

MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-III AC : WINTER- 2022
SUBJECT : RECENT ANALYTICAL TECHNIQUES

Day : Saturday

Time : 02:00 PM-05:00 PM

Date : 31-12-2022

W-20161-2022

Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Graph Papers are supplied with the answer sheet.
- 5) Answers to both the sections should be written in the **SEPARATE** answer books.

SECTION - I

Q.1 Attempt **ANY THREE** of the following: **[15]**

- i) Explain in detail LASER based atomic fluorescence spectroscopy.
- ii) Define photometric titrations. Explain its use in industry.
- iii) Explain atomic absorption spectroscopy based on flame ionization.
- iv) Describe in brief different mass analyzers used in mass spectrometers.
- v) Define :
 - a) Absorbance
 - b) Transmittance
 - c) Radiant power
 - d) Absorptivity
 - e) Radiant energy

Q.2 A) Attempt **ANY TWO** of the following: **[10]**

- i) Write a note on monochromators with optical spectrometers.
- ii) Discuss all sources used in AAS and describe hollow cathode lamp in detail.
- iii) Define Beer's law and explain deviation for Beer's law.

B) Solve **ANY ONE** of the following : **[05]**

- i) Calculate the molar absorptivity of the given solution. 20 mg/ml solution of a substance (molecular weight = 250) has an absorbance 0.340 at 280 nm in 1.0 cm cell.
- ii) Calculate the kinetic energy of singly charged ion ($z = 1$), if it is accelerated through a potential 2.5×10^3 V in an electron impact source.

P.T.O.

SECTION - II

Q.3 Attempt **ANY THREE** of the following: **[15]**

- i) Explain the following terms :
 - a) Detergents having alcohol soluble materials
 - b) Iodine value of the detergent
- ii) Explain the physiological significance of fat-soluble vitamins.
- iii) Draw a sketch of C, H, N, O analyzer for organic compounds and describe each analysis in detail.
- iv) Describe in brief flow injection analysis and their applications in industries.
- v) Explain the use of automatic titration in pathology laboratory.

Q.4 A) Attempt **ANY TWO** of the following: **[10]**

- i) Describe tests for sulphonated and non sulphonated material in detergents.
- ii) Describe the use of robots in automatic analysis.
- iii) Explain physiological significance of fat soluble vitamins.

B) Solve **ANY ONE** of the following : **[05]**

- i) The sample of blood serum was analyzed for the calcium contents by AAS 455.7 nm in nitrous oxide acetylene flame. It gave the following data:

Conc. (PPM)	1.0	2.5	4.0	5.0	6.0	Unknown
Absorbance	0.090	0.231	0.367	0.460	0.551	0.328

Calculate the concentration of calcium (Ca) in given blood serum.

- ii) A solution of vitamin B₁₂ shows 75% transmittance at wavelength 270 nm. Calculate the absorbance of the solution.

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