Seat No. : 337

DR-106

December-2013

M. Sc. Semester I Examination

CHE 404 : CHEMISTRY

(Analytical Chemistry)

Time : 3 Hours] [Max. Marks : 70

1. Answer any two of the following : 14

   (a) Describe in brief the scope of Analytical Science and its Literature.

   (b) Write a short note on control charts, confidence interval and confidence limits.

   (c) What are the ways to express accuracy and precision ? Discuss in brief types of errors.

   (d) Discuss the importance of F-test and Q-test in statistical treatment.

   The following set of data was obtained for the analyses of chloride on separate aliquots of a pooled serum samples : 103, 114, 106 and 107 meq/L.

   (i) Which of these is a questionable value ?

   (ii) Evaluate the results using the Q-test and predict acceptance or rejection of the questionable value if any. (The Q-value for rejection at 95% confidence is 0.829)

2. Answer any two of the following : 14

   (a) Explain in brief the procedure to find the 'best straight line' using least square regression.

   (b) Define molarity and molality. Calculate the molality of 11.3 M solution of HCl. [mol. mass. of HCl, 36.5 gm/mol; density 1.18 gm/cc; assay, 35%].

   (c) What is sampling and sample preparation ? Discuss the general steps involved in chemical analysis.

   (d) Discuss the significance of internal standard and standard addition technique in quantitative analysis.

3. Answer any two of the following : 14

   (a) Explain in brief Circular Dichroism and Optical Rotatory Dispersion.

   (b) Describe in detail the instrumentation of a UV-Visible Spectrophotometer.

   (c) Derive Beer's Law in chemical analysis and give an explanation for the logarithmic relation between transmittance and concentration.

   (d) Write a short note on Derivative Spectrophotometry.

4. Answer any **two** of the following : 14

(a) Explain the analysis of a mixture with resolved and unresolved UV spectra.

(b) Describe in detail the method used for measurement of equilibrium constant.

(c) How photometric titrations are helpful in locating the equivalence point ? And discuss its types.

(d) Write a short note on the Job's method of continuous variation.

5. Answer in brief : (**1** mark each) 14

(1) Define significant figures. Indicate which zeros are significant in the following value : 0.060700.

(2) Define mole fraction.

(3) Distinguish between standard deviation and variance.

(4) What is the difference between limit of detection and limit of quantitation ?

(5) Define sensitivity and selectivity.

(6) What is signified by 'residues' in a calibration plot ?

(7) What does the value of correlation coefficient, r = 1 suggest ?

(8) Define : Auxochrome and chromophore.

(9) Explain in brief 'vibrational spectra.'

(10) Give the wavelength region for UV radiation.

(11) Give units for absorbance and molar absorptivity.

(12) Define wavenumber and wavelength.

(13) What is the function of monochromator ?

(14) Define Lambert's law.