Q.P. Code : 40603

[Time: 2.5 Hours] **[Marks: 75]**

Please check whether you have got the right question paper.

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

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

A. Name three types of systematic errors. Explain the terms constant errors and proportionate errors, with suitable examples. **5**

B. In a certain electrochemical process, the quantity of electricity consumed in coulombs were as follows: **5**

125.3, 125.5, 126.2, 125.7, 125.5, 124.9.

Calculate relative standard deviation.

C. A sample of portland cement containing 50% CaO by weight on anaylsis, yielded the following results. **5**

Weight of sample (mg)	200	300	400	500
Weight of CaO (mg)	98	147	196	245

Calculate: i) absolute error, and ii) relative error in parts per thousand.

D. Describe the technique of sampling of immiscible and homogeneous stationary liquid. **5**

E. Discuss the importance of particle size and sample size with respect to sampling of solids. **5**

F. Explain the use of various reagents and fluxes in the dissolution of sample. Name any two common fluxes, mentioning their nature. **5**

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

A. Discuss the nature of titration curve for the titration of strong acid against strong base, justifying the choice of suitable indicators. **5**

B. Discuss the choice of indicators in the titration of 10.0 cm^3 of 0.1M acetic acid ($K_a=1.8x10^{-5}$) against 0.1M NaOH, with the help of pH calculations as under: **5**

i) at half the equivalence point

ii) at the equivalence point

iii) on addition of 10.1 cm^3 of titrant.

C. Discuss Volhard's method for the estimation of chloride ions by back titration, explaining the techniques to minimize errors. **5**

D. Describe the determination of end point by Fajan's method in precipition titration. **5**

E. Name the different light dispersing devices used in UV-Visible spectrophotometer and describe any one in detail. **5**

F. With help of neat labelled diagram, explain the function of components in a single beam spectrophotometer. **5**

Q.P. Code : 40603

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

A. Explain the term chromatography. Discuss the classification of chromatographic technique based on the nature of phases involved, giving suitable examples. **5**

B. 0.1 dm^3 of 1M aqueous phase of Fe^{3+} is to be extracted with 20cm^3 portions of ether. Calculate how many extractions are necessary so as to bring the concentration of Fe^{3+} in the aqueous solution to $1x10^{-2}$mM. Given $D_{o/w}$=18.6. **5**

C. Ninety percent of metal chelate is extracted, when equal volumes of aqueous and organic phases were used. What will be the percentage extraction, if the volume of organic phase in tripled? **5**

D. State Nernst distribution law. Explain the following with respect to solvent extraction. **5**
i) Role of complexing agent, and
ii) Batch extraction.

E. Discuss the principle and any two applications of paper chromatography. **5**

F. Explain the following with respect to TLC. **5**
i) Preparation of chromatoplate.
ii) Any two advantages over paper chormatography.

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

A. With the help of a schematic diagram, discuss the construction and working of electrothermal atomizer in AAS. **5**

B. Draw a neat labelled diagram of a flame photometer and explain the function of each components. **5**

C. Discuss the following with respect to AAS. **5**
i) Radiation source, and
ii) Role of chopper

D. Discuss the effect of concentration of solution and particle size on scattering of light by solid particle. **5**

E. Discuss the following with respect to tubidimetry. **5**
i) Determination of molecular weight of macromolecules, and
ii) Phase titrations

F. Describe the basic principle of fluorimetry. **5**

Q.5 A. Fill in the blanks. **4**

a) Median of the set of observations 19.4, 19.2, 19.8, 19.1 = _____
b) The agreement among the numerical values of the replicate set recorded in an identical fashion is called _____.
c) An accurately weighed amount of _____ taken for analysis is called the analysis sample.
d) Displacement method is one of the methods used for sampling of _____.

OR

A. **State true or false.** **4**

p) The true value of a measurement is never known exactly.

Q.P. Code : 40603

q) Systematic errors affect the accuracy of the results.
r) Coning and quartering is used for reducing the particle size.
s) Random sampling is the selection of sample with bias.

Q.5 B. **Fill in the blanks.** **4**

a) For a titration of weak acid again weak base, pH changes are_____ near the equivalence point.
b) In Mohr's method, _____ is used as an indicator.
c) Absorbance determination are always carried out at wavelength of _____ absorption.
d) In the titration of 0.1M acetic acid versus 0.1M ammonium hydroxide, pH at the equivalence point is_____.

OR

B. **State true or false.** **4**

p) Mixed indicators are generally used for the titration of weak acid of weak base.
q) In Mohr's method, pH of the solution to be titrated should be preferably between 4.6 to 6.9
r) Absorption curve in spectrophotometer is a plot of absorbance versus concentration of the solution.
s) Mohr's method can be used for titration of iodide and thiocyanate.

Q.5 C. **Fill in the blanks.** **4**

a) According to Bush-Densen equation, for given D_A and D_B values, $\frac{V_o}{V_w}$ = _____

b) In TLC, _____ value is used for qualitative analysis.
c) In solvent extraction, for a given aystem, $[C_w]= 2\times10^{-4}M$, $[C_o]= 2\times10^{-3}M$, then $D_{o/w}$=_____
d) The choice of best possible developing solvent in paper chromatography depends on single facts that retardation factor should be _____ for different components in the given mixture.

OR

C. State true or false. **4**

p) The process of locating analyte on a thin layer plate is often termed as visualization.
q) R_f value is constant for a given system even under varying experimental conditions
r) TLC has become workhorse of drug industry for determination of product purity.
s) In solvent extraction, singled step extraction using large volumes of extractant is more efficient than multistep extraction using small volumes.

Q.5 D. **Fill in the blanks.** **3**

a) Liquid _____ is used to cool the sample to enhance the phenomenon of phosphorescence.
b) Phosphoroscope is a device that helps to measure _____ in presence of fluorescence.
c) The instrument used to measure turbidance is known as _____.

OR

D. **State true or false**. **3**

p) Flame serves as a radiation source for different elements in AAS.
q) The life time of phosphorescence is much larger than fluorescence.
r) AAS is independent of flame temperature.