MET 2023

Physics

Q.1 A ball is thrown from ground with velocity u and angle w range is 10m. If the ball is thrown with velocity 3u and wi the horizontal range will become

Option 1:
10 m

Option 2:
40 m

Option 3:
90 m

Option 4:
60 m

Correct Answer:
90 m

Solution:
As we learned

Projectile Projected at angle ? -

When the velocity of projectile increased n time then

- wherein

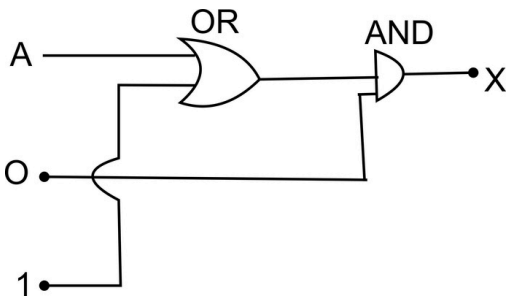
horizontal range is increased by a fator of n2

$$R = \frac{u^2 \sin 2\Theta}{g}$$

for same

$$R \propto u^2 \qquad \frac{R_2}{R_1} = \left(\frac{3u}{u}\right)^2 \Rightarrow R_2 = 9R_1$$

Q. 2 The output, in the folowing gate logic, would be:



Option 1:
0

Option 2:
1

Option 3:
A

Option 4:
1 + A

Correct Answer:
0

Solution:
As we have learned

Some Important relation -

$$A + A = A$$

$$A \cdot A = A$$

$$A + 1 = 1$$

$$A \cdot 1 = 1$$

$$A \cdot 0 = 0$$

$$A + 0 = A$$

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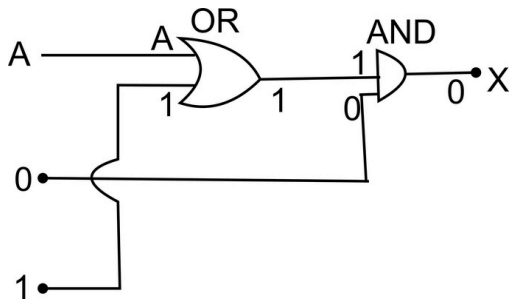


We know 1+A=1 always, hence the output of OR gate would be al

1	A	OR
1	0	1
	1	1
1		

Similarly $1 + 0 = 0$

We know that output of AND gate is zero, if atleast one input to

A	0	AND
1	0	0
0	0	0

Hence X=0

Q. 3 If the magnitude of voltage in a circuit changes with tim
direction changes periodically then the voltage is called:

Option 1:
Alternative voltage

Option 2:
direct voltage

Option 3:
constant voltage

Option 4:
reversible voltage

Correct Answer:
Alternative voltage

Solution:
As we learn

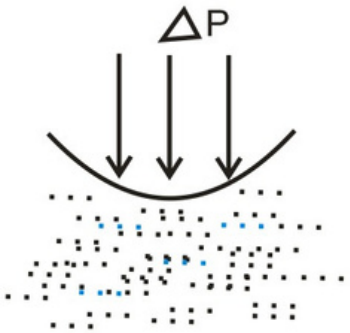
Alternating Voltage (V) -

An alternating voltage (V) is one whose magnitude changes with time between zero to peak value (0 to V0)

- wherein

Where voltage changes periodically.

Q. 4 For the gluon concave surface ΔP the excess oressure



Option 1:

$Zero$

Option 2:

$\frac{T}{R}$

Option 3:

$\frac{2T}{R}$

Option 4:

$\frac{4T}{R}$

Correct Answer:

$\frac{2T}{R}$

Solution:
As we have learnt in

Excess pressure for concave surface -

$$\Delta P = \frac{2T}{R}$$

-

ΔP for concave surface = $\frac{2T}{R}$

Q. 5 Faraday's law of electromagnetic induction is conservatio

Option 1:
charge

Option 2:
magnetic ux

Option 3:
energy

Option 4:
magnetic eld

Correct Answer:
energy

Solution:
As we have learnt

Faraday Second Law of Induction emf -

$$\varepsilon = \frac{-d\phi}{dt} = -L\frac{dI}{dt}$$

-

(concept not mentioned)

Induced charge is given by the rate of change of magnetic ux

Q. 6 Which of the following is true about the mass of the body

Option 1:
It's value does not change with g

Option 2:
It is a scalar quantity

Option 3:
it's unit is in kilogram

Option 4:
All of the above

Correct Answer:
All of the above

Solution:
As we learn

Mass -

Quantity of matter contained in body

$S.I. \rightarrow [Kg]$

dimension $[M]$

- wherein

(i) Value does not change with g

(ii) Can never be zero

(iii) Scalar quantity

Q. 7 A constant retarding force of 50m is applied to a body of speed of 15m/s. How long does the body take to stop ?

Option 1:
4 s

Option 2:
5 s

Option 3:
10 s

Option 4:
6 s

Correct Answer:
6 s

Solution:
As we learn

Newton's 2nd Law -

$$F \propto \frac{dp}{dt}$$

$$F = \frac{kdp}{dt}$$

$$F = \frac{d(mv)}{dt}$$

$$F = \frac{m(dv)}{dt}$$

$$\frac{dv}{dt} = a$$

Therefore $F = ma$

- wherein

$K = 1$ in C.G.S & S.I

Force can be defined as rate of change of momentum.

Retardation $a = \frac{F}{m} = \frac{50}{20} = 2.5m/s^2$

Now by equation of motion

$$v = u + at = 0 = u - at$$

$$t = \frac{u}{a} = \frac{15}{2.5} = 6sec$$

Q. 8 If a 5 Kg mass is suspended by a spring balance in a lift v
m/s 2 .The reading of the balance is

Option 1:
more than 5Kg weight

Option 2:
is less than 5Kg weight and greater than zero

Option 3:
is equal to 5 Kg weight

Option 4:
zero

Correct Answer:
zero

Solution:

Apparent weight of body in a lift when Lift is moving down wit

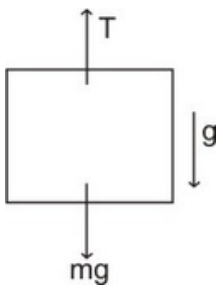
As $a = g$

$$mg - R = mg$$

$$R = 0$$

Apparent weight = 0 (weightlessness)

Draw FBD of block



mg - T = mg

T = 0

so reading of balance is zero

Q. 9 In the experiment of obtaining velocity of transverse wav
λ_1 *and* λ_2 as two succesive responce length then velocity wil

Option 1:
$V \ \alpha \ (l_1 \times l_2)$

Option 2:
$V\alpha\,(l_2/l_1)$

Option 3:
$V\alpha\,(l_1/l_2)$

Option 4:
$V\alpha\,(l_2 - l_1)$

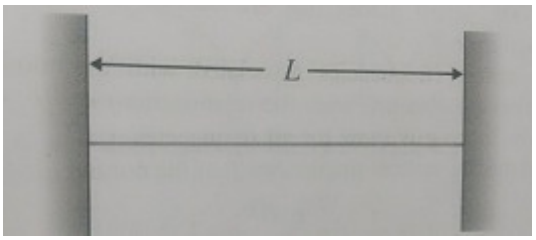
Correct Answer:
$V\alpha\,(l_2 - l_1)$

Solution:
As we learned from

Velocity of transverse wave using sonometer -

$v = n_0\lambda$

$= 2\,n_0\,(l_2 - l_1)$



- wherein

where $\frac{\lambda}{2} = l_2 - l_1$

l_2 *and* l_1 are the two successive resonance length.

$V = n_0(\lambda)$

$\lambda = 2\,(l_2 - l_1)$

so $V = 2n_0\,(l_2 - l_1)$

Q. 10 Axis of rotation of earth is called:

Option 1:
Magnetic axis

Option 2:
Geographic pole

Option 3:
geographic axis

Option 4:
Magnetic pole

Correct Answer:
Geographic pole

Solution:
As we learn

Geographic Axis -

Axis of rotation of Earth is called Geographic axis.

-

Q. 11 The current gain of a common emitter ampli er is 69. If t
collector current (in mA) is :

Correct Answer:
6.9

Solution:
As we have learnt,

Relation between α and β -

$$\beta = \frac{\alpha}{1-\alpha}$$

- wherein

$$\alpha = \frac{I_C}{I_E}$$

$$\beta = \frac{I_C}{I_B} \text{ (current gain)}$$

Current gain $\beta = \frac{\Delta I_C}{\Delta I_B} = 69$

$$\frac{\Delta I_C}{\Delta I_E - \Delta I_C} = 69 \Rightarrow \frac{\Delta I_E}{\Delta I_C} - 1 = \frac{1}{69}$$
$$\frac{\Delta I_C}{\Delta I_E} = 1 + \frac{1}{69} = \frac{70}{69}$$
$$\Rightarrow \Delta I_C = (\Delta I_E)\frac{70}{69} = (7mA) \times \frac{69}{70} = 6.9mA$$

Q. 12 A certain mass of hydrogen is changed to He by the process of fusion. The mass defect in fusion reaction is 0.02866u. The energy liberated (in MeV) per μ is (1μ=931MeV)

Correct Answer:
Correct Answer:
6.675

Solution:
As we learn

Mass of electron,proton & neutron in terms of energy -

$m_e = 0.511\ Mev/c^2$

$m_p = 938.27\ Mev/c^2$

$m_n = 939.56\ Mev/c^2$

$1\,amu = 931.5\ Mev/c^2$

As ${}^2\mathrm{H} + {}^2_1\mathrm{H} \rightarrow {}^4_2\mathrm{He}$
Here, $\Delta m = 0.02866\mathrm{u}$

$\therefore$ The energy liberated per u is

$= \frac{\Delta M \times 931}{4} \text{MeV}$

$= \frac{0.02866 \times 931}{4} \text{MeV}$

$= \frac{26.7}{4} \text{MeV} = 6.675 \text{MeV}$

Q. 13 When radiation of wavelength λ is used to illuminate a metallic surface, stopping potential is V. When the same surface is illuminated with potential is V/4 . If the threshold wavelength for $n\lambda$ value of n will be_____

Correct Answer:
9

Solution:

$$\frac{hc}{\lambda} = \frac{hc}{\lambda_0} + eV \quad \ldots\ldots (i)$$

$$\frac{hc}{3\lambda} = \frac{hc}{\lambda_0} + \frac{e \cdot V}{4} \quad \ldots\ldots (ii)$$

$(multiply \ \ equation(ii) \ by \ 4)$

$we \ get \ \frac{4hc}{3\lambda} = \frac{4hc}{\lambda_0} + eV \quad \ldots (iii)$

$Now \ From \ (i) \ \& \ (iii) \ we \ get$

$$\frac{hc}{\lambda} - \frac{hc}{\lambda_0} = \frac{4hc}{3\lambda} - \frac{4hc}{\lambda_0}$$

$$-\frac{hc}{3\lambda} = -\frac{3hc}{\lambda_0}$$

$$\Rightarrow 9\lambda = \lambda_0$$

$n = 9$

Q. 14 A car is moving with a speed of 30 m/s on a circular path increasing at the rate of $2 m/s^2$. What is the acceleration (in m/s2) of t

Correct Answer:
2.7

Solution:

Given :

Tangential acceleration, $(a_t) = 2\ m/s^2$

Centripetal acceleration, $(a_c) = \dfrac{v^2}{r} = \dfrac{900}{500} = 1.8\ m/s^2$

$\therefore$ Net acceleration , $(a) = \sqrt{(a_t)^2 + (a_c)^2}$

$$a = \sqrt{(2)^2 + (1.8)^2} = 2.7\ m/s^2$$

Q. 15

A man weighs 80 kg. He stands on a weighing scale in a li
uniform acceleration of 5m/s2. What would be the reading

Correct Answer:

1200

Solution:

Solution :

Reading of weighing scale = m(g+a) = 80(10 + 5) = 1200 N

Chemistry

Q. 1 Which of the following is a colourless neutral gas:

Option 1:

NO

Option 2:

NO_2

Option 3:

N_2O_3

Option 4:

N_2O_5

Correct Answer:

NO

Solution:

As we learn

Nitric oxide -

NO (+2), colourless

- wherein

$N = O$

N_2O : Colourless neutral gas

NO : Colourless neutral gas

NO_2 : Brown gas

N_2O_3 : Blue Solid

N_2O_5 : Colourless solid

Q. 2 A gas expands from 10 ltr to 12 ltr against 1 atm pressure and absorb 10 Ltr – atm heat. Then change in its internal energy will be

Option 1:
12 Ltr- atm

Option 2:
-2 Ltr – atm

Option 3:
8 Ltr - atm

Option 4:
2 Ltr – atm

Correct Answer:
8 Ltr - atm

Solution:
As we learn

First law of Thermodynamics -

The energy of universe is always conserved or total energy of a

$\Delta E = q + W$

- wherein

$\Delta E =$ Internal Energy

$Q =$ Heat

$W =$ work

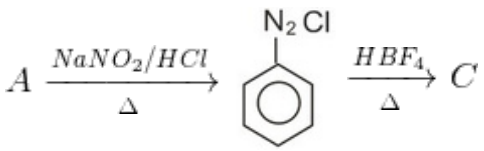
$$\Delta E = q + w$$

$$\begin{aligned} q &= 10Ltr - atm \\ w &= -P(V_f - V_i) \\ &= -1(12 - 10) \\ &= -20Ltr - atm \end{aligned}$$

$$\Delta E = 10 - 2$$

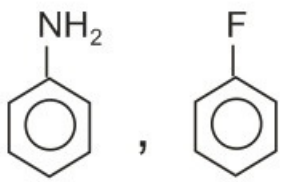
$$\Delta = 8Ltr - atm$$

Q. 3

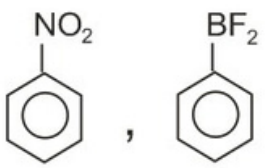


In the above reaction what is A ans C respectively?

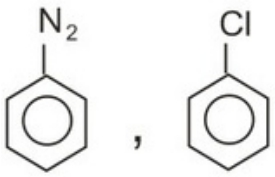
Option 1:



Option 2:



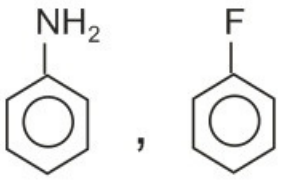
Option 3:



Option 4:

None of these

Correct Answer:



Solution:

As we learn

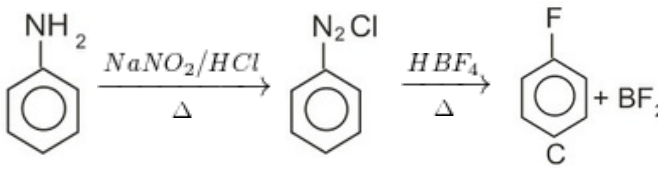
Reaction with Nitrous Acid Primary Amines -

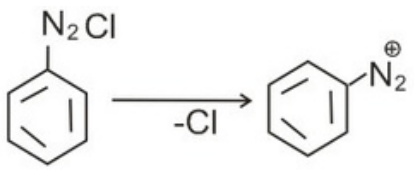
Primary amines react with nitrous acid to produce diazonium io

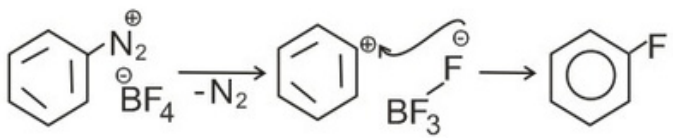
- wherein

$$R-NH_2+HNO_2\rightarrow R-N^{\oplus}\equiv N$$

$$ArNH_2+HNO_2\rightarrow Ar-N^{\oplus}\equiv N$$







Q. 4 Na2O2 is pale yellow in colour due to

Option 1:
Presence of traces of superoxides (NaO2)

Option 2:
O_2^{-2} ion has unpaired electrons.

Option 3:
O_2^{-2} ion is paramagnetic in nature

Option 4:
Its high oxidising power.

Correct Answer:
Presence of traces of superoxides (NaO2)

Solution:

Properties of Na2O 2-

Colourless in pure state, faint yellow is due to presence of small amount of superoxide NaO_2

-

Though O_2^{-2} ion does not has any unpaired electron yet Na2O2 is pale yellow in colour due to the presence of traces of NaO2.

Correct option is 1.

Q. 5 Which of the following metal cation has least heat of hyd

Option 1:
Li+

Option 2:
Na+

Option 3:
K+

Option 4:
Rb

Correct Answer:
Rb

Solution:
As we learn-

Rb+ has minimum charge density .

So its $\Delta_{hydration}H$ is minimum.

Q. 6 Which of the following element has the lowest melting po

Option 1:
B

Option 2:
Al

Option 3:
Ga

Option 4:
In

Correct Answer:
Ga

Solution:
As we have learnt,

Melting Point of Boron Family -

Decreases from B to Ga then increases

- wherein

Due to strong crystalline lattice, boron has usually high meltin

Element:	B	Al	Ga	In
M.P: (OC)	2180	660	30	

Melting point of Ga is lowest $\approx 30^{\circ}C$

Q. 7 Which statement is correct for cross Aldol Reaction ?

Option 1:
Reactants must contain $\alpha - H$ atom

Option 2:
The product of the Reaction is hydroxy Aldehyde or hydroxy Ke

Option 3:
Condensation carried out between two di erent Aldehydes or K one ketone

Option 4:
All of the above

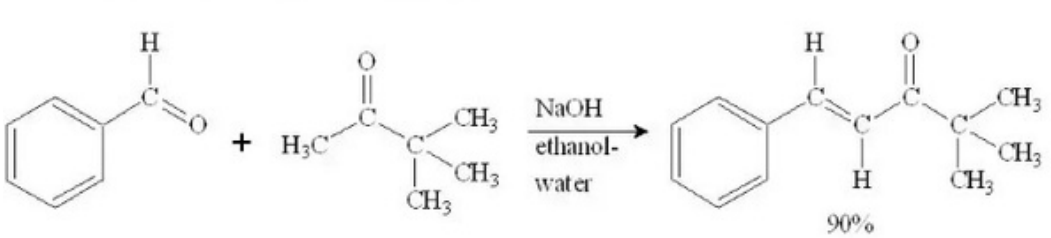
Correct Answer:
All of the above

Solution:
As we learned

Cross aldol condensation -

Aldol condensation carried out between two di erent aldehydes and one ketone.

- wherein



Q. 8 The dilute aqueous solution of which acid is used as a we

Option 1:
H_3BO_3

Option 2:
H_2SO_4

Option 3:
H_2CO_3

Option 4:
H_3PO_3

Correct Answer:
H_3BO_3

Solution:

Boric acid -

Its dilute solution is used as weak antiseptic for eyes and form

-

Boric acid in dilute aqueous solution is weak antiseptic for eye

Q. 9 In Lassaigne's test of Sulphur containing compound the a
the presence of

Option 1:
$\mathrm{Na_4\,[Fe(CN)_6]}$

Option 2:
$\mathrm{FeSO_4}$

Option 3:
$[Fe(CN)_5NOS]^{4-}$

Option 4:
$[Fe(CN)_5NO]^{2-}$

Correct Answer:
$[Fe(CN)_5NOS]^{4-}$

Solution:
As we have learnt,

Test for Sulphur:

In Lassaigne's test of Sulphur containing compound, the violet $[Fe(CN)_5NOS]^{4-}$ upon reaction of sodium fusion extract with Nitropr

The reaction is given below:

$$S^{2-} + [Fe(CN)_5NO]^{2-} \longrightarrow [Fe(CN)_5NOS]^{4-}$$

Hence, the correct answer is Option (3)

Q. 10 The primary valency of the central metal ion in the compl $[Co(NH_3)_5Cl]Cl_2$ is

Option 1:
1

Option 2:
2

Option 3:
3

Option 4:
6

Correct Answer:
2

Solution:
As we have learned

Primary valency -

These are normally ionisable and satis ed by negative ions.

- wherein

eg:

$COCl_2 \rightarrow$ Primary Valency is 2

$CrCl_3 \rightarrow$ Primary Valency is 3

Postulates of Werner's theory

Q. 11 Solve the following equation with correct signi cant gure

---

Correct Answer:
9.6

Solution:
The number of signi cant gures in the result would not exceed
least number of signi cant gures.

So, solution is 9.6 as 1.5 has just 2 signi cant gures

Therefore, Option (1) is correct

Q. 12 At 518o C, the rate of decomposition of a sample of gaseo
pressure of 363 Torr, was 1.00 Torr s–1 when 5% had reacte
reacted. The order of the reaction is :

Correct Answer:
2

Solution:
nth-order reaction -

The rate of the reaction is proportional to the nth power of the

Di erential rate law (r)

$$= \frac{dx}{dt} = k(a-x)^n$$

a-x = left amount.

5% reacted means 100-5 = 95% left amount

33% reacted means 100-33 = 67% left amount

Then

At 363 torr 95% of Total = a-x = 0.95 Po

And after 33% reacted then 67% of Total = a-x = 0.67 Po

Let rate law be:

$\mathrm{r} = \mathrm{K}\,[\mathrm{Acetaldehyde}]^{\mathrm{n}}$

after 5% reaction

$\therefore 1 = K\,(0.95\,P_o)^n$

After 33% reaction

$0.5 = K\,(0.67\,P_o)^n$

$So\ 2 = \left(\frac{0.95}{0.67}\right)^n \Rightarrow 2 = (1.41)^n$

$\therefore n = 2$

Q. 13 The formula of a gaseous hydrocarbon which requires 6 times its volume of O_2 for complete oxidation and produces 4 times its volume of CO_2. The value of y is _____.

Correct Answer:
8

Solution:

$C_xH_y + 6O_2 \longrightarrow 4CO_2 + \frac{y}{2} H_2O$

Applying POAC on 'O' atoms

$6 \times 2 = 4 \times 2 + y/2 \times 1$

$y/2 = 4 \Rightarrow y = 8$

Answer : 8

Q. 14 What is the total number of moles if we have a mixture of and 10g Hydrogen?

Correct Answer:
8

Solution:

$$Number\ of\ moles\ of\ ammonia = \frac{mass\ of\ ammonia}{molar\ mass\ of\ ammonia} = \frac{34}{17} = 2$$

$$Number\ of\ moles\ of\ benzene = \frac{78}{78} = 1$$

$$Number\ of\ moles\ of\ hydrogen = \frac{10}{2} = 5$$

Total number of moles = 2 + 1 + 5 = 8

Therefre, Option(1) is correct

Q. 15 Calculate the number of atoms of oxygen present in 88 g of CO2. What would be the mass (in gm) of CO having the same number of oxygen atoms?

Correct Answer: 112

Solution:

LAWS OF CHEMICAL COMBINATIONS -

Law of Multiple Proportions :

This law was proposed by Dalton in 1803. According to this law, more than one compound, the masses of one element that comb element, are in the ratio of small whole numbers.

-

No. of moles of CO2 = 88/(44 g/mol) = 2 moles

As one mole of CO2 contains two moles of oxygen atoms, so two moles of CO2 contain 4 moles of oxygen atoms.
Number of oxygen atoms = 4 X 6.023 X 1023 = 2.5092 X 1024

As 1 mole oxygen atoms present in 1 mole of CO so, 4 moles oxygen atoms are present in 4 moles of CO.

It's mass is 4 X 28 = 112 g.

(correct option is a.)

Maths

Q. 1 WHich of the follwoing is a paradox :

Option 1:
That yellow car is running at 60 Km /h

Option 2:
My car is chau eur driven

Option 3:
The black car over there is running fast

Option 4:
None

Correct Answer:
The black car over there is running fast

Solution:
As we have learned

Statement -

A sentence which is both true or false is not a statement rather

- wherein

Example: "I must be cruel to be kind."

Q. 2 $I = \int \frac{x^2}{(x^3+1)^4} dx$

Option 1:
$\frac{1}{9(x^3+1)^3} + C$

Option 2:
$\frac{1}{3(x^3+1)^3} + C$

Option 3:

$$-\frac{1}{3(x^3+1)^3}+C$$

Option 4:

$$-\frac{1}{9(x^3+1)^3}+C$$

Correct Answer:

$$-\frac{1}{9(x^3+1)^3}+C$$

Solution:
As we have learned

Type of integration by substitution -

$$\int (f(x))^n \cdot f'(x)dx$$

$$\therefore \frac{[f(x)]^{n+1}}{n+1}+c$$

- wherein

Let $f(x)=t$

$$f'(x)dx=dt$$

$$put: \quad x^3+1=u \Rightarrow dx=\frac{1}{3x^2}$$

$$I=\frac{1}{3}\int 1/u^4 du$$

$$\int u^n du=\frac{U^{n+1}}{n+1} heren=-4$$

$$I=\frac{1}{3}\left[\frac{4^{-4+1}}{-4+1}\right]=-\frac{1}{9u^3}$$

$$\frac{-1}{9(x^3+1)^3}+C$$

Q. 3 The value of $\lim_{x\to 0}(\sin x+\cos(3x))^{2/x}$ is

Option 1:
e

Option 2:
e^{-2}

Option 3:
e^{2}

Option 4:
1 / e

Correct Answer:
e^{2}

Solution:

$$\lim_{x\to 0}(1+\sin x+\cos(3x)-1)^{2/x}$$

$$\Rightarrow e^{\lim_{x\to 0}\, 2/x(\sin x+\cos(3x)-1)}$$

Apply L' hospital rule

$$\Rightarrow e\lim_{x\to 0}\frac{2(\cos x)-3\sin(3x)}{1}$$

$$=e^{2}$$

Q. 4 $\frac{d}{dx}(2x^{2}-3x)=?$

Option 1:
$4x-3$

Option 2:
$4x$

Option 3:
$4x+3$

Option 4:
$-4x+3$

Correct Answer:
$4x-3$

Solution:
As we have learnt,

Rule for di erentiation -

The derivative of constant times a function is constant times th

- wherein

$$\frac{d}{dx}(c.f(x)) = c.\frac{d}{dx}f(x)$$

$$\begin{aligned}\frac{d}{dx}(2x^2 - 3x) &= \frac{d}{dx}(2x^2) - \frac{d}{dx}(3x) \\ &= 2\frac{d}{dx}(x^2) - 3\frac{d}{dx}(x) \\ &= 4x - 3\end{aligned}$$

Q. 5 Find the geometric mean of the new observations obtaine observations by 7 whole geometric mean was 14.

Option 1:
98

Option 2:
2

Option 3:
28

Option 4:
None of these

Correct Answer:
98

Solution:
As we learned

Properties of Geometric Mean -

Multiplying each observation by a non-zero constant multiplies constant.

$G' = (x_1 x_2 x_3 \cdots x_n)^{\frac{1}{n}} \cdot (k^n)^{\frac{1}{n}}$

$= (x_1 x_2 x_3 \cdots x_n)^{\frac{1}{n}} k = kG$

-

$G' = 7 \times 14$

$= 98$

Q. 6 How many squares are present in a chessboard?

Option 1:
2 0 4

Option 2:
$\sum_{r=1}^{8} r^3$

Option 3:
6 4

Option 4:
1 4 4

Correct Answer:
2 0 4

Solution:

Number of squares -

Number of squares of any size from $n \times n$ is $\sum_{r=1}^{n} r^2$

- wherein

$\sum_{r=1}^{n} r^2 = 1^2 + 2^2 + ... + n^2$

Here n=8

Sum $1^2 + 2^2 + \ldots 8^2$

$= (8 * 9 * 17)/6$

$= 204$

Q. 7 Differential equation of $y = 3ax(x+b)$ is, where a,b are constant.

Option 1:

$$y^2\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 = 0$$

Option 2:

$$y^2\frac{dy}{dx} = 3x$$

Option 3:

$$2\frac{d^2y}{dx^2} + y\left(\frac{dy}{dx}\right)^2 = 0$$

Option 4:

$$y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 = 0$$

Correct Answer:

$$y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 = 0$$

Solution:
As we learnt

Differential Equations -

An equation involving independent variable (x), dependent variable (y) and derivatives of dependent variable with respect to independent variable $\left(\frac{dy}{dx}\right)$

- wherein

eg:

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 5x = 0$$

Di erentiating $y^3 = 9a(x+b)$ wrt x

$$3y^2\frac{dy}{dx} = 9a \;\; i.e \;\; y^2\frac{dy}{dx} = 3a$$

Again di erentiating wrt x

$$y^2\frac{d^2y}{dx^2} + 2y\left(\frac{dy}{dx}\right)^2 = 0$$

OR

$$y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 = 0$$

The elimination of arbitrary constant leads to formation of di e

Q. 8 $f(x) = \sin^{-1}x + \cos^{-1}x$ is di erentiable in:

Option 1:
$x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Option 2:
$x \in [0, \pi]$

Option 3:
$x \in \left[0, \frac{\pi}{2}\right]$

Option 4:
$x \in [-1, 1]$

Correct Answer:
$x \in [-1, 1]$

Solution:
As we have learnt in

Properties of di erentiable functions -

Trigonometric and inverse trigonometric functions are di erenti

$f(x) = \sin^{-1} x + \cos^{-1} \frac{x}{2}$
$has\ \ [-1, 1]\ \ common\, domain$

-

Q. 9 The product $2^{1/4} \cdot 4^{1/16} \cdot 8^{1/48} \cdot 16^{1/128} \ldots$. is equal to :

Option 1:
$2^{1/4}$

Option 2:
2

Option 3:
$2^{1/2}$

Option 4:
1

Correct Answer:
$2^{1/2}$

Solution:
Sum of an infinite GP

If a is the first term and r is the common ratio of a G.P. Then,

$$S_\infty = \frac{a}{1-r}$$

S_∞ is the sum to infinite terms of the G.P.

Now,

$2^{1/4} \cdot 4^{1/16} \cdot 8^{1/48} \ldots = 2^{\frac{1}{4}+\frac{1}{8}+\frac{1}{16}\cdots}$
$\Rightarrow 2^{\frac{\frac{1}{4}}{1-\frac{1}{2}}} = \sqrt{2}$