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S. No. of Question Paper : 1560

Unique Paper Code : 2172541101

Name of the Paper : DSC A1 (Basic Principles and Laboratory Operations)

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

Semester : I

Duration : 2 Hours

Maximum Marks : 60

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt four questions in all.

1. (a) (i) What is interference and how it effect the sample analysis ?
(ii) Explain the term mole and molar mass.
- (b) Give a flow diagram showing steps in quantitative analysis and explain any *one* step.
- (c) Perform a Q-test on the given data set and determine if you can statistically designate data point number 5 as an outlier within a 95% confidence limit. Given $Q_{\text{critical}} = 0.466$.

Cup Number	10	7	2	8	3	6	9	1	4	5
Caffeine (ppm)	83	82	82	81	81	79	78	78	77	72

5,5,5

2. (a) What is derive unit ? Derive the SI unit of momentum and force.
- (b) Calculate the *p*-value for each ion in a solution that is 2.00×10^{-3} M in KCl and 5.4×10^{-4} M in HI.
- (c) How can systematic errors be minimized in an experiment ?

5,5,5

P.T.O.

3. (a) Define the fundamental SI units of :
- (i) Length
 - (ii) Time.
- (b) Write the units and symbols for frequency, force, pressure, energy and power.
- (c) When should you apply an F-test in analytical data analysis ? 5,5,5
4. (a) How should chemical waste be handled and disposed of in an environmentally safe manner ?
- (b) A solution requires the addition of 10.0 ± 0.1 mL of HCl and 15.0 ± 0.2 mL of H_2O . Calculate the propagated error in total volume.
- (c) Explain the terms :
- (i) Analytical molarity
 - (ii) Equilibrium molarity. 5,5,5
5. (a) What is propagation of errors ? Differentiate between propagation of errors in addition subtraction and multiplication division.
- (b) A chemist measures the mass of a sample using an analytical balance. The reported mass is $m = 25.2$ with an uncertainty of $\Delta m = 0.1$ g. the sample is then dissolved in a solution, and the chemist measures its volume to be $V = 50.0$ mL with an uncertainty of $\Delta V = 0.2$ mL. Calculate the density ρ of the sample using $\rho = m/V$, and determine the uncertainty in the density $\Delta\rho$.

(c) What are significant figures ? Find the significant figures in the following : 5,5,5

(i) 92.001

(ii) 2.03×10^5 .

6. (a) Define the terms accuracy and precision. Illustrate with schematic diagram to show the difference between these two.

(b) Discuss the importance of safety with chemicals in a laboratory. Provide five guidelines to ensure safety.

(c) Write a short note on methods of detecting analytes. 5,5,5