

Q1 - 25 July - Shift 1

If the maximum value of the term independent of t

in the expansion of $\left(t^2 x^{\frac{1}{5}} + \frac{(1-x)^{\frac{1}{10}}}{t} \right)^{15}$, $x \geq 0$, is

K , then $8K$ is equal to _____.

Space for your notes:

Q2 - 25 July - Shift 2

The remainder when $(11)^{1011} + (1011)^{11}$ is divided by 9 is

- (A) 1 (B) 4
(C) 6 (D) 8

Space for your notes:

Q3 - 26 July - Shift 1

If the coefficients of x and x^2 in the expansion of $(1+x)^p(1-x)^q$, $p, q \leq 15$, are -3 and -5 respectively, then the coefficient of x^3 is equal to _____.

Space for your notes:

Q4 - 26 July - Shift 2

$\sum_{\substack{i,j=0 \\ i \neq j}}^n {}^nC_i {}^nC_j$ is equal to

- (A) $2^{2n} - 2^n C_n$ (B) $2^{2n-1} - 2^{n-1} C_{n-1}$
(C) $2^{2n} - \frac{1}{2} 2^n C_n$ (D) $2^{n-1} + 2^{n-1} C_n$

Space for your notes:

Q5 - 27 July - Shift 1

Questions

MathonGo

The remainder when $(2021)^{2022} + (2022)^{2021}$ is divided by 7 is

- (A) 0 (B) 1
(C) 2 (D) 6

*Space for your notes:***Q6 - 27 July - Shift 2**

Let for the 9^{th} term in the binomial expansion of $(3 + 6x)^n$, in the increasing powers of $6x$, to be the greatest for $x = \frac{3}{2}$, the least value of n is n_0 . If k is the ratio of the coefficient of x^6 to the coefficient of x^3 , then $k + n_0$ is equal to:

*Space for your notes:***Q7 - 28 July - Shift 1**

The remainder when $7^{2022} + 3^{2022}$ is divided by 5 is:

- (A) 0 (B) 2 (C) 3 (D) 4

*Space for your notes:***Q8 - 28 July - Shift 2**

Let the coefficients of the middle terms in the expansion of $\left(\frac{1}{\sqrt{6}} + \beta x\right)^4$, $(1 - 3\beta x)^2$ and $\left(1 - \frac{\beta}{2}x\right)^6$, $\beta > 0$, respectively form the first three terms of an A.P. If d is the common difference of this A.P., then $50 - \frac{2d}{\beta^2}$ is equal to _____

Space for your notes:

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Questions

MathonGo

Q9 - 28 July - Shift 2

If $1 + (2 + {}^{49}C_1 + {}^{49}C_2 + \dots + {}^{49}C_{49}) ({}^{50}C_2 + {}^{50}C_4 + \dots + {}^{50}C_{50})$ is equal to $2^n \cdot m$, where m is odd, then $n + m$ is equal to _____.

Space for your notes:

Q10 - 29 July - Shift 1

Let the ratio of the fifth term from the beginning to the fifth term from the end in the binomial expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$, in the increasing powers of $\frac{1}{\sqrt[4]{3}}$ be $\sqrt[4]{6} : 1$. If the sixth term from the beginning is $\frac{\alpha}{\sqrt[4]{3}}$, then α is equal to _____.

Space for your notes:

Q11 - 29 July - Shift 2

If $\sum_{k=1}^{10} K^2 \left(10C_k\right)^2 = 22000L$, then L is equal to _____.

Space for your notes:

Q1 - 24 June - Shift 1

The remainder when 3^{2022} is divided by 5 is

Space for your notes:

(A) 1

(B) 2

(C) 3

(D) 4

Q2 - 24 June - Shift 2

The remainder on dividing $1 + 3 + 3^2 + 3^3 + \dots + 3^{2021}$ by 50 is _____.

Space for your notes:

Q3 - 25 June - Shift 1

Let C_r denote the binomial coefficient of x^r in the expansion of $(1 + x)^{10}$. If $\alpha, \beta \in \mathbb{R}$. $C_1 + 3 \cdot 2C_2 + 5 \cdot 3C_3 + \dots$ upto 10 terms

Space for your notes:

$$= \frac{\alpha \times 2^{11}}{2^\beta - 1} \left(C_0 + \frac{C_1}{2} + \frac{C_2}{3} + \dots \text{upto 10 terms} \right)$$

then the value of $\alpha + \beta$ is equal to

Q4 - 25 June - Shift 2

The coefficient of x^{101} in the expression

Space for your notes:

$$(5 + x)^{500} + x(5 + x)^{499} + x^2(5 + x)^{498} + \dots + x^{500},$$

$x > 0$, is

(A) ${}^{501}C_{101}(5)^{399}$

(B) ${}^{501}C_{101}(5)^{400}$

(C) ${}^{501}C_{100}(5)^{400}$

(D) ${}^{500}C_{101}(5)^{399}$

Q5 - 25 June - Shift 2

Questions

MathonGo

If the sum of the coefficients of all the positive even powers of x in the binomial expansion of

$\left(2x^3 + \frac{3}{x}\right)^{10}$ is $5^{10} - \beta \cdot 3^9$, then β is equal to _____

Space for your notes:

Q6 - 26 June - Shift 1

The remainder when $(2021)^{2023}$ is divided by 7 is :

- (A) 1 (B) 2 (C) 5 (D) 6

Space for your notes:

Q7 - 26 June - Shift 2

If $\binom{40}{0} + \binom{41}{1} + \binom{42}{2} + \dots + \binom{60}{20} = \frac{m}{n} \cdot {}^{60}C_{20}$, m

and n are coprime, then $m + n$ is equal to _____.

Space for your notes:

Q8 - 27 June - Shift 1

If the coefficient of x^{10} in the binomial expansion

of $\left(\frac{\sqrt{x}}{5^{\frac{1}{4}}} + \frac{\sqrt{5}}{x^{\frac{1}{3}}}\right)^{60}$ is $5^k l$, where $l, k \in \mathbb{N}$ and l is co-

prime to 5, then k is equal to _____.

Space for your notes:

Q9 - 27 June - Shift 2

If the sum of the coefficients of all the positive powers of x , in the binomial expansion of

$\left(x^n + \frac{2}{x^5}\right)^7$ is 939, then the sum of all the possible

integral values of n is :

Space for your notes:

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Q10 - 28 June - Shift 1

If

$$\sum_{k=1}^{31} \binom{31}{k} \binom{31}{k-1} - \sum_{k=1}^{30} \binom{30}{k} \binom{30}{k-1} = \frac{\alpha (60!)}{(30!)(31!)},$$

Where $\alpha \in \mathbb{R}$, then the value of 16α is equal to

(A) 1411

(B) 1320

(C) 1615

(D) 1855

Space for your notes:

Q11 - 28 June - Shift 1

The number of positive integers k such that the constant term in the binomial expansion of

$$\left(2x^3 + \frac{3}{x^k}\right)^{12}, x \neq 0 \text{ is } 2^8 \cdot \ell, \text{ where } \ell \text{ is an odd}$$

integer, is _____.

Space for your notes:

Q12 - 28 June - Shift 2

The term independent of x in the expression of

$$\left(1 - x^2 + 3x^3\right) \left(\frac{5}{2}x^3 - \frac{1}{5x^2}\right)^{11}, x \neq 0 \text{ is}$$

(A) $\frac{7}{40}$ (B) $\frac{33}{200}$ (C) $\frac{39}{200}$ (D) $\frac{11}{50}$

Space for your notes:

Q13 - 29 June - Shift 1

Questions

MathonGo

If the constant term in the expansion of $\left(3x^3 - 2x^2 + \frac{5}{x^5}\right)^{10}$ is $2^k \cdot l$, where l is an odd integer, then the value of k is equal to :

- (A) 6 (B) 7
(C) 8 (D) 9

Space for your notes:

Q14 - 29 June - Shift 2

Let $n \geq 5$ be an integer. If $9^n - 8n - 1 = 64\alpha$ and $6^n - 5n - 1 = 25\beta$, then $\alpha - \beta$ is equal to:

- (A) $1 + {}^nC_2(8-5) + {}^nC_3(8^2-5^2) + \dots + {}^nC_n(8^{n-1}-5^{n-1})$
(B) $1 + {}^nC_3(8-5) + {}^nC_4(8^2-5^2) + \dots + {}^nC_n(8^{n-2}-5^{n-2})$
(C) ${}^nC_3(8-5) + {}^nC_4(8^2-5^2) + \dots + {}^nC_n(8^{n-2}-5^{n-2})$
(D) ${}^nC_4(8-5) + {}^nC_5(8^2-5^2) + \dots + {}^nC_n(8^{n-3}-5^{n-3})$

Space for your notes:

Q15 - 29 June - Shift 2

Let the coefficients of x^{-1} and x^{-3} in the expansion

of $\left(2x^{\frac{1}{5}} - \frac{1}{x^{\frac{1}{5}}}\right)^{15}$, $x > 0$, be m and n respectively. If

r is a positive integer such that $mn^2 = {}^{15}C_r \cdot 2^r$, then the value of r is equal to__.

Space for your notes:

Q1 - 24 June - Shift 2

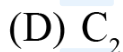
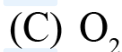
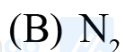
The correct order of bond orders of C_2^{2-} , N_2^{2-} and O_2^{2-} is, respectively.



Space for your notes:

Q2 - 25 June - Shift 1

Bonding in which of the following diatomic molecule(s) become(s) stronger, on the basis of MO Theory, by removal of an electron ?



Space for your notes:

Q3 - 25 June - Shift 2

Amongst BeF_2 , BF_3 , H_2O , NH_3 , CCl_4 and HCl , the number of molecules with non-zero net dipole moment is _____.

Space for your notes:

Q4 - 26 June - Shift 1

Questions

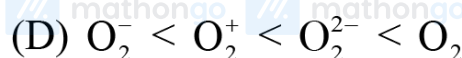
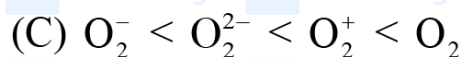
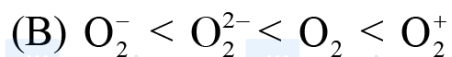
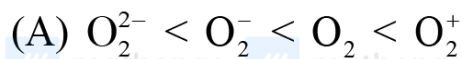
MathonGo

Consider the ions/molecule

Space for your notes:



For increasing bond order the correct option is :



Q5 - 26 June - Shift 2

The oxide which contains an odd electron at the nitrogen atom is

Space for your notes:

- (1) N_2O (2) NO_2 (3) N_2O_3 (4) N_2O_5

Q6 - 26 June - Shift 2

Amongst SF_4 , XeF_4 , CF_4 and H_2O , the number of species with two lone pairs of electrons _____.

Space for your notes:

Q7 - 27 June - Shift 1

Questions

MathonGo

Based upon VSEPR theory, match the shape (geometry) of the molecules in List-I with the molecules in List-II and select the most appropriate option

*Space for your notes:***List-I****(Shape)**

- (A) T-shaped
- (B) Trigonal planar
- (C) Square planar
- (D) See-saw

List-II**(Molecules)**

- (I) XeF_4
- (II) SF_4
- (III) ClF_3
- (IV) BF_3

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

Q8 - 27 June - Shift 2

Identify the **incorrect** statement for PCl_5 from the following.

Space for your notes:

- (A) In this molecule, orbitals of phosphorous are assumed to undergo sp^3d hybridization.
- (B) The geometry of PCl_5 is trigonal bipyramidal.
- (C) PCl_5 has two axial bonds stronger than three equatorial bonds.
- (D) The three equatorial bonds of PCl_5 lie in a plane.

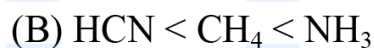
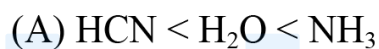
Q9 - 27 June - Shift 2

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Questions

MathonGo

The correct order of increasing intermolecular hydrogen bond strength is

Space for your notes:**Q10 - 28 June - Shift 1**

The hybridization of P exhibited in PF_5 is sp^xd^y .

Space for your notes:

The value of y is _____.

Q11 - 28 June - Shift 2

In the structure of SF_4 , the lone pair of electrons on S is in.

Space for your notes:

(A) equatorial position and there are two lone pair-bond pair repulsions at 90°

(B) equatorial position and there are three lone pair-bond pair repulsions at 90°

(C) axial position and there are three lone pair – bond pair repulsion at 90° .

(D) axial position and there are two lone pair – bond pair repulsion at 90° .

Q12 - 29 June - Shift 1

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Questions

MathonGo

Arrange the following in the decreasing order of their covalent character :

- (A) LiCl
- (B) NaCl
- (C) KCl
- (D) CsCl

Question: Choose the **most appropriate** answer from the options given below :

- (A) (A) > (C) > (B) > (D)
- (B) (B) > (A) > (C) > (D)
- (C) (A) > (B) > (C) > (D)
- (D) (A) > (B) > (D) > (C)

Space for your notes:

Q13 - 29 June - Shift 2

Consider the species CH_4 , NH_4^+ and BH_4^- . Choose the correct option with respect to the there species:

- (A) They are isoelectronic and only two have tetrahedral structures
- (B) They are isoelectronic and all have tetrahedral structures
- (C) Only two are isoelectronic and all have tetrahedral structures
- (D) Only two are isoelectronic and only two have tetrahedral structures

Space for your notes:

Q14 - 29 June - Shift 2

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Questions

MathonGo

Number of lone pair (s) of electrons on central atom and the shape of BrF_3 molecule respectively, are :

Space for your notes:

(A) 0, triangular planar.

(B) 1, pyramidal.

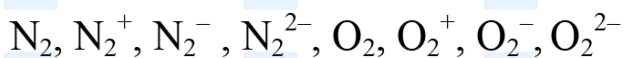
(C) 2, bent T-shape.

(D) 1, bent T-shape

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Q1 - 25 July - Shift 1

Among the following species



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

Space for your notes:

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

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}

Space for your notes:

- (A) 3
- (B) 4
- (C) 5
- (D) 6

Q4 - 25 July - Shift 2

Questions

MathonGo

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)**(A) BrF_5 (B) $[\text{CrF}_6]^{3-}$ (C) O_3 (D) PCl_5 **List - II****(Shape)**

(I) bent

(II) square pyramidal

(III) trigonal bipyramidal

(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**

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Questions

MathonGo

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

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Questions

MathonGo

Match List-I with List-II

List-I

List-II

(A) $\Psi_{\text{MO}} = \Psi_{\text{A}} - \Psi_{\text{B}}$

(I) Dipole moment

(B) $\mu = Q \times r$

(II) Bonding molecular orbital

(C) $\frac{N_{\text{b}} - N_{\text{a}}}{2}$

(III) Anti-bonding

molecular orbital

(D) $\Psi_{\text{MO}} = \Psi_{\text{A}} + \Psi_{\text{B}}$

(IV) Bond order

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

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

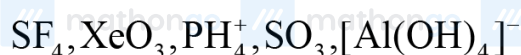
(C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(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 _____.



Space for your notes:

Q12 - 28 July - Shift 1

The number of paramagnetic species among the following is _____.



Space for your notes:

Q13 - 28 July - Shift 2

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Questions

MathonGo

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

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Questions

MathonGo

Consider, PF_5 , BrF_5 , PCl_3 , SF_6 , $[\text{ICl}_4]^-$, ClF_3 and IF_5 .

Space for your notes:

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

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