STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted during the academic year 2019-10 & thereafter)

B.Sc. DEGREE EXAMINATION, APRIL 2024
BRANCH III - PHYSICS
FOURTH SEMESTER

COURSE : ALLIED – CORE
PAPER : FUNDAMENTALS OF CHEMISTRY- II
SUBJECT CODE : 19CH/AC/FC43
TIME : 3 HOURS MAX. MARKS : 100

SECTION – A

Answer all the questions: (30 x 1 = 30)
Choose the correct answer:

1. The _____ of a solution is the number of gram molecular weights of solute per litre of the solution.
   (a) Normality (b) Molarity (c) Formality (d) equivalent weight

2. The determination of the proportions in which elements react with one another is known as _____.
   (a) Stoichiometry (b) mole (c) ppm (d) mole fraction

3. The unit of conductance is _____.
   (a) m^{-1} (b) Sm^{-1} (c) ohm (d) Ohm^{-1}

4. Molar conductance _____ with dilution.
   (a) decreases (b) increase (c) remains constant (d) no change

5. Water belongs to _____ component system.
   (a) One (b) two (c) three (d) none

6. Gibb's phase rule is _____
   (a) F=C-P+2 (b) F=C-P+1 (c) F=C-P-1 (d) F=C-P-2

7. An example for anionic ligand _____
   (a) F^- (b) CN^- (c) OH^- (d) all the above

8. A vitamin which is a coordination complex of cobalt is ____
   (a) Vit B12 (b) Vit B3 (c) Vit B2 (d) Vit B1

9. The thermogram in TGA is plotted between Temperature vs _____.
   (a) ΔH (b) ΔT (c) dw / dT (d) weight

10. The technique used to study the glass transition temperature of a polymer is ___.
    (a) TGA (b) DTA (c) DSC (d) NMR

Fill in the blanks:

11. The equivalent weight for $K_2Cr_2O_7$ in acidic medium is ____.
12. In a galvanic cell, the chemical reaction that occurs is _____
13. Solid CO_2 is commonly known as _____.
14. The isomerism exhibited by ONO and NO_2 is called _____ isomerism.

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15. An elevation in the DTA curve is observed for _____ process.
16. Expression for ppm is _____.
17. Thermocouple widely used in TGA is _____.
18. Ostwald's dilution law is applicable for _____ electrolytes.
19. Number of donor atoms in ethylene diamine is _____.
20. An example for ionisation isomerism _____

Match the following:

21. 1 mole - (a) F = 4-P
22. Secondary cells - (b) exo & endo peaks
23. Two component system - (c) BM
24. Magnetic moment - (d) rechargeable
25. DTA - (e) 6.022 X 10^{23}

Answer in a line or two:

26. Normality
27. Fuel cells
28. Triple point
29. Hydrate isomerism
30. Differential Scanning Calorimetry

SECTION - B

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

31. Define the following term – (i) Mole fraction (ii) ppm (iii) molarity
32. Write Nernst equation and explain its significance.
33. Apply phase rule to water system and draw its phase diagram.
34. Explain the following on the basis of VB theory.
    (a) $[FeF_6]^{3-}$ is paramagnetic and sp^3d^2 hybridized.
    (b) $[Ni(CN)_4]^{2-}$ is diamagnetic and its magnetic moment is zero.
35. Explain the factors that affect TGA and DTA.
36. Explain the principle of conductometric titration. Discuss the titration of Strong acid Vs Strong base.
37. Explain the cis-trans isomerism in coordinated complexes with examples.

SECTION - C

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

38. (a) How equivalent weight of $KMnO_4$ is calculated in acidic, alkaline and neutral medium?
    (b) Draw and explain the application of phase rule to Pb-Ag system.
    (c) Explain mole concept (6+8+6)

39. (a) State Kohlrausch's law. Discuss its application in detail.
    (b) Discuss the cell reactions involved and usage of Lead storage and Ni-Cd batteries. (10+10)

40. (a) Draw the structure of Haemoglobin and write their functions.
    (b) Draw and explain the TGA curve expected for the following –
    (i) $AgNO_3$ (ii) $CaC_2O_4.H_2O$
    (C) Explain the principle and instrumentation of TGA (6+6+8)