

[Time: 2 $\frac{1}{2}$ Hours]

[Marks:75]

Please check whether you have got the right question paper.

- N.B:
1. All Question are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of log table/non-programmable calculator is allowed.

Q.1 Answer **any three** of the following.

(A) Explain: 5

- i) Chi square test, and
- ii) Confidence limits and its significance

(B) Derive a regression equation for a straight line assuming the variables bear a linear relationship to one another, by least square method. 5

x	-3	-2	-1	0	1	2	3
y	80	90	92	83	94	99	92

(C) Discuss any two methods used for the reduction of sample size, in sampling of solids. 5

(D) A chemist obtained the following two sets of observations for the percentage of iron in the ore by two independent methods. Use the variance ratio test to determine whether the results from one method are statistically more precise than those of the other. 5

Given $F_{table} = 19.16$

Set I (%)	10.25	10.32	10.40	-
Set II (%)	10.42	10.29	10.35	10.26

(E) Explain: 5

- i) Null hypothesis, and
- ii) Q-test

(F) Describe briefly: 5

- i) Ambient sampling, and
- ii) Sampling of flowing liquid.

Q. 2 Answer **any three** of the following

(A) What is chromatography? Discuss the classification of chromatographic methods based on the principle involved. 5

(B) Explain the following w.r.t TLC. 5

- a) Preparation of chromatoplates, and
- b) Any three applications of TLC.

(C) What is the role of mobile phase in paper chromatography? Write the criteria for the selection of solvent system in paper chromatography. 5

(D) Write a note on precolumn & analytical column, as used in HPLC. 5

(E) What is the role of detector in HPLC? Discuss the UV detector used in HPLC, mentioning its advantages. 5

(F) Describe the methods used in applying sample on the HPTLC plates. Give any two limitations of HPTLC technique. 5

Q. 3 Answer **any three** of the following.

- (A) Explain the use of hollow cathode lamp, with a labelled diagram, giving its any one disadvantage. 5
- (B) Discuss the principle of flame photometry. 5
- (C) Mention any four applications of fluorimetry & discuss any two of these applications. 5
- (D) Draw a neat labelled diagram of nephelometer and explain nephelometric calibration curve. 5
- (E) Describe construction and working of graphite furnace with a labelled diagram. 5
- (F) Discuss the basis of choice between turbidimetry and nephelometry. Explain turbidimetric titrations. 5

Q. 4 Answer **any three** of the following.

- (A) Discuss the use of ferroin as an indicator in the redox titration of Fe^{2+} versus Ce^{4+} ? 5
- (B) Write a note on synergistic solvent extraction. 5
- (C) Describe the technique of Craig's counter current extraction with a neat labelled diagram. 5
- (D) Explain the process of extraction of metals by chelation giving suitable examples, w.r.t. solvent extraction. 5
- (E) Draw a neat labelled diagram of a double beam spectrophotometer and explain the function of each component. 5
- (F) What do you mean by redox-titration curve? Calculate the potential on addition of 10.5cm^3 of titrant in the titration of 10.0cm^3 of 0.1M Fe (II) solution against 0.02M KMnO_4 at $\text{pH}=1$. Given $E^{\circ}_{\text{Pt}/\text{Fe}^{3+}, \text{Fe}^{2+}} = 0.771\text{V}$ & $E^{\circ}_{\text{Pt}/\text{MnO}_4^-, \text{Mn}^{2+}} = 1.510\text{V}$. 5

Q. 5 (A) Fill in the blanks. 4

- a) Flushing is one of the methods used for sampling of _____.
- b) The most common fluxes used for decomposition of sample are compounds of _____ metals.
- c) Equation of Gaussian distribution curve is given as $Y = \text{_____}$.
- d) The sample prepared by mixing the increment is called _____ sample.

OR

- (A) State whether the following statements are true or false. 4
- p) Pyrosulphates are potent basic flux
- q) Sampling error is found to be inversely proportional to the square root of the number of samples averaged.
- r) Samples of gases is more easy as compared to sampling of liquids.
- s) For a sample to be true representative of the bulk, the bulk ratio should be as large as possible

Q. 5 (B) Fill in the blanks. 4

- a) The sample volume required in HPTLC is _____ than in TLC.
- b) Separation of solutes in HPTLC takes place by the phenomenon of _____.
- c) In paper chromatography, the relative position of migrated spots on the chromatogram is expressed in terms of _____ value.

d) In HPLC, when a single solvent of constant composition is used for separation, the technique is termed as _____ elution.

OR

(B) State whether the following statements are true or false. 4

- The developed spots are less diffuse in TLC than that in paper chromatography.
- Post chromatographic derivatization is possible in HPTLC.
- Solvent consumption is less in HPTLC as compared to TLC.
- HPTLC can simultaneously handle several samples of divergent nature & composition at a given time.

Q. 5 (C) Fill in the blanks. 4

- Most commonly used radiation source in fluorimeter is _____ lamp.
- A calibration curve, in flame photometry, is a plot of _____ against concentration.
- The function of secondary filter, in fluorimeter, is to absorb _____ radiations.
- Phosphoroscope measures _____ in the presence of fluorescence.

OR

(C) State whether the following statements are true or false. 4

- Phosphorescence is not readily observed at room temperature.
- In AAS, absorption of radiations by ground state atoms follows Beer's law.
- When test solution is complex in character, calibration method is preferred for quantitative analysis in flame photometry.
- Life time of phosphorescence is much larger than fluorescence.

Q. 5 (D) Fill in the blanks. 3

- Crown ethers is a generic name given to macrocyclic _____ containing ethylene bridge separating electronegative oxygen atoms.
- Unsaturated organic compounds absorb radiations in the _____ region.
- In a UV- visible spectrophotometer, cuvettes made up of _____ are used in the UV region.

OR

(D) State whether the following statements are true or false. 3

- In solid phase extraction, substantial waste disposal is a problem.
- The function of a detector in a UV visible spectrophotometer is to convert transmitted radiation to electrical signal.
- Spectrophotometers operate only in the visible region.
