ST—467—2022

FACULTY OF SCIENCE

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

MAY/JUNE, 2022

(New/CBCS Pattern)

ANALYTICAL CHEMISTRY

Paper XXIII

ACH-519

(Instrumental Methods of Chemical Analysis-II)

(Wednesday, 6-7-2022)   **Time : 2.00 p.m. to 5.45 p.m.**

Time— 3.45 *Hours*   *Maximum Marks—*75

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

(ii)   *All* questions carry equal marks.

(iii)   Use of logarithmic table and non-programmable calculator is allowed.

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

(a)   Describe calomel electrode with neat labelled diagram.

(b)   A solution containing 4.48 ppm of $KMNO_4$ (Mol. wt. = 158.04) was found to have transmittance of 0.309, when measured in 1 cm cell at wavelength of 250 mm. Calculate molar absorptivity of $KMNO_4$ solution.

(c)   Explain main component of mass spectrometer in detail.

(d)   Discuss in brief comparative method for neutron activation analysis.

(e)   Calculate the conductance of the following common salt separately, containing :

P.T.O.

(i) 1.90×10^{-4} m of common salt, 6.30×10^{-5} m of potassium chloride with cell constant 2.49.

(ii) 2.15×10^{-4} m of common salt, 1.20×10^{-5} m of potassium chromate with cell constant 1.56. (Given : $k : 1.49 \times 10^{-4}$)

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

(a) Describe acid-base titration in non-aqueous solvent by potentiometry.

(b) Explain in brief : Migration current and residual current.

(c) Calculate optimum path length of the current, if number of fringes (n) were 59 and 49 between wave number $3000 - 900$ cm^{-1}.

(d) Explain photoemissive cell detectors in U.V. Visible spectrophotometry with its diagram.

(e) The molar absorptivity of solute is 1.40×10^{-4} m^{-1}. mol^{-1}, cm^{-1}. when solution has absorbance 0.85, in 1 cm light path cell, calculate the transmittance and concentration of the solution.

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

(a) Describe double beam U.V. visible spectrophotometer with its schematic diagram. 7

Or

Discuss applications of potentiometry in detail.

(b) A sample of Barium sulphate weighted about 0.950 gm about 65 ml of 0.28 N of silver nitrate was added to precipitate as silver sulphate, the excess of silver nitrate was titrated against 0.20 N of KSCN to give 52 ml of litre value. What is the amount of barium sulphate in the sample ? (mol wt = 233.38)

Or

Describe the principle and working of Scientillation counter with its block diagram.

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

(*a*) An absorbance of 0.323 was obtained after 10.6 ml of titrating agent was added to 56 ml of an initial solution. What was the corrected absorbance of solution ? What would be percentage error if the correction was not made ?

Or

What do you mean by half wave potential ? What are the factors affect on limiting current ?

(*b*) Calculate separately the optimum path length of the current, if the number of fringes were (*n*); 65 and 38 in between wave number 3500 – 600 cm^{-1} and 3100 – 500 cm^{-1}.

Or

Give an account of applications of IR-spectrophotometry and conductometry.

5. Write notes on any *three* : 15

(*a*) Photometric filtrations

(*b*) Applications of radioactive element

(*c*) Polarographs

(*d*) Cell thickness.