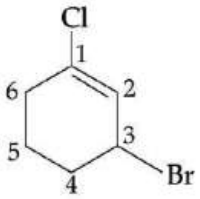
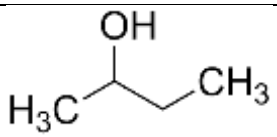
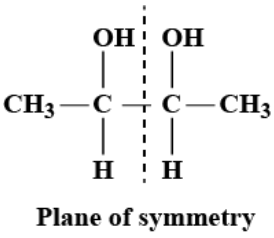
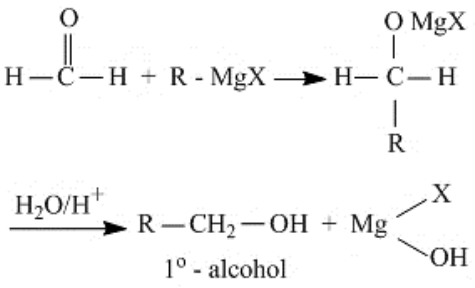
Sample Question Paper (TERM - I)	
Solutions	
Section - A	
Ans. 1	(b) Homogeneous, anisotropic **Explanation:** Homogeneity refers to uniformity in composition, which is a characteristic property of crystalline solids. Isotropy is when the values of physical properties do not change with direction throughout the body of the solid. Crystalline solids are anisotropic because the composition of the solid changes with direction, hence the physical properties also change with direction.
Ans. 2	(b) Molarity to decrease **Explanation:** An increase in temperature increase the volume of solution and therefore it will result in its molarity to decrease.
Ans. 3	(b) (iii) > (ii) > (i) **Explanation:** The reactivity order of alcohols towards halogen acids is $3^\circ > 2^\circ > 1^\circ$ as the stability of carbocations is of the order $3^\circ > 2^\circ > 1^\circ$.
Ans. 4	(a) (c) < (a) < (b) **Explanation:** The boiling points of isomeric haloalkanes decrease with an increase in branching as with an increase in branching surface area decreases which leads to a decrease in intermolecular forces. Hence, the increasing order of their boiling points is c < a < b.
Ans. 5	(a) Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1ol **Explanation:** Boiling point increases with increase in molecular mass of the alcohols. Among isomeric alcohols 1° alcohols have higher boiling point than 2° alcohols. Thus, correct order is: Propan-1-ol < Butan-2-ol < Butan-1-ol < pentan-1-ol
Ans. 6	(C) Amphoteric **Explanation:** Amino acids are amphoteric because they contain both basic $-NH_2$ group and acidic -COOH group.

Ans. 7	(c) Unit cell **Explanation:** Crystalline solids are composed of many small crystals, each of which is called a unit cell. It is a specific term. Monomer is the basic unit for a polymer, and atoms make up molecules, which can further arrange themselves to form solids, liquids or gases.
Ans. 8	(b) supersaturated **Explanation:** When a small amount of solute is added to its solution, it does not dissolve and get precipitated then this type of solution is called as supersaturated solution.
Ans. 9	(d) SbH_3 **Explanation:** The strongest reducing agent is SbH_3 due to the presence of minimum bond enthalpy.
Ans. 10	(d) $(CH_3)_3C-I$ **Explanation:** $(CH_3)_3C-I$ will undergo $S_N{}^1$ reaction most readily as C-I bond is weakest, due to the large difference in the size of carbon and iodine.
Ans. 11	(b) (i), (ii), (iii) **Explanation:** Asymmetric/Chiral carbon atom is that in which all of its four valencies lie with four different groups or atoms.
Ans. 12	(c) Hydrogen bonds **Explanation:** α-helix structure of protein is stabilised by hydrogen bonds. A polypeptide chain forms all possible hydrogen bonds by twisting into right-handed helix with the -NH group of each amino acid residue hydrogen bonded to $>C=O$ of an adjacent turn of helix.
Ans. 13	(d) lattice point **Explanation:** The point at which the atoms may be present on the unit cell is termed as lattice point. It shows the position of atoms in crystal.
Ans. 14	(b) The relative lowering of vapour pressure is equal to the mole fraction of solute. **Explanation:** According to Raoult's law, for a dilute solution, the relative lowering of vapour pressure is equal to the mole fraction of solute.

	$\frac{P_A^0 - P_A}{P_A{}^0} = X_B$ Where $\frac{P_A^0 - P_A}{P_A{}^0}$ = Relative lowering of vapour pressure X_B = mole fraction of solute
Ans. 15	(c) SF_4 **Explanation:** SF_4 has trigonal bi-pyramidal structure.
Ans. 16	(c) 3-bromo-1-chlorocyclohexene **Explanation:**  IUPAC name: 3-bromo-1-chlorocyclohexene
Ans. 17	(c) Oxidation by heating with copper followed by reaction with Fehling solution. **Explanation:** Oxidation by heating with copper followed by reaction with Fehling solution.
Ans. 18	(b) Guanine **Explanation:** Guanine (G) is the complementary base of cytosine (C) in one stand to that in another stand of DNA. $C \equiv G$
Ans. 19	(c) 8 **Explanation:** Coordination number of a unit cell is defined as the number of atoms/ions that surround the central atom/ion. In the case of BCC, the central particle is surrounded by 8 particles hence, 8.
Ans. 20	(c) 3.15 gm **Explanation:** For hydrated oxalic acid, $(COOH)_2 \cdot 2H_2O$, molar mass is 126 g/mol. Equivalent weight $= \frac{M}{2} = 63$ Normalily $= \frac{\text{N0.of gram Eq}}{\text{Volume of solution in L}}$ $0.1 = \frac{w \times 1000}{63 \times 500}$

	$w = \frac{0.1 \times 1000}{63 \times 500}$ $x = \frac{6.3}{2} = 3.15g$ Hence, mass of oxalic acid required is 3.15 g.
Ans. 21	(b) Moisture **Explanation:** Coloured material $+[O] \rightarrow$ Colorless material. Therefore, chlorine acts as a bleaching agent only when moisture is present.
Ans. 22	(b) $CH_3COCH_2CH_2Br$ **Explanation:** Due to formation of the conjugate system, it will be most reactive towards alc. KOH: $CH_3COCH_2CH_2Br + \text{ alc.KOH} \rightarrow CH_3COCH = CH_2$
Ans. 23	(a) alcohols **Explanation:** Lucas test - Alcohol reacts with concentrated hydrochloric acid in presence of anhydrous $ZnCl_2$ to form alkyl halides. The three type of alcohols undergo this reaction at different rates. Order of rate of reaction is: tertiary > secondary > primary. $R - OH + HCl \xrightarrow{ZnCl_2} R - Cl + H_2O$
Ans. 24	(c) Glucose **Explanation:** The Glucose structure has an aldehyde group and due to which it gives a positive test for Fehling's solution. Thus, the right answer is Glucose.
Ans. 25	(d) $I_2 < Br_2 < Cl_2 < F_2$ **Explanation:** Fluorine has low heat of dissociation and high heat of hydration which more than compensates the lower value of electron affinity. Hence, fluorine is the strongest oxidizing agent. Bromine and iodine have low dissociation energies than chlorine but they are poor oxidizing agents than chlorine. This is due to their small electron affinities and smaller hydration energies.

Section – B	
Ans. 26	(b) CaF_2 **Explanation:** AB_2 type stucture breaks down as: $AB_2 \rightleftharpoons A^{2+} + 2\ B^-$ Similarly, $CaF_2 \rightleftharpoons Ca^{2+} + 2\ F^-$ $\therefore$ AB_2 type of structure is present in CaF_2.
Ans. 27	(a) equal to second **Explanation:** 12g urea = 12/60 mol = 0.2 mol, 86.4g sucrose =68.4/342=0.2 mol. As mole fraction of solute is same. Hence, lowering of V.P. is same.
Ans. 28	(a) Lactose **Explanation:** Starch and cellulose are polysaccharides, fructose is monosaccharide and lactose are disaccharide.
Ans. 29	(b) d-orbitals are available for bonding **Explanation:** Nitrogen does not have vacant d-orbital in the outermost shell. N (7) $=1s^2,2s^2 2p^3$
Ans. 30	(a) Na **Explanation:** $2CH_3Br + 2Na \rightarrow CH_3CH_3 + 2NaBr$
Ans. 31	(d) Helium **Explanation:** Noble gases can form compounds in which the gases are entrapped in the cavities of crystal lattices. Such compounds are called clathrates. Only Argon, Krypton, Xenon and Radon are known to form clathrates among the noble gases.
Ans. 32	(d) glucose **Explanation:** Glucose is the monomer of many of the larger carbohydrates, namely starch, cellulose. Hydrolysis of starch gives glucose.
Ans. 33	(b) secondary alcohol **Explanation:** Butan-2-ol is an example of secondary alcohol, as -OH group connected to secondary carbon (connected to two carbon atom).

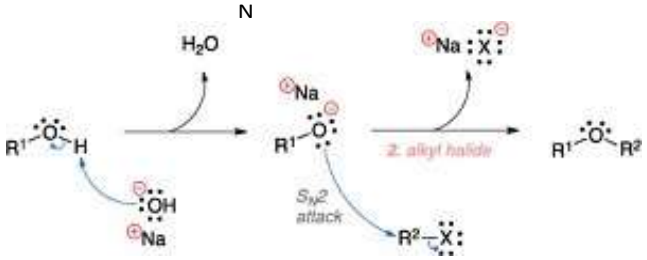
	
Ans. 34	(a) High pressure **Explanation:** High pressure increases the boiling point of water so it reduces the cooking time.
Ans. 35	(d) NI_3 **Explanation:** The strongest lewis base is NI_3 due to lower electronegativity of I. So the tendency of trihalides of N decreases from $NI_3 > NBr_3 > NCl_3 > NF_3$ due to increase in electronegativity from I to F.
Ans. 36	(b) $CH_3CH(OH)CH(OH)CH_3$ **Explanation:** Only compound B have plane of symmetry in all the given compounds thus it has meso form.  **Plane of symmetry**
Ans. 37	(a) 4,4 **Explanation:** Coordination numbers of Zn^{2+} and S^{2-} in the crystal structure of wurtzite are 4,4. Sulphide ions occupies ccp while zinc ions occupy alternate tetrahedral voids. Number of formula units per unit cell is 4 .
Ans. 38	(a) HCHO **Explanation:**  1° - alcohol

Ans. 39	(b) 287.8pm Explanation: For fcc lattice, $4r = a\sqrt{2}$ and $2r$ = diameter $= \frac{a\sqrt{2}}{2} = \frac{407\times\sqrt{2}}{2} = 287.8pm$
Ans. 40	(b) 5.08 **Explanation:** $\Delta T_f = K_f \times m$ $(5.45 - 3.55) = K_f \times 0.374$ $\Longrightarrow K_f = \frac{1.9}{0.374} = 5.08$
Ans. 41	(a) H_3PO_4 **Explanation:** H3PO4 has 3P-OH groups, hence they are tribasic.
Ans. 42	(b) Propylene **Explanation:** **(b)** $CH_3 - CH = CH_2 + H_2O \xrightarrow[\text{Markowinkoff's rule}]{\text{Conc. } H_2SO_4}$ $CH_3 - CH(OH) - CH_3$ Isopropyl alcohol
Ans. 43	(b) Inert pair effect **Explanation:** Due to inert pair effect +5 oxidation state becomes less stable and +3 oxidation state becomes more stable down the group
Ans. 44	(d) Monosaccharide **Explanation:** A carbohydrate which cannot be hydrolyzed to simpler compounds, is called. Monosaccharide is the simplest carbohydrate which cannot be hydrolyze to simpler compounds.
Ans. 45	(c) A is true but R is false. **Explanation:** S1: Pb^{2+} is more stable because of inert effect.

	I^- being larger has the tendency to lose the electron easily. S2: Smaller and highly electronegative elements like F^- can stabilize the higher oxidation state not I^-.
Ans. 46	(c) A is true but R is false. **Explanation:** Bond angle of $H_2S(92^\circ) < H_2O(104^\circ 31)$. As the electronegativity of the central atom decreases, bond angle decreases. In the present case, S is less electronegative than oxygen. Thus bond pairs in H_2 S are more away from the central atom than in H_2O and thu, s repulsive forces between bond pairs are smaller producing smaller bond angle. Hence, assertion is correct but reason is incorrect.
Ans. 47	(b) Both assertion and reason are wrong statements. **Explanation:** The primary structure of protein depicts the sequence of amino acids in a chain or gives the positional information in a protein. Protein thread is folded in the form of a helix or in the sheet form in the secondary structure. The long protein chain is also folded upon itself like a hollow wollen ball, giving rise to the tertiary structure. This gives us a 3-dimensional view of a protein. Tertiary structure is absolutely necessary for many biological activities of proteins.
Ans. 48	(a) Both A and R are true and R is the correct explanation of A. **Explanation:** Oxygen is small in size and the lone pair of oxygen repel the bond pairs of O—O bond to larger extent than the lone pairs of sulphur in S—S bond. Sulphur naturally exists in nature as S_8 molecules. On heating these rings break and link jointly in to long chains. Hence sulphur has greater tendency for catenation than oxygen.

Ans. 49	(a) Both A and R are true and R is the correct explanation of A. **Explanation:** A Frenkel defect is a type of defect in crystalline solids wherein an atom is displaced from its lattice position to an interstitial site, creating a vacancy at the original site and an interstitial defect at the new location within the same element without any changes in chemical properties. No cation or anion are leaving the crystal. Only the cation is moving from one place to another place within the crystal. So, the density of crystalline solid will not change.

Section – C

Ans. 50	(b) 0.51°C **Explanation:** $\Delta T = K_b \times \frac{w}{m} \times \frac{1000}{W}$ $0.170 = K_b \times \frac{0.450}{60} \times \frac{1000}{22.5}$ $K_b = \frac{0.170 \times 60 \times 22.5}{1000 \times 0.450} = 0.51°C$
Ans. 51	(c) Glucose **Explanation:** Fehling solution generally reduces aldehyde group. Only glucose has aldehyde group. So glucose gives positive test for Fehling's solution.
Ans. 52	(b) ethers **Explanation:** The Williamson ether synthesis is an organic reaction, forming an ether from an organohalide and deprotonated alcohol (alkoxide).  This reaction was developed by Alexander Williamson in

	1850. Typically it involves the reaction of an alkoxide ion with a primary alkyl halide via an S_N^2 reaction.
Ans. 53	(b) IF_7 - pentagonal bipyramidal **Explanation:** $[ICl_2]^-$ —linear, ClF_3 — T-shaped, $[BrF_4]^-$- Square planar
Ans. 54	(b) 5 bond pairs and one lone pair **Explanation:** It has square pyramidal shape and has 5 bond pairs and one lone pair.
Ans. 55	**(d) 7** **Explanation:** In **IF_7**, iodine is the least electronegative halogen, so its highest oxidation number (**+7**) is more stable than those of the lighter member of the group.