distinguish between atomic absorption spectra and atomic fluorescence spectra.

     (*b*)   Calculate the energy in Joules per quantum, calories per mole at wavelength 2800 Å.

         (Given : $C = 3 \times 10^8$ m/sec, $N = 6.02 \times 10^{-23}$ mole^{-1}, $h = 6.62 \times 10^{-34}$ s/sec.)

                                              P.T.O.

(c) Explain electrothermal automizers with its block diagram.

(d) Discuss the applications of DTA in detail.

(e) A sample of 1-alanine with specific rotation are 40.27 Å and 65.27 Å and angle of rotation 16.23 and 32.16 and length of tube is 15 cm. Calculate the concentration.

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

(a) Describe applications of thermometric titrations. 7

Or

Calculate the frequency of radiation whose wavelength is 700 and 1500 Å. Express this wavelength in wave number.

(Given : $C = 3 \times 10^{10}$ cm/sec)

(b) Explain principle and working of Differential Thermal Analysis (DTA) with its schematic diagram. 8

Or

Calculate the energy in Joules per quantum, calories per mole at wavelength 2800 Å and 3500 Å.

(Given : $C = 3 \times 10^8$ m/sec, $N = 6.02 \times 10^{-23}$, mol^{-1}, $h = 6.62 \times 10^{-34}$ s/sec)

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

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

(i) 1.25

(ii) 1.09

(iii) 1.78

(iv) 1.5

Or

Give the applications of nephelometry and turbidimetry.

(*b*) Explain spectral interference and chemical interference in detail. 7

Or

The refractive index of benzene is found to be 1.642 if the density is 1.712, calculate molar refraction. (molecular weight = 78).

5. (A) Choose the correct choice : 5

(1) The light scattered in nephelometry is ....

(*a*) elastic

(*b*) non-elastic

(*c*) both (*a*) and (*b*)

(*d*) none of the above

(2) AAS can be used to determine concentration as low as ....

(*a*) 10—20 ppm

(*b*) 10 ppm

(*c*) 1 ppm

(*d*) any amount

(3) The anlge of rotation depends upon ....

(*a*) conc.

(*b*) wavelength

(*c*) temperature

(*d*) all of the above

(4) Snell's law is ....

(*a*) $\sin i \times r = n$

(*b*) $\dfrac{\sin i}{\sin r} = \infty$

(*c*) $\dfrac{\sin i}{\sin r} = n$

(*d*) $\dfrac{\sin r}{\sin i} = n$

P.T.O.

(5) .... is used for accurate and good result.

    (a) ASC

    (b) DSC

    (c) TG

    (d) DT

(B) Write short notes on any *two* :   10

    (a) Flame atomization

    (b) Snell's law

    (c) Optical rotation.