1. Which one of the following pairs of molecules will have permanent dipole moments for both members?
(1) NO_2 and CO_2 (2) NO_2 and O_3
(3) SiF_4 and CO_2 (4) SiF_4 and NO_2

2. The pair of species having identical shapes for molecules of both species is :
(1) XeF_2, CO_2 (2) BF_3, PCl_3
(3) PF_5, IF_5 (4) CF_4, SF_4

3. The correct order of bond angles (smallest first) in H_2S, NH_3, BF_3 and SiH_4 is :–
(1) $H_2S < NH_3 < SiH_4 < BF_3$
(2) $NH_3 < H_2S < SiH_4 < BF_3$
(3) $H_2S < SiH_4 < NH_3 < BF_3$
(4) $H_2S < NH_3 < BF_3 < SiH_4$

4. lattice energy of an ionic compound depends upon
(1) charge on the ion only
(2) size of the ion only
(3) packing of the ion only
(4) charge and size of the ion

5. The correct order of increasing C - O bond length of, CO, CO_3^{2-}, CO_2 is
(1) $CO_3^{2-} < CO_2 < CO$
(2) $CO_2 < CO_3^{2-} < CO$
(3) $CO < CO_3^{2-} < CO_2$
(4) $CO < CO_2 < CO_3^{2-}$

6. Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is
(1) H_2O because of hydrogen bonding
(2) H_2Te because of higher molecular weight
(3) H_2S because of hydrogen bonding
(4) H_2Se because of lower molecular weight

7. Which species has the maximum number of lone pair of electrons on the central atom?
(1) ClO_3^- (2) XeF_4
(3) SF_4 (4) I_3^-

8. Which is not an exception to octet rule ?
(1) BF_3 (2) $SnCl_4$
(3) BeI_2 (4) ClO_2

9. The correct order of decreasing bond energy is:-
(1) O–O > S – S > Se – Se
(2) C – C > Si – Si > Ge – Ge
(3) F – F > O – O > N – N
(4) F – F > Cl – Cl > Br – Br

10. Both CO_2 and H_2O contain polar covalent bonds but CO_2 is nonpolar while H_2O is polar because–
(1) H atom is smaller than C atom
(2) CO_2 is a linear molecule while H_2O is an angular molecule
(3) O – H bond is more polar than C – H bond
(4) CO_2 contains multiple bonds while H_2O has only single bonds

11. Maximum bond energy will be shown by the species
(1) O_2^+ (2) O_2 (3) O_2^- (4) O_2^{-2}

12. Resonance is not shown by -
(1) C_6H_6 (2) CO_2 (3) CO_3^{2-} (4) SiO_2

13. Two ice cubes are pressed over each other until they unite to form one block. The force mainly responsible for holding them together is–
(1) van der Waals force
(2) dipole-dipole interaction
(3) H bonding
(4) covalent bonding

14. Which order of decreasing bond angle is correct?
(1) $CCl_4 > BF_3 > NO_2^+$
(2) $NH_3 > NCl_3 > NBr_3$
(3) $Br_2O > Cl_2O > OF_2$
(4) $PCl_3 > PBr_3 > PI_3$

15. On the basis of hybridization of one s & one p orbitals they are arrange at :-
(1) Two orbitals mutually at 90° angle
(2) two orbitals mutually at 180° angle
(3) Two orbitals mutually at 120°angle
(4) Two orbitals mutually at 150° angle

16. The shape of IF_4^+ will be :-
(1) Square planar
(2) Tetranedral
(3) Pentagonal bipyramidal
(4) Distorted tetrahedral

17. Which of the following has the highest value of dipole moment ?
(1) HCl (2) HF (3) HI (4) HBr

18. The AsF_5 molecule is trigonal bipyramidal. The hybrid orbitals used by the As atoms for bonding are:
(1) $d_{x^2-y^2}, d_{z^2}, s, p_x, p_y$ (2) d_{xy}, s, p_x, p_y, p_z
(3) $s, p_x, p_y, p_z, d_{z^2}$ (4) $d_{x^2-y^2}, s, p_x, p_y$

19. Which of the following is paramagnetic ?
(1) O_2^- (2) CN^- (3) CO (4) NO^+

20. Acetic acid exists as dimer in benzene due to:-
(1) Condensation reaction
(2) Hydrogen bonding
(3) Presence of carboxyl group
(4) None of the above

21. Which of the following compound gives paramagnetic gas on heating ?
(1) $LiNO_3$ (2) $NaNO_3$
(3) KNO_3 (4) All of these

22. Which of the following statement is correct ?
As the %s- character of a hybrid orbital decreases
(1) The bond angle decreases
(2) The bond strength increases
(3) The bond length decreases
(4) Size of orbital decreases

23. In S_8 each sulphur atom is :-
(1) sp hybridised with a planar ring
(2) sp^3 hybridised with a planar ring
(3) sp^3 hybridised with a non-planar ring
(4) sp^3d hybridised two sulphur atoms

24. Maximum number of identical bond length are present in
(1) SF_6 (2) IF_7 (3) PCl_5 (4) SO_4^{-2}

25. Which of the following molecule is planar as well as polar ?
(1) $PC\ell_3$ (2) SF_4
(3) $C\ell F_3$ (4) None of these

26. Which one is formed in II[nd] excited state ?
(1) PCl_5 (2) SH_6
(3) SO_3 (4) IF_7

27. In which of the following compounds, breaking of covalent bond take place :-
(1) Boiling of H_2O (2) Melting of KCN
(3) Boiling of CF_4 (4) Melting of SiO_2

28. Which of the following order is incorrect ?
(1) Ionic character = $MCl < MCl_2 < MCl_3$
(2) Polarisibility = $F^- < Cl^- < Br^- < I^-$
(3) Polarising power = $Na^+ < Ca^{+2} < Mg^{+2} < Al^{+3}$
(4) Covalent character = LiF < LiCl < LiBr < LiI

29. The salt having least solubility in water :-
(1) $BaCl_2$ (2) $Ba(NO_3)_2$
(3) $MgSO_4$ (4) $BaSO_4$

30. Which of the following substance on being heated will give a gas that does not turn lime water milky?
(1) $LiNO_3$ (2) $ZnCO_3$
(3) $ZnSO_3$ (4) $MgCO_3$

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**2**	**1**	**1**	**4**	**4**	**1**	**4**	**2**	**2**	**2**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**4**	**3**	**3**	**2**	**4**	**2**	**3**	**1**	**2**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**1**	**3**	**1**	**3**	**3**	**4**	**1**	**4**	**1**

PREVIOUS YEARS' QUESTIONS EXERCISE-II

1. Which of the following molecules\ions does not contain unpaired electrons? **[AIEEE-2006]**

(1) N_2^+ (2) O_2 (3) O_2^{2-} (4) B_2

2. Among the following mixtures, dipole-dipole as the major interaction, is present in **[AIEEE-2006]**

(1) KCl and water

(2) benzene and carbon tetrachloride

(3) benzene and ethanol

(4) acetonitrile and acetone

3. In which of the following molecules/ions are all the bonds **not** equal? **[AIEEE-2006]**

(1) XeF_4 (2) BF_4^-

(3) SF_4 (4) SiF_4

4. The decreasing values of bond angles from NH_3 (106°) to SbH_3 (91°) down group-15 of the periodic table is due to **[AIEEE-2006]**

(1) decreasing lp – bp repulsion

(2) increasing electronegativity

(3) increasing bp – bp repulsion

(4) increasing p-orbital character in sp^3

5. In which of the following ionizion processes, the bond order has increased and the magnetic behaviour has changed **[AIEEE-2007]**

(1) $NO \rightarrow NO^+$ (2) $O_2 \rightarrow O_2^+$

(3) $N_2 \rightarrow N_2^+$ (4) $C_2 \rightarrow C_2^+$

6. Which of the following hydrogen bonds is the strongest **[AIEEE-2007]**

(1) F–H.....F (2) O–H.....O

(3) O–H.....F (4) O–H.....N

7. Which of the following species exhibits the diamagnetic behaviour **[AIEEE-2007]**

(1) O_2^+ (2) O_2 (3) NO (4) O_2^{2-}

8. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represent the increasing order of the polarizing power of the cationic species, K^+, Ca^{+2}, Mg^{+2}, Be^{+2} **[AIEEE-2007]**

(1) $Be^{+2} < K^+ < Ca^{+2} < Mg^{+2}$

(2) $K^+ < Ca^{+2} < Mg^{+2} < Be^{+2}$

(3) $Ca^{+2} < Mg^{+2} < Be^{+2} < K^+$

(4) $Mg^{+2} < Be^{+2} < K^+ < Ca^{+2}$

9. Using MO theory predict which of the following species has the shortest bond length? **[AIEEE-2009]**

(1) O_2^- (2) O_2^{2-} (3) O_2^{2+} (4) O_2^+

10. The hybridisation of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively:- **[AIEEE-2011]**

(1) sp, sp^3, sp^2 (2) sp^2, sp^3, sp

(3) sp, sp^2, sp^3 (4) sp^2, sp, sp^3

11. The structure of IF_7 is :- **[AIEEE-2011]**

(1) octahedral

(2) pentagonal bipyramid

(3) square pyramid

(4) trigonal bipyramid

12. Among the following the maximum covalent character is shown by the compound :- **[AIEEE-2011]**

(1) $AlCl_3$ (2) $MgCl_2$

(3) $FeCl_2$ (4) $SnCl_2$

13. Which of the following has maximum number of lone pairs associated with Xe ? **[AIEEE-2011]**

(1) XeO_3 (2) XeF_4

(3) XeF_6 (4) XeF_2

14. The number of types of bonds between two carbon atoms in calcium carbide is :- **[AIEEE-2005, 2011]**

(1) One sigma, two pi (2) One sigma, one pi

(3) Two sigma, one pi (4) Two sigma, two pi

15. Ortho-Nitrophenol is less soluble in water than p– and m– Nitrophenols because :- **[AIEEE-2005, 2012]**

(1) Melting point of o–Nitrophenol is lower than those of m– and p– isomers

(2) o–Nitrophenol is more volatile in steam than those of m– and p– isomers

(3) o–Nitrophenol shows Intramolecular H–bonding

(4) o–Nitrophenol shows Intermolecular H–bonding

16. The molecule having smallest bond angle is :- **[AIEEE-2012]**

(1) PCl_3 (2) NCl_3

(3) $AsCl_3$ (4) $SbCl_3$

17. In which of the following pairs the two species are not isostructural ? **[AIEEE-2012]**

(1) AlF_6^{3-} and SF_6 (2) CO_3^{2-} and NO_3^-

(3) PCl_4^+ and $SiCl_4$ (4) PF_5 and BrF_5

18. Among the following species which two have trigonal bipyramidal shape ? **[AIEEE-2012 (Online)]**

(I) NI_3 (II) I_3^-

(III) SO_3^{2-} (IV) NO_3^-

(1) II and III (2) III and IV

(3) I and IV (4) None of them

19. Among the following, the species having the smallest bond is :- **[AIEEE-2012 (Online)]**

(1) NO (2) NO^+ (3) O_2 (4) NO^-

20. Based on lattice energy and other considerations, which one of the following alkali metal chloride is expected to have the highest melting point ? **[AIEEE-2012 (Online)]**

(1) RbCl (2) LiCl (3) KCl (4) NaCl

21. Which of the following has the square planar structure ? **[AIEEE-2012 (Online)]**

(1) NH_4^+ (2) CCl_4

(3) XeF_4 (4) BF_4^-

22. The compound of Xenon with zero dipole moment is :- **[AIEEE-2012 (Online)]**

(1) XeO_3 (2) XeO_2

(3) XeF_4 (4) $XeOF_4$

23. Among the following the molecule with the lowest dipole moment is :- **[AIEEE-2012 (Online)]**

(1) $CHCl_3$ (2) CH_2Cl_2

(3) CCl_4 (4) CH_3Cl

24. The formation of molecular complex $BF_3 - NH_3$ results in a change in hybridisation of boron :- **[AIEEE-2012 (Online)]**

(1) from sp^3 to sp^3d

(2) from sp^2 to dsp^2

(3) from sp^3 to sp^2

(4) from sp^2 to sp^3

25. Which one of the following molecules is expected to exhibit diamagnetic behaviour ? **[JEE (MAIN) 2013]**

(1) C_2 (2) N_2

(3) O_2 (4) S_2

26. In which of the following pairs of molecules/ions, both the species are not likely to exist ? **[JEE (MAIN) 2013]**

(1) H_2^+, He_2^{2-} (2) H_2^-, He_2^{2-}

(3) H_2^{2+}, He_2 (4) H_2^-, He_2^{2+}

27. Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of :- **[JEE (MAIN) 2013]**

(1) $Li_2 < Li_2^+ < Li_2^-$

(2) $Li_2^- < Li_2^+ < Li_2$

(3) $Li_2 < Li_2^- < Li_2^+$

(4) $Li_2^- < Li_2 < Li_2^+$

28. Which one of the following properties is **not** shown by NO ? **[JEE (MAIN) 2014]**

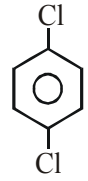
(1) It combines with oxygen to form nitrogen dioxide

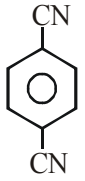
(2) It's bond order is 2.5

(3) It is diamagnetic in gaseous state

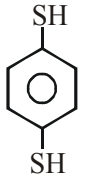
(4) It is a neutral oxide

29. For which of the following molecule significant $\mu \neq 0$? **[JEE (MAIN) 2014]**

(a) 

(b) 

(c) 

(d) 

(1) Only (c) (2) (c) and (d)

(3) Only (a) (4) (a) and (b)

30. Which of the following species is not paramagnetic :- **[JEE (MAIN) 2017]**

(1) NO (2) CO

(3) O_2 (4) B_2

PREVIOUS YEARS QUESTIONS				ANSWER KEY						Exercise-II
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**4**	**3**	**4**	**1**	**1**	**4**	**2**	**3**	**4**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**2**	**1**	**4**	**1**	**3**	**4**	**4**	**4**	**2**	**4**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**3**	**3**	**4**	**1,2**	**3**	**2**	**3**	**2**	**2**