[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 8301 **C** **Roll No.....**

Unique Paper Code : 217167

Name of the Paper : ACPT-101 : Analytical Chemistry – I

Name of the Course : B.Sc. (Prog.) Applied Sciences – Analytical Chemistry

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer any **five** questions.
3. Use of scientific calculators is **NOT** permitted.

1. (a) Explain the significance of S.I. units. Enumerate the seven fundamental units.

   (b) Express the following in S.I. units :–

   (i) 5'6", the average height of an Indian man.

   (ii) 80 miles per hour, average speed of a bus.

   (iii) 100 pounds, the average weight of an Indian.

   (iv) –10°C, lowest temperature in Simla.

   (v) 2 litres of milk.

   (c) (i) What is a bias ?

   (ii) Define :– confidence level, confidence limit. (7+5+3)

2. (a) Describe the principle of the analytical balance.

P.T.O.

(b) Why are electric balances subject to fewer errors or mechanical failures than the mechanical balances ?

(c) Give three rules that one must observe while weighing with an analytical balance.

(d) What do you understand by 'weighing by difference' ? (8+2+3+2)

3. (a) Give a flow diagram showing steps in quantitative analysis.

(b) Describe in detail any five factors that must be kept in mind while selecting a method for analysis.

(c) What are the desirable properties of precipitates in gravimetric analysis ? Aluminum hydroxide precipitates are not desirable for gravimetric estimation of aluminum. Explain. (5+5+5)

4. (a) Define molar concentration. Differentiate between Analytical molarity and Equilibrium molarity with the help of examples.

(b) Given a 1.125 liter solution which contains 5.74 g urea, (H_2NCONH_2, MW = 60.06,) determine the molar concentration of urea in this solution.

(c) Explain how one would prepare 250 mL of a 0.250 M solution of a salt having a MW = 322.19.

(d) How many milliliters of concentrated sulphuric acid, 94.0% (g/100g) solution, density 1.83g/cm^3 are required to prepare one litre of 0.500M solution ? Give the procedure for preparing this solution. (4+3+3+5)

5. (a) What are constant errors ? Explain with the help of an example how a constant error will become serious as the size of the quantity measured decreases.

(b) Suggest a way to minimize the effect of a constant error.

(c) Calculate the mean and standard deviation for the following set of analytical results;

12.76, 12.96, 13.05, 12.81 and 12.75. (5+3+7)

6. (a) Explain with the help of a suitable example, the difference between precision and accuracy.

(b) Explain the terms i) mean value ii) median value, indicating the advantages of median over mean.

(c) Given below are the observations obtained by different analysts :–

Observations → Analyst ↓	1	2	3	4	5	Average
A	12.3	12.4	12.5	12.6	12.7	12.5
B	12.0	12.1	12.2	12.3	12.4	12.2
C	12.1	12.3	12.5	12.7	12.9	12.5
D	12.0	12.7	12.9	13.1	13.3	12.8

Evaluate the above data, and determine the level of accuracy and precision for each of the analysts. (5+5+5)

7. (a) What is the difference between a homogeneous material and a heterogeneous material ?

(b) A 25.0 µL serum sample was analysed for glucose content and found to contain 26.7 µg. Calculate the concentration of glucose in ppm and in mg/dL.

(c) What is the difference between a qualitative and a quantitative analysis ?

(d) Calculate the p-value for each ion in a solution that is :

(i) 2.00×10^{-3} M in NaCl and 5.4×10^{-4} M in HCl.

(ii) 6.7×10^{-3} M in $CaCl_2$ and 7.6×10^{-3} in $BaCl_2$.

(e) A pipette should not be blown out by mouth. Comment. (3+5+2+3+2)

8. (a) Describe a desiccator.

(b) Name any three desiccants used in desiccators.

(c) Describe in detail the procedure for calibration of a burette in your laboratory. (5+3+7)