[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 option and rewrite the statement
(Any Twelve) **12**

i) Incomplete drying of precipitate is _____ type of error.
a) instrumental b) methodic c) operational
ii) Macro analysis refers to analysis in which sample size is _____.
a) more than 100 mg. b) 10mg to 100 mg c) less than 10 mg
iii) Systematic sampling is also called as _____.
a) random sampling b) non random sampling c) unbiased sampling
iv) Increment is definite portion withdrawn from _____.
a) sampling unit b) universe c) sample
v) Error is a measurement of _____.
a) deviation b) reproducibility c) accuracy
vi) Un-calibrated glassware develops _____ type of error.
a) methodic b) instrumental c) operational
vii) Which of the following is used as a primary standard in acid base titration?
a) Acetic acid b) Sulphuric acid 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 in burette is called as_____.
a) indicator b) titrand c) titrant
x) In precipitation titration, generally _____ of the following is used as a titrant.
a) silver nitrate b) silver chloride c) silver chromate
xi) Metallochromic indicators (Metal ion indicators) are used in _____ type of titration.
a) neutralisation b) redox c) complxometric
xii) Precipitation of ionic solid takes place if _____.
a) solubility product > ionic product b) solubility Product < ionic Product
c) solubility Product = ionic Product
xiii) Which of the following is not optical type of instrument?
a) spectrophotometer b) colorimeter c) potentiometer
xiv) According to Beer-Lambert's law _____.
a) absorbance is directly proportional to concentration
b) absorbance is inversely proportional to concentration
c) there is no relation between absorbance and concentration
xv) In photometer, _____ is used to make the light monochromatic.
a) prism b) colour Filter c) grating

xvi) Plot of a mass against temperature is called as_____.
a) polarogram b) chromatogram c) thermogram
xvii) Wavelength region of vacuum uv is _____.
a) 1 to180 nm b) 180 to 400 nm c) 400 to 780 nm
xviii) Beer Lambert's law obeys only in_____.
a) hot solution b) dilute solution c) concentrated solution

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

i) Physical limitation of chemist develops operational error
ii) One of the purposes of sampling is to judging acceptability.
iii)Eriochrome Black T is used as an indicator in complexometric titration.
iv) Equivalence point of neutralization titration cannot be identifying by conductometric titration.
v) Photomultiplier tube is used as a detector in optical instruments like photometer, spectrophotometer.
vi)Extension in conjugation in carbon chain is always associated with shift towards shorter wavelength.

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

Column A	**Column B**
Phenolphthalein	Titration with liberated iodine
Diphenyl amine	Detector
Iodometry	Monochromator
Iodimetry	Indicator of acid base titration
Prism	Indicator of redox titration
Photo emissive cell	Titration with direct iodine

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

a) What are determinate errors? Describe source wise classification of determinate errors.
b) Explain the terms with example: i) universe ii) gross sample iii) sample iv) sub sample v) analysis sample
c) What is the purpose of sampling? Describe method of sampling of flowing liquid.
d) Enlist the instrumental methods of analysis. Write advantages of it. Discuss any one instrumental method.
e) Three samples of alloy were analyzed for Ni content by gravimetric method, following results were obtained.

Sample No	01	02	03
Mass of sample in mg.	100	200	300
Amount of Nickel in mg.	88	176	264

The actual Nickel content in each sample is 90% of the mass of respective sample, Calculate absolute error, relative error, relative error in pph, also comment on the result.

f) A sample of steel was analysed for chromium content. Calculate absolute error, relative error, relative error in pph and relative error in ppt. The actual chromium content is 56.27%

Sample No	1	2	3	4	5	6
Content of Chromium in %	56.28	56.25	56.21	56.31	56.26	56.30

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

a) What are primary standards? What conditions must they satisfy? Give any two examples of primary standards used in Acid Base titration.

b) Discuss in detail any two applications of gravimetric analysis.

c) Explain the methods of calibration of burette and pipette.

d) 10 cm^3 0.1M acetic acid is titrated against 0.1M NaOH solution at 298K. Calculate pH at equivalence point. (Given Ka for acetic acid is 1.8×10^{-5}, Kw = 10^{-14})

e) State and Explain: i) Neutralisation titration ii) End point

iii) Equivalence point iv) Indicator and its use to locate end point of titration

f) Describe the purpose of i) Drying ii) Incineration in gravimetric analysis.

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

a) What is thermal method of analysis? Explain the classification of thermal methods.

b) With the help of neat and labeled diagram, explain the construction and working of double beam spectrophotometer.

c) State Beers law and derive its mathematical equation.

d) Describe important deviations of Beer Lambert's law.

e) The absorbance of a 2×10^{-4}M solution when placed in a cell of length 1cm was found to be 0.234 at 535nm, calculate molar absorptivity. If the same solution is placed in cell of length 2cm calculate i) absorbance ii) transmittance and iii) % transmittance.

f) The absorbance of a 1.8×10^{-4}M solution was found to be 0.123 at 620nm when placed in cell of length 1cm. Calculate the absorbance of solution having concentration i) triple of original concentration ii) one fourth of original concentration and both are placed in cell of length 2cm.

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

a) Describe different types of equipments employed in sampling of compact solid.

b) State and explain any five methods for minimization of determinate errors.

c) Enlist and explain various types of titrations.

d) Explain the effect of i) Temperature ii) Diverse ion effect on the solubility of precipitate.

e) Compare: colorimeter and spectrophotometer.

f) Discuss photometric titration curves.

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