

KJ-716

January-2013

404-Chemistry – Paper-IV**(Analytical Chemistry)**

Time : 3 Hours]

[Max. Marks : 75

1. Answer any two of the following : 14
- (a) Explain qualitative and quantitative analysis in analytical science with a suitable example.
 - (b) What do you understand by validation ? Describe various parameters for method validation as per Good Laboratory Practices.
 - (c) Discuss the implication of quality control charts. How will you determine the significance of a new method compared to a standard / established method ?
 - (d) Discuss the importance of F-test and Q-test in statistical treatment with a suitable illustration.
2. Answer any two of the following : 14
- (a) Write a brief note on the use of internal standards and standard addition technique with an illustration.
 - (b) Discuss sampling and sample preparation with general steps involved in chemical analysis.
 - (c) Write a brief note on calibration curve.
 - (d) How will you find the 'best straight line' using least square regression ?
3. Answer any two of the following : 14
- (a) Discuss in detail the various components of a UV – Visible Spectrophotometer.
 - (b) Explain :
 - (i) The photometric accuracy using Ringbom Plot
 - (ii) Derivative Spectrophotometry
 - (c) Derive Lambert – Beer's Law and explain the logarithmic relation between transmittance and concentration.
 - (d) Write a brief note on Optical Rotatory Dispersion and Circular Dichroism.

4. Answer any two of the following :

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- (a) Discuss : The Job's method of continuous variation for determining the composition of a complex.
- (b) Explain the analysis of a mixture when :
 - (i) the individual spectra overlap and
 - (ii) the individual spectra are well resolved.
- (c) How will you measure an equilibrium constant using Scatchard plot ?
- (d) Explain the various photometric titration curves and its advantages in locating the equivalence point.

5. Answer in brief : (1 mark each)

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- (1) Define limit of detection.
- (2) When do you find 'variance' of a method ?
- (3) Define : Accuracy and Precision.
- (4) How many significant figures are present in 8.256×10^{-3} ?
- (5) Define normality.
- (6) What does the value of correlation coefficient, $r = 0$ suggest ?
- (7) How can you calibrate a burette ?
- (8) Give the relation between Velocity of light, Frequency, Wavelength and Energy.
- (9) Explain :
 - (i) Monochromatic light
 - (ii) Plane-polarized light
- (10) Give units for absorbance and molar absorptivity.
- (11) Explain in brief 'vibration spectra'.
- (12) Give different units of wavelength and the conversion factor.
- (13) Give the relation between absorbance and transmittance.
- (14) Define : Chromophore