Q1 - 25 July - Shift 1

Among the following species

$N_2, N_2^+, N_2^-, N_2^{2-}, O_2, O_2^+, O_2^-, O_2^{2-}$

the number of species showing diamagnetism is

Space for your notes:

Q2 - 25 July - Shift 2

Match **List I** with **List II** :

List-I (molecule)	**List-II (hybridization; shape)**
A. XeO_3	I. sp^3d ; linear
B. XeF_2	II. sp^3; pyramidal
C. $XeOF_4$	III. sp^3d^3; distorted octahedral
D. XeF_6	IV. sp^3d^2 ;square pyramidal

Choose the correct answer from the options given below:

(A) A-II, B-I, C-IV, D-III

(B) A-II, B-IV, C-III, D-I

(C) A-IV, B-II, C-III, D-I

(D) A-IV, B-II, C-I, D-III

Space for your notes:

Q3 - 25 July - Shift 2

The total number of acidic oxides from the following list is: NO, N_2O, B_2O_3, N_2O_5, CO, SO_3, P_4O_{10}

(A) 3 (B) 4

(C) 5 (D) 6

Space for your notes:

Q4 - 25 July - Shift 2

The sum of number of lone pairs of electrons present on the central atoms of XeO_3, $XeOF_4$ and XeF_6 is _____

Space for your notes:

Q5 - 26 July - Shift 1

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

List - I (Compound)	**List – II (Shape)**
(A) BrF_5	(I) bent
(B) $[CrF_6]^{3-}$	(II) square pyramidal
(C) O_3	(III) trigonal bipyramidal
(D) PCl_5	(IV) octahedral

Choose the **correct** answer from the options given below :

(A) (A) – (I), (B) - (II), (C) - (III), (D) - (IV)
(B) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(C) (A) - (II), (B) - (IV), (C) - (I), (D) - (III)
(D) (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

Space for your notes:

Q6 - 26 July - Shift 2

Arrange the following in increasing order of their covalent character.

(A) CaF_2 (B) $CaCl_2$
(C) $CaBr_2$ (D) CaI_2

Choose the correct answer from the options given below.

(A) B < A < C < D (B) A < B < C < D
(C) A < B < D < C (D) A < C < B < D

Space for your notes:

Q7 - 27 July - Shift 1

Given below are two statements.

Statement I : O_2 , Cu^{2+} and Fe^{3+} are weakly attracted by magnetic field and are magnetized in the same direction as magnetic field.

Statement II : NaCl and H_2O are weakly magnetized in opposite direction to magnetic field.

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

(A) Both Statement I and Statement II are correct.

(B) Both Statement I and Statement II are incorrect.

(C) Statement I is correct but Statement II is incorrect.

(D) Statement I is incorrect but Statement II is correct.

Space for your notes:

Q8 - 27 July - Shift 1

Amongst the following the number of oxide(s) which are paramagnetic in nature is

Na_2O, KO_2, NO_2, N_2O, ClO_2, NO, SO_2, Cl_2O

Space for your notes:

Q9 - 27 July - Shift 1

According to MO theory, number of species/ions from the following having identical bond order is_____:

$CN^-, NO^+, O_2, O_2^+, O_2^{2+}$

Space for your notes:

Q10 - 27 July - Shift 2

Match List-I with List-II

List-I	List-II
(A) $\Psi_{MO} = \Psi_A - \Psi_B$	(I) Dipole moment
(B) $\mu = Q \times r$	(II) Bonding molecular orbital
(C) $\frac{N_b - N_a}{2}$	(III) Anti-bonding molecualr orbital
(D) $\Psi_{MO} = \Psi_A + \Psi_B$	(IV) Bond order

(A) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
(B) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)
(D) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

Space for your notes:

Q11 - 27 July - Shift 2

The number of molecule(s) or ion(s) from the following having non-planar structure is_____.

$NO_3^-, H_2O_2, BF_3, PCl_3, XeF_4,$
$SF_4, XeO_3, PH_4^+, SO_3, [Al(OH)_4]^-$

Space for your notes:

Q12 - 28 July - Shift 1

The number of paramagnetic species among the following is _____.

B_2, Li_2, C_2, C_2^-, O_2^{2-}, O_2^+ and He_2^+

Space for your notes:

Q13 - 28 July - Shift 2

Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : Zero orbital overlap is an out of phase overlap.

Reason : It results due to different orientation/ direction of approach of orbitals.

In the light of the above statements. Choose the ***correct*** answer from the options given below

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

Space for your notes:

Q14 - 29 July - Shift 1

Number of lone pairs of electrons in the central atom of SCl_2, O_3, ClF_3 and SF_6, respectively, are :

(A) 0, 1, 2 and 2

(B) 2, 1, 2 and 0

(C) 1, 2, 2 and 0

(D) 2, 1, 2 and 0

Space for your notes:

Q15 - 29 July - Shift 2

Consider, PF_5, BrF_5, PCl_3, SF_6, $[ICl_4]^-$, ClF_3 and IF_5.

Amongst the above molecule(s)/ion(s), the number of molecule(s)/ion(s) having sp^3d^2 hybridisation is____.

Space for your notes:

Answer Key

Q1 (2) **Q2** (A) **Q3** (B) **Q4** (3)

Q5 (C) **Q6** (B) **Q7** (A) **Q8** (4)

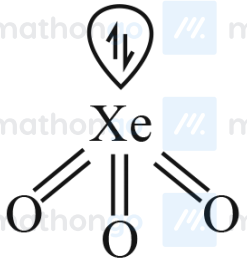
Q9 (3) **Q10** (C) **Q11** (6) **Q12** (4)

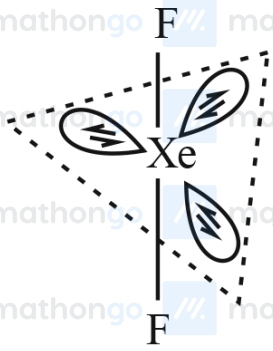
Q13 (A) **Q14** (B) **Q15** (4)

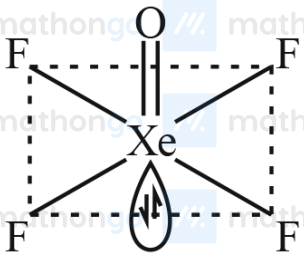
Q1 (2)

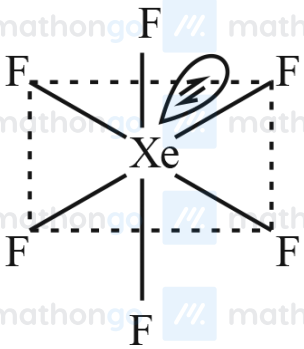
Diamagnetic species are: N_2, O_2^{2-}

Q2 (A)

(A)  – sp^3 – pyramidal

(B)  – sp^3d – linear

(C)  –sp^3d^2–square pyramidal

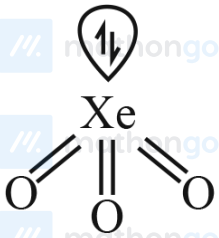
(D)  sp^3d^3–distorted octahedral

Q3 (B)

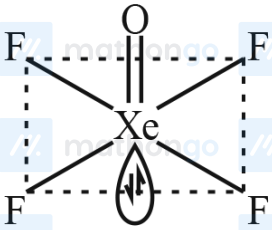
Neutral Oxides — N_2O, NO, CO

Acidic Oxides — B_2O_3, N_2O_5, SO_3, P_4O_{10}

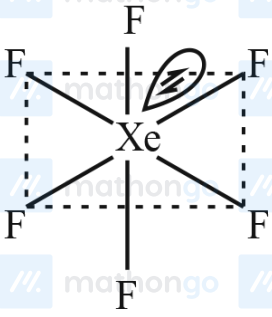
Q4 (3)



- one lone pair on central atom

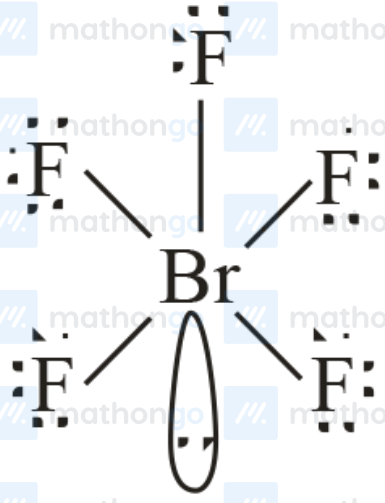


- one lone pair on central atom



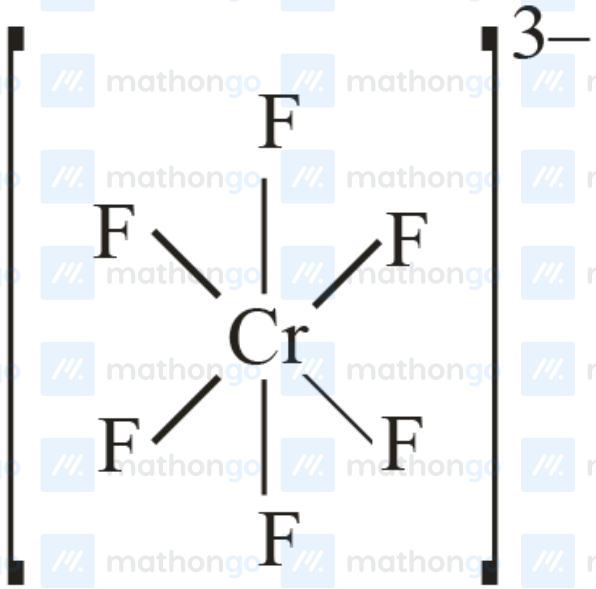
- one lone pair on central atom

Q5 (C)



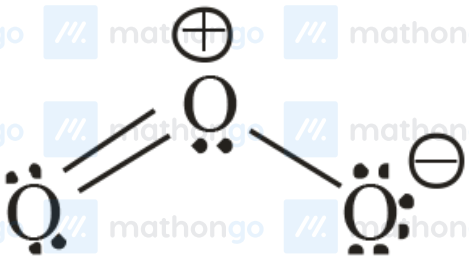
(Square pyramidal)

$[CrF_6]^{3-}$:



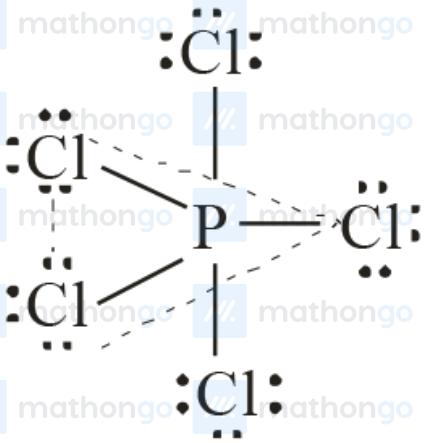
(Octahedral)

O_3 :



(Bent)

PCl_5 :



(Trigonal bipyramidal)

Q6 (B)

According to Fajan's rule,

Covalent character $\propto$ size of Anion

Q7 (A)

O_2, Cu^{2+} and Fe^{3+} are paramagnetic,

$\therefore$ Weakly attracted by magnetic field.

NaCl and H_2O are diamagnetic,

$\therefore$ Weakly repelled by magnetic field.

Q8 (4)

KO_2, NO_2, ClO_2, NO are paramagnetic.

Q9 (3)

CN^-, NO^+, O_2^{2+} have bond order = 3

Q10 (C)

(A) $\psi_{MO} = \psi_A - \psi_B$ (III) ABMO

(B) $\mu = Q \times r$ (I) Dipole moment

(C) $\frac{N_b - N_a}{2}$ (IV) Bond order

(D) $\psi_{MO} = \psi_A + \psi_B$ (II) BMO

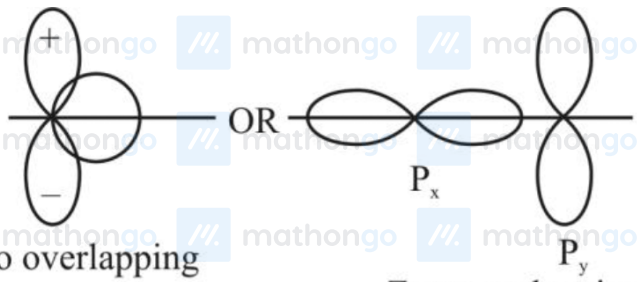
Q11 (6)

SO_3	—	sp^2	Planar
BF_3	—	sp^2	Planar
NO_3^-	—	sp^2	Planar
SF_4	—	sp^3d	Non-planar
H_2O_2	—	sp^3	Non-planar
PCl_3	—	sp^3	Non-planar
$[Al(OH)_4]^-$	—	sp^3	Non-planar
XeF_4	—	sp^3d^2	Planar
XeO_3	—	sp^3	Non-planar
PH_4^+	—	sp^3	Non-planar

Q12 (4)

Paramagnetic $B_2, C_2^-, O_2^+, He_2^+$

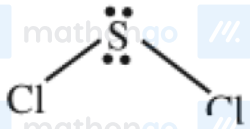
Q13 (A)



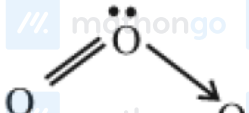
Zero overlapping

Zero overlapping due to improper orientation of orbitals

Q14 (B)



(2 ℓ .p.)



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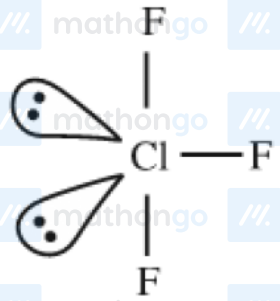

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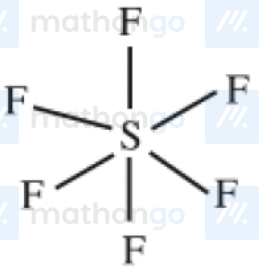
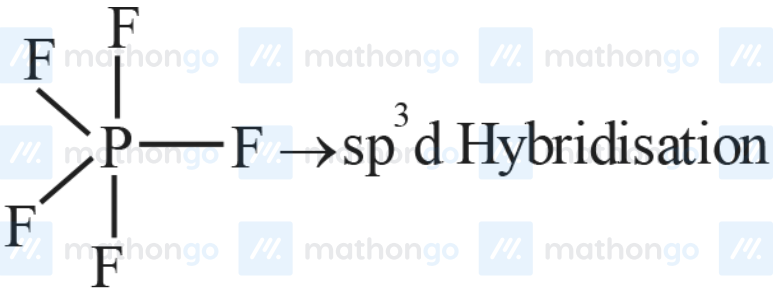
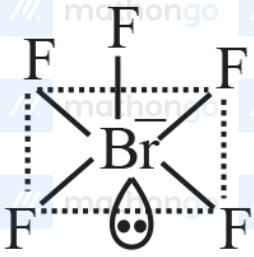


(0 ℓ .p.)

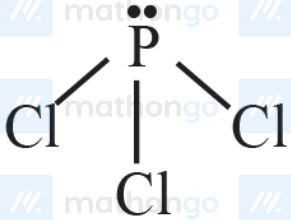
Q15 (4)



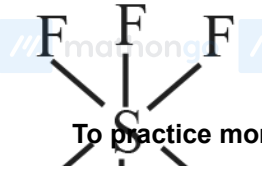
$\rightarrow sp^3d$ Hybridisation

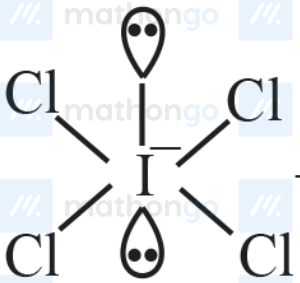


$\rightarrow sp^3d^2$ Hybridisation

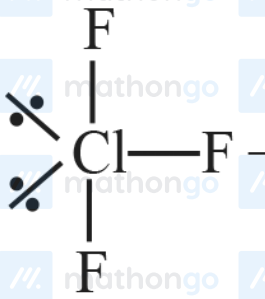


$\rightarrow sp^3$ Hybridisation

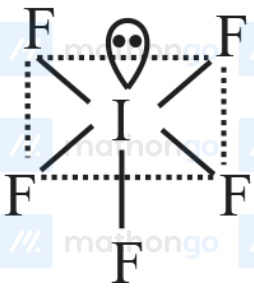




$\rightarrow sp^3d^2$ Hybridisation



$\rightarrow sp^3d$ Hybridisation



$\rightarrow sp^3d^2$ Hybridisation