DAV PUBLIC SCHOOL, POKHARIPUT
PSVT EXAMINATION, 2021-22

- Check that this question paper contains 06 Printed pages.
- Check that this question paper contains 20 questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.

CLASS - XII

SUB: CHEMISTRY

Time: 1.5 Hours   **Maximum Marks: 35**

General instruction:

- All questions are compulsory.
- Question no.1 carries 4 marks.
- Questions 2-13 carry 1 mark each.
- Questions 14-17 carry 2 marks each.
- Questions 18-19 carry 3 marks each.
- Question no.20 carries 5 marks.

SECTION A (OBJECTIVE TYPE)	
1.	**Read the passage given below and answer the following questions:** In hexagonal system of crystals, a frequently encountered arrangement of atoms is described as a hexagonal prism. Here the top and bottom of the cell are regular hexagon and three atoms are present in between them. A space filling model of this structure called hexagonal closed packed (hcp) is constituted of a sphere on a flat surface surrounded in the same plane by six identical spheres as closely as possible. Three spheres are then packed over the first layer so that they touch each other and represent the second layer. Finally, the second layer is covered by a third layer that is identical to the bottom layer in relative position. Assume radius of every sphere to be 'r'. **The following questions are multiple choice questions. Choose the most appropriate answer** (i)The number of atoms in hcp unit cell is: (a) 4 (b) 6 (c) 12 (d) 17	1x4

	(ii) The volume of this hcp unit cell is:
	
	    (a) $24\sqrt{2}r^3$ (b) $16\sqrt{2}r^3$ (c) $12\sqrt{2}r^3$ (d) $\frac{64}{3}\sqrt{3}r^3$
	
	(iii)The empty space in this hcp unit cell is:
	
	    (a) 74% (b) 47.6% (c) 32% (d) 26%
	
	(iv) Which of the following statement is not true about the hexagonal close packing?
	
	    (a) The coordination number is 12
	
	    (b) It has packing efficiency 74%
	
	    (c) Tetrahedral voids of the second layer are covered by the spheres of the third layer.
	
	    (d) In this arrangement spheres of the fourth layers are exactly aligned with those of the first layer.
	
	OR
	
	    If N is the number of tetrahedral voids in a close-packed structure, then the number of octahedral voids is:
	
	    a) N/4 b) 4N c) 2N d) N/2	

Following questions (No.2-8) are multiple choice questions carrying 1 mark each.	
2.	Alkali metal halides do not show Frenkel defect because (a) cations and anions have almost equal size (b) there is a large difference in size of cations and anions (c) cations and anions have low coordination number (d) anions cannot be accommodated in voids.	1
3.	p-dichlorobenzene has higher melting point than its o- and m- isomers because (a) p-dichlorobenzene is more polar than o- and m- isomer. (b) p-isomer has a symmetrical crystalline structure. (c) boiling point of p-isomer is more than o- and m-isomer. (d) All of these are correct reasons.	1

	OR Which of the following is an example of vic-dihalide? (a)Dichloromethane (b)1,2-Dichloroethane (c)Ethylidene chloride (d)Allyl chloride	1
4.	Which of the following will have metal deficiency defect? (a) NaCl (b) FeO (c) KCl (d) ZnO	1
5.	The reaction of toluene with chlorine in presence of $FeCl_3$ gives predominantly. (a) a mixture of o-and p-chlorotoluene (b) benzyl chloride (c) m-chlorotuluene (d) benzoyl chloride	1
6.	In which pair most efficient packing is present? (a) hcp and bcc (b) hcp and ccp (c) bcc and ccp (d) bcc and simple cubic cell	1
7.	S_N1 reaction of alkyl halides lead to (a) Retention of configuration (b) Racemization (c) Inversion of configuration (d) None of these	1
8.	To get n-type of semiconductor, germanium should be doped with (a) gallium (b) arsenic (c) aluminium (d) boron	1

In the following questions (Q.No.9- 13) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is the correct explanation for assertion.

b) Assertion and reason are correct but reason is not the correct explanation of assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement

9.	Assertion: Crystalline solids are anisotropic. Reason: The constituents particles are very closely packed.	1
10.	Assertion: It is difficult to replace chlorine by -OH in chlorobenzene in comparison to that of chloroethane.	1

	Reason: C – Cl bond in chlorobenzene has a partial double character due to resonance.		
11.	Assertion: Graphite is a good conductor of electricity however diamond belongs to the category of insulators. Reason: Graphite is soft in nature on the other hand diamond is very hard and brittle.	1	
12.	Assertion: 2,4-dinitro-chlorobenzene is more reactive towards SN reaction. Reason: Electron donating group at ortho and para position facilitates SN reaction at aromatic ring.	1	
13.	Assertion: On heating ferromagnetic or ferrimagnetic substances they become paramagnetic. Reason: The electrons change their spin on heating. **OR** Assertion: Total number of octahedral voids present in unit cell of cubic close packing including the one that is present at the body center, is four. Reason: Besides the body center there is one octahedral void present at the center of each of the six faces of the unit cell and each of which is shared between two adjacent unit cells.(c)	1	

SECTION B

The following questions, Q. No 14 -17 are Short Answer Type I and carry 2 marks each.

14.	Ferric oxide crystallises in a hexagonal close-packed array of oxide ions with two out of every three octahedral holes occupied by ferric ions. Derive the formula of the ferric oxide.	2
15.	Carry out the following conversions: a) ethane to bromoethane b) benzene to biphenyl	1+1

	OR
	
	Give reasons:
	
	   a) Dipole moment of chlorobenzene is lower than cyclohexyl chloride.
	
	   b) Grignard's reagent should be prepared under anhydrous condition.	

16.	Account for the following:
	
	   a) NaCl appears yellow in colour sometimes.
	
	   b) Electrical conductivity of a metal decreases with rise in temperature.
		1+1

17.	Write the IUPAC name of the following compounds: a) $CH_3CH=CHC(Br)(CH_3)_2$ b) $p\text{-}ClC_6H_4CH_2CH(CH_3)_2$	1+1
SECTION C		
Q. No 18-19 are Short Answer Type II and carry 3 marks each.		
18.	An element with molar mass 2.7×10^{-2} kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is 2.7×10^3 kg m^{-3}, what is the nature of the cubic unit cell?	3

19.	a) Write the mechanism for the following reaction:
	
	$$CH_2 = CH_2 + H_2O \xrightarrow{H^+} C_2H_5OH$$
	b) Name the reagent used for conversion of propene to propan-1-ol.
	
	OR
	
	Write the structure and IUPAC name of the products formed in the following reactions:
	
	   a) Catalytic reduction of butanal
	
	   b) Reaction of propanone with methyl magnesium bromide
	      followed by hydrolysis.
	
	   c) Reduction of acetic acid in presence of LiAlH$_4$
		2+1
		
		1+1+1

SECTION D

Q. No- 20 is Long Answer Type carrying 5 marks .

20.	Primary alkyl halide C_4H_9Br (A) reacted with alcoholic KOH to give compound (B). Compound (B) is reacted with HBr to give (C) which is an isomer of (A). When (A) is reacted with sodium metal it gives compound (D), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium.
	
	   a) Give the structural formula of (A) .
	
	   b) Identify B, C & D
	
	   c) Write the equations involved in all the reactions.
	
	 OR
	a) What happens when:
	
	   i) Methyl chloride is treated with alc. KCN.
	
	   ii) Chlorobenzene is treated with nitrating mixture.
	
	   iii) Bromomethane is heated with AgF.
	
	b) In the following pairs of compounds, which of the following undergoes SN^2 reaction faster & why?
	
	i)
	
	ii)
		5