

Seat No. : _____

DD-127
December-2018
M.Sc., Sem.-I
404 : Chemistry
(Analytical Chemistry)

Time : 2.30 Hours]

[Max. Marks : 70

1. (A) Explain in detail confidence limit, confidence intervals and test of significance. An enzymatic method for determining alcohol in wine is evaluated by comparison with a gas-chromatographic (GC) method. The same sample is analyzed several times by both methods with the following results (% ethanol). Enzymatic method: 13.1, 12.7, 12.6, 13.3, 13.3. GC method: 13.5, 13.3, 13.0, 12.9. Comment on the significance of the enzymatic method compared to the GC method at the 95 % confidence level. (F value at 95 % confidence level is 9.12) **14**
- OR**
- (i) Discuss in brief qualitative and quantitative analysis in analytical science. **7**
- (ii) Describe the significance of quality control charts and Q-test. **7**
- (B) Answer the following : (any **four** out of **six**) **4**
- (i) What is relative standard deviation ?
- (ii) Explain method robustness.
- (iii) Name any two publishers in analytical science.
- (iv) How can determinate errors be overcome ?
- (v) What do you understand by sample matrix ?
- (vi) Define: Limit of detection.
2. (A) Explain the fundamentals of sampling and sample preparation. Discuss general steps involved in chemical analysis. **14**
- OR**
- (i) Give an account of least square regression for finding best straight line. **7**
- (ii) Describe in brief standard addition technique and importance of internal standards. **7**
- (B) Answer the following : (any **four** out of **six**) **4**
- (i) Significance of correlation co-efficient.
- (ii) What are residues in a calibration curve ?

- (iii) If the mole fraction of KBr in its aqueous solution is 0.24, what will be the mole fraction of water ? (Molecular mass of KBr is 119.0 g/mol and that of water is 18.0 g/mol)
- (iv) Molarity is independent of temperature. – True or false.
- (v) 50 mL of an iron(II) sulphate solution reacts completely with 60.0 ml of 0.150 N potassium permanganate. Calculate the normality of iron (II) sulphate solution.
- (vi) Why it is recommended to prepare solutions in normality for titrations ?
3. (A) Derive Lambert-Beer's Law in chemical analysis. Describe in detail the instrumental components of UV-Visible spectrophotometer. **14**
- OR**
- (i) Explain the concept of circular dichroism and optical rotary dispersion. **7**
- (ii) Give a detailed account of Ringbom plot. **7**
- (B) Answer the following : (any **three** out of **five**) **3**
- (i) Define : Transmittance.
- (ii) Why monochromator is placed after the light source in a spectrophotometer ?
- (iii) State the equation which represents relation between frequency and wavelength for electromagnetic waves,
- (iv) What is derivative spectrophotometry ?
- (v) Find the absorbance of a 0.0024 M solution of a substance with a molar absorptivity of 313 L M⁻¹ cm⁻¹ in a cell with a path length of 2.00 cm.
4. (A) Discuss the analysis of a mixture of analytes when the spectra are resolved and unresolved. **14**
- OR**
- (i) Explain the theory for measurement of equilibrium constant by Scatchard Plot. **7**
- (ii) Describe the role of Job's method of continuous variation in finding stoichiometry of a complex. **7**
- (B) Answer the following : (any **three** out of **five**) **3**
- (i) Absorbance is dimensionless. – True or false.
- (ii) What do you understand by stoichiometry ?
- (iii) Give any one example of photometric titration.
- (iv) Define equilibrium constant.
- (v) Give any two applications of spectrophotometry.