

# PYQSide

## NEET CHEMICAL BONDING AND MOLECULAR STRUCTURE — PYQS

Max. Marks: 436

Questions: 109

### Section A (MCQ)

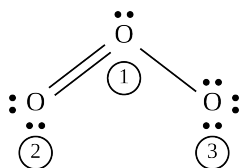
**Q.1** Identify the correct statement about  $\text{ClF}_3$  from the following options : [NEET (UG) 2026]

- (1) It has T-shaped geometry with three lone pairs on Cl atom.
- (2) It has T-shaped geometry with two lone pairs on Cl atom.
- (3) It has a trigonal pyramidal geometry with two lone pairs on Cl atom.
- (4) It has a planar trigonal geometry with two lone pairs on Cl atom.

Scan or tap for the full solution



**Q.2** The correct formal charges on oxygen atoms numbered 2, 1 and 3 respectively are : [NEET (UG) 2026]



- (1) 0, 0, 0
- (2) -1, 0, +1
- (3) +1, 0, -1
- (4) 0, +1, -1

Scan or tap for the full solution



**Q.3** Match **List-I** with **List-II** : [NEET (UG) 2026]

| List-I |                        | List-II |                                |
|--------|------------------------|---------|--------------------------------|
| A.     | $\text{C}_2\text{H}_4$ | I.      | $3\sigma$ bonds, $2\pi$ bonds  |
| B.     | $\text{C}_2\text{H}_2$ | II.     | $3\sigma$ bonds, one lone pair |
| C.     | $\text{CH}_4$          | III.    | $4\sigma$ bonds                |
| D.     | $\text{NH}_3$          | IV.     | $5\sigma$ bonds, $1\pi$ bond   |

- (1) A-IV, B-I, C-III, D-II
- (2) A-III, B-IV, C-II, D-I
- (3) A-II, B-III, C-I, D-IV
- (4) A-I, B-II, C-IV, D-III

Scan or tap for the full solution



**Q.4** The highest occupied molecular orbital for  $\text{Ne}_2$  is [RE-NEET (UG) 2026]

- (1)  $\sigma_{2p}^*$
- (2)  $\pi_{2p}$
- (3)  $\sigma_{2p}$
- (4)  $\pi_{2p}^*$

Scan or tap for the full solution



**Q.5** Match the species in **List-I** with their geometry in **List-II**. [RE-NEET (UG) 2026]

| List-I |                                 | List-II |                      |
|--------|---------------------------------|---------|----------------------|
| A.     | $\text{PCl}_5$                  | I.      | Tetrahedral          |
| B.     | $\text{BrF}_5$                  | II.     | Square Planar        |
| C.     | $\text{BF}_4^-$                 | III.    | Trigonal bipyramidal |
| D.     | $[\text{Ni}(\text{CN})_4]^{2-}$ | IV.     | Square pyramidal     |

- (1) A-III, B-II, C-I, D-IV
- (2) A-IV, B-III, C-I, D-II
- (3) A-III, B-IV, C-I, D-II
- (4) A-III, B-I, C-II, D-IV

Scan or tap for the full solution



**Q.6** Given below are two statements :

**Statement-I:** A hypothetical diatomic molecule with bond order zero is quite stable.

**Statement-II:** As bond order increases, the bond length increases.

In the light of the above statements, choose the most appropriate answer from the options given below:

[NEET (UG) 2025]

- (1) Statement-I is true but Statement-II is false
- (2) Statement-I is false but Statement-II is true
- (3) Both Statement-I and Statement-II are true
- (4) Both Statement-I and Statement-II are false

Scan or tap for the full solution



**Q.7** Match **List-I** with **List-II**

| List - I |                 | List - II |                                                |
|----------|-----------------|-----------|------------------------------------------------|
| A.       | $\text{XeO}_3$  | I.        | $\text{sp}^3\text{d}$ ; linear                 |
| B.       | $\text{XeF}_2$  | II.       | $\text{sp}^3$ ; pyramidal                      |
| C.       | $\text{XeOF}_4$ | III.      | $\text{sp}^3\text{d}^3$ ; distorted octahedral |
| D.       | $\text{XeF}_6$  | IV.       | $\text{sp}^3\text{d}^2$ ; square pyramidal     |

Choose the correct answer from the options given below :

[NEET (UG) 2025]

- (1) A-IV, B-II, C-III, D-I
- (2) A-IV, B-II, C-I, D-III
- (3) A-II, B-I, C-IV, D-III
- (4) A-II, B-I, C-III, D-IV

Scan or tap for the full solution



**Q.8** Identify the correct orders against the property mentioned

Choose the correct answer from the options given below:

- A.  $\text{H}_2\text{O} > \text{NH}_3 > \text{CHCl}_3$  - dipole moment  
 B.  $\text{XeF}_4 > \text{XeO}_3 > \text{XeF}_2$  - number of lone pairs on central atom  
 C.  $\text{O-H} > \text{C-H} > \text{N-O}$  - bond length  
 D.  $\text{N}_2 > \text{O}_2 > \text{H}_2$  - bond enthalpy [NEET (UG) 2025]  
 (1) A, C only (2) B, C only  
 (3) A, D only (4) B, D only

Scan or tap for the full solution



**Q.9** Match List I with List II.

| List I<br>(Molecule) |                               | List II<br>(Number and types of bond/s between two carbon atoms) |                                         |
|----------------------|-------------------------------|------------------------------------------------------------------|-----------------------------------------|
| A.                   | ethane                        | I.                                                               | one $\sigma$ -bond and two $\pi$ -bonds |
| B.                   | ethene                        | II.                                                              | two $\pi$ -bonds                        |
| C.                   | carbon molecule, $\text{C}_2$ | III.                                                             | one $\sigma$ -bond                      |
| D.                   | ethyne                        | IV.                                                              | one $\sigma$ -bond and one $\pi$ -bond  |

Choose the correct answer from the options given below : [NEET (UG) 2024]

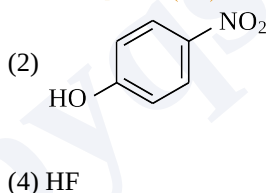
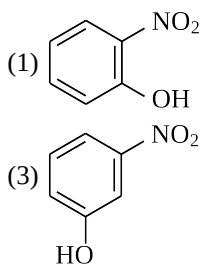
- (1) A-I, B-IV, C-II, D-III (2) A-IV, B-III, C-II, D-I  
 (3) A-III, B-IV, C-II, D-I (4) A-III, B-IV, C-I, D-II

Scan or tap for the full solution



**Q.10** Intramolecular hydrogen bonding is present in

[NEET (UG) 2024]



Scan or tap for the full solution



**Q.11** Match List I with List II.

| List I<br>(Compound) |                | List II<br>(Shape/geometry) |                    |
|----------------------|----------------|-----------------------------|--------------------|
| A.                   | $\text{NH}_3$  | I.                          | Trigonal Pyramidal |
| B.                   | $\text{BrF}_5$ | II.                         | Square Planar      |
| C.                   | $\text{XeF}_4$ | III.                        | Octahedral         |
| D.                   | $\text{SF}_6$  | IV.                         | Square Pyramidal   |

Choose the correct answer from the options given below: [NEET (UG) 2024]

- (1) A-I, B-IV, C-II, D-III (2) A-II, B-IV, C-III, D-I  
 (3) A-III, B-IV, C-I, D-II (4) A-II, B-III, C-IV, D-I

Scan or tap for the full solution



**Q.12** Identify the correct answer. [NEET (UG) 2024]

- (1) Three resonance structures can be drawn for ozone  
 (2)  $\text{BF}_3$  has non-zero dipole moment  
 (3) Dipole moment of  $\text{NF}_3$  is greater than that of  $\text{NH}_3$   
 (4) Three canonical forms can be drawn for  $\text{CO}_3^{2-}$  ion

Scan or tap for the full solution



**Q.13** Which of the following molecules has "NON ZERO" dipole moment value? [RE-NEET (UG) 2024]

- (1)  $\text{CCl}_4$  (2) HI (3)  $\text{CO}_2$  (4)  $\text{BF}_3$

Scan or tap for the full solution



**Q.14** Identify the incorrect statement about  $\text{PCl}_5$ .

[RE-NEET (UG) 2024]

- (1)  $\text{PCl}_5$  possesses two different Cl-P-Cl bond angles  
 (2) All five P-Cl bonds are identical in length  
 (3)  $\text{PCl}_5$  exhibits  $\text{sp}^3\text{d}$  hybridisation  
 (4)  $\text{PCl}_5$  consists of five P-Cl (sigma) bonds

Scan or tap for the full solution



**Q.15** Match List-I with List-II:

| List - I<br>Molecule |              | List - II<br>Bond enthalpy<br>( $\text{kJ mol}^{-1}$ ) |       |
|----------------------|--------------|--------------------------------------------------------|-------|
| A.                   | HCl          | I.                                                     | 435.8 |
| B.                   | $\text{N}_2$ | II.                                                    | 498   |
| C.                   | $\text{H}_2$ | III.                                                   | 946.0 |
| D.                   | $\text{O}_2$ | IV.                                                    | 431.0 |

Choose the correct answer from the options given below: [RE-NEET (UG) 2024]

- (1) A-III, B-IV, C-I, D-II (2) A-IV, B-I, C-III, D-II  
 (3) A-IV, B-III, C-II, D-I (4) A-IV, B-III, C-I, D-II

Scan or tap for the full solution



**Q.16** Amongst the following, the total number of species NOT having eight electrons around central atom in its outermost shell, is

$\text{NH}_3$ ,  $\text{AlCl}_3$ ,  $\text{BeCl}_2$ ,  $\text{CCl}_4$ ,  $\text{PCl}_5$  [NEET (UG) 2023]

- (1) 2 (2) 4 (3) 1 (4) 3

Scan or tap for the full solution



**Q.17** The correct order of energies of molecular orbitals of  $N_2$  molecule, is [NEET (UG) 2023]

- (1)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$   
 (2)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$   
 (3)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma 2p_z < \sigma^* 2p_z$   
 (4)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

Scan or tap for the full solution



**Q.18** Amongst the following which one will have maximum 'lone pair - lone pair' electron repulsions? [NEET (UG) 2022]

- (1)  $ClF_3$  (2)  $IF_5$  (3)  $SF_4$  (4)  $XeF_2$

Scan or tap for the full solution



**Q.19** Which amongst the following is incorrect statement? [NEET (UG) 2022]

- (1) The bond orders of  $O_2^+$ ,  $O_2$ ,  $O_2^-$  and  $O_2^{2-}$  are 2.5, 2, 1.5 and 1, respectively  
 (2)  $C_2$  molecule has four electrons in its two degenerate  $\pi$  molecular orbitals  
 (3)  $H_2^+$  ion has one electron  
 (4)  $O_2^+$  ion is diamagnetic

Scan or tap for the full solution



**Q.20** Match List-I with List-II :

| List-I<br>(Molecules) |         | List-II<br>(Shape) |                      |
|-----------------------|---------|--------------------|----------------------|
| a.                    | $NH_3$  | i.                 | Square pyramidal     |
| b.                    | $ClF_3$ | ii.                | Trigonal bipyramidal |
| c.                    | $PCl_5$ | iii.               | Trigonal pyramidal   |
| d.                    | $BrF_5$ | iv.                | T-shape              |

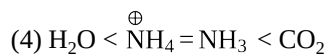
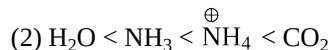
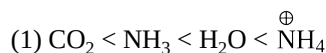
Choose the correct answer from the options given below : [NEET (UG) 2022 (Phase 2)]

- (1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)  
 (2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)  
 (3) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)  
 (4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Scan or tap for the full solution



**Q.21** The correct order of bond angles in the following compounds/species is : [NEET (UG) 2022 (Phase 2)]



Scan or tap for the full solution



**Q.22**  $BF_3$  is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are : [NEET (UG) 2021]

- (1)  $sp^2$  and 8 (2)  $sp^3$  and 4 (3)  $sp^3$  and 6 (4)  $sp^2$  and 6

Scan or tap for the full solution



**Q.23** Match List - I with List - II :

| List - I |         | List - II |                      |
|----------|---------|-----------|----------------------|
| a.       | $PCl_5$ | i.        | Square pyramidal     |
| b.       | $SF_6$  | ii.       | Trigonal planar      |
| c.       | $BrF_5$ | iii.      | Octahedral           |
| d.       | $BF_3$  | iv.       | Trigonal bipyramidal |

Choose the correct answer from the options given below. [NEET (UG) 2021]

- (1) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)  
 (2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)  
 (3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)  
 (4) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

Scan or tap for the full solution



**Q.24** Which of the following molecules is non-polar in nature? [NEET (UG) 2021]

- (1)  $NO_2$  (2)  $POCl_3$  (3)  $CH_2O$  (4)  $SbCl_5$

Scan or tap for the full solution



**Q.25** Which of the following set of molecules will have zero dipole moment? [NEET (UG) 2020]

- (1) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1, 3-dichlorobenzene  
 (2) Nitrogen trifluoride, beryllium difluoride, water, 1, 3-dichlorobenzene  
 (3) Boron trifluoride, beryllium difluoride, carbon dioxide, 1, 4-dichlorobenzene  
 (4) Ammonia, beryllium difluoride, water, 1, 4-dichlorobenzene

Scan or tap for the full solution



**Q.26** Identify a molecule which does not exist.

[NEET (UG) 2020]

- (1)  $\text{Li}_2$       (2)  $\text{C}_2$       (3)  $\text{O}_2$       (4)  $\text{He}_2$

Scan or tap for the full solution



**Q.27** Which of the following diatomic molecular species has only  $\pi$  bonds according to Molecular Orbital Theory?

[NEET (UG) 2019]

- (1)  $\text{C}_2$       (2)  $\text{Be}_2$       (3)  $\text{O}_2$       (4)  $\text{N}_2$

Scan or tap for the full solution



**Q.28** Consider the following species :  $\text{CN}^+$ ,  $\text{CN}^-$ , NO and CN. Which one of these will have the highest bond order?

[NEET 2018]

- (1) NO      (2)  $\text{CN}^-$       (3)  $\text{CN}^+$       (4) CN

Scan or tap for the full solution



**Q.29** In the structure of  $\text{ClF}_3$ , the number of lone pairs of electrons on central atom 'Cl' is

[NEET 2018]

- (1) one      (2) two      (3) four      (4) three

Scan or tap for the full solution



**Q.30** Which of the following pairs of compounds is isoelectronic and isostructural ?

[NEET 2017]

- (1)  $\text{TeI}_2$ ,  $\text{XeF}_2$       (2)  $\text{IBr}_2^-$ ,  $\text{XeF}_2$   
(3)  $\text{IF}_3$ ,  $\text{XeF}_2$       (4)  $\text{BeCl}_2$ ,  $\text{XeF}_2$

Scan or tap for the full solution



**Q.31** The species, having bond angles of  $120^\circ$  is

[NEET 2017]

- (1)  $\text{ClF}_3$       (2)  $\text{NCl}_3$       (3)  $\text{BCl}_3$       (4)  $\text{PH}_3$

Scan or tap for the full solution



**Q.32** Which one of the following pairs of species have the same bond order ?

[NEET 2017]

- (1)  $\text{O}_2$ ,  $\text{NO}^+$       (2)  $\text{CN}^-$ , CO  
(3)  $\text{N}_2$ ,  $\text{O}_2^-$       (4) CO, NO

Scan or tap for the full solution



**Q.33** Consider the molecules  $\text{CH}_4$ ,  $\text{NH}_3$  and  $\text{H}_2\text{O}$ . Which of the given statements is false?

[NEET 2016 (Phase 1)]

- (1) The H – O – H bond angle in  $\text{H}_2\text{O}$  is smaller than the H – N – H bond angle in  $\text{NH}_3$ .
- (2) The H – C – H bond angle in  $\text{CH}_4$  is larger than the H – N – H bond angle in  $\text{NH}_3$ .
- (3) The H – C – H bond angle in  $\text{CH}_4$ , the H – N – H bond angle in  $\text{NH}_3$ , and the H – O – H bond angle in  $\text{H}_2\text{O}$  are all greater than  $90^\circ$ .
- (4) The H – O – H bond angle in  $\text{H}_2\text{O}$  is larger than the H – C – H bond angle in  $\text{CH}_4$ .

Scan or tap for the full solution



**Q.34** Predict the correct order among the following :

[NEET 2016 (Phase 1)]

- (1) bond pair - bond pair > lone pair - bond pair > lone pair - lone pair
- (2) lone pair - bond pair > bond pair - bond pair > lone pair - lone pair
- (3) lone pair - lone pair > lone pair - bond pair > bond pair - bond pair
- (4) lone pair - lone pair > bond pair - bond pair > lone pair - bond pair

Scan or tap for the full solution



**Q.35** Which one of the following compounds shows the presence of intramolecular hydrogen bond?

[NEET 2016 (Phase 2)]

- (1)  $\text{H}_2\text{O}_2$
- (2) HCN
- (3) Cellulose
- (4) Concentrated acetic acid

Scan or tap for the full solution



**Q.36** The hybridizations of atomic orbitals of nitrogen in  $\text{NO}_2^+$ ,  $\text{NO}_3^-$  and  $\text{NH}_4^+$  respectively are

[NEET 2016 (Phase 2)]

- (1) sp,  $\text{sp}^3$  and  $\text{sp}^2$       (2)  $\text{sp}^2$ ,  $\text{sp}^3$  and sp  
(3) sp,  $\text{sp}^2$  and  $\text{sp}^3$       (4)  $\text{sp}^2$ , sp and  $\text{sp}^3$

Scan or tap for the full solution



**Q.37** Which of the following pairs of ions is isoelectronic and isostructural?

[NEET 2016 (Phase 2)]

- (1)  $\text{CO}_3^{2-}$ ,  $\text{NO}_3^-$       (2)  $\text{ClO}_3^-$ ,  $\text{CO}_3^{2-}$   
(3)  $\text{SO}_3^{2-}$ ,  $\text{NO}_3^-$       (4)  $\text{ClO}_3^-$ ,  $\text{SO}_3^{2-}$

Scan or tap for the full solution



**Q.38** The correct geometry and hybridization for  $\text{XeF}_4$  are

[NEET 2016 (Phase 2)]

- (1) octahedral,  $sp^3d^2$   
 (2) trigonal bipyramidal,  $sp^3d$   
 (3) planar triangle,  $sp^3d^3$   
 (4) square planar,  $sp^3d^2$

Scan or tap for the full solution



**Q.39** Among the following, which one is a wrong statement ? [NEET 2016 (Phase 2)]

- (1)  $PH_5$  and  $BiCl_5$  do not exist.  
 (2)  $p\pi - d\pi$  bonds are present in  $SO_2$ .  
 (3)  $SeF_4$  and  $CH_4$  have same shape.  
 (4)  $I_3^+$  has bent geometry.

Scan or tap for the full solution



**Q.40** In which of the following pairs, both the species are not isostructural ? [AIPMT 2015]

- (1) Diamond, Silicon carbide  
 (2)  $NH_3$ ,  $PH_3$   
 (3)  $XeF_4$ ,  $XeO_4$   
 (4)  $SiCl_4$ ,  $PCl_4^+$

Scan or tap for the full solution



**Q.41** Decreasing order of stability of  $O_2$ ,  $O_2^-$ ,  $O_2^+$  and  $O_2^{2-}$  is [AIPMT 2015]

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

Scan or tap for the full solution



**Q.42** Which of the following pairs of ions are isoelectronic and isostructural ? [AIPMT 2015 (Cancelled)]

- (1)  $SO_3^{2-}$ ,  $NO_3^-$  (2)  $ClO_3^-$ ,  $SO_3^{2-}$   
 (3)  $CO_3^{2-}$ ,  $SO_3^{2-}$  (4)  $ClO_3^-$ ,  $CO_3^{2-}$

Scan or tap for the full solution



**Q.43** The correct bond order in the following species is [AIPMT 2015 (Cancelled)]

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

Scan or tap for the full solution



**Q.44** Which of the following options represents the correct bond order ? [AIPMT 2015 (Cancelled)]

- (1)  $O_2^- > O_2 < O_2^+$  (2)  $O_2^- < O_2 > O_2^+$   
 (3)  $O_2^- > O_2 > O_2^+$  (4)  $O_2^- < O_2 < O_2^+$

Scan or tap for the full solution



**Q.45** Maximum bond angle at nitrogen is present in which of the following ? [AIPMT 2015 (Cancelled)]

- (1)  $NO_2^+$  (2)  $NO_3^-$  (3)  $NO_2$  (4)  $NO_2^-$

Scan or tap for the full solution



**Q.46** Which of the following species contains equal number of  $\sigma$ - and  $\pi$ -bonds ? [AIPMT 2015 (Cancelled)]

- (1)  $(CN)_2$  (2)  $CH_2(CN)_2$   
 (3)  $HCO_3^-$  (4)  $XeO_4$

Scan or tap for the full solution



**Q.47** Which of the following molecules has the maximum dipole moment? [AIPMT 2014]

- (1)  $CO_2$  (2)  $CH_4$  (3)  $NH_3$  (4)  $NF_3$

Scan or tap for the full solution



**Q.48** Which one of the following species has plane triangular shape? [AIPMT 2014]

- (1)  $N_3^-$  (2)  $NO_3^-$  (3)  $NO_2^-$  (4)  $CO_2$

Scan or tap for the full solution



**Q.49**  $XeF_2$  is isostructural with [NEET 2013]

- (1)  $SbCl_3$  (2)  $BaCl_2$  (3)  $TeF_2$  (4)  $ICl_2^-$

Scan or tap for the full solution



**Q.50** Which of the following is a polar molecule? [NEET 2013]

- (1)  $SiF_4$  (2)  $XeF_4$  (3)  $BF_3$  (4)  $SF_4$

Scan or tap for the full solution



**Q.51** Which of the following is paramagnetic? [NEET 2013]

- (1)  $CN^-$  (2)  $NO^+$  (3)  $CO$  (4)  $O_2^-$

Scan or tap for the full solution



**Q.52** Which one of the following molecules contains no  $\pi$  bond? [NEET 2013]

- (1)  $SO_2$  (2)  $NO_2$  (3)  $CO_2$  (4)  $H_2O$

Scan or tap for the full solution



**Q.53** The pair of species that has the same bond order in the following is [NEET 2013 (Karnataka)]

- (1)  $CO$ ,  $NO^+$  (2)  $NO^-$ ,  $CN^-$   
 (3)  $O_2$ ,  $N_2$  (4)  $O_2$ ,  $B_2$

Scan or tap for the full solution



**Q.54** In which of the following pair both the species have  $sp^3$  hybridization ? [NEET 2013 (Karnataka)]

- (1)  $SiF_4$ ,  $BeH_2$  (2)  $NF_3$ ,  $H_2O$   
(3)  $NF_3$ ,  $BF_3$  (4)  $H_2S$ ,  $BF_3$

Scan or tap for the full solution



**Q.55** In which of the following ionization processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic.

[NEET 2013 (Karnataka)]

- (1)  $O_2 \rightarrow O_2^+$  (2)  $C_2 \rightarrow C_2^+$   
(3)  $NO \rightarrow NO^+$  (4)  $N_2 \rightarrow N_2^+$

Scan or tap for the full solution



**Q.56** During change of  $O_2$  to  $O_2^-$  ion, the electron adds on which one of the following orbitals ?

[AIPMT 2012 (Mains)]

- (1)  $\pi^*$  orbital (2)  $\pi$  orbital (3)  $\sigma^*$  orbital (4)  $\sigma$  orbital

Scan or tap for the full solution



**Q.57** Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them [AIPMT 2012 (Mains)]

- (1)  $NO < O_2^- < C_2^{2-} < He_2^+$   
(2)  $O_2^- < NO < C_2^{2-} < He_2^+$   
(3)  $C_2^{2-} < He_2^+ < O_2^- < NO$   
(4)  $He_2^+ < O_2^- < NO < C_2^{2-}$

Scan or tap for the full solution



**Q.58** Which one of the following pairs is isostructural (i.e., having the same shape and hybridization) ?

[AIPMT 2012 (Prelims)]

- (1)  $[BCl_3 \text{ and } BrCl_3]$  (2)  $[NH_3 \text{ and } NO_3^-]$   
(3)  $[NF_3 \text{ and } BF_3]$  (4)  $[BF_4^- \text{ and } NH_4^+]$

Scan or tap for the full solution



**Q.59** Bond order of 1.5 is shown by

[AIPMT 2012 (Prelims)]

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

Scan or tap for the full solution



**Q.60** Which of the following species contains three bond pairs and one lone pair around the central atom ?

[AIPMT 2012 (Prelims)]

- (1)  $H_2O$  (2)  $BF_3$  (3)  $NH_2^-$  (4)  $PCl_3$

Scan or tap for the full solution



**Q.61** The pair of species with the same bond order is

[AIPMT 2012 (Prelims)]

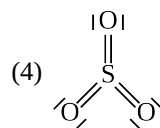
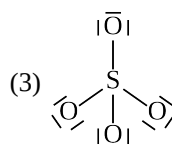
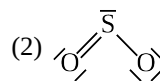
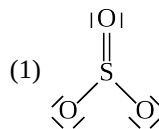
- (1)  $O_2^{2-}$ ,  $B_2$  (2)  $O_2^+$ ,  $NO^+$   
(3)  $NO$ ,  $CO$  (4)  $N_2$ ,  $O_2$

Scan or tap for the full solution



**Q.62** Which of the following structures is the most preferred and hence of lowest energy for  $SO_3$ ?

[AIPMT 2011 (Mains)]



Scan or tap for the full solution



**Q.63** The pairs of species of oxygen and their magnetic behaviours are noted below. Which of the following presents the correct description?

[AIPMT 2011 (Mains)]

- (1)  $O_2^-$ ,  $O_2^{2-}$  (2)  $O_2^+$ ,  $O_2$   
– Both diamagnetic – Both paramagnetic  
(3)  $O$ ,  $O_2^{2-}$  (4)  $O^+$ ,  $O_2^{2-}$   
– Both paramagnetic – Both paramagnetic

Scan or tap for the full solution



**Q.64** Which of the following has the minimum bond length ?

[AIPMT 2011 (Prelims)]

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

Scan or tap for the full solution



**Q.65** Which of the two ions from the list given below that have the geometry that is explained by the same hybridization of orbitals,  $NO_2^-$ ,  $NO_3^-$ ,  $NH_2^-$ ,  $NH_4^+$ ,  $SCN^-$ ?

[AIPMT 2011 (Prelims)]

- (1)  $NO_2^-$  and  $NO_3^-$  (2)  $NH_4^+$  and  $NO_3^-$   
(3)  $SCN^-$  and  $NH_2^-$  (4)  $NO_2^-$  and  $NH_2^-$

Scan or tap for the full solution



**Q.66** The correct order of increasing bond length of C–H, C–O, C–C and C=C is

[AIPMT 2011 (Prelims)]

- (1)  $C-H < C=C < C-O < C-C$   
(2)  $C-C < C=C < C-O < C-H$   
(3)  $C-O < C-H < C-C < C=C$   
(4)  $C-H < C-O < C-C < C=C$

Scan or tap for the full solution



**Q.67** The pairs of species of oxygen and their magnetic behavior are noted below. Which of the following presents the correct description?

[AIPMT 2011 (Prelims)]

- (1)  $O_2^-$ ,  $O_2^{2-}$  - Both diamagnetic
- (2)  $O^+$ ,  $O_2^{2-}$  - Both paramagnetic
- (3)  $O_2^+$ ,  $O_2$  - Both paramagnetic
- (4)  $O$ ,  $O_2^{2-}$  - Both paramagnetic

Scan or tap for the full solution



**Q.68** Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear?

[AIPMT 2011 (Prelims)]

- (1)  $CH_3-CH=CH-CH_3$
- (2)  $CH_3-C \equiv C-CH_3$
- (3)  $CH_2=CH-CH_2-C \equiv CH$
- (4)  $CH_3-CH_2-CH_2-CH_3$

Scan or tap for the full solution



**Q.69** Which of the following compounds has the lowest melting point?

[AIPMT 2011 (Prelims)]

- (1)  $CaCl_2$
- (2)  $CaBr_2$
- (3)  $CaI_2$
- (4)  $CaF_2$

Scan or tap for the full solution



**Q.70** In which of the following molecules the central atom does not have  $sp^3$  hybridization?

[AIPMT 2010 (Mains)]

- (1)  $CH_4$
- (2)  $SF_4$
- (3)  $BF_4^-$
- (4)  $NH_4^+$

Scan or tap for the full solution



**Q.71** Some of the properties of the two species,  $NO_3^-$  and  $H_3O^+$  are described below. Which one of them is correct?

[AIPMT 2010 (Mains)]

- (1) Dissimilar in hybridization for the central atom with different structures.
- (2) Isostructural with same hybridization for the central atom.
- (3) Isostructural with different hybridization for the central atom.
- (4) Similar in hybridization for the central atom with different structures.

Scan or tap for the full solution



**Q.72** In which of the following pairs of molecules/ ions, the central atoms have  $sp^2$  hybridisation?

[AIPMT 2010 (Prelims)]

- (1)  $NO_2^-$  and  $NH_3$
- (2)  $BF_3$  and  $NO_2^-$
- (3)  $NH_2^-$  and  $H_2O$
- (4)  $BF_3$  and  $NH_2^-$

Scan or tap for the full solution



**Q.73** Which one of the following species does not exist under normal conditions?

[AIPMT 2010 (Prelims)]

- (1)  $Be_2^+$
- (2)  $Be_2$
- (3)  $B_2$
- (4)  $Li_2$

Scan or tap for the full solution



**Q.74** In which one of the following species the central atom has the type of hybridization which is not the same as that present in the other three?

[AIPMT 2010 (Prelims)]

- (1)  $SF_4$
- (2)  $I_3^-$
- (3)  $SbCl_5^{2-}$
- (4)  $PCl_5$

Scan or tap for the full solution



**Q.75** The correct order of increasing bond angles in the following species is

[AIPMT 2010 (Prelims)]

- (1)  $Cl_2O < ClO_2 < ClO_2^-$
- (2)  $ClO_2 < Cl_2O < ClO_2^-$
- (3)  $Cl_2O < ClO_2^- < ClO_2$
- (4)  $ClO_2^- < Cl_2O < ClO_2$

Scan or tap for the full solution



**Q.76** What is the dominant intermolecular force or bond that must be overcome in converting liquid  $CH_3OH$  to a gas?

[AIPMT 2009]

- (1) Dipole-dipole interaction
- (2) Covalent bonds
- (3) London dispersion force
- (4) Hydrogen bonding

Scan or tap for the full solution



**Q.77** According to MO theory which of the lists ranks the nitrogen species in terms of increasing bond order?

[AIPMT 2009]

- (1)  $N_2^{2-} < N_2^- < N_2$
- (2)  $N_2 < N_2^{2-} < N_2^-$
- (3)  $N_2^- < N_2^{2-} < N_2$
- (4)  $N_2^- < N_2 < N_2^{2-}$

Scan or tap for the full solution



**Q.78** In which of the following molecules/ions  $BF_3$ ,  $NO_2^-$ ,  $NH_2^-$  and  $H_2O$ , the central atom is  $sp^2$  hybridised?

[AIPMT 2009]

- (1)  $NH_2^-$  and  $H_2O$
- (2)  $NO_2^-$  and  $H_2O$
- (3)  $BF_3$  and  $NO_2^-$
- (4)  $NO_2^-$  and  $NH_2^-$

Scan or tap for the full solution



**Q.79** The energy absorbed by each molecule ( $A_2$ ) of a substance is  $4.4 \times 10^{-19}$  J and bond energy per molecule is  $4.0 \times 10^{-19}$  J. The kinetic energy of the molecule per atom will be

[AIPMT 2009]

- (1)  $2.2 \times 10^{-19}$  J
- (2)  $2.0 \times 10^{-19}$  J
- (3)  $4.0 \times 10^{-20}$  J
- (4)  $2.0 \times 10^{-20}$  J

Scan or tap for the full solution



**Q.80** In the case of alkali metals, the covalent character decreases in the order [AIPMT 2009]

- (1)  $\text{MF} > \text{MCl} > \text{MBr} > \text{MI}$
- (2)  $\text{MF} > \text{MCl} > \text{MI} > \text{MBr}$
- (3)  $\text{MI} > \text{MBr} > \text{MCl} > \text{MF}$
- (4)  $\text{MCl} > \text{MI} > \text{MBr} > \text{MF}$

Scan or tap for the full solution



**Q.81** Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them [AIPMT 2008]

- (1)  $\text{NO} < \text{O}_2^- < \text{C}_2^{2-} < \text{He}_2^+$
- (2)  $\text{O}_2^- < \text{NO} < \text{C}_2^{2-} < \text{He}_2^+$
- (3)  $\text{C}_2^{2-} < \text{He}_2^+ < \text{O}_2^- < \text{NO}$
- (4)  $\text{He}_2^+ < \text{O}_2^- < \text{NO} < \text{C}_2^{2-}$

Scan or tap for the full solution



**Q.82** The correct order of increasing bond angles in the following triatomic species is [AIPMT 2008]

- (1)  $\text{NO}_2^+ < \text{NO}_2 < \text{NO}_2^-$  (2)  $\text{NO}_2^+ < \text{NO}_2^- < \text{NO}_2$
- (3)  $\text{NO}_2^- < \text{NO}_2^+ < \text{NO}_2$  (4)  $\text{NO}_2^- < \text{NO}_2 < \text{NO}_2^+$

Scan or tap for the full solution



**Q.83** The angular shape of ozone molecule ( $\text{O}_3$ ) consists of [AIPMT 2008]

- (1)  $1\sigma$  and  $1\pi$  bond (2)  $2\sigma$  and  $1\pi$  bond
- (3)  $1\sigma$  and  $2\pi$  bonds (4)  $2\sigma$  and  $2\pi$  bonds

Scan or tap for the full solution



**Q.84** In which of the following pairs, the two species are isostructural? [AIPMT 2007]

- (1)  $\text{SO}_3^{2-}$  and  $\text{NO}_3^-$  (2)  $\text{BF}_3$  and  $\text{NF}_3$
- (3)  $\text{BrO}_3^-$  and  $\text{XeO}_3$  (4)  $\text{SF}_4$  and  $\text{XeF}_4$

Scan or tap for the full solution



**Q.85** The correct order of C–O bond length among  $\text{CO}$ ,  $\text{CO}_3^{2-}$ ,  $\text{CO}_2$  is [AIPMT 2007]

- (1)  $\text{CO} < \text{CO}_3^{2-} < \text{CO}_2$  (2)  $\text{CO}_3^{2-} < \text{CO}_2 < \text{CO}$
- (3)  $\text{CO} < \text{CO}_2 < \text{CO}_3^{2-}$  (4)  $\text{CO}_2 < \text{CO}_3^{2-} < \text{CO}$

Scan or tap for the full solution



**Q.86** Which of the following is not a correct statement? [AIPMT 2006]

- (1) Multiple bonds are always shorter than corresponding single bonds.
- (2) The electron-deficient molecules can act as Lewis acids.
- (3) The canonical structures have no real existence.
- (4) Every  $\text{AB}_5$  molecule does in fact have square pyramid structure.

Scan or tap for the full solution



**Q.87** Which of the following is not isostructural with  $\text{SiCl}_4$ ? [AIPMT 2006]

- (1)  $\text{NH}_4^+$  (2)  $\text{SCl}_4$  (3)  $\text{SO}_4^{2-}$  (4)  $\text{PO}_4^{3-}$

Scan or tap for the full solution



**Q.88** Which of the following species has a linear shape? [AIPMT 2006]

- (1)  $\text{O}_3$  (2)  $\text{NO}_2^-$  (3)  $\text{SO}_2$  (4)  $\text{NO}_2^+$

Scan or tap for the full solution



**Q.89** The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of  $\text{NH}_3$  (1.5 D) is larger than that of  $\text{NF}_3$  (0.2 D). This is because [AIPMT 2006]

- (1) in  $\text{NH}_3$  the atomic dipole and bond dipole are in the opposite directions whereas in  $\text{NF}_3$  these are in the same direction
- (2) in  $\text{NH}_3$  as well as in  $\text{NF}_3$  the atomic dipole and bond dipole are in the same direction
- (3) in  $\text{NH}_3$  the atomic dipole and bond dipole are in the same direction whereas in  $\text{NF}_3$  these are in opposite directions
- (4) in  $\text{NH}_3$  as well as in  $\text{NF}_3$  the atomic dipole and bond dipole are in opposite directions.

Scan or tap for the full solution



**Q.90** In which of the following molecules are all the bonds not equal? [AIPMT 2006]

- (1)  $\text{NF}_3$  (2)  $\text{ClF}_3$  (3)  $\text{BF}_3$  (4)  $\text{AlF}_3$

Scan or tap for the full solution



**Q.91** Which of the following molecules has trigonal planar geometry? [AIPMT 2005]

- (1)  $\text{BF}_3$  (2)  $\text{NH}_3$  (3)  $\text{PCl}_3$  (4)  $\text{IF}_3$

Scan or tap for the full solution



**Q.92** The correct order in which the O–O bond length increases in the following is [AIPMT 2005]

- (1)  $\text{O}_2 < \text{H}_2\text{O}_2 < \text{O}_3$  (2)  $\text{O}_3 < \text{H}_2\text{O}_2 < \text{O}_2$
- (3)  $\text{H}_2\text{O}_2 < \text{O}_2 < \text{O}_3$  (4)  $\text{O}_2 < \text{O}_3 < \text{H}_2\text{O}_2$

Scan or tap for the full solution



**Q.93** The correct sequence of increasing covalent character is represented by [AIPMT 2005]

- (1)  $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$  (2)  $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$   
 (3)  $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$  (4)  $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$

Scan or tap for the full solution



**Q.94** Which of the following would have a permanent dipole moment? [AIPMT 2005]

- (1)  $\text{SiF}_4$  (2)  $\text{SF}_4$  (3)  $\text{XeF}_4$  (4)  $\text{BF}_3$

Scan or tap for the full solution



**Q.95** Among the following, the pair in which the two species are not isostructural is [AIPMT 2004]

- (1)  $\text{SiF}_4$  and  $\text{SF}_4$  (2)  $\text{IO}_3^-$  and  $\text{XeO}_3$   
 (3)  $\text{BH}_4^-$  and  $\text{NH}_4^+$  (4)  $\text{PF}_6^-$  and  $\text{SF}_6$

Scan or tap for the full solution



**Q.96** In a regular octahedral molecule,  $\text{MX}_6$ , the number of  $\text{X} - \text{M} - \text{X}$  bonds at  $180^\circ$  is [AIPMT 2004]

- (1) three (2) two (3) six (4) four

Scan or tap for the full solution



**Q.97**  $\text{H}_2\text{O}$  is dipolar, whereas  $\text{BeF}_2$  is not. It is because [AIPMT 2004]

- (1) the electronegativity of F is greater than that of O  
 (2)  $\text{H}_2\text{O}$  involves hydrogen bonding whereas  $\text{BeF}_2$  is a discrete molecule  
 (3)  $\text{H}_2\text{O}$  is linear and  $\text{BeF}_2$  is angular  
 (4)  $\text{H}_2\text{O}$  is angular and  $\text{BeF}_2$  is linear.

Scan or tap for the full solution



**Q.98** In  $\text{BrF}_3$  molecule, the lone pairs occupy equatorial positions to minimize [AIPMT 2004]

- (1) lone pair - bond pair repulsion only  
 (2) bond pair - bond pair repulsion only  
 (3) lone pair - lone pair repulsion and lone pair - bond pair repulsion  
 (4) lone pair - lone pair repulsion only.

Scan or tap for the full solution



**Q.99** Which one of the following statements is not correct for sigma- and pi- bonds formed between two carbon atoms? [AIPMT 2003]

- (1) sigma-bond is stronger than a pi-bond.  
 (2) Bond energies of sigma- and pi-bonds are of the order of 264 kJ/mol and 347 kJ/mol, respectively  
 (3) Free rotation of atoms about a sigma-bond is allowed but not in case of a pi-bond.  
 (4) Sigma-bond determines the direction between carbon atoms but a pi-bond has no primary effect in this regard.

Scan or tap for the full solution



**Q.100** Which of the following has  $\pi - \pi$  bonding? [AIPMT 2002]

- (1)  $\text{NO}_3^-$  (2)  $\text{SO}_3^{2-}$  (3)  $\text{BO}_3^{3-}$  (4)  $\text{CO}_3^{2-}$

Scan or tap for the full solution



**Q.101** In  $\text{NO}_3^-$  ion number of bond pair and lone pair of electrons on nitrogen atom are [AIPMT 2002]

- (1) 2, 2 (2) 3, 1 (3) 1, 3 (4) 4, 0

Scan or tap for the full solution



**Q.102** Main axis of a diatomic molecule is z, atomic orbitals  $p_x$  and  $p_y$  overlap to form which of the following orbitals. [AIPMT 2001]

- (1)  $\pi$  molecular orbital (2)  $\sigma$  molecular orbital  
 (3)  $\delta$  molecular orbital (4) No bond will form

Scan or tap for the full solution



**Q.103** Which of the following two are isostructural? [AIPMT 2001]

- (1)  $\text{XeF}_2$ ,  $\text{IF}_2^-$  (2)  $\text{NH}_3$ ,  $\text{BF}_3$   
 (3)  $\text{CO}_3^{2-}$ ,  $\text{SO}_3^{2-}$  (4)  $\text{PCl}_5$ ,  $\text{ICl}_5$

Scan or tap for the full solution



**Q.104** In which of the following bond angle is maximum? [AIPMT 2001]

- (1)  $\text{NH}_3$  (2)  $\text{NH}_4^+$  (3)  $\text{PCl}_3$  (4)  $\text{SCl}_2$

Scan or tap for the full solution



**Q.105** In  $\text{X}-\text{H}\cdots\text{Y}$ , X and Y both are electronegative elements. Then [AIPMT 2001]

- (1) electron density on X will increase and on H will decrease  
 (2) in both electron density will increase  
 (3) in both electron density will decrease  
 (4) on X electron density will decrease and on H will increase.

Scan or tap for the full solution



**Q.106**  $d\pi - p\pi$  bond present in [AIPMT 2000]

- (1)  $\text{CO}_3^{2-}$  (2)  $\text{PO}_4^{3-}$  (3)  $\text{NO}_3^-$  (4)  $\text{NO}_2^-$

Scan or tap for the full solution



**Q.107** Right order of dissociation energy  $\text{N}_2$  and  $\text{N}_2^+$  is [AIPMT 2000]

- (1)  $\text{N}_2 > \text{N}_2^+$  (2)  $\text{N}_2 = \text{N}_2^+$   
(3)  $\text{N}_2^+ > \text{N}_2$  (4) none

Scan or tap for the full solution



**Q.108** Which species does not exhibit paramagnetism? [AIPMT 2000]

- (1)  $\text{N}_2^+$  (2)  $\text{O}_2^-$  (3)  $\text{CO}$  (4)  $\text{NO}$

Scan or tap for the full solution



**Q.109** Which compound forms linear polymer due to H-bond? [AIPMT 2000]

- (1)  $\text{H}_2\text{O}$  (2)  $\text{NH}_3$  (3)  $\text{HF}$  (4)  $\text{HCl}$

Scan or tap for the full solution



### ANSWER KEY

|       |    |      |     |     |     |     |     |
|-------|----|------|-----|-----|-----|-----|-----|
| Ques. | 1  | 2    | 3   | 4   | 5   | 6   | 7   |
| Ans.  | 2  | 4    | 1   | 1   | 3   | 4   | 3   |
| Ques. | 8  | 9    | 10  | 11  | 12  | 13  | 14  |
| Ans.  | 3  | 3    | 1   | 1   | 4   | 2   | 2   |
| Ques. | 15 | 16   | 17  | 18  | 19  | 20  | 21  |
| Ans.  | 4  | 4    | 4   | 4   | 4   | 3   | 2   |
| Ques. | 22 | 23   | 24  | 25  | 26  | 27  | 28  |
| Ans.  | 4  | 2    | 4   | 3   | 4   | 1   | 2   |
| Ques. | 29 | 30   | 31  | 32  | 33  | 34  | 35  |
| Ans.  | 2  | 2    | 3   | 2   | 4   | 3   | 3   |
| Ques. | 36 | 37   | 38  | 39  | 40  | 41  | 42  |
| Ans.  | 3  | 1, 4 | 1   | 3   | 3   | 4   | 2   |
| Ques. | 43 | 44   | 45  | 46  | 47  | 48  | 49  |
| Ans.  | 2  | 4    | 1   | 4   | 3   | 2   | 4   |
| Ques. | 50 | 51   | 52  | 53  | 54  | 55  | 56  |
| Ans.  | 4  | 4    | 4   | 1   | 2   | 3   | 1   |
| Ques. | 57 | 58   | 59  | 60  | 61  | 62  | 63  |
| Ans.  | 4  | 4    | 2   | 4   | 1   | 4   | 2   |
| Ques. | 64 | 65   | 66  | 67  | 68  | 69  | 70  |
| Ans.  | 1  | 1    | 1   | 3   | 2   | 3   | 2   |
| Ques. | 71 | 72   | 73  | 74  | 75  | 76  | 77  |
| Ans.  | 1  | 2    | 2   | 3   | 4   | 4   | 1   |
| Ques. | 78 | 79   | 80  | 81  | 82  | 83  | 84  |
| Ans.  | 3  | 4    | 3   | 4   | 4   | 2   | 3   |
| Ques. | 85 | 86   | 87  | 88  | 89  | 90  | 91  |
| Ans.  | 3  | 4    | 2   | 4   | 3   | 2   | 1   |
| Ques. | 92 | 93   | 94  | 95  | 96  | 97  | 98  |
| Ans.  | 4  | 3    | 2   | 1   | 1   | 4   | 4   |
| Ques. | 99 | 100  | 101 | 102 | 103 | 104 | 105 |
| Ans.  | 2  | 2    | 4   | 1   | 1   | 2   | 1   |

| Ques. | 106 | 107 | 108 | 109 |  |  |  |
|-------|-----|-----|-----|-----|--|--|--|
| Ans.  | 2   | 1   | 3   | 3   |  |  |  |