STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2019-20 & thereafter)

SUBJECT CODE: 19CH/MC/AC23

B.Sc. DEGREE EXAMINATION, APRIL 2023
BRANCH IV - CHEMISTRY
SECOND SEMESTER

COURSE : MAJOR – CORE
PAPER : ANALYTICAL CHEMISTRY
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

ANSWER ALL THE QUESTIONS. **(30x1=30)**

I Choose the correct answer.

1. The number of significant figures in 0.01050 are
   a) 1 b) 2 c) 3 d) 4

2. Instrumental error is
   a) Determinate b) Indeterminate c) Random d) Relative

3. Nearness of a measure value to true value is called
   a) Mean b) Median c) Accuracy d) Precision

4. Which of the following is not a derived SI unit
   a) Nm b) Js^{-1} c) Nm^{-2} d) K

5. Organic acid can be separated from ether layer using
   a) HCl b) Sodium bicarbonate solution
   c) water d) concentrated H_2SO_4

6. Which of the following techniques employs liquid stationary phase
   a) Partition chromatography b) paper chromatography
   c) column chromatography d) adsorption chromatography

7. The range of phenolphthalein indicator
   a) 4-6 b) 8-9 c) 3-4 d) 6-8

8. Titration required 25 mL of HCl to react completely with 11.95 mL of 0.02 M $Ba(OH)_2$. The molarity of the HCl is
   a) 0.01912 b) 0.00956 c) 0.0956 d) 0.00191

9. DTA measurement involves measurement of
   a) Change in weight b) Heat evolved or absorbed
   c) rate of change of weight d) change of temperature

10. Most common Indicator used EDTA titrations is
    a) Methyl Orange b) Ferroin c) Phenolphthalein d)EBT

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II Fill in the blanks:

11. The SI unit for current is _____.
12. Mass and weight are related by the expression _____.
13. The line of best fit for a scatter diagram is obtained using the method of _____
14. The number of moles of benzoic acid in 2.00 g of the acid is _____.
15. In GLC the mobile phase is _____.
16. The indicator used in argentometric titrations is _____.
17. EDTA is a _____ dentate ligand.
18. Titration of an acid against a standard base is called _____.
19. TGA measures change in _____ with temperature.
20. Standard deviation represents deviation from the _____.

III State whether true or false:

21. Specific gravity is dimensionless.
22. The empirical and molecular formula is the same for formaldehyde.
23. Precision is expressed in terms of deviation of a set of results from arithmetic mean of the set.
24. Direct titration of iodine with a reducing agent is termed as iodometric titration.
25. Endothermic change causes the sample temperature to lead furnace temperature.

IV Answer in a line or two:

26. Define mole.
27. Why is starch indicator added close to the end point?
28. Differentiate between absolute and relative error.
29. What is the use of Q-Test?
30. What is meant by R_f value?

SECTION – B

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

31. Define (a) normality (b) molarity (c) molality
32. Calculate the mean and standard deviation of the following data 15.67, 15.69 and 16.03g.
33. What are the causes of determinate errors? Explain with examples.
34. What are the factors affecting solvent extraction?
35. Discuss the principle and advantages HPLC.
36. What are the requirements of a primary standard?
37. Discuss the principle and applications of DSC.

SECTION – C

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

38 a. Differentiate between accuracy and precision? (6)

b. Explain how solvent extraction is carried out using Soxhlet apparatus. (7)

c. Discuss the principle and method of carrying out Thin Layer chromatography (TLC). (7)

39. a. What are random or indeterminate errors? How can we minimize errors and improve the accuracy of the data? (7)

b. What are the limitations of volumetric analysis? (8)

c. How is the burette calibrated? (5)

40. a. Explain the theory of acid base indicators. (8)

b. Discuss the principle and instrumentation of Gas Liquid chromatography (GLC). (6)

c. Discuss the principle and application of Differential Thermal Analysis (DTA). (6)