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# AG—289—2018

**FACULTY OF SCIENCE**

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

**NOVEMBER/DECEMBER, 2018**

**(CBCS Pattern)**

ANALYTICAL CHEMISTRY

Paper XX (CH-544/4)

(Instrumental Methods of Chemical Analysis—II)

**(Tuesday, 4-12-2018)** **Time : 2.00 p.m. to 5.00 p.m.**

*Time*—3 *Hours* *Maximum Marks*—75

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

(*ii*) *All* questions carry equal marks.

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

1. Answer any *three* of the following : 3×5=15

(*a*) Draw a labelled diagram of membrane electrode and explain it in detail.

(*b*) Calculate the conductance of the following common salt solution separately containing :

(*i*) $1.60 \times 10^{-4}$ m common salt, $4.30 \times 10^{-5}$ m of Boric acid, with cell constant 1.58 ?

(*ii*) $2.30 \times 10^{-4}$ m common salt, $1.28 \times 10^{-5}$ m of Potassium borate, with cell constant 1.35 ?

(Given : K = $1.49 \times 10^{-4}$)

(*c*) Explain far infrared region in IR-spectroscopy.

P.T.O.

(*d*) Explain the following terms :

(*i*) Diffusion current

(*ii*) Residual current.

(*e*) Describe in brief sample inlet system in mass spectrometry with its schematic diagram.

2. Answer any *three* of the following : 3×5=15

(*a*) Explain main component of mass spectrometer in detail.

(*b*) Describe calomel electrode with neat labelled diagram.

(*c*) 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 nm. Calculate molar absorptivity of $KMnO_4$ solution.

(*d*) Explain correlation of IR-with molecular structure for IR-region.

(*e*) Explain in brief comparative method for neutron activation analysis.

3. Answer any *two* of the following :

(*a*) Describe the principle and working of scientillation counter with its block diagram. 8

*Or*

A sample of potassium bromide weighted about 0.700 gm about 80 ml of 0.45 N silver nitrate was added to precipitate as silver bromide, the excess of silver nitrate was titrated against 0.49 N of potassium thiocyanate to give 42.3 ml titre value. What is the amount of potassium bromide in the sample ?

(*b*) Give an account of applications of IR-spectrophotometry and conductometry separately. 7

*Or*

Discuss in detail applications of polarography.

4. (*a*) Discuss acid-base titrations in non-aqueous solvent by potentiometry. 8

*Or*

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 % error ? If the correction was not made ?

(*b*) Draw a neat labelled diagram of double beam spectrophotometer and discuss in detail. 7

*Or*

Calculate separately, the optimum path length of the current if the number of fringes were (*n*) 51 and 49 between wave-number 3500-900 $cm^{-1}$ and 3000-500 $cm^{-1}$.

5. (A) Choose the *correct* choice : 5

(*i*) An electrochemical cell consists of :

(*a*) Cadmium cell

(*b*) Two half cell

(*c*) Three half cell

(*d*) Lead accumulator

(*ii*) To study the proper circulation of blood, radioisotope use is :

(*a*) $I^{131}$

(*b*) $Na^{24}$

(*c*) $CO^{60}$

(*d*) $P^{32}$

P.T.O.

(*iii*) Spectrophotometer mainly concerned with wavelength of visible radiation is :

(*a*) 8000-4000 Å

(*b*) 2000-1000 Å

(*c*) 1000-100 Å

(*d*) 200-100 Å

(*iv*) The current due to supporting electrolyte is called :

(*a*) Residual current

(*b*) Migration current

(*c*) Diffusing current

(*d*) Limiting current

(*v*) The ions are accelerated by application of acceleration potential ranging from :

(*a*) 1 to 50 kV

(*b*) 1 to 100 kV

(*c*) 1 to 200 kV

(*d*) 100 to 1000 kV

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

(*i*) Films

(*ii*) Half wave potential

(*iii*) Applications of mass spectroscopy.