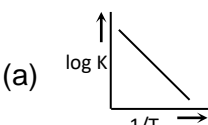
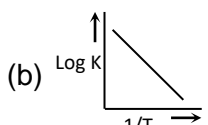
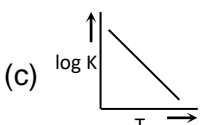
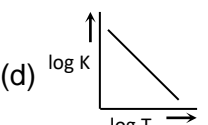


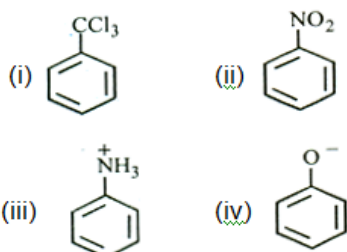
PART – A

Instructions:

- (1) There are 50 objective type (M.C.Q) questions in part-A and all questions are compulsory.
- (2) The questions are serially numbered from 1 to 50 and each carries 1 mark.
- (3) Read each question carefully, select proper alternative and answer in the O.M.R. sheet.
- (4) The OMR sheet is given for answering the questions. The answer of each question is represented by (1) O, (2) O, (3) O, (4)O. Darken the circle of the correct answer with ball-pen.
- (5) Rough work is to be done in the space provided for this purpose in the test booklet only.
- (6) Set No. of question paper printed on the upper-most right side of the Question paper is to be written in the column provided in the OMR sheet.
- (7) Use of simple calculator and log table is allowed, if required.

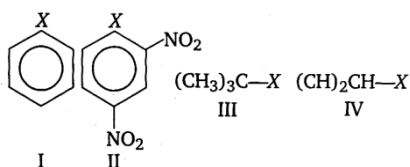
1. A solution of $\text{Al}_2(\text{SO}_4)_3$ {d = 1.253 gm/ml} contain 22% salt by weight. The molarity, normality and molality of the solution is
 (a) 0.805 M, 4.83 N, 0.825 M (b) 0.825 M, 48.3 N, 0.805 M
 (c) 4.83 M, 4.83 N, 4.83 M (d) None of these
2. Consider the reaction $\text{M}_{(\text{aq})}^{n+} + \text{ne}^- \rightarrow \text{M}_{(\text{s})}$. The standard reduction potential values of the elements M_1 , M_2 and M_3 are -0.34 V , -3.05 V and -1.66 V and respectively. The order of their reducing power will be
 (a) $\text{M}_1 > \text{M}_2 > \text{M}_3$ (b) $\text{M}_3 > \text{M}_2 > \text{M}_1$ (c) $\text{M}_1 > \text{M}_3 > \text{M}_2$ (d) $\text{M}_2 > \text{M}_3 > \text{M}_1$
3. On passing C ampere of electricity through a electrolyte solution for t second, m gram metal deposits on cathode. The equivalent weight E of the metal is
 (a) $E = \frac{C \times t}{m \times 96500}$ (b) $E = \frac{C \times m}{t \times 96500}$ (c) $E = \frac{96500 \times m}{C \times t}$ (d) $E = \frac{C \times t \times 96500}{m}$
4. Which of the following plots is in accordance with the Arrhenius equation
 (a)  (b)  (c)  (d) 
5. The boiling point of water at 760 mm pressure is 373 K. The vapour pressure of water at 298K is 23mm. If the vaporisation enthalpy is 40.656 KJ/ mole, then what be boiling point of water at 23 mm. Pressure?
 (1) 250 K (2) 298 K (3) 51.6 K (4) 12.5 K
6. The mole fraction of solute is 0.2 at which decrease in vapour pressure is 10 mm. If the decrease in vapour pressure is 20mm, then what will be the mole fraction of solute?
 (1) 0.2 (2) 0.4 (3) 0.6 (4) 0.8

7. 5 % Sucrose solution is isotonic with 1% 'X' solution. What will be the molecular weight of 'X'?
- (1) 342 gram/ mole (2) 180 gram/ mole (3) 68.4 gram/ mole (4) 171 gram / mole
8. Electrolytic cell containing molten nickel chloride and aluminium chloride solutions are arranged in a series. If on passing same current through both the solution, if 18 gm Al is obtained then how much Ni is obtained? (Atomic mass of Al = 27 and Ni = 58.5 gm mol⁻¹)
- (1) 58.5 gm (2) 29.25 gm
(3) 117 gm (4) 5.85 gm
9. Which of the following gives H₂ on cathode and O₂ on anode on electrolysis by using platinum electrode?
- (1) Molten NaCl (2) Dilute solution of NaCl
(3) Concentrated solution of NaCl (4) Solid NaCl.
10. Molar conductivity of KCl, NaCl and KNO₃ are 150, 126 and 109 S cm² mol⁻¹ respectively, then what is the molar conductivity of NaNO₃?
- (1) 385 S cm² mol⁻¹ (2) 133 S cm² mol⁻¹ (3) 167 S cm² mol⁻¹ (4) 85 S cm² mol⁻¹
11. What is the SI unit of specific conductivity?
- (1) Sm² (2) Sm⁻² (3) Sm⁻¹ (4) Sm³
12. What is the unit for rate constant for pseudo first order reaction?
- (1) L mol⁻¹ sec⁻¹ (2) sec⁻¹ (3) molL⁻¹ sec⁻¹ (4) L² mol⁻² sec⁻¹
13. At 298 K temperature the activation energy for the reaction X₂ + Y₂ → 2XY + 20 KJ is 15 KJ. What will be the activation energy for the reaction 2XY → X₂ + Y₂?
- (1) +35 KJ (2) -35 KJ (3) -5 KJ (4) -15 KJ
14. The half life period for a first order reaction is 10 sec then rate constant will be
- (1) 0.693 s⁻¹ mol⁻¹ lt (2) 0.0693 s⁻¹ (3) 0.693 s⁻¹ (4) 0.0693 s⁻¹ mol⁻¹ lt
15. A first order reaction requires 30 minutes for 50% completion. The time required to complete the reaction by 75% will be
- (a) 45 minutes (b) 15 minutes (c) 60 minutes (d) None of these
16. When KMnO₄ reacts with acidified FeSO₄
- (a) Only FeSO₄ is oxidised (b) Only KMnO₄ is oxidised
(c) FeSO₄ is oxidised KMnO₄ and is reduced (d) None of these
17. Which of the following compounds can reduce Tollen's reagent?
- (I) Sucrose (II) Glucose
(III) Fructose (IV) Maltose
- (a) I, II, III and IV (b) II (c) II and III (d) II, III and IV
18. The IUPAC name of [Ni(CO)₄] is
- (a) Tetra carbonyl nickel (II) (b) Tetra carbonyl nickel (0)
(c) Tetra carbonyl nickelate (II) (d) Tetra carbonyl nickelate (0)
19. In which of the following NO₂⁺ will attack at m-position



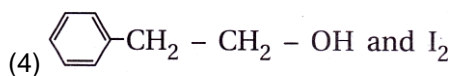
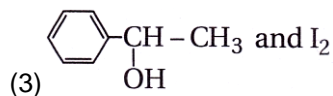
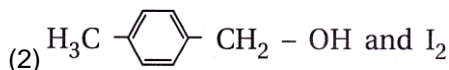
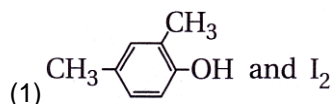
- (a) I, II and III (b) II and IV (c) II and III only (d) I only

20. The correct order of increasing reactivity of C - X bond towards nucleophile in the following compounds is



- (a) I < II < IV < III (b) II < III < I < IV (c) IV < III < I < II (d) III < II < I < IV
21. Order of basicity of ethyl amines in water is
 (a) Secondary > Primary > Tertiary (b) Primary > Secondary > Tertiary
 (c) Secondary > Tertiary > Primary (d) Tertiary > Primary > Secondary
22. Identify 'Z' in the following series
 $\text{C}_2\text{H}_5\text{I} \xrightarrow[\text{KOH}]{\text{Alcoholic}} \text{X} \xrightarrow{\text{Br}_2} \text{Y} \xrightarrow{\text{KCN}} \text{Z}$
 (a) $\text{CH}_3\text{CH}_2\text{CN}$ (b) $\text{CN} - \text{CH}_2\text{CH}_2 - \text{CN}$
 (c) $\text{Br} - \text{CH}_2 - \text{CH}_2\text{CN}$ (d) $\text{Br} - \text{CH} = \text{CHCN}$
23. **Assertion (A):** Dextro rotator 3°-alcohol reacts with HI to produce racemic mixture of corresponding iodo compound.
Reason (R) : 3°-Alcohol react with HI through $\text{S}_{\text{N}}1$ mechanism forming 3° carbocation as intermediate.
 (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false.
 (d) (A) is false but (R) is true
24. When mercuric iodide is added to the aqueous solution of potassium iodide, the
 (a) Freezing point is raised (b) Freezing point is lowered
 (c) Freezing point does not change (d) Boiling point does not change
25. Which ionic pair from the following is coloured in aqueous solution?
 (1) $\text{Sc}^{3+}, \text{Ti}$ (2) $\text{Sc}^{3+}, \text{Co}^{2+}$ (3) $\text{Ni}^{2+}, \text{Cu}^+$ (4) $\text{Ni}^{2+}, \text{Ti}^{3+}$
26. Which of the following descending order of second ionization enthalpy?
 (1) $\text{V} > \text{Mn} > \text{Cr} > \text{Ti}$ (2) $\text{Mn} > \text{Cr} > \text{Ti} > \text{V}$ (3) $\text{Ti} > \text{V} > \text{Cr} > \text{Mn}$ (4) $\text{Cr} > \text{Mn} > \text{V} > \text{Ti}$
27. The colour of the light absorbed by an aqueous solution of CuSO_4 is ...
 (1) Orange-red (2) Blue-green (3) Yellow (4) Violet
28. What is the cyclic complex compound by metal ion and polydentate ligand?
 (1) Chelate complex
 (2) Simple complex
 (3) Polycentered complex
 (4) None of these
29. In which of the following complex geometrical as well as optical isomerism is observed?
 (1) $[\text{Fe}(\text{Ox})_3]^{3-}$ (2) $[\text{Fe}(\text{NH}_3)_2(\text{en})_2]^{3+}$
 (3) $[\text{Fe}(\text{NH}_3)_3(\text{CN})_3]$ (4) $[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]^{-1}$
30. The configuration of the following is...
-
- (1) 1S, 2S (2) 1S, 2R (3) 1R, 2S (4) 1R, 2R

31. Compound A, $C_8H_{10}O$ is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell. A and Y are respectively.



32. Which of the following is allylic halide?

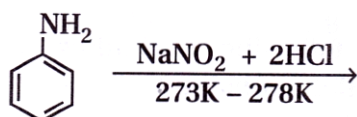
(1) Benzyl chloride

(2) (1 - bromo ethyl) benzene

(3) 1 - bromo benzene

(4) 3 - Chlorocyclo hex - 1 - ene

33. Give the product of following reaction



(1) Nitrobenzene

(2) Chlorobenzene

(3) Benzene diazonium chloride

(4) Benzene

34. By the reaction between 3 mole ethanol and 1 mole PBr_3 , the product obtained are 3 mole bromo ethane and 1 mole X; What is X?

(1) H_3PO_4

(2) H_3PO_2

(3) H_3PO_3

(4) HPO_3

35. Cumene $\xrightarrow[\text{(ii) } H_2O, H^+]{\text{(i) } O_2}$ (X) and (Y), What is X and Y?

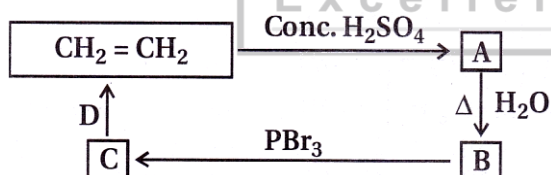
(1) Toluene, Propene

(2) Toluene, Propyl chloride

(3) Phenol, Acetone

(4) Phenol, Acetaldehyde

36. Identify B and D in the following.



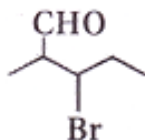
(1) Methanol and Bromoethane

(2) Ethanol and Alcoholic KOH

(3) Ethanol and K_2CO_3

(4) Ethyl hydrogen sulphate and KOH

37. What is the IUPAC name of the following compound?



(1) 2-methyl - 3- bromohexanal

(2) 3-methyl - 2- methyl butanal

(3) 2-methyl - 3- bromobutanal

(4) 3- bromo - 2- methyl pentanal

38. Fehling A and Fehling B is a.....

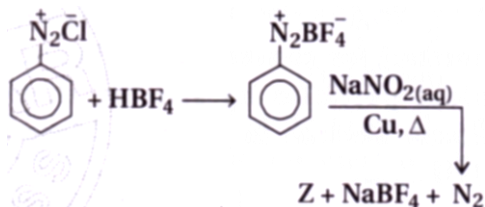
(1) Solution of $CuSO_4$ and solution of NH_4OH

(2) Solution of $CuSO_4$ and solution of sodium potassium tartrate.

(3) Solution of $CuSO_4$ and solution of sodium sytrate.

(4) Solution of $CuSO_4$ and solution of NaOH.

39.



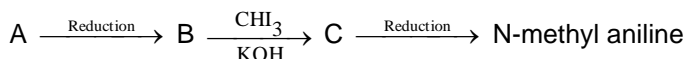
What is Z?

- (1) Aniline (2) Fluorobenzene (3) Nitrobenzene (4) o-Fluorobenzene

40. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{HNO}_2} \text{A} \xrightarrow{\text{PCl}_5} \text{B} \xrightarrow{\text{NH}_3} \text{C}$. The compound C is.

- (1) Acetamide (2) Ethylamine (3) Methylamine (4) Propane nitrile

41. What is A in following reaction



- (1) (2) (3) CH_3NH_2 (4)

42. Which of the following is strongest base?

- (1) CH_3NH_2 (2) $(\text{C}_6\text{H}_5)_2\text{NH}$ (3) NH_3 (4) $(\text{CH}_3)_2\text{NH}$

43. The formula of Rhamnose is....

- (1) $\text{C}_6\text{H}_{12}\text{O}_6$ (2) $\text{C}_6\text{H}_{12}\text{O}_5$ (3) $\text{C}_6\text{H}_{10}\text{O}_5$ (4) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

44. **Assertion (A):** The strength of 1 molar solution in g L^{-1} is always higher than that of 1 molal solution for same solute and solvent.**Reason (R)** Molality depends upon density while molarity does not.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false.
 (d) (A) is false but (R) is true

45. The incorrect example is.....

- (1) Keratin and Myosin- Fibrous proteins
 (2) Insulin and Albumin- Globular proteins
 (3) Insulin and Albumin- Dipeptide
 (4) Haemoglobin- Derived protein

46. Which amino acid shows the strong basic character?

- (1) Lysine (2) Arginine (3) Tryptophan (4) Glutamine

47. If P° and P are the vapour pressure of a solvent and its solution respectively and N_1 and N_2 are the mole fractions of the solvent and solute respectively, then correct relation is

- (a) $P = P^\circ N_1$ (b) $P = P^\circ N_2$
 (c) $P^\circ = P N_2$ (d) $P = P^\circ (N_1/N_2)$

48. Consider the Galvanic cell



The reaction at cathode is

- (a) $\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn}$ (b) $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
 (c) $\text{Cu}^{2+} + \text{Zn} \rightarrow \text{Cu} + \text{Zn}^{2+}$ (d) $\text{Zn}^{2+} + \text{Cu} \rightarrow \text{Zn} + \text{Cu}^{2+}$

49. *EMF* of cell $\text{Ni} | \text{Ni}^{2+} (1.0\text{M}) || \text{Au}^{3+} (1.0\text{M}) | \text{Au}$ (Where E° for $\text{Ni}^{2+} | \text{Ni}$ is -0.25 V ; E° for $\text{Au}^{3+} | \text{Au}$ is 1.50 V) is
 (a) $+ 1.25\text{ V}$ (b) $- 1.75\text{ V}$ (c) $+ 1.75\text{ V}$ (d) $+ 4.0\text{ V}$
50. In the reaction $2\text{A} + \text{B} \rightarrow \text{A}_2\text{B}$, if the Concentration of A is doubled and of B is halved, then the rate of the reaction will
 (a) Increase by four times (b) Decrease by two times
 (c) Increase by two times (d) Remain the same

PART- B

Instructions:

- (1) Write in a clear legible handwriting.
- (2) There are three sections in part- B of the question paper and total 1 to 27 questions are there.
- (3) All the questions are compulsory. Internal options are given.
- (4) The numbers at right side represent the marks of the question.
- (5) Start new section on new page.
- (6) Maintain sequence.
- (7) Use of simple calculator and log table is allowed, if required.

SECTION – A [2 M]

- **Question No. 1 to 12 do as directed. Each question carries 2 marks. (Attempt any 8 out of 12)** **[16]**
1. For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.
 2. A solution is obtained by mixing 300g of 25% solution and 400g of 40% solution by mass. Calculate the mass percentage of the resulting solution.
 3. $[\text{Cr}(\text{NH}_3)_6]^{3+}$ is paramagnetic while $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic. Explain why?
 4. Give preparation of haloalkanes from hydrocarbons.
 5. Explain basic character (nature) of amine compounds.
 6. Explain reaction of diazotization with suitable examples.
 7. Write a note on denaturation of proteins
 8. Using IUPAC norms write the systematic names of the following:
 - (i) $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
 - (ii) $[\text{Co}(\text{NH}_3)_4\text{Cl}(\text{NO}_2)]\text{Cl}$
 9. How many geometrical isomers are possible in the following coordination entities?
 - (i) $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$
 - (ii) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
 10. Write structures of the following compounds:
 - (i) 2-Chloro-3-methylpentane
 - (ii) 1-Chloro-4-ethylcyclohexane
 - (iii) 4-tert. Butyl-3-iodoheptane
 - (iv) 1,4-Dibromobut-2-ene
 11. The cell in which the following reactions occurs:

$$2\text{Fe}^{3+}(\text{aq}) + 2\text{I}^-(\text{aq}) \rightarrow 2\text{Fe}^{2+}(\text{aq}) + \text{I}_2(\text{s})$$
 Has $E_{\text{cell}}^\theta = 0.236\text{ V}$ at 298 K.
 Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.
 12. Why does the conductivity of a solution decrease with dilution?

SECTION – B [3 M]

- **Question No. 13 to 21 do as directed. Each question carries 3 marks. (Attempt any 6 out of 9)** **[18]**
13. The partial pressure of ethane over a solution containing 6.56×10^{-3} g of ethane is 1 bar. If the solution contains 5.00×10^{-2} g of ethane, then what shall be the partial pressure of the gas?
14. The half life of ^{14}C is 5730 years. The activity of ^{14}C in a living wood was found to be 60%, estimate the Age in years of a sample of old wood
15. What may be the stable oxidation state of the transition element with the following d electron configurations in the ground state of their atoms : $3d^3$, $3d^5$, $3d^8$ and $3d^4$?
16. **How are vitamins classified? Name the vitamin responsible for the coagulation of blood.**
17. Explain giving reasons:
- (i) Transition metals and many of their compounds show paramagnetic behaviour.
 - (ii) The enthalpies of atomisation of the transition metals are high.
 - (iii) The transition metals generally form coloured compounds.
 - (iv) Transition metals and their many compounds act as good catalyst.
18. Arrange the following in order of increasing property indicated:
- (i) HCHO , CH_3COCH_3 , $\text{CH}_3\text{CH}_2\text{CHO}$, $\text{C}_6\text{H}_5\text{CHO}$ (toward HCN)
 - (ii) ClCH_2COOH , FCH_2COOH , CH_3COOH , $\text{C}_6\text{H}_5\text{COOH}$ (acidic strength)
 - (iii) CH_3CHO , CH_3COCH_3 , CH_3COOH , CH_3OCH_3 (boiling point)
19. Give only balanced equations of preparation of $\text{K}_2\text{Cr}_2\text{O}_7$ from chromite ore.
20. Explain: Reactions of primary, secondary and tertiary alcohol with heated Cu metal.
21. State laws of osmotic pressure and derive the formula to obtain the molecular mass of solute.

SECTION – C [4 M]

- Question No. 22 to 27 do as directed. Each question carries 4 marks. (Attempt any 4 out of 6)** **[16]**
22. Calculate following quantity:
- (1) Number of coulombs needed for reduction of 8 moles of MnO_4^- .
 - (2) Number of coulombs needed for reduction of 0.2 moles of $\text{Cr}_2\text{O}_7^{2-}$.
 - (3) Number of Faradays needed to obtain 40g if Al from molten Al_2O_3 ($\text{Al} = 27\text{g/mol}$)
 - (4) Number of coulombs needed to obtain 10 moles of FeO from Fe_2O_3
23. Explain : Optical isomerism with two different illustrations in co-ordination compounds.
24. Discuss briefly giving an example in each case of co-ordination compounds:
- (i) biological systems
 - (ii) Analytical chemistry
 - (iii) medicinal chemistry and
 - (iv) extraction / metallurgy of metals
25. A solution of CuSO_4 is electrolysed in 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?
26. Resistance of conductivity cell filled with $0.1 \text{ mol L}^{-1}\text{KCl}$ solution is 100Ω . If the resistance of the same cell when filled with $0.02 \text{ mol L}^{-1}\text{KCl}$ solution is 520Ω , calculate the conductivity and molar conductivity of $0.02 \text{ mol L}^{-1}\text{KCl}$ solution. The conductivity of $0.1 \text{ mol L}^{-1}\text{KCl}$ solution is 1.29 S/m .
27. Three electrolytic cells containing $\text{Cr}_2(\text{SO}_4)_3$, AgNO_3 and CuSO_4 are connected in series and 10 A current is Passed for 1930 seconds through them
- What masses of Cr , Ag and Cu metals are obtained at cathode. ($\text{Cr} = 52$, $\text{Ag} = 108$ and $\text{Cu} = 63.5$)