CHEMISTRY **Max.Marks:80**

SECTION-1

(SINGLE CORRECT CHOICE TYPE)

Section-I (Single Correct Answer Type, Total Marks: 24) contains 8 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.** For each question you will be awarded 3 marks if you darken ONLY the bubble corresponding to the correct answer and zero marks if no bubble is darkened. In all other cases, minus one (-1) mark will be awarded.

1. In which of the following triatomic molecules the observed bond angle is about 116º

   A) H_2O B) OF_2 C) CO_2 D) O_3

2. The least stable ion among the following is

   A) Li^+ B) B^- C) C^- D) Be^-

3. Which of the following is false?

   A) An element which has high electronegativity always has high electron gain enthalpy

   B) Electron gain enthalpy is the property of an isolated atom

   C) Electronegativity is the property of bonded atom

   D) Both electronegativity and electron gain enthalpy are directly related to nuclear charge and inversely related to atomic size

4. Anything that influence the valence electron will effect the chemistry of an element. Which one of the following factors does not affect the valence shall
   A) Valence principal quantum number (n)
   B) Effective nuclear charge
   C) Nuclear mass
   D) Number of core electrons
5. Which of the following statement is **CORRECT**
   A) Dipole – dipole interactions between molecules are greatest if the molecules possess only temporary dipolemoments
   B) All compounds containing hydrogen atoms can participate in hydrogen bonding
   C) Dispersion forces exist among all atoms, molecules and ions
   D) The extent of ion-induced dipole interaction depends only on the charge of the ion
6. Polarisation involves the distortion of the shape of an anion by an adjacently placed cation. In this context, which of the following statements is **CORRECT**?
   A) Maximum polarization is brought about by a cation of high charge
   B) Minimum polarization is brought about by a cation of high charge
   C) A large cation is likely to bring about a high degree of polarisation
   D) The polarising power of a cation is less than that of an anion

7. The normality and volume strength of a solution made by mixing 1.0 L each of 5.6 volume and 11.2 volume H_2O_2 solution are

A) $1N, 5.6 vol$ B) $1.5N, 5.6 vol$ C) $1.5N, 8.4 vol$ D) $1N, 8.4 vol$

8. Which of the following statements, is **WRONG?**

A) Dihydrogen acts as a reducing agent in its reaction with chlorine

B) Dihydrogen acts as an oxidising agent in its reaction with sodium

C) Dihydrogen forms electron precise covalent molecules with 14^{th} group elements

D) Electrolysis of fused hydrolith liberates hydrogen at cathode.

SECTION-2
(MORE THAN ONE TYPE)

Section - II (Multiple Correct Answers Type, Total Marks: 16) contains 4 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE or MORE may be correct. For each question you will be awarded 4 marks if you darken ALL the bubble(s) corresponding to the correct answer(s) ONLY and zero marks otherwise. There are no negative marks in this section.

9. IE, of lithium is 5.4ev $atom^{-1}$ and the electron affinity of chlorine is 3.6eV $atom^{-1}$.

Calculate the $\Delta_r H^0$ of the reaction

$Li(g) + Cl(g) \rightarrow Li^+(g) + Cl^-(g)$

Formed at such a low pressure that resulting ions do not combine with each other (EA, is negative)

A) 41.5 K.cal mol^{-1} B) 41.5 kJ mol^{-1}

C) 173.7 kJ mol^{-1} D) 1.8 eV ionic pair $^{-1}$

10. Which statement is/are **CORRECT**

A) Formation of anions with unit charge (e.g. Cl^-, Br^-, I^-) are very common because EA's of these atoms is positive and quite high or $\Delta_{eg}H^0$ of these atoms are negative and quite high

B) EA's of above atoms (Cl, Br, I) is negative and quite high or $\Delta_{eg}H^0$ of these atoms is positive and quite high

C) Formation of anions with -2 charge ($e.g. S^{2-}, O^{2-}$) is not so easy as their second EA's are negative, i.e. energy is needed to add second electron

D) Formation of anions gaseous with -3 charge (e.g N^{3-}, P^{3-}) is almost rare as the 3rd $\Delta_{eg}H^0$ are positive i.e energy is needed to add third electron

11. Which statements is are **CORRECT** for AB_xE type molecule?

A) If the EN of central atom decreases, the bond angle decreases

B) If the size of central atom increases, the bond angle decreases

C) If the EN of atom B decreases the bond angle increases

D) If the EN of atom B decreases, the bond angle decrease

12. Permanent hardness due to $CaCl_2$ & $MgCl_2$ is removed by adding sodium carbonate. Then which of the following statement(s) is/are **CORRECT**?

A) If hardness is 100ppm $CaCO_3$, the amount of Na_2CO_3 required to soften 10L of hard water is 1.06

B) If hardness is 100 ppm $CaCO_3$ the amount of Na_2CO_3 required to soften 10L of hard water is 10.6 g.

C) If hardness is 420 ppm with respect to $MgCO_3$, the amount of Na_2CO_3 required to soften 10L hard water is 53.0 g

D) If hardness is 420 ppm with respect to $MgCO_3$, the amount of Na_2CO_3 required to soften 10L of hard water is 5.3 gm

SECTION-3
[INTEGER TYPE]

Section-III (Integer Answer Type, Total Marks: 24) contains 6 questions. The answer to each of the questions is a single-digit integer, ranging from 0 to 9. The bubble corresponding to the correct answer is to be darkened in the ORS. For each question you will be awarded 4 marks if you darken ONLY the bubble corresponding to the correct answer and zero marks otherwise. There are no negative marks in this section.

13. Total number of molecules in which all the possible bond angles are identical (Neglecting the angles between BP and LP)

$PF_3, CF_4, XeF_4, PF_5, IF_7, BeCl_2(solid), ICl_4^-, CH_2F_2$

14. In solid ice the number of oxygen atoms bonded to oxygen atom of a water molecule through hydrogen atoms

15. How many of the following give compounds having same molecular weight equal to heavy water by treating with heavy water $Mg_3N_2, BeC_2, Al_4C_3, CaC_2, Ca_3P_2, AlN, SiF_4, AlCl_3$

16. How many of the following are paramagnetic? $O_2, O_2^-, O_2^+, C_2, C_2^+, C_2^-, NO, NO^+, B_2, B_2^+, B_2^-$

17. How many of the following molecules contain polar covalent bonds but net dipolemoment is almost zero $BF_3, CCl_4, SiCl_4, CO_2, SO_3, NO_3^-, CO_3^{2-}$

18. How many of the following compounds/ions have bond order 1.5

$SO_4^{2-}, C_6H_6, O_3, O_2^-, N_2^-, SO_3^{2-}, PO_4^{3-}$

SECTION-4

[Matrix Matching Type]

Section-IV (Matrix-Match Type, Total Marks: 16) contains 2 questions. Each question has four statements (A, B, C and D) given in Column I and five statements (p, q, r, s and t) in Column II. Any given statement in Column I can have correct matching with ONE or MORE statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for the particular question, against statement B, darken the bubbles corresponding to q and r in the ORS. For each question you will be awarded 2 marks for each row in which you have darkened ALL the bubble(s) corresponding to the correct answer(s) ONLY and zero marks otherwise. Thus, each question in this section carries a maximum of 8 marks. There are no negative marks in this section.

19. Match the following Column – I with Column – II

Column – I	**Column – II**
A) SiO_3^{2-}	P) Planar triangular
B) BF_3	Q) Non-polar
C) CO_3^{2-}	R) Bond order 1.33
D) NO_3^-	S) Resonance hybrid of three structure

20. Match the following Column – I with Column – II

Column – I	**Column – II**
A) Oxidant	P) CsH
B) Reductant	Q) Hydrogen (liquid or gas)
C) Bleaching agent	R) H_2O
D) Rocket fuel	S) H_2O_2