

NOTE: i) All the questions are compulsory.

ii) Figures to the right indicate full marks.

iii) Use of non-programmable calculator / log table is allowed.

**Q.1:A. Multiple choice questions (any 12)**

**(12M)**

- 1) Accuracy stands for \_\_\_\_\_  
a) Reproducibility      b) sensitivity      c) selectivity      d) correctness
- 2) Acid base titrations are based on the..... reactions.  
a) Precipitation b) neutralization c) complexation d) eletrochemical
- 3) In ----- silica is stationary phase and organic solvent is mobile phase.  
a) Thin layer chromatography      b) paper chromatography  
c) Ion exchange chromatography      d) gas liquid chromatography
- 4) A definite amount of sample drawn from each sampling unit is  
a) Increment b) Gross sample c) Sub-sample d) Bulk
- 5) Blowing of a pipette is  
a) Random error b) methodic error c) operational error d) instrumental error
- 6) The value of the selectivity may vary from -----?  
a. 0 to 1 b) 1 to 0 c) 1 to 1 d) 2 to 1
- 7) ..... Indicators are used in complexometric titration  
a) Adsorption b) Neutralisation c) Metallochromic d) Methyl orange
- 8) ..... Is a suitable indicator for the titration of strong acid and weak alkali.  
a) Methyl orange indicator b) phenolphthalein indicator  
c) Litmus solution      d) universal indicator
- 9) ..... Is the most widely used chelating agent in complexometry  
a) NaOH b) KOH c) EDTA d) Ni complex
- 10) In precipitation titration generally..... is used as a titrant.  
a) Silver nitrate b) sodium hydroxide c) Succinic acid d) silver hydroxide
- 11) Iodometry is one of the most important ----- titration method  
a. Acid -base      b. complexation      c. redox      d. precipitation
- 12) . ----- is not use as indicator in complexometry.  
a. Murex ide      b. EBT      c. phenol red      d. all of these
- 13) Visible spectrometry use radiation in \_\_\_\_\_ the region of electromagnetic spectrum.  
a) 400-750nm b) 180-400nm c) 750-951nm d) 200-450nm
- 14) For analysis in UV region the cuvette should be made up of \_\_\_\_\_.  
a) glass b) quartz c) plastic d) silica

15) Filters are used as a monochromators in \_\_\_\_\_.

- a) Potentiometer b) colorimeter c) spectrophotometer d) pH meter

16) Spectrophotometers used \_\_\_\_\_ as a monochromator.

- a) Filters b) grating c) both filters as well as grating d) photocell

17) According to Beer – Lamberts law, a plot of absorbance versus concentration is a

- a) straight line passing through origin with a positive slope  
b) straight line passing through origin with a negative slope  
c) straight line with a negative slope and intercept on x axis  
d) straight line with a negative slope and intercept on y axis

18) In a visible spectrum light absorbed is blue then complementary colour transmitted is \_\_\_\_\_

- a) Red b) red c) yellow d) green

**B. Match the following.**

- |                                  |   |
|----------------------------------|---|
| 1. Colorimeter                   | a. two different types of electrodes are used |
| 2. Photo cell                    | b. potassium chloride against silver nitrate  |
| 3. Potentiometry                 | c. quantitative estimation                    |
| 4. precipitation titration       | d. Phenolphthalein indicator                  |
| 5. NaOH V/s CH <sub>3</sub> COOH | e. visible region                             |

**C) Write true or false.**

1. Solvent extraction is based on the principle of Nernst's distribution law.
2. Spectrophotometers are more sensitive than colorimeter.
3. Colloidal precipitate is easily filterable

**Q.2. Attempt any four:**

[20]

- A. Define the following: i) Gross sampling ii) Sampling unit iii) Increment iv) subsample v) Analysis sample
- B. What is titration? Write down the types of titration? Explain any one type of titration?
- C. What is the purpose of sampling? Describe the methods of sampling of immiscible and flowing liquids.
- D. What are the various factors to be considered while choosing an analytical method?
- E. What is proximity analysis? Write the proximate analysis parameter.
- F. Calculate the absolute and relative error for the measurement, if in the determination of the chloride content of a water sample 100 cm<sup>3</sup> required 1.8 cm<sup>3</sup> of 0.1 M silver nitrate and the expected value of the chloride content is 70 ppm.



**Q.3. Attempt any four:**

[20]

- A. Discuss the importance of calibration of burette and pipette in titrimetry
- B. a) Differentiate between iodometry and iodimetry  
b) What is primary standard? Give one example
- C. Explain the importance of drying and washing in gravimetric analysis
- D. List various type of titration and explain neutralization titration.
- E. What is pH and pOH ? Prove that  $\text{pH} + \text{pOH} = 14$ .
- F. What are complexometric titration explain?

**Q.4. Attempt any four:**

[20]

- A. Define the following terms  
Radiant power b. Plane polarised light c. Absorbance d. transmittance e. wave length of maximum absorption
- B. State and derive mathematical expression for Beer's law
- C. Draw schematic diagram of photoelectric colorimeter and discuss the instrumentation and working
- D. Molar absorptivity of a substance in a solution is  $4.65 \times 10^3 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$  at a wavelength 375 nm . If the transmittance of the solution in a cell of 1 cm length is 0.67 calculate i) the concentration of the solution ii) the concentration of the solution that will give the transmittance of 0.78 when placed in the cell same cell at the same wavelength
- E. What are the deviations from Lambert's and beer's law.
- F. Describe photomultiplier tube with diagram.

**Q.5. Attempt any four:**

[20]

- A. Write short note on i) universe, ii) sample, iii) increment , iv) gross sample, v) analysis sample
- B. What are the various factors to be considered while choosing an analytical method?
- C. Define the following term  
a) Equivalence point b) Titrimetry c) Endpoint d) Indicator) Titrant
- D. What is co-precipitation and post precipitation?
- E. State and derive mathematical expression for Lambert's law
- F. Explain the two different interactions possible between stimulus and analyser