

7. The product/s formed when phenol is treated with excess of bromine water is/are
 (i) o-bromophenol (ii) p- bromophenol (iii) picric acid (iv) 2,4,6- tribromophenol
 a) only (iii) b) only (iv) c) both (i) and (ii) d) only (ii)
8. Which of the following observation is shown by 2-methylpropan-2-ol with Lucas reagent?
 a) Turbidity will be observed after five minutes.
 b) No turbidity will be observed at room temperature.
 c) Turbidity will be observed immediately.
 d) Turbidity will be observed at room temperature but will disappear after five minutes.
9. The transition metal present in red pigment of blood haemoglobin is
 a) cobalt b) nickel c) iron d) copper.
10. The geometry of the complex $\text{Fe}(\text{CO})_5$ is
 a) octahedral b) tetrahedral c) trigonal bipyramidal d) square pyramidal
11. Match the following given in List I with List II

List-I	List-II
A) Gatterman-Koch reaction	i) $\text{SnCl}_2, \text{HCl} / \text{H}_3\text{O}^+$
B) Stephen reaction	ii) $\text{CrO}_2\text{Cl}_2 / \text{H}_3\text{O}^+$
C) Rosenmund reaction	iii) $\text{CO}, \text{HCl} / \text{Anhyd. AlCl}_3$
D) Etard reaction	iv) $\text{H}_2 / \text{Pd-BaSO}_4$

- a) A-(iv), B- (iii), C-(ii), D-(i) b) A-(iii), B-(i), C-(iv), D-(ii)
 c) A-(iii), B-(i), C-(ii), D-(iv) d) A-(iii), B-(ii), C-(iv), D-(i)
12. An organic compound with the molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. The organic compound is
 a) 3-ethyl benzaldehyde b) 2-ethyl benzaldehyde
 c) 4-ethyl benzaldehyde d) 2, 3-dimethyl benzaldehyde.
13. The following factor which does not affect the rate of reaction is
 a) molecularity b) temperature
 c) catalyst d) concentration of reactant
14. The correct order of basic strength in case of ethyl substituted amines in aqueous solution is
 a) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
 b) $(\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
 c) $(\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_2\text{NH} > \text{NH}_3$
 d) $\text{NH}_3 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2$
15. N-Ethylbenzenesulphonamide soluble in alkali because
 a) It does not contain any hydrogen atom attached to nitrogen atom and is not acidic.
 b) It contains hydrogen atom attached to nitrogen atom and is strongly acidic.
 c) It contains hydrogen atom attached to nitrogen atom but is not acidic.
 d) It does not contain any hydrogen atom attached to nitrogen atom but is acidic.

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:

($\text{S}_{\text{N}}2$, instantaneous, phosphodiester, CHCl_3 , glycosidic, Yb^{2+} .)

5 × 1 = 05

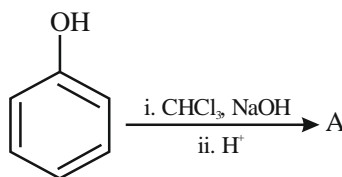
16. During Surgery, _____ was used as anesthesia
 17. The rate at a particular moment of time is expressed as _____ rate of reaction.

18. The diamagnetic lanthanoid ion is _____.
19. Williamson's synthesis of preparing dimethyl ether involves _____ reaction for the attack of a methoxide ion on methyl chloride.
20. Nucleotides are joined together by _____ linkage between 5' and 3' carbon atoms of pentose sugar.

PART-B

III. Answer ANY THREE of the following. Each question carries two marks. $3 \times 2 = 06$

21. Name an important alloy, which contains maximum percentage of the lanthanoid metals. Mention one of its use.
22. Explain Fittig's reaction.
23. Write the expression to relate cryoscopic constant and change in enthalpy of fusion. Explain the terms involved in it.
24. Give an example for female sex hormone and write its function.
25. Complete the following reaction and name the reaction.



PART-C

IV. Answer ANY THREE of the following. Each question carries three marks. $3 \times 3 = 09$

26. Using abbreviations of following ligands, identify the number of donor sites and write the formula of each ligand. a) en b) EDTA c) PPh₃
27. Write the equations for the preparation of potassium permanganate from pyrolusite ore, what is the colour of KMnO₄ crystals?
28. Using Valence Bond Theory [VBT], explain geometry, hybridisation and magnetic property of [CoF₆]³⁻ ion. [Atomic number of Cobalt is 27].
29. Give any three applications of coordination compounds.
30. Transition elements have higher enthalpy of atomization. Give two reasons. Among 3d and 4d series of transition elements, which series has higher enthalpy of atomization?

V. Answer ANY TWO of the following. Each question carries three marks. $2 \times 3 = 06$

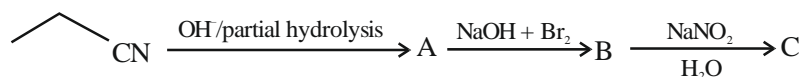
31. What does P and Z_{AB} represent in the equation: Rate = PZ_{AB}e^{-E_a/RT}? Name a factor on which Z depends.
32. Name the fuel cell used in Apollo space programme and write its anodic and cathodic reaction.
33. Give any three differences between ideal and non-ideal solutions.
34. Mention any three thermodynamic properties determined by using electrochemical cells.

PART-D

VI. Answer ANY FOUR of the following. Each question carries five marks. $4 \times 5 = 20$

35. a) Write the reactions involved in the conversion of toluene to m-nitrobenzoic acid.
 b) The pK_a values of acetic acid, benzoic acid and trifluoroacetic acid are 4.76, 4.19 and 0.23 respectively. Arrange them in the increasing order of acid strength. Justify the arrangement. (3+2)
36. a) Write the mechanism involved in the conversion of 2-bromo-2-methylpropane to 2-methylpropan-2-ol.
 b) What are enantiomers? Name one physical property which differs enantiomers. (3+2)
37. a) Give the mechanism involved in the acid catalyzed hydration of C₂H₄ to C₂H₅OH. (3+2)
 b) Name the enzyme involved in fermentation of glucose into ethanol and write its chemical equation.

38. a) What does tertiary structure of proteins represent? Give its two major molecular shapes.
 b) Write the Haworth structure of $\alpha - D - (+) -$ Glucopyranose. (3+2)
39. a) Identify the product A, B and C.



- b) Name any one biologically active amino compound used in the following:
 (i) to increase blood pressure (containing secondary amino group)
 (ii) as an anaesthetic in dentistry (a synthetic amino compound) (3+2)
40. An organic compound (X) with molecular formula $\text{C}_8\text{H}_8\text{O}$ forms an orange-red precipitate with 2,4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens reagent nor does it decolourise bromine water. On oxidation with chromic acid, 'X' gives a carboxylic acid (Y) having molecular formula $\text{C}_7\text{H}_6\text{O}_2$. Identify the compounds (X) and (Y) and write all the reactions involved. 5

PART-E

(NUMERICAL PROBLEMS)

VII. Answer ANY THREE of the following. Each question carries three marks. $3 \times 3 = 09$

41. Calculate the molality of 20%(w/v) aqueous solution of KI. Given density of aqueous solution of KI = 1.2gcm^{-3} . Molar mass of KI = 166gmol^{-1} .
42. Vapour pressure of water at 293K is 17.535 mm Hg. Calculate the vapour pressure of water at 293K when 25 g of glucose is dissolved in 450 g of water.
43. Calculate the emf of the following cell and state whether the cell is feasible or not?
 $\text{Pt (s)} | \text{Br}^- (0.01\text{M}) | \text{Br}_2 (\text{l}) || \text{H}^+ (0.03\text{M}) | \text{H}_2 (\text{g}) (1\text{bar}) | \text{Pt (s)}$ $E^\circ(\frac{1}{2}\text{Br}_2|\text{Br}^-) = 1.09\text{V}$.
44. Calculate the limiting molar conductivity of Cl^- by using the data Λ° for $\text{CaCl}_2 = 271.6 \text{ S cm}^2 \text{ mol}^{-1}$ and λ° for $\text{Ca}^{2+} = 119.0 \text{ S cm}^2 \text{ mol}^{-1}$.
45. The rate constant for a reaction is 60 s^{-1} . How much time will it take to reduce the initial concentration of the reactant to its $1/16^{\text{th}}$ value?
46. In the given reaction $\text{A} \rightarrow \text{B}$, the rate constant k is $2.0 \times 10^{-2} \text{ lit mol}^{-1}\text{s}^{-1}$, find initial rate of reaction when $[\text{A}] = 0.5 \text{ M}$ at 298K.