STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2019–20 & thereafter)

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023
BRANCH III - PHYSICS
THIRD SEMESTER

COURSE : ALLIED CORE
PAPER : FUNDAMENTALS OF CHEMISTRY- I
SUBJECT CODE : 19CH/AC/FC33
TIME : 3 HOURS **MAX.MARKS :100**

SECTION – A

ANSWER ALL QUESTIONS: **(30x1=30)**

I. Choose the correct answer:

1. The test used to identify the presence of protein is _____.
   (a) Ninhydrin test (b) Flourescence test (c) Biuret test (d) Schiff's test
2. The intermediate formed by homolytic cleavage is _____.
   (a) free radical (b) carbocation (c) carbanion (d) nucleophile
3. Natural rubber is a polymer of _____.
   (a) adipic acid (b) vinyl chloride (c) ethylene (d) isoprene
4. The most significant biodegradable polymer is
   (a) PVC (b) PLA (c) PE (d) Nylon
5. Amino acid which is optically inactive is _____
   (a) alanine (b) valine (c) glycine (d) leucine
6. An example for polysaccharide is _____.
   (a) starch (b) maltose (c) glucose (d) fructose
7. The sum of powers of the concentration of the reactants in the rate equation is known as _____.
   (a) buffer (b) equilibrium (c) molecularity (d) order
8. Temperature coefficient is _____.
   (a) k_{308K} / k_{278K} (b) k_{308K} / k_{298K} (c) k_{298K} / k_{278K} (d) k_{398K} / k_{308K}
9. Lower the ____ value, greater is the acid strength.
   (a) pK_w (b) pK_b (c) pK_a (d) all of these
10. pH of water is _____.
    (a) 7 (b) 14 (c) 0 (d) 10^{-7}

II. Fill in the blanks:

11. The carbocation formed by heterolytic cleavage of $(CH_3)_3C$-Cl is _____.
12. An example for nucleophile is _____ and an example for electrophile is _____.
13. An example for thermosetting polymer is _____.
14. The monomers used to prepare bakelite is _____.
15. Ninhydrin test is used to identify _____.
16. Cellulose nitrate is also known as _____.
17. The energy possessed by a molecule in a chemical reaction in excess of kinetic energy is known as _____.
18. For a zero order reaction , $t_{1/2}$ is expressed as _____
19. An example for buffer solution is _____.
20. Number of species of the reactants that participate in a reaction is known as _____ of a reaction.

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III. Match the following:

21. Homolytic cleavage - (a) boiled egg
22. Thermoplastic - (b) free radical
23. Denaturation - (c) $1x\ 10^{-14}$
24. Iodination of acetone - (d) polythene
25. Ionic product of water - (e) zero order reaction

IV. Answer in a line or two:

26. Define addition polymerization
27. What is vulcanization of rubber?
28. What is a Zwitter ion?
29. Define a pseudo-unimolecular reaction
30. Give the expression for K_a.

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5x6=30)

31. Write the structural formula of the following functional groups and give examples for each:
    (a) Amines (b) Aldehydes (c) Carboxylic acids
32. Differentiate between a) thermoplastics and thermosetting plastics.
    b) Biodegradable and non-biodegradable polymers (3+3)
33. Explain a) Molisch test b) Osazone test c) Fehling's test
34. Explain in detail about Arrhenius equation.
35. Highlight the concept of Lowry-Bronsted and Lewis concepts of acid – base.
36. Draw the Fisher and Haworth projections for Glucose and Fructose.
37. What would be the pH value of (a) 0.0001N HCl (b) 0.005 M H_2SO_4
    (c) 0.005 N NaOH (log 5 = 0.6990)

SECTION – C (2x20=40)

ANSWER ANY TWO QUESTIONS:

38. (a) What are the different types of intermediates and how they are formed ? Give examples. (10+10)
    (b) Explain the following types of reactions (i) Substitution (ii) Elimination.

39. (a) What are buffer solutions? Derive Henderson-Hasselbalch equation and write is significance
    (b) Explain the structure and applications of PVC and Nylon 66. (12+8)

40. (a) Describe the different types of protein structure.
    (b) Define order of a reaction. Give examples for different types of orders of reactions.
    (c) Discuss any two methods for determining order of reaction. (8+6+6)

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