SUBJECT CODE: 19CH/MC/AC23

B.Sc. DEGREE EXAMINATION, APRIL 2022
BRANCH IV - CHEMISTRY
SECOND SEMESTER

COURSE   :   **MAJOR – CORE**
PAPER   :   **ANALYTICAL CHEMISTRY**
TIME   :   **3 HOURS**   **MAX. MARKS : 100**
<div align="center">

SECTION – A
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ANSWER ALL THE QUESTIONS.   **(30x1=30)**
I   Choose the correct answer.

1. The number of significant figures in the value 0.0005 is
   a) 1   b) 5   c) 4   d) 3

2. The scientific notation of 0.00023
   a) 2.3×10^{-1} b) 2.3×10^{-2} c) 2.3×10^{-3} d) 2.3×10^{-4}

3. Sampling of metals and alloys are obtained by
   a) drilling   b) milling   c) sawing   d) all

4. The difference between the true value and the measured value, with regard to the sign, is
   a) absolute error   b) relative error   c) relative accuracy   d) relative deviation

5. The following solvents in the increasing order of polarity is
   a) $C_2H_5OC_2H_5 < nC_6H_{14} < H_2O < C_2H_5COOH < C_2H_5OH$
   b) $C_2H_5OH < H_2O < C_2H_5OC_2H_5 < C_2H_5COOH < nC_6H_{14}$
   c) $nC_6H_{14} < C_2H_5OC_2H_5 < C_2H_5OH < H_2O < C_2H_5COOH$
   d) $nC_6H_{14} < C_2H_5COOH < C_2H_5OH < H_2O < C_2H_5OC_2H_5$

6. The commonly used dye for protein detection by SDS-PAGE is
   a) bromophenol blue   b) ethidium bromide   c) coomassie blue   d) fluorescein

7. In Fajans method of titration of chloride by silver ion, the indicator is
   a) sodium chloride   b) potassium chromate   c) murexide   d) fluorescein

8. The stationary phase in paper chromatography
   a) alumina   b) water on cellulose   c) calcium carbonate   d) all

9. Which among the following is used as a non-volatile liquid in GLC is
   a) silicone oil   b) water   c) hexane   d) ethanol

10. TGA measures -------------- changes in samples as a function of temperature
    a) enthalpy   b) heat evolved   c) weight   d) heat absorbed

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II   Fill in the blanks:

11. The median of the following values - 5,6,7 and 8 is _____
12. The mathematical expression to calculate confidence limit is _____
13. _____ grams of KOH should be dissolved in _____ ml of distilled water to obtain 6% of KOH solution
14. EDTA is a _____ dentate ligand.
15. _____ methods are techniques in which changes in physical and/ or chemical properties of a substance are measured as a function of temperature
16. The device used to determine the _____in a DTA apparatus is thermocouples.
17. The name of the SI unit for amount of the substance is _____
18. Ferroin is an example of _____ indicator.
19. Sodium carbonate is a _____ standard.
20. One millimole is 10^{-x} mole where x is equal to   _____ .

III   State whether true or false:

21. Extraction with a second solvent is an application of Nernst distribution law.
22. One ppm solution contains one gram of the solute in one liter of the solution.
23. The F test cannot be used to reject an outlier in a given data.
24. The masking by CN^- can be removed by a mixture of formaldehyde and acetic acid.
25. The second peak obtained by DTA analysis of calcium oxalate monohydrate in air is endothermic peak.

IV   Match the following:

26. Force	a. indeterminate
27. Instrumental error	b. N
28. Complexometric titration	c. rate of change in weight
29. GLC	d. katharometer
30. DTG	e. diphenyl amine
	f. determinate
	g. EDTA
	h. UV detector
	g. Nm

SECTION – B

Answer any five questions.   **(5 x 6 = 30)**

31. Distinguish between a) mass and weight   b) precision and accuracy

32. a) Following five values were obtained for the weight of aluminium present in a sample, 31.4, 30.6, 30.8, 38.9 and 30.1
Analyze if the value 31.4 and 38.9 are rejectionable. (Given $Q_{95, 5} = 0.642$).
    b) Draw a plot for error analysis.   (4 + 2)

33. a) Sample of water from Chennai was analyzed for magnesium content by two different methods A and B. If the standard deviation of each method, $S_A = 6.9432$ and $S_B = 2.987$, Identify if the methods are significantly similar or different and also identify which method is more precise by applying the F- test, Given $F_{0.05, (4,4)} = 5.05$ (1+2+2)

   b) Write the mathematical expression for variance. (1)

34. Illustrate and discuss the Rotavapor extraction.

35. a) What is the principle of SDS-PAGE electrophoresis?
   b) Discuss the construction of the experimental set up for TLC. Explain the technique involved in TLC. (2+4)

36. What are redox indicators? Discuss in brief the role of ferroin and diphenyl amine as redox indicators. (1 +5)

37. Construct the TGA thermogram of silver nitrate and explain the factors affecting TGA. (3+3)

SECTION – C

Answer any two questions.   **(2 x 20 = 40)**

38. a) Classify the types of errors and suggest any three methods to minimize errors. (7+3)
   b) Analyze the number of significant figures in the following.
        i.   0.00745   ii. 6.023×10^{23} (2)
   c) Calculate the mean, standard deviation and confidence limit of the following data, 10.12, 10.23, 9.99, 9.89, 10.09; given the critical value of t at 95% confidence level and four degrees of freedom is 2.776. (1+5+2)

39. a) Calculate the following and report with significant figures;
        i) logarithm of 1.36×10^{-4} ii) Antilog of 1.243   iii) Product of (4.6453×0.76)
   b) Discuss the sample handling of liquids and gases
   c) Distinguish between i) titrant and titrand   ii) primary and secondary standards
   d) How many moles and millimoles of benzoic acid are contained in 2 g of pure acid?
   e) When are indicators called metallochromic indicators? Interpret the role of Eriochrome Black T in the estimation of magnesium by complexometry.
                                                                    (3+5+6+2+4)

40. a) Discuss in detail HPLC with a neat diagram of the instrumentation.
   b) Illustrate the TGA and DTA thermogram of calcium oxalate and interpret the observations
   c) Compare the estimation of halides by Mohr's and Fajans method of precipitation titration.
                                                                    (10+4+ 6)

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