Duration: 3 Hours   **Total marks: 80**

  i. All questions are compulsory.

  ii. Figures to the right indicate full marks.

  iii. Draw neat and labeled diagrams wherever relevant.

Q1A. Complete the following table: **(05)**

API	Indicator used in its assay
Ferrous sulphate	
Aspirin	
Acetazolamide	
Ascorbic acid	
Calcium gluconate	

B. Explain the following terms (**Any Five**):   **(05)**
  i. Precision
  ii. Solubility product
  iii. Peptization
  iv. Overvoltage
  v. Buffer capacity
  vi. Limiting current

C. Attempt **any five** of the following questions: **(10)**
  i. Balance the given reaction:
$$I^- + MnO_4^- \longrightarrow I_2 + Mn^{2+}$$
  ii. What is the Ilkovic equation? Explain the terms involved.
  iii. Enlist the contents of a pharmacopoeial monograph.
  iv. Identify number of significant figures in following: $6.022140857 \times 10^{23}$, 3.147
  v. What are the types of coulometric titrations?
  vi. What is Ostwald ripening?

Q2. Attempt **any three** of the following questions: **(12)**
  a) What is a "blank" determination? Give the reactions of an assay involving blank determination.
  b) Discuss the neutralization curve obtained for the titration of a strong acid versus a strong base. Suggest a suitable indicator for such a titration.
  c) Explain the term "fractional precipitation". Write a note on standardization of 0.1N AgNO$_3$.
  d) Using suitable examples, discuss "leveling and differentiating solvents".

Q3. Attempt **any three** of the following questions: **(12)**
  a) What are the disadvantages of KMnO$_4$? Suggest a suitable titrant which overcomes most of these disadvantages for redox titrations.
  b) Give an account of iodate titrations.
  c) Compare determinate and indeterminate errors. What is relative error?
  d) Write a note on multiple extraction. Draw a suitable diagram of an apparatus used for continuous extraction using an extractant of high density.

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Q4. Attempt **any three** of the following questions. **(12)**

    a) Give the principle and chemical reactions involved in the assay of: **(any two)**

        i. Sodium benzoate

        ii. Soluble aspirin tablets

        iii. NaCl

        iv. H_2O_2

    b) Give the role of:

        i. Starch iodide paste in nitrite titrations

        ii. Pyridine in Karl Fischer reagent

        iii. Potassium sulphate in Kjeldahl's method

        iv. NaOH in oxygen flask combustion technique

    c) What are amperometric titrations? Explain with suitable examples and diagrams.

    d) Explain the role of supporting electrolyte. Write a note on differential pulse polarography.

Q5. Attempt **any three** of the following questions: **(12)**

    a) NH_3 obtained when 0.5g of an organic compound substance was subjected to Kjeldahl's method was neutralized by 10 mL of 1M H_2SO_4. Estimate the composition (percentage) of nitrogen in the given organic compound.

    b) Four measurements of an analytical experiment are: 51.3, 55.6, 49.9 and 52.0. Calculate the mean, standard deviation, variance and relative standard deviation.

    c) Solve the following:

        i) Calculate the pH of a solution containing 5×10^{-5} M of H^+ ions per liter. Also calculate the pOH of the solution.

        ii) Calculate the gravimetric factor for conversion of CaO to $CaCO_3$. (Given: At. Wt. of Ca= 40, C= 12, O= 16)

    d) A solute A (Partition co-efficient= 4) was dissolved in 10ml of water. This solution was extracted twice with 10ml of ether each time. Calculate the percentage of solute A in the solution at the end of two extractions.

Q6. Attempt **any three** of the following questions: **(12)**

    a) What is the significance of the von Weirmarn ratio? Write a note on precipitation from homogeneous solutions.

    b) Classify different precipitating agents used in gravimetry. Give ideal properties of both the precipitating agents and precipitate formed.

    c) Give the role of :

        i. KCN and formaldehyde-acetic acid solution in complexometric titrations.

        ii. 0.05 M $MgSO_4$ solution in assay for Calcium gluconate.

    d) What is the importance of buffers in complexometry? Give an account of metallochromic indicators.

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