

**Time allowed :3 hours.**

**Maximum marks :70**

**Read the following instructions very carefully and strictly follow them:**

### General Instructions

1. This question paper contains 33 questions.
2. All questions are compulsory.
3. The question paper is divided into five sections – A, B, C, D and E.
4. Section A contains Question Nos. 1 to 16 carrying 1 mark each.
5. Section B contains Question Nos. 17 to 21 carrying 2 marks each.
6. Section C contains Question Nos. 22 to 28 carrying 3 marks each.
7. Section D contains Question Nos. 29 and 30 carrying 4 marks each.
8. Section E contains Question Nos. 31 to 33 carrying 5 marks each.
9. Use of calculator is not permitted.
10. Internal choices are provided in some questions.

#### SECTION - A

1.	The conversion of alkyl halide into alcohol using aqueous NaOH is an example of:  A. Addition reaction B. Elimination reaction C. Substitution reaction D. Polymerisation reaction	1
2.	An azeotropic mixture showing negative deviation from Raoult's law has:  A. Lower boiling point than both liquids B. Higher boiling point than both liquids C. Same boiling point as solvent D. No fixed boiling point	1
3.	Aniline on direct nitration yields:  A. 51%ortho, 47%meta, 2%para. B. 51%ortho, 47%para, 2%meta. C. 51%para, 47%meta, 2%ortho. D. 51%meta, 47%ortho, 2%para.	1
4	Gabriel phthalimide synthesis is used for the preparation of:  A. Secondary amines. B. Primary aromatic amines. C. Tertiary amines. D. Primary aliphatic amines.	1

5.	<p>Which of the following compounds undergoes dehydration most easily?</p> <p>A. Ethanol  B. Propan-1-ol  C. 2-Methylpropan-2-ol  D. Methanol</p>	1
6.	<p>The coordination number of cobalt in <math>[\text{Co}(\text{NH}_3)_6]\text{Cl}_3</math> is:</p> <p>A. 6  B. 4  C. 3  D. 2</p>	1
7.	<p>Which of the following transition metal ion is not coloured?</p> <p>A. <math>\text{Cu}^+</math>  B. <math>\text{Ni}^{2+}</math>  C. <math>\text{Co}^{2+}</math>  D. <math>\text{V}^{3+}</math></p>	1
8.	<p>During electrolysis of dilute <math>\text{H}_2\text{SO}_4</math>, using platinum electrodes, the gas evolved at the anode is:</p> <p>A. <math>\text{H}_2</math> gas  B. <math>\text{O}_2</math> gas  C. <math>\text{SO}_2</math> gas  D. <math>\text{SO}_3</math> gas</p>	1
9.	<p>The number of molecules that react in an elementary reaction is a measure of the:</p> <p>A. Stoichiometry of the reaction.  B. Order of the reaction.  C. Molecularity of the reaction.  D. Activation energy of the reaction.</p>	1
10.	<p>The conversion of phenol to salicylic acid can be accomplished by:</p> <p>A. Reimer tiemann reaction  B. Kolbe's reaction.  C. Etard reaction.  D. Friedel craft reaction.</p>	1
11.	<p>The number of moles of <math>\text{AgCl}</math> precipitated when excess <math>\text{AgNO}_3</math> solution is mixed with one mole of <math>[\text{Co}(\text{NH}_3)_3\text{Cl}_3]</math> is :</p> <p>A. 3  B. 2  C. 1  D. 0</p>	1
12	<p><math>\alpha</math>-helix structure refers to:</p> <p>A. primary structure of protein.  B. Secondary structure of protein.  C. Tertiary structure of protein.  D. Quaternary structure of protein</p>	1

	<p>For question number 13 to 16, two statements are given, one labelled as assertion (A) and the other labelled as reason (R). Select the correct answer to these questions from the codes A, B, C and D given below:</p> <p>A. both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of the assertion.</p> <p>B. Both assertion (A) and reason (R) are true, but reason is not the correct explanation of the assertion.</p> <p>C. Assertion (A) is true, but reason (R) is false.</p> <p>D. Assertion (A) is false, but reason (R) is true.</p>	
13.	<p>Assertion (A): Cooking time is reduced in the pressure cooker.</p> <p>Reason (R): Elevation of boiling point happens inside the pressure cooker.</p>	1
14.	<p>Assertion (A): Zn is not regarded as a transition element.</p> <p>Reason (R): Zinc has completely filled d orbital in its ground state as well as in oxidised state.</p>	1
15.	<p>Assertion (A): Boiling point of diethyl amine is lower than that of n-butylamine.</p> <p>Reason (R): Extensive hydrogen bonding is observed in diethyl amine in comparison to n-butyl amine.</p>	1
16.	<p>Assertion (A): Vitamin D can be stored in our body.</p> <p>Reason (R): Vitamin D is a fat-soluble vitamin.</p>	1
<b>SECTION - B</b>		
17.	<p>Give reasons:</p> <p>(i) Equilibrium constant is related to <math>E^0_{\text{cell}}</math>.</p> <p>(ii) Salt Bridge plays a very important role in galvanic cell.</p> <p style="text-align: center;">OR</p> <p>Metals 'A' and 'B' have standard electrode potential values of 0.34 Volt and -0.76 Volt respectively. Which of these will liberate hydrogen gas from dilute sulfuric acid?</p>	2
18.	<p>The electrical resistance of a column of 0.05 M NaOH solution of area <math>1 \text{ cm}^2</math> and length 10 cm is <math>500 \Omega</math>. Calculate its resistivity and molar conductivity.</p>	2
19.	<p>Using valence band theory, deduce the shape and hybridization of <math>[\text{Ni}(\text{NH}_3)_6]^{2+}</math>. [atomic number of nickel is 28]</p>	2
20.	<p>Carry out the following conversions:</p> <p>(i) Ethanol to But-1-yne.</p> <p>(ii) 1-Bromopropane to 2-Bromopropane</p>	2
21.	<p>Write IUPAC names of the following compounds:</p> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{OH} \quad \text{OH} \\   \quad   \\ \text{CH}_3 - \text{C} - \text{C} - \text{CH}_3 \\   \quad   \\ \text{CH}_3 \quad \text{CH}_3 \end{array}</math> </div> <p>(i)</p> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{CH} - \text{O} - \text{CH}_3 \\ \diagup \\ \text{CH}_3 \end{array}</math> </div> <p>(ii)</p>	2
<b>SECTION - C</b>		

22.	Draw the various possible isomers of $C_7H_7Cl$ containing the benzene ring. Identify the structure with the weakest C-Cl bond and give reasons in support of your choice.	3				
23.	Give simple chemical test to distinguish between the following pair of compounds: - (i) Propanal & Propanone. (ii) Benzaldehyde and Acetophenone. (iii) Ethanoic acid & Phenol.	3				
24.	Following data are obtained for the reaction: $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$  <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><math>t/s</math></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>300</b></td> <td style="text-align: center;"><b>600</b></td> </tr> </table> $[N_2O_5]/\text{mol L}^{-1}$ $1.6 \times 10^{-2}$ $0.8 \times 10^{-2}$ $0.4 \times 10^{-2}$ (i) Show that it follows first order reaction. (ii) Calculate the half-life. (Given $\log 2 = 0.3010$ , $\log 4 = 0.6021$ )	$t/s$	<b>0</b>	<b>300</b>	<b>600</b>	3
$t/s$	<b>0</b>	<b>300</b>	<b>600</b>			
25.	An organic compound A, having the molecular formula $C_3H_8O$ on treatment with Cu at 573K, gives B. B does not reduce Fehling's solution but gives a yellow precipitate of the compound C with $I_2$ and NaOH. Deduce the structure of A, B and C. Support your answer with suitable chemical equations.  <b>OR</b> Phenol is treated with $CO_2$ and NaOH at 410 K under pressure to give compound 'A'. 'A' on acidification gives compound 'B'. 'B' reacts with acetyl chloride to give compound 'C' which is a very popular analgesic. Deduce the structure of 'A', 'B' and 'C' and explain all the reactions involved.	3				
26.	Write structures of different isomeric amines with the molecular formula $C_4H_{11}N$ which liberate nitrogen gas when treated with nitrous acid. Identify the isomer which will be optically active and write its IUPAC name.	3				
27.	(i) Draw geometrical isomers of $[Co(en)_2Cl_2]^+$ . (ii) Write the electronic configuration of d4 ion if $\Delta_o < P$ .	2+1				
28.	A food company stores milk packets at low temperature during transportation. The company claims that refrigeration slows down spoilage by reducing the rate of chemical reactions responsible for decomposition. Explain why lowering temperature decreases the rate of spoilage. Name the equation and give mathematical relation that relates rate constant with temperature.	3				
<b>SECTION - D</b>						
29.	Vanillin, the compound responsible for the flavour of vanilla, contains an aldehyde functional group. In a laboratory, a student performed different tests on organic compounds to identify aldehydes and carboxylic acids. One compound produced silver mirror with Tollen's reagent, while another compound reacted with sodium bicarbonate releasing brisk effervescence. The student also observed that aldehydes are generally more reactive than ketones towards nucleophilic addition reactions.	1+1+2				

	<p>Based on the above passage, answer the following questions:</p> <p>(i) Which test is used to distinguish aldehydes from ketones by formation of silver mirror?</p> <p>(ii) Name the gas evolved when a carboxylic acid reacts with sodium bicarbonate.</p> <p>(iii) Why are aldehydes more reactive than ketones towards nucleophilic addition reactions? OR</p> <p>(iii) Write the chemical equations for: (a) Reaction of ethanoic acid with sodium bicarbonate (b) Tollen's test with ethanal</p>	
30.	<p>A water purification plant uses electrolysis for electroplating iron parts with chromium to prevent corrosion. During the process, an electric current is passed through an electrolytic cell containing chromium ions. The engineers observed that the mass of chromium deposited on the iron surface depends upon the amount of electricity passed through the solution. They also noticed that improper electrode selection reduced the efficiency of electroplating. Based on the above passage, answer the following questions:</p> <p>(i) Name the electrode on which chromium gets deposited during electroplating.</p> <p>(ii) State one reason why electroplating is done on iron objects.</p> <p>(iii) Explain why the amount of chromium deposited increases with increase in electric current passed through the solution. OR</p> <p>(iii) A current of 2 A is passed through the electrolytic cell for 30 minutes. Calculate the quantity of electricity passed through the solution.</p>	1+1+2
<b>SECTION-E</b>		
31.	<p>(i) Define the following: (a) Anomers (b) Glycosidic linkage (c) Invert sugar.</p> <p>(ii) Give one point of difference between the following: (a) Acidic and basic amino acids. (b) Nucleotide and Nucleoside.</p> <p>OR</p> <p>(i) Account for the following: (a) Pentaacetate of glucose doesn't react with Hydroxylamine. (b) Fructose is a reducing sugar. (c) Non-essential amino acids are also important in our diet.</p> <p>(ii) Write two points of differences between DNA and RNA.</p>	3+2
32.A	(i) Account for the following:	3+2

