CHEMISTRY

PAPER – 2

(PRACTICAL)

(Maximum Marks: 30)

(Time allowed: Three hours)

(Candidates are allowed additional 15 minutes for **only** reading the paper**.**

They must NOT start writing during this time.)

ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOKLET PROVIDED SEPARATELY.

Question 1 is an **oxidation-reduction titration** in which sufficient working details are given. All essential working must be shown.

Question 2 is an exercise dealing with (a) **identification of an organic compound** and (b) **identification of a compound as carbohydrate or protein**.
Credit will be given for precise observations recorded and for well-drawn deductions.

Question 3 is an exercise in **qualitative analysis**.

Read the questions carefully and follow the given instructions.

Attempt **all** questions.

All working, including rough work, should be done on the same sheet as the rest of the answer.

The intended marks for questions or parts of questions are given in brackets [ ].

Mathematical Tables are provided.

Attempt **all** questions.

Question 1 **[7]**

You are provided with two solutions as follows:

- **C-10** is a solution containing 2·80 gms of potassium manganate (VII) ($KMnO_4$) per litre.
- **C-11** is a solution prepared by dissolving 6·25gms of impure sample of oxalic acid crystals ($H_2C_2O_4 \cdot 2H_2O$) per litre.

This Paper consists of 4 printed pages.

PROCEDURE:

Rinse and fill the burette with potassium manganate (VII) solution **C-10** ($KMnO_4$).

Pipette out 20 ml or 25 ml of the oxalic acid solution **C-11** ($H_2C_2O_4.2H_2O$) in a clean conical flask. To this, add 20 ml of dilute sulphuric acid (H_2SO_4) **C-12**, specially provided for this purpose. Warm the contents of the flask to 60°C – 70°C. The heating should be continued till the first bubble appears at the bottom of the flask.

Remove the conical flask from fire and titrate this solution by running solution **C-10** from the burette. Shake the solution constantly till a permanent pale pink colour is obtained. Ensure that the pink colour obtained does not disappear on shaking the contents of the conical flask.

Repeat the above procedure to get at least **two** concordant readings.

Tabulate your readings.

State:

(a) The capacity of the pipette used.

(b) The titre value you intend to use in your calculations.

Show the titre value to the Visiting Examiner.

The equations for the above reactions are as follows:

$2KMnO_4 + 3H_2SO_4 + 5H_2C_2O_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

Relative atomic masses:

K = 39 Mn = 55 C = 12 O = 16 H = 1

Calculate the following:

(i) The **molarity** of potassium manganate (VII) solution **C-10.**

(ii) The **molarity** of oxalic acid solution **C-11.**

(iii) The **strength** of oxalic acid solution in gms per litre.

(iv) The **percentage purity** of the sample of oxalic acid solution.

Note: Molarity must be calculated up to at least 4 decimal places.

Question 2 **[4]**

(a) You are provided with an organic compound **C–13.** Perform the experiments given below on the compound. Record the changes taking place at each step of the experiment.

Note the smell of the substance formed, if significant, the colour of the solution obtained, the colour of the precipitate produced and any other observations you may have. State the identity of the compound on the basis of the experiments and observational changes.

Substance C-13

PROCEDURE:

(i) Take 1 ml of **C-13** in a test tube and add a few drops of water. Add 2 – 3 drops of sodium hypochlorite solution and shake the contents.

(ii) Take 1 ml of **C-13** in a test tube and add 1 ml of concentrated hydrochloric acid to it. Now, add a few drops of neutral ferric chloride solution and dilute the contents with water.

(iii) Take 1 ml of **C-13** in a test tube and add a few drops of dilute sulphuric acid. Now, add 1 ml of potassium dichromate solution. Shake and warm the contents.

(b) Substance **C-14** is an unknown sample of either carbohydrate or protein. Carry out the following experiments and record all your observations. State the identity of the compound as carbohydrate or protein on the basis of the experiments and observational changes.

Substance C-14

PROCEDURE:

Take the sample **C-14** in a test tube. Dissolve it in 10 ml of distilled water in order to obtain saturated solution. Divide the solution into three parts.

(i) To the first part of **C-14**, add 1 ml of Fehling's solution. Warm the contents.

(ii) To the second part of **C-14**, add 2 – 3 drops of α – naphthol solution. Now, pour concentrated sulphuric acid slowly along the sides of the test tube.

(iii) To the third part of **C-14**, add 1 ml of lead acetate solution followed by 1 ml ammonium hydroxide solution. Boil the contents.

Question 3 **[4]**

Analyse qualitatively the substance **C-15** which contains one anion and one cation. Identify these ions.

(a) While testing for **anion** you must mention:

(i) How the gases were identified.

(ii) The confirmatory test for anion.

Show the results as required, to the Visiting Examiner.

(b) While testing for **cation** you must mention:

(i) How the original solution for group analysis was prepared.

(ii) The formal group analysis with pertinent group reagents.

(iii) The confirmatory test for cation.

Show the results as required, to the Visiting Examiner.

Note: Use of qualitative analysis booklet / table is not allowed.

Question 4

Show the following to the Visiting Examiner for assessment:

(a) Project **[10]**

(b) Chemistry Practical File. **[5]**