

[Time: Three Hours]

[Marks: 100]

N.B:

1. All questions are compulsory.
2. Figures to right indicate full marks
3. Use of log table and non-programmable calculator is allowed.

Q.1 A] Fill in the blanks with suitable options and rewrite the statement

(Any Twelve)

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- i) Titration error is _____ type of error.
a) instrumental b) methodic c) operational
- ii) Semi micro analysis refers to analysis in which sample size is _____.
a) more than 100 mg. b) less than 10 mg c) 10mg to 100 mg
- iii) Random sampling is _____.
a) unbiased sampling b) systematic sampling c) biased sampling
- iv) Analysis sample is prepared from _____.
a) increment b) gross sample c) sub sample
- v) Precision is measured in terms of _____.
a) error b) deviation c) relative error
- vi) Uncertainty of last digit of measurement is an example of _____ type of error.
a) methodic b) instrumental c) operational
- vii) Which of the following is used as a primary standard in Redox titration?
a) potassium dichromate b) zinc sulphate c) succinic acid
- viii) The plot of pH against volume of titrant added is known as _____.
a) standard curve b) neutralisation curve c) calibration curve
- ix) Solution taken in flask for titration is called as _____.
a) indicator b) titrant c) titrand
- x) In complexometric titration, generally _____ of the following is used as a titrant.
a) EDTA b) succinic acid c) silver nitrate
- xi) Nickel can be precipitated as Ni-DMG in _____ medium.
a) highly acidic b) nearly neutral c) moderately alkaline
- xii) Ostwald's ripening refers to _____ of precipitate.
a) heating b) digestion c) drying
- xiii) Which of the following is optical type of instrument?
a) colorimeter b) potentiometer c) conductometer
- xiv) Beer's law spells about relationship between Absorbance and _____.
a) transmittance b) concentration of solution c) thickness of solution
- xv) Photomultiplier tube is used as a _____ in optical instruments like photometer, spectrophotometer.
a) monochromator b) sample cell c) detector
- xvi) Absorbance of _____ solutions can be measured by uv-visibal spectrophotometer.
a) coloured as well as colourless b) only colourless c) only coloured
- xvii) Wavelength region of uv is _____.
a) 1 to 180 nm b) 180 to 400 nm c) 400 to 780 nm
- xviii) Unit of absorbance is _____.
a) $\text{dm}^3 \text{mol}^{-1} \text{cm}^{-1}$ b) nm c) none of these

Q.1 B] State True or False (Any Three)**03**

- Incomplete drying of precipitate is methodic type of error
- Determination of the elements present in the sample, irrespective of chemical form in which they are present is called as proximate analysis
- Diphenyl amine is used as an indicator in acid base titration.
- Digestion of precipitate helps to give particles of uniform size.
- In spectrophotometer, monochromator used is a colour filter.
- Extension in conjugation in carbon chain is always associated with shift towards longer wavelength.

Q.1 C] Match the following: (Any Five)**05**

Column A	Column B
Methyl Orange	373 K
Eriochrome Black T	Detector
Drying of precipitate	Monochromator
Ignition of precipitate	Indicator of acid base titration
Grating	Indicator of complexometric titration
Photo emissive cell	500 to 1500 K

Q.2 Solve any four of the following**20**

- Give comparative account on accuracy and precision.
- State and explain the terms i) Increment ii) Sampling unit iii) Macro analysis iv) Micro analysis v) Trace analysis
- What is the purpose of sampling? Describe methods of sampling of different types solids.
- Enlist the classical methods of analysis. Write advantages of it. Discuss any one classical method.
- Three samples of alloy were analyzed for tin content, following results were obtained.

Sample No	01	02	03
Mass of sample in mg.	100	200	300
Amount of Tin in mg.	88	168	248

The actual Tin content in each sample is 80% of the mass of respective sample, Calculate absolute error, relative error, relative error in pph, also comment on the result

- A sample of blood was analysed for Hb content. Calculate absolute error, relative error, relative error in pph and relative error in ppt

Blood Sample No	1	2	3	4	5	6
Hb content	15.08	15.05	15.01	15.11	15.06	15.10

If the actual Hb content is 15.07

Q.3 Solve any four of the following**20**

- What are secondary standards? What conditions must they satisfy? Give examples of secondary standards used in acid base, and redox titration.
- Discuss estimation of Ni in Cu-Ni alloy.
- Explain the methods of calibration of burette and pipette.
- 10cm^3 0.1M ammonium hydroxide is titrated against 0.1M HCl solution at 298K. Calculate pH at equivalence point.
(Given K_b for ammonium hydroxide = 1.8×10^{-5} , $K_w = 10^{-14}$)

- e) Describe the difference with example between i) end point and equivalence point
 ii) One colour indicator and two colour indicator
 f) Discuss unit operations of gravimetric analysis i) Digestion ii) Washing

Q.4 Solve any four of the following**20**

- a) With the help of neat and labeled diagram explain the construction and working of double beam photometer.
 b) Compare: photometer and spectrophotometer.
 c) State Lambert's law and derive its mathematical equation.
 d) With the help diagram describe construction and functioning of 'photo emissive cell'
 e) The absorbance of a $3.2 \times 10^{-4}\text{M}$ solution when placed in a cell of length 2cm was found to be 0.456 at 650nm, Calculate molar absorptivity. If the same solution is placed in cell of length 4cm calculate i) absorbance ii) transmittance and iii) % transmittance.
 f) The absorbance of a $2.8 \times 10^{-4}\text{M}$ solution was found to be 0.202 at 420nm when placed in cell of length 2cm. Calculate the absorbance of solution having concentration i) double of original concentration ii) half of original concentration and both are placed in cell of length 4cm.

Q.5 Solve any four of the following**20**

- a) Describe method of sampling of flowing liquid.
 b) How minimization of determinate errors can be carried out?
 c) Describe i) Complexometric titration
 ii) Precipitation titration
 d) Explain the effect of i) pH ii) common ion effect on the solubility of precipitate.
 e) With the help of neat and labeled diagram explain the construction and working of single beam spectrophotometer.
 f) Write advantages and limitations of photometric titrations.
