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Section : **Mathematics Section A**

Q.1 If $\cot x = \frac{5}{12}$ for some $x \in \left(\pi, \frac{3\pi}{2}\right)$, then

$\sin 7x\left(\cos\frac{13x}{2}+\sin\frac{13x}{2}\right)+\cos 7x\left(\cos\frac{13x}{2}-\sin\frac{13x}{2}\right)$ is equal to

Options

1. $\frac{1}{\sqrt{13}}$
2. $\frac{5}{\sqrt{13}}$
3. $\frac{6}{\sqrt{26}}$
4. $\frac{4}{\sqrt{26}}$

Question Type : **MCQ**
Question ID : **444792537**
Option 1 ID : **4447921833**
Option 2 ID : **4447921832**
Option 3 ID : **4447921830**
Option 4 ID : **4447921831**
Status : **Answered**
Chosen Option : **1**

Q.2

Let $S = \frac{1}{25!} + \frac{1}{3!23!} + \frac{1}{5!21!} + \ldots$ up to 13 terms. If $13S = \frac{2^k}{n!}$, $k \in N$, then $n + k$ is equal to

Options

1. 49
2. 51
3. 50
4. 52

Question Type : **MCQ**
Question ID : **444792532**
Option 1 ID : **4447921810**
Option 2 ID : **4447921812**
Option 3 ID : **4447921811**
Option 4 ID : **4447921813**
Status : **Answered**
Chosen Option : **3**

Q.3

Let each of the two ellipses $E_1 : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b)$ and $E_2 : \frac{x^2}{A^2} + \frac{y^2}{B^2} = 1, (A < B)$ have eccentricity $\frac{4}{5}$. Let the lengths of the latus recta of E_1 and E_2 be l_1 and l_2, respectively, such that $2l_1^2 = 9l_2$. If the distance between the foci of E_1 is 8, then the distance between the foci of E_2 is

Options

1. $\frac{8}{5}$
2. $\frac{32}{5}$
3. $\frac{16}{5}$
4. $\frac{96}{5}$

Question Type : **MCQ**
Question ID : **444792535**
Option 1 ID : **4447921822**
Option 2 ID : **4447921824**
Option 3 ID : **4447921823**
Option 4 ID : **4447921825**
Status : **Not Answered**
Chosen Option : **--**

Q.4 If the domain of the function

$f(x) = \log_{(10x^2 - 17x + 7)}(18x^2 - 11x + 1)$

is $(-\infty, a) \cup (b, c) \cup (d, \infty) - \{e\}$, then

$90(a + b + c + d + e)$ equals:

Options
1. 307
2. 177
3. 170
4. 316

Question Type : **MCQ**
Question ID : **444792527**
Option 1 ID : **4447921791**
Option 2 ID : **4447921793**
Option 3 ID : **4447921792**
Option 4 ID : **4447921790**
Status : **Not Answered**
Chosen Option : **--**

Q.5 The value of $\dfrac{\sqrt{3}\,\text{cosec}20^\circ - \sec 20^\circ}{\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ}$ is equal to

Options
1. 64
2. 16
3. 12
4. 32

Question Type : **MCQ**
Question ID : **444792539**
Option 1 ID : **4447921841**
Option 2 ID : **4447921838**
Option 3 ID : **4447921839**
Option 4 ID : **4447921840**
Status : **Answered**
Chosen Option : **4**

Q.6

Let A(1, 0), B(2, −1) and $C\left(\frac{7}{3},\frac{4}{3}\right)$ be three points. If the equation of the bisector of the angle ABC is $\alpha x + \beta y = 5$, then the value of $\alpha^2 + \beta^2$ is

Options
1. 5
2. 10
3. 13
4. 8

Question Type : **MCQ**
Question ID : **444792538**
Option 1 ID : **4447921834**
Option 2 ID : **4447921836**
Option 3 ID : **4447921837**
Option 4 ID : **4447921835**
Status : **Not Answered**
Chosen Option : **--**

Q.7

Let $\alpha, \beta \in \mathbb{R}$ be such that the function $f(x)=\begin{cases}2\alpha\left(x^2-2\right)+2\beta x & , x<1\\ (\alpha+3)x+(\alpha-\beta) & , x\geq 1\end{cases}$ be differentiable at all $x \in \mathbb{R}$. Then $34(\alpha + \beta)$ is equal to

Options
1. 24
2. 84
3. 36
4. 48

Question Type : **MCQ**
Question ID : **444792543**
Option 1 ID : **4447921854**
Option 2 ID : **4447921857**
Option 3 ID : **4447921855**
Option 4 ID : **4447921856**
Status : **Answered**
Chosen Option : **4**

Q.8

Let $S=\left\{z\in\mathbb{C}:\left|\frac{z-6i}{z-2i}\right|=1 \text{ and } \left|\frac{z-8+2i}{z+2i}\right|=\frac{3}{5}\right\}$.

Then $\sum_{z\in S}|z|^2$ is equal to

Options
1. 413
2. 398
3. 423
4. 385

Question Type : **MCQ**
Question ID : **444792528**
Option 1 ID : **4447921796**
Option 2 ID : **4447921795**
Option 3 ID : **4447921797**
Option 4 ID : **4447921794**
Status : **Answered**
Chosen Option : **4**

Q.9

Consider an A.P.: $a_1, a_2, ..., a_n$; $a_1 > 0$. If $a_2 - a_1 = \frac{-3}{4}$, $a_n = \frac{1}{4}a_1$, and

$\sum_{i=1}^{n} a_i = \frac{525}{2}$, then $\sum_{i=1}^{17} a_i$ is equal to

Options
1. 952
2. 476
3. 238
4. 136

Question Type : **MCQ**
Question ID : **444792531**
Option 1 ID : **4447921809**
Option 2 ID : **4447921808**
Option 3 ID : **4447921807**
Option 4 ID : **4447921806**
Status : **Answered**
Chosen Option : **3**

Q.10

If the function $f(x)=\dfrac{e^{x}\left(e^{\tan x-x}-1\right)+\log_{e}(\sec x+\tan x)-x}{\tan x-x}$ is

continuous at $x=0$, then the value of $f(0)$ is equal to

Options

1. $\dfrac{1}{2}$
2. 2
3. $\dfrac{3}{2}$
4. $\dfrac{2}{3}$

Question Type : **MCQ**
Question ID : **444792542**
Option 1 ID : **4447921850**
Option 2 ID : **4447921853**
Option 3 ID : **4447921852**
Option 4 ID : **4447921851**
Status : **Not Answered**
Chosen Option : **--**

Q.11 From a lot containing 10 defective and 90 non-defective bulbs, 8 bulbs are selected one by one with replacement. Then the probability of getting at least 7 defective bulbs is

Options

1. $\dfrac{7}{10^{7}}$
2. $\dfrac{81}{10^{8}}$
3. $\dfrac{67}{10^{8}}$
4. $\dfrac{73}{10^{8}}$

Question Type : **MCQ**
Question ID : **444792534**
Option 1 ID : **4447921819**
Option 2 ID : **4447921820**
Option 3 ID : **4447921821**
Option 4 ID : **4447921818**
Status : **Answered**
Chosen Option : **4**

Q.12 The number of the real solutions of the equation:

$x|x+3|+|x-1|-2=0$ is

Options
1. 4
2. 2
3. 3
4. 5

Question Type : **MCQ**
Question ID : **444792530**
Option 1 ID : **4447921805**
Option 2 ID : **4447921802**
Option 3 ID : **4447921803**
Option 4 ID : **4447921804**
Status : **Answered**
Chosen Option : **2**

Q.13 Let the lines $L_1 : \vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right), \lambda \in \mathbb{R}$ and $L_2 : \vec{r} = \left(4\hat{i} + \hat{j}\right) + \mu\left(5\hat{i} + 2\hat{j} + \hat{k}\right), \mu \in \mathbb{R}$, intersect at the point R. Let P and Q be the points lying on lines L_1 and L_2, respectively, such that $\left|\overrightarrow{PR}\right| = \sqrt{29}$ and $\left|\overrightarrow{PQ}\right| = \sqrt{\frac{47}{3}}$. If the point P lies in the first octant, then $27(QR)^2$ is equal to

Options
1. 320
2. 340
3. 360
4. 348

Question Type : **MCQ**
Question ID : **444792541**
Option 1 ID : **4447921846**
Option 2 ID : **4447921847**
Option 3 ID : **4447921849**
Option 4 ID : **4447921848**
Status : **Not Answered**
Chosen Option : **--**

Q.14 Let $\vec{a} = 2\hat{i} + \hat{j} - 2\hat{k}$, $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c} = \vec{a} \times \vec{b}$. Let $\vec{d}$ be a vector such that $|\vec{d} - \vec{a}| = \sqrt{11}$, $|\vec{c} \times \vec{d}| = 3$ and the angle between $\vec{c}$ and $\vec{d}$ is $\frac{\pi}{4}$. Then $\vec{a} \cdot \vec{d}$ is equal to

Options
1. 1
2. 0
3. 11
4. 3

Question Type : **MCQ**
Question ID : **444792540**
Option 1 ID : **4447921843**
Option 2 ID : **4447921842**
Option 3 ID : **4447921845**
Option 4 ID : **4447921844**
Status : **Answered**
Chosen Option : **2**

Q.15 Let 729, 81, 9, 1, … be a sequence and P_n denote the product of the first n terms of this sequence.

If $2\sum_{n=1}^{40} \left(P_n\right)^{\frac{1}{n}} = \frac{3^{\alpha} - 1}{3^{\beta}}$ and $gcd\,(\alpha, \beta) = 1$, then

$\alpha + \beta$ is equal to

Options
1. 76
2. 73
3. 74
4. 75

Question Type : **MCQ**
Question ID : **444792529**
Option 1 ID : **4447921801**
Option 2 ID : **4447921798**
Option 3 ID : **4447921799**
Option 4 ID : **4447921800**
Status : **Not Answered**
Chosen Option : **--**

Q.16 Let R be a relation defined on the set $\{1, 2, 3, 4\} \times \{1, 2, 3, 4\}$ by

$R = \{((a, b), (c, d)) : 2a + 3b = 3c + 4d\}$.

Then the number of elements in R is

Options
1. 6
2. 15
3. 18
4. 12

Question Type : **MCQ**
Question ID : **444792526**
Option 1 ID : **4447921786**
Option 2 ID : **4447921788**
Option 3 ID : **4447921789**
Option 4 ID : **4447921787**
Status : **Not Answered**
Chosen Option : **--**

Q.17 Let A_1 be the bounded area enclosed by the curves $y = x^2 + 2$, $x + y = 8$ and y-axis that lies in the first quadrant. Let A_2 be the bounded area enclosed by the curves $y = x^2 + 2$, $y^2 = x$, $x = 2$, and y-axis that lies in the first quadrant. Then $A_1 - A_2$ is equal to

Options
1. $\frac{2}{3}\left(\sqrt{2}+1\right)$
2. $\frac{2}{3}\left(3\sqrt{2}+1\right)$
3. $\frac{2}{3}\left(4\sqrt{2}+1\right)$
4. $\frac{2}{3}\left(2\sqrt{2}+1\right)$

Question Type : **MCQ**
Question ID : **444792545**
Option 1 ID : **4447921862**
Option 2 ID : **4447921864**
Option 3 ID : **4447921865**
Option 4 ID : **4447921863**
Status : **Not Answered**
Chosen Option : **--**

Q.18

Let $f(t)=\int\left(\frac{1-\sin\left(\log_e t\right)}{1-\cos\left(\log_e t\right)}\right)dt,\ t>1.$

If $f\left(e^{\pi/2}\right)=-e^{\pi/2}$ and $f\left(e^{\pi/4}\right)=\alpha\, e^{\pi/4}$, then α equals

Options

1. $-1-2\sqrt{2}$
2. $-1+\sqrt{2}$
3. $1+\sqrt{2}$
4. $-1-\sqrt{2}$

Question Type : **MCQ**
Question ID : **444792544**
Option 1 ID : **4447921858**
Option 2 ID : **4447921861**
Option 3 ID : **4447921860**
Option 4 ID : **4447921859**
Status : **Not Answered**
Chosen Option : **--**

Q.19

Let a circle of radius 4 pass through the origin O, the points $A\left(-\sqrt{3}a,0\right)$ and $B\left(0,-\sqrt{2}b\right)$, where a and b are real parameters and $ab\neq 0$. Then the locus of the centroid of ΔOAB is a circle of radius

Options

1. $\frac{7}{3}$
2. $\frac{5}{3}$
3. $\frac{8}{3}$
4. $\frac{11}{3}$

Question Type : **MCQ**
Question ID : **444792536**
Option 1 ID : **4447921827**
Option 2 ID : **4447921826**
Option 3 ID : **4447921828**
Option 4 ID : **4447921829**
Status : **Answered**
Chosen Option : **3**

Q.20 The mean and variance of a data of 10 observations are 10 and 2, respectively. If an observations α in this data is replaced by β, then the mean and variance become 10.1 and 1.99, respectively. Then $\alpha + \beta$ equals

Options
1. 15
2. 5
3. 20
4. 10

Question Type : **MCQ**
Question ID : **444792533**
Option 1 ID : **4447921816**
Option 2 ID : **4447921814**
Option 3 ID : **4447921817**
Option 4 ID : **4447921815**
Status : **Answered**
Chosen Option : **3**

Section : **Mathematics Section B**

Q.21 Let a differentiable function f satisfy the equation $\int_0^{36} f\left(\frac{tx}{36}\right) dt = 4\alpha f(x)$.

If $y = f(x)$ is a standard parabola passing through the points (2, 1) and (− 4, β), then β^{α} is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **444792550**
Status : **Not Answered**

Q.22 Let $(2\alpha, \alpha)$ be the largest interval in which the function $f(t) = \frac{|t+1|}{t^2}$, $t < 0$, is strictly decreasing. Then the local maximum value of the function $g(x) = 2\log_e(x-2) + \alpha x^2 + 4x - \alpha$, $x > 2$, is _____

Given **4**
Answer :

Question Type : **SA**
Question ID : **444792549**
Status : **Answered**

Q.23 Let a line L passing through the point P (1,1,1) be perpendicular to the lines $\frac{x-4}{4}=\frac{y-1}{1}=\frac{z-1}{1}$ and $\frac{x-17}{1}=\frac{y-71}{1}=\frac{z}{0}$. Let the line L intersect the yz-plane at the point Q. Another line parallel to L and passing through the point S (1, 0, − 1) intersects the yz-plane at the point R. Then the square of the area of the parallelogram PQRS is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **444792548**
Status : **Not Answered**

Q.24 The number of numbers greater than 5000, less than 9000 and divisible by 3, that can be formed using the digits 0, 1, 2, 5, 9, if the repetition of the digits is allowed, is _____

Given --
Answer :

Question Type : **SA**
Question ID : **444792547**
Status : **Not Answered**

Q.25 The number of 3×2 matrices A, which can be formed using the elements of the set $\{-2, -1, 0, 1, 2\}$ such that the sum of all the diagonal elements of A^TA is 5, is _____

Given --
Answer :

Question Type : **SA**
Question ID : **444792546**
Status : **Not Answered**

Section : **Physics Section A**

Q.26 A boy throws a ball into air at 45° from the horizontal to land it on a roof of a building of height H. If the ball attains maximum height in 2 s and lands on the building in 3 s after launch, then value of H is _____m.

($g = 10\ m/s^2$)

Options
1. 15
2. 10
3. 25
4. 20

Question Type : **MCQ**
Question ID : **444792555**
Option 1 ID : **4447921887**
Option 2 ID : **4447921890**
Option 3 ID : **4447921888**
Option 4 ID : **4447921889**
Status : **Answered**
Chosen Option : **1**

Q.27 The electrostatic potential in a charged spherical region of radius r varies as $V = ar^3 + b$, where a and b are constants. The total charge in the sphere of unit radius is $\alpha \times \pi a \epsilon_o$. The value of α is _____.
(permittivity of vacuum is ϵ_o)

Options
1. -9
2. -6
3. -12
4. -8

Question Type : **MCQ**
Question ID : **444792560**
Option 1 ID : **4447921910**
Option 2 ID : **4447921908**
Option 3 ID : **4447921907**
Option 4 ID : **4447921909**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.28 Two electrons are moving in orbits of two hydrogen like atoms with speeds 3×10^5 m/s and 2.5×10^5 m/s respectively. If the radii of these orbits are nearly same then the possible order of energy states are_____ respectively.

Options
1. 8 and 10
2. 9 and 8
3. 10 and 12
4. 6 and 5

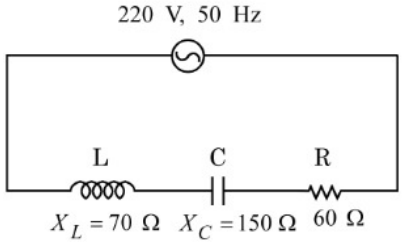
Question Type : **MCQ**
Question ID : **444792570**
Option 1 ID : **4447921950**
Option 2 ID : **4447921947**
Option 3 ID : **4447921948**
Option 4 ID : **4447921949**
Status : **Answered**
Chosen Option : **4**

Q.29 The exit surface of a prism with refractive index n is coated with a material having refractive index $\frac{n}{2}$. When this prism is set for minimum angle of deviation, it exactly meets the condition of critical angle. The prism angle is _____.

Options
1. $60°$
2. $45°$
3. $15°$
4. $30°$

Question Type : **MCQ**
Question ID : **444792568**
Option 1 ID : **4447921941**
Option 2 ID : **4447921942**
Option 3 ID : **4447921939**
Option 4 ID : **4447921940**
Status : **Not Answered**
Chosen Option : **--**

Q.30 For the series *LCR* circuit connected with 220 V, 50 Hz a.c source as shown in the figure, the power factor is $\frac{\alpha}{10}$. The value of α is _____.



Options
1. 8
2. 10
3. 4
4. 6

Question Type : **MCQ**
Question ID : **444792562**
Option 1 ID : **4447921917**
Option 2 ID : **4447921918**
Option 3 ID : **4447921915**
Option 4 ID : **4447921916**
Status : **Answered**
Chosen Option : **4**

Q.31 Match the **LIST-I** with **LIST-II**

	List-I		List-II
A.	Radio-wave	I.	is produced by Magnetron valve
B.	Micro-wave	II.	due to change in the vibrational modes of atoms
C.	Infrared-wave	III.	due to inner shell electrons moving from higher energy level to lower energy level
D.	X-ray	IV.	due to rapid acceleration of electrons

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

Options
1. A-IV, B-I, C-II, D-III
2. A-IV, B-II, C-I, D-III
3. A-IV, B-III, C-I, D-II
4. A-II, B-IV, C-III, D-I

Question Type : **MCQ**
Question ID : **444792565**
Option 1 ID : **4447921928**
Option 2 ID : **4447921930**
Option 3 ID : **4447921927**
Option 4 ID : **4447921929**
Status : **Marked For Review**
Chosen Option : **1**

Q.32 Match the **LIST-I** with **LIST-II**

List-I		List-II	
A.	Magnetic induction	I.	$M L T^{-2} A^{-2}$
B.	Magnetic flux	II.	$M L^2 T^{-2} A^{-2}$
C.	Magnetic permeability	III.	$M L^0 T^{-2} A^{-1}$
D.	Self inductance	IV.	$M L^2 T^{-2} A^{-1}$

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

Options
1. A-IV, B-III, C-I, D-II
2. A-III, B-IV, C-I, D-II
3. A-I, B-III, C-IV, D-II
4. A-III, B-IV, C-II, D-I

Question Type : **MCQ**
Question ID : **444792551**
Option 1 ID : **4447921872**
Option 2 ID : **4447921874**
Option 3 ID : **4447921873**
Option 4 ID : **4447921871**
Status : **Answered**
Chosen Option : **2**

Q.33 A brass wire of length 2 m and radius 1 mm at 27 °C is held taut between two rigid supports. Initially it was cooled to a temperature of –43 °C creating a tension T in the wire. The temperature to which the wire has to be cooled in order to increase the tension in it to $1.4T$, is _____ °C.

Options
1. –80
2. –86
3. –71
4. –65

Question Type : **MCQ**
Question ID : **444792558**
Option 1 ID : **4447921901**
Option 2 ID : **4447921899**
Option 3 ID : **4447921900**
Option 4 ID : **4447921902**
Status : **Answered**
Chosen Option : **3**

Q.34 There are three co-centric conducting spherical shells A, B and C of radii a, b and c respectively ($c > b > a$) and they are charged with charge q_1, q_2 and q_3 respectively. The potentials of the spheres A, B and C respectively, are :

Options

1. $\frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{a}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{b}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{c}\right)$
2. $\frac{1}{4\pi\epsilon_o}\left(\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2}{b}+\frac{q_3}{c}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{c}\right)$
3. $\frac{1}{4\pi\epsilon_o}\left(\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{b}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{c}\right)$
4. $\frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2+q_3}{a}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1+q_2}{b}+\frac{q_3}{c}\right), \frac{1}{4\pi\epsilon_o}\left(\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right)$

Question Type : **MCQ**
Question ID : **444792563**
Option 1 ID : **4447921921**
Option 2 ID : **4447921920**
Option 3 ID : **4447921919**
Option 4 ID : **4447921922**
Status : **Answered**
Chosen Option : **2**

Q.35 An unpolarised light is incident at an interface of two dielectric media having refractive indices of 2 (incident medium) and $2\sqrt{3}$ (medium) respectively. To satisfy the condition that reflected and refracted rays are perpendicular to each other, the angle of incidence is _____.

Options

1. $30°$
2. $60°$
3. $45°$
4. $10°$

Question Type : **MCQ**
Question ID : **444792566**
Option 1 ID : **4447921933**
Option 2 ID : **4447921931**
Option 3 ID : **4447921932**
Option 4 ID : **4447921934**
Status : **Answered**
Chosen Option : **2**

Q.36 Density of water at 4 °C and 20 °C are 1000 kg/m^3 and 998 kg/m^3 respectively. The increase in internal energy of 4 kg of water when it is heated from 4 °C to 20 °C is _____J.
(specific heat capacity of water = 4.2 J / kg. and 1 atmospheric pressure = 10^5 Pa)

Options
1. 234699.2
2. 268799.2
3. 258700.8
4. 315826.2

Question Type : **MCQ**
Question ID : **444792557**
Option 1 ID : **4447921898**
Option 2 ID : **4447921897**
Option 3 ID : **4447921895**
Option 4 ID : **4447921896**
Status : **Not Answered**
Chosen Option : **--**

Q.37 A spring of force constant 15 N/m is cut into two pieces. If the ratio of their length is 1:3, then the force constant of smaller piece is _____N/m.

Options
1. 20
2. 60
3. 15
4. 45

Question Type : **MCQ**
Question ID : **444792552**
Option 1 ID : **4447921875**
Option 2 ID : **4447921877**
Option 3 ID : **4447921878**
Option 4 ID : **4447921876**
Status : **Answered**
Chosen Option : **2**

Q.38 Two masses 400 g and 350 g are suspended from the ends of a light string passing over a heavy pulley of radius 2 cm. When released from rest the heavier mass is observed to fall 81 cm in 9 s. The rotational inertia of the pulley is _____ $kg.m^2$. ($g = 9.8\ m/s^2$)

Options
1. 4.75×10^{-3}
2. 8.3×10^{-3}
3. 9.5×10^{-3}
4. 1.86×10^{-2}

Question Type : **MCQ**
Question ID : **444792556**
Option 1 ID : **4447921894**
Option 2 ID : **4447921891**
Option 3 ID : **4447921892**
Option 4 ID : **4447921893**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.39 Given below are two statements:

Statement I: For all elements, greater the mass of the nucleus, greater is the binding energy per nucleon.

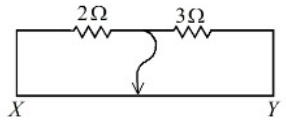
Statement II: For all elements, nuclei with less binding energy per nucleon transforms to nuclei with greater binding energy per nucleon.

In the light of the above statements, choose the ***correct*** answer from the options given below

Options
1. Statement I is true but Statement II is false
2. Both Statement I and Statement II are false
3. Statement I is false but Statement II is true
4. Both Statement I and Statement II are true

Question Type : **MCQ**
Question ID : **444792569**
Option 1 ID : **4447921945**
Option 2 ID : **4447921944**
Option 3 ID : **4447921946**
Option 4 ID : **4447921943**
Status : **Answered**
Chosen Option : **3**

Q.40 Two resistors 2 Ω and 3 Ω are connected in the gaps of bridge as shown in figure. The null point is obtained with the contact of jockey at some point on wire *XY*. When an unknown resistor is connected in parallel with 3 Ω resistor, the null point is shifted by 22.5 cm toward *Y*. The resistance of unknown resistor is_____Ω .



Options 1. 1
2. 3
3. 4
4. 2

Question Type : **MCQ**
Question ID : **444792553**
Option 1 ID : **4447921879**
Option 2 ID : **4447921881**
Option 3 ID : **4447921882**
Option 4 ID : **4447921880**
Status : **Answered**
Chosen Option : **4**

Q.41 In a microscope of tube length 10 cm two convex lenses are arranged with focal length of 2 cm and 5 cm. Total magnification obtained with this system for normal adjustment is $(5)^k$. The value of k is_____.

Options 1. 4
2. 5
3. 2
4. 3.5

Question Type : **MCQ**
Question ID : **444792567**
Option 1 ID : **4447921935**
Option 2 ID : **4447921937**
Option 3 ID : **4447921936**
Option 4 ID : **4447921938**
Status : **Answered**
Chosen Option : **3**

Q.42 Two resistors of 100 Ω each are connected in series with a 9 V battery. A voltmeter of 400 Ω resistance is connected to measure the voltage drop across one of the resistors. The voltmeter reading is _____V.

Options
1. 4.5
2. 2
3. 4
4. 3

Question Type : **MCQ**
Question ID : **444792561**
Option 1 ID : **4447921914**
Option 2 ID : **4447921911**
Option 3 ID : **4447921913**
Option 4 ID : **4447921912**
Status : **Answered**
Chosen Option : **3**

Q.43 Three masses 200 kg, 300 kg and 400 kg are placed at the vertices of an equilateral triangle with sides 20 m. They are rearranged on the vertices of a bigger triangle of side 25 m and with the same centre. The work done in this process _____J.
(Gravitational constant G = 6.7×10^{-11} N m^2/ kg^2)

Options
1. 1.74×10^{-7}
2. 4.77×10^{-7}
3. 9.86×10^{-6}
4. 2.85×10^{-7}

Question Type : **MCQ**
Question ID : **444792554**
Option 1 ID : **4447921886**
Option 2 ID : **4447921883**
Option 3 ID : **4447921884**
Option 4 ID : **4447921885**
Status : **Answered**
Chosen Option : **1**

Q.44 A cylindrical block of mass M and area of cross section A is floating in a liquid of density ρ and with its axis vertical. When depressed a little and released the block starts oscillating. The period of oscillation is _____.

Options

1. $2\pi\sqrt{\frac{\rho A}{Mg}}$
2. $\pi\sqrt{\frac{\rho A}{Mg}}$
3. $2\pi\sqrt{\frac{M}{\rho Ag}}$
4. $\pi\sqrt{\frac{2M}{\rho Ag}}$

Question Type : **MCQ**
Question ID : **444792559**
Option 1 ID : **4447921905**
Option 2 ID : **4447921906**
Option 3 ID : **4447921903**
Option 4 ID : **4447921904**
Status : **Marked For Review**
Chosen Option : **3**

Q.45 Three charges $+2q$, $+3q$ and $-4q$ are situated at $(0, -3a)$, $(2a, 0)$ and $(-2a, 0)$ respectively in the $x\,y$ plane. The resultant dipole moment about origin is _____.

Options

1. $2qa\left(3\hat{j}-7\hat{i}\right)$
2. $2qa\left(3\hat{i}-7\hat{j}\right)$
3. $2qa\left(3\hat{j}-\hat{i}\right)$
4. $2qa\left(7\hat{i}-3\hat{j}\right)$

Question Type : **MCQ**
Question ID : **444792564**
Option 1 ID : **4447921926**
Option 2 ID : **4447921925**
Option 3 ID : **4447921924**
Option 4 ID : **4447921923**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

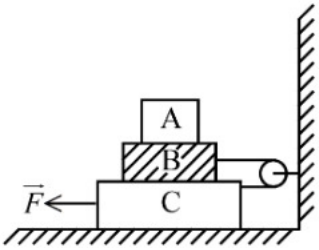
Section : **Physics Section B**

Q.46 Sixty four rain drops of radius 1 mm each falling down with a terminal velocity of 10 cm/s coalesce to form a bigger drop. The terminal velocity of bigger drop is _____ cm/s.

Given **160**
Answer :

Question Type : **SA**
Question ID : **444792573**
Status : **Answered**

Q.47 In the given figure the blocks A, B and C weigh 4 kg, 6 kg and 8 kg respectively. The co-efficient of sliding friction between any two surfaces is 0.5. The force $\vec{F}$ required to slide the block C with constant speed is _____ N. (Use $g = 10\ m/s^2$)



Given **--**
Answer :

Question Type : **SA**
Question ID : **444792572**
Status : **Not Answered**

Q.48 A short bar magnet placed with its axis at 30° with an external field of 800 Gauss, experiences a torque of 0.016 N.m. The work done in moving it from most stable to most unstable position is $\alpha \times 10^{-3}$ J. The value of α is _____.

Given **64**
Answer :

Question Type : **SA**
Question ID : **444792575**
Status : **Answered**

Q.49 A voltage regulating circuit consisting of Zener diode, having break-down voltage of 10 V and maximum power dissipation of 0.4 W, is operated at 15 V. The approximate value of protective resistance in this circuit is _____Ω.

Given **125**
Answer :

Question Type : **SA**
Question ID : **444792571**
Status : **Answered**

Q.50 A gas of certain mass filled in a closed cylinder at a pressure of 3.23 kPa has temperature 50 °C. The gas is now heated to double its temperature. The modified pressure is ____Pa.

Given Answer : **6**

Question Type : **SA**
Question ID : **444792574**
Status : **Answered**

Section : **Chemistry Section A**

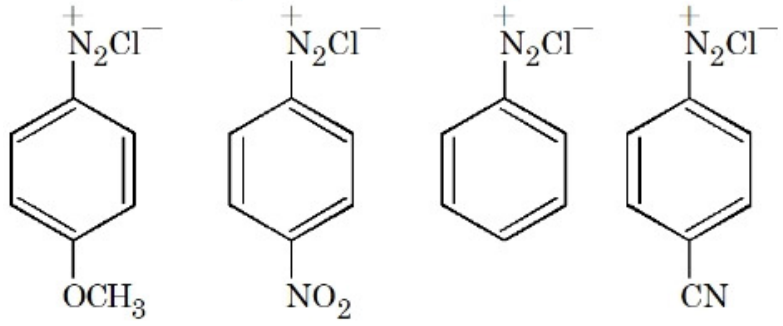
Q.51 Consider three metal chlorides x, y and z, where x is water soluble at room temperature, y is sparingly soluble in water at room temperature and z is soluble in hot water. x, y and z are respectively

Options

1. $AgCl$, Hg_2Cl_2 and $PbCl_2$
2. $MgCl_2$, $AgCl$ and $AlCl_3$
3. $CuCl_2$, $AgCl$ and $PbCl_2$
4. $AlCl_3$, $PbCl_2$ and $BaCl_2$

Question Type : **MCQ**
Question ID : **444792595**
Option 1 ID : **4447922034**
Option 2 ID : **4447922035**
Option 3 ID : **4447922033**
Option 4 ID : **4447922032**
Status : **Answered**
Chosen Option : **3**

Q.52 The correct stability order of the following diazonium salts is

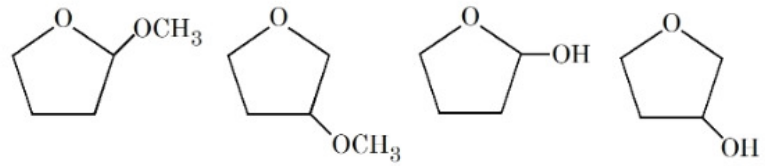


(A) (B) (C) (D)

Options
1. A > C > D > B
2. C > D > B > A
3. A > B > C > D
4. C > A > D > B

Question Type : **MCQ**
Question ID : **444792593**
Option 1 ID : **4447922025**
Option 2 ID : **4447922027**
Option 3 ID : **4447922024**
Option 4 ID : **4447922026**
Status : **Answered**
Chosen Option : **1**

Q.53 A student is given one compound among the following compounds that gives positive test with Tollen's reagent.



A B C D

The compound is :

Options
1. B
2. C
3. A
4. D

Question Type : **MCQ**
Question ID : **444792587**
Option 1 ID : **4447922001**
Option 2 ID : **4447922002**
Option 3 ID : **4447922000**
Option 4 ID : **4447922003**
Status : **Answered**
Chosen Option : **2**

Q.54 A solution is prepared by dissolving 0.3 g of a non-volatile non-electrolyte solute 'A' of molar mass 60 g mol^{-1} and 0.9 g of a non-volatile non-electrolyte solute 'B' of molar mass 180 g mol^{-1} in 100 mL H_2O at 27°C. Osmotic pressure of the solution will be
[Given: R = 0.082 L atm K^{-1} mol^{-1}]

Options
1. 0.82 atm
2. 1.47 atm
3. 2.46 atm
4. 1.23 atm

Question Type : **MCQ**
Question ID : **444792579**
Option 1 ID : **4447921968**
Option 2 ID : **4447921970**
Option 3 ID : **4447921971**
Option 4 ID : **4447921969**
Status : **Answered**
Chosen Option : **3**

Q.55 Given below are two statements:

Statement I: K > Mg > Al > B is the correct order in terms of metallic character.

Statement II: Atomic radius is always greater than the ionic radius for any element.

In the light of the above statements, choose the ***correct*** answer from the options given below

Options
1. Both Statement I and Statement II are false
2. Statement I is true but Statement II is false
3. Statement I is false but Statement II is true
4. Both Statement I and Statement II are true

Question Type : **MCQ**
Question ID : **444792583**
Option 1 ID : **4447921985**
Option 2 ID : **4447921986**
Option 3 ID : **4447921987**
Option 4 ID : **4447921984**
Status : **Marked For Review**
Chosen Option : **2**

Q.56 Given below are statements about some molecules/ions.

Identify the **CORRECT** statements.

A. The dipole moment value of NF_3 is higher than that of NH_3.
B. The dipole moment value of BeH_2 is zero.
C. The bond order of O_2^{2-} and F_2 is same.
D. The formal charge on the central oxygen atom of ozone is −1.
E. In NO_2, all the three atoms satisfy the octet rule, hence it is very stable.

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

Options
1. A, C & D Only
2. B & C Only
3. A, B, C, D & E
4. B, C & D Only

Question Type : **MCQ**
Question ID : **444792578**
Option 1 ID : **4447921967**
Option 2 ID : **4447921965**
Option 3 ID : **4447921964**
Option 4 ID : **4447921966**
Status : **Marked For Review**
Chosen Option : **2**

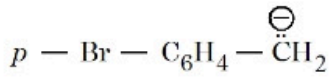
Q.57 Consider a mixture 'X' which is made by dissolving 0.4 mol of $[Co(NH_3)_5SO_4]Br$ and 0.4 mol of $[Co(NH_3)_5Br]SO_4$ in water to make 4 L of solution. When 2 L of mixture 'X' is allowed to react with excess of $AgNO_3$, it forms precipitate 'Y'. The rest 2 L of mixture 'X' reacts with excess $BaCl_2$ to form precipitate 'Z'. Which of the following statements is **CORRECT**?

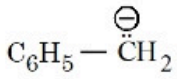
Options

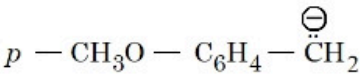
1. 0.1 mol of 'Y' is formed.
2. 'Y' is $BaSO_4$ and 'Z' is AgBr.
3. 0.4 mol of 'Z' is formed.
4. 0.2 mol of 'Z' is formed.

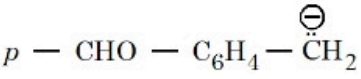
Question Type : **MCQ**
Question ID : **444792576**
Option 1 ID : **4447921957**
Option 2 ID : **4447921959**
Option 3 ID : **4447921956**
Option 4 ID : **4447921958**
Status : **Answered**
Chosen Option : **4**

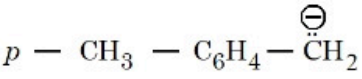
Q.58 Arrange the following carbanions in the decreasing order of stability.

I. 

II. 

III. 

IV. 

V. 

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

Options
1. IV > I > II > V > III
2. I >IV > II > V > III
3. IV > II > I > III > V
4. I > II > IV > V > III

Question Type : **MCQ**
Question ID : **444792588**
Option 1 ID : **4447922004**
Option 2 ID : **4447922006**
Option 3 ID : **4447922005**
Option 4 ID : **4447922007**
Status : **Marked For Review**
Chosen Option : **1**

Q.59 Among the following, the CORRECT combinations are

A. $IF_3 \rightarrow$ T–shaped (sp^3d)

B. $IF_5 \rightarrow$ Square pyramidal (sp^3d^2)

C. $IF_7 \rightarrow$ Pentagonal bipyramidal (sp^3d^3)

D. $ClO_4^- \rightarrow$ Square planar (sp^2d)

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

Options

1. A and B Only
2. B, C and D Only
3. A, B and C Only
4. A, B, C and D

Question Type : **MCQ**
Question ID : **444792584**
Option 1 ID : **4447921990**
Option 2 ID : **4447921989**
Option 3 ID : **4447921991**
Option 4 ID : **4447921988**
Status : **Answered**
Chosen Option : **3**

Q.60 'W' g of a non-volatile electrolyte solid solute of molar mass 'M' g mol^{-1} when dissolved in 100 mL water, decreases vapour pressure of water from 640 mm Hg to 600 mm Hg. If aqueous solution of the electrolyte boils at 375 K and K_b for water is 0.52 K kg mol^{-1}, then the mole fraction of the electrolyte solute (x_2) in the solution can be expressed as
(Given : density of water = 1 g/mL and boiling point of water = 373 K)

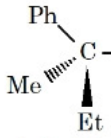
Options

1. $\frac{1\cdot3}{8}\times\frac{W}{M}$
2. $\frac{2\cdot6}{16}\times\frac{M}{W}$
3. $\frac{1\cdot3}{8}\times\frac{M}{W}$
4. $\frac{16}{2\cdot6}\times\frac{W}{M}$

Question Type : **MCQ**
Question ID : **444792580**
Option 1 ID : **4447921974**
Option 2 ID : **4447921973**
Option 3 ID : **4447921972**
Option 4 ID : **4447921975**
Status : **Answered**
Chosen Option : **1**

Q.61 Given below are two statements:

Statement I: 'C − Cl' bond is stronger in $CH_2 = CH - Cl$ than $CH_3 - CH_2 - Cl$

Statement II: The given optically active molecule,  on hydrolysis gives a solution that can rotate the plane polarized light.

In the light of the above statements, choose the ***correct*** answer from the options given below

Options
1. Both Statement I and Statement II are true
2. Statement I is true but Statement II is false
3. Statement I is false but Statement II is true
4. Both Statement I and Statement II are false

Question Type : **MCQ**
Question ID : **444792590**
Option 1 ID : **4447922012**
Option 2 ID : **4447922014**
Option 3 ID : **4447922015**
Option 4 ID : **4447922013**
Status : **Marked For Review**
Chosen Option : **2**

Q.62 Given below are two statements:

Statement I: The number of paramagnetic species among $[CoF_6]^{3-}$, $[TiF_6]^{3-}$, V_2O_5 and $[Fe(CN)_6]^{3-}$ is 3.

Statement II:
$K_4[Fe(CN)_6] < K_3[Fe(CN)_6] < [Fe(H_2O)_6]\ SO_4.H_2O < [Fe(H_2O)_6]Cl_3$ is the correct order in terms of number of unpaired electron(s) present in the complexes.

In the light of the above statements, choose the ***correct*** answer from the options given below

Options
1. Statement I is false but Statement II is true
2. Statement I is true but Statement II is false
3. Both Statement I and Statement II are false
4. Both Statement I and Statement II are true

Question Type : **MCQ**
Question ID : **444792586**
Option 1 ID : **4447921999**
Option 2 ID : **4447921998**
Option 3 ID : **4447921997**
Option 4 ID : **4447921996**
Status : **Answered**
Chosen Option : **4**

Q.63 $A \rightarrow D$ is an endothermic reaction occurring in three steps (elementary).

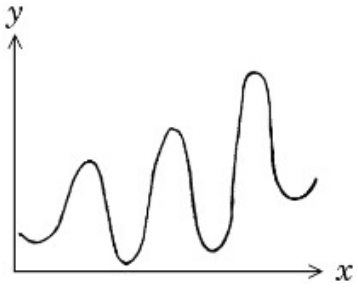
(i) $A \rightarrow B\ \Delta H_i = +ve$

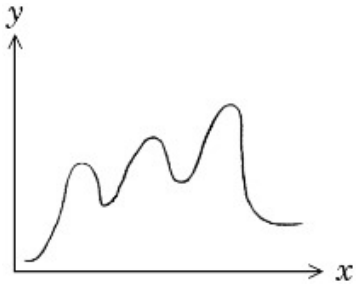
(ii) $B \rightarrow C\ \Delta H_{ii} = -ve$

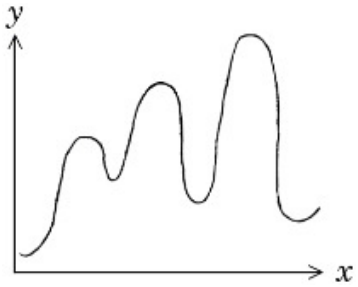
(iii) $C \rightarrow D\ \Delta H_{iii} = -ve$

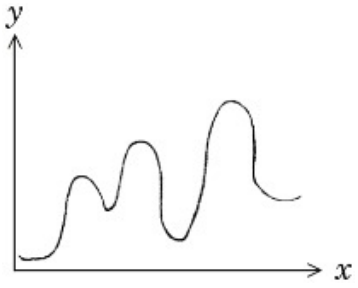
Which of the following graphs between potential energy (y-axis) vs reaction coordinate (x-axis) correctly represents the reaction profile of $A \rightarrow D$?

Options

1.


2.


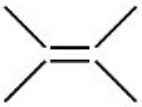
3.


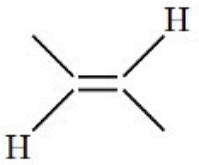
4.


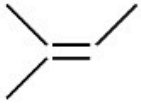
Question Type : **MCQ**
Question ID : **444792582**
Option 1 ID : **4447921982**
Option 2 ID : **4447921983**
Option 3 ID : **4447921981**
Option 4 ID : **4447921980**

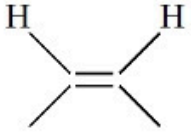
Status : **Answered**
Chosen Option : **3**

Q.64 Arrange the following alkenes in decreasing order of stability.

I. 

II. 

III. 

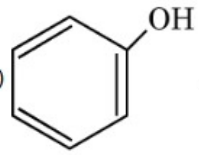
IV. 

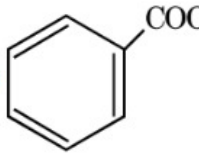
Choose the ***correct*** answer from the options given below:

Options
1. III > II > I > IV
2. I > III > IV > II
3. I > III > II > IV
4. III > I > II > IV

Question Type : **MCQ**
Question ID : **444792589**
Option 1 ID : **4447922008**
Option 2 ID : **4447922011**
Option 3 ID : **4447922010**
Option 4 ID : **4447922009**
Status : **Marked For Review**
Chosen Option : **3**

Q.65 Consider the following two reactions A and B.

(A)  $\xrightarrow{Na}$ Main Product + gas (x)

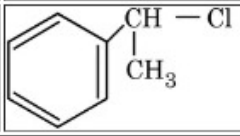
(B)  $\xrightarrow{NaHCO_3}$ Main Product + gas (y)

Numerical value of [molar mass of x + molar mass of y] is ____.

Options
1. 88
2. 160
3. 4
4. 46

Question Type : **MCQ**
Question ID : **444792592**
Option 1 ID : **4447922022**
Option 2 ID : **4447922021**
Option 3 ID : **4447922023**
Option 4 ID : **4447922020**
Status : **Answered**
Chosen Option : **4**

Q.66 Match the **LIST-I** with **LIST-II**

	List-I Chloro derivative		**List-II Example**
A.	Vinyl Chloride	I.	$CH_2 = CH - CH_2Cl$
B.	Benzyl Chloride	II.	$CH_3 - CH(Cl)CH_3$
C.	Alkyl Chloride	III.	$CH_2 = CHCl$
D.	Allyl Chloride	IV.	

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

Options

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

Question Type : **MCQ**
Question ID : **444792591**
Option 1 ID : **4447922019**
Option 2 ID : **4447922016**
Option 3 ID : **4447922017**
Option 4 ID : **4447922018**
Status : **Answered**
Chosen Option : **3**

Q.67 Given below are two statements:

Statement I: Hybridisation, shape and spin only magnetic moment of $K_3[Co(CO_3)_3]$ is sp^3d^2, octahedral and 4.9 BM respectively.

Statement II: Geometry, hybridisation and spin only magnetic moment values (BM) of the ions $[Ni(CN)_4]^{2-}$, $[MnBr_4]^{2-}$ and $[CoF_6]^{3-}$ respectively are square planar, tetrahedral, octahedral; dsp^2, sp^3, sp^3d^2 and 0, 5.9, 4.9.

In the light of the above statements, choose the ***correct*** answer from the options given below

Options
1. Statement I is false but Statement II is true
2. Both Statement I and Statement II are true
3. Both Statement I and Statement II are false
4. Statement I is true but Statement II is false

Question Type : **MCQ**
Question ID : **444792585**
Option 1 ID : **4447921995**
Option 2 ID : **4447921992**
Option 3 ID : **4447921993**
Option 4 ID : **4447921994**
Status : **Answered**
Chosen Option : **1**

Q.68 At 27 °C in presence of a catalyst, activation energy of a reaction is lowered by 10 kJ mol^{-1}. The logarithm of ratio of $\frac{k(catalysed)}{k(uncatalysed)}$ is....

(Consider that the frequency factor for both the reactions is same)

Options
1. 0.1741
2. 3.482
3. 17.41
4. 1.741

Question Type : **MCQ**
Question ID : **444792581**
Option 1 ID : **4447921976**
Option 2 ID : **4447921979**
Option 3 ID : **4447921978**
Option 4 ID : **4447921977**
Status : **Answered**
Chosen Option : **4**

Q.69 Match the **LIST-I** with **LIST-II**

List-I Isothermal process for ideal gas system		List-II Work done ($V_f > V_i$)	
A.	Reversible expansion	I.	$w = 0$
B.	Free expansion	II.	$w = -nRT\ln\frac{V_f}{V_i}$
C.	Irreversible expansion	III.	$w = -p_{ex}(V_f - V_i)$
D.	Irreversible compression	IV.	$w = -p_{ex}(V_i - V_f)$

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

Options
1. A-IV, B-II, C-III, D-I
2. A-IV, B-I, C-III, D-II
3. A-I, B-III, C-II, D-IV
4. A-II, B-I, C-III, D-IV

Question Type : **MCQ**
Question ID : **444792577**
Option 1 ID : **4447921960**
Option 2 ID : **4447921962**
Option 3 ID : **4447921963**
Option 4 ID : **4447921961**
Status : **Answered**
Chosen Option : **4**

Q.70 A hydroxy compound (X) with molar mass 122 g mol^{-1} is acetylated with acetic anhydride, using a large excess of the reagent ensuring complete acetylation of all hydroxyl groups. The product obtained has a molar mass of 290 g mol^{-1}. The number of hydroxyl groups present in compound (X) is:

Options
1. 3
2. 4
3. 5
4. 2

Question Type : **MCQ**
Question ID : **444792594**
Option 1 ID : **4447922028**
Option 2 ID : **4447922031**
Option 3 ID : **4447922029**
Option 4 ID : **4447922030**
Status : **Answered**
Chosen Option : **2**

Section : **Chemistry Section B**

Q.71

Electricity is passed through an acidic solution of Cu^{2+} till all the Cu^{2+} was exhausted, leading to the deposition of 300 mg of Cu metal. However, a current of 600 mA was continued to pass through the same solution for another 28 minutes by keeping the total volume of the solution fixed at 200 mL. The total volume of oxygen evolved at STP during the entire process is _____ mL. (Nearest integer)
[Given:
$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$ $E^o_{red} = +0.34\,V$

$O_2(g) + 4H^+ + 4e^- \rightarrow 2H_2O$ $E^o_{red} = +1.23\,V$

Molar mass of Cu = 63.54 g mol^{-1}

Molar mass of O_2 = 32 g mol^{-1}

Faraday Constant = 96500 C mol^{-1}

Molar volume at STP = 22.4 L]

Given --
Answer :

Question Type : **SA**
Question ID : **444792600**
Status : **Not Answered**

Q.72 The hydrogen spectrum consists of several spectral lines in Lyman series (L_1, L_2, L_3...; L_1 has lowest energy among Lyman series). Similarly it consists of several spectral lines in Balmer series (B_1, B_2, B_3 ... ; B_1 has lowest energy among Balmer lines). The energy of L_1 is x times the energy of B_1. The value of x is _____ $\times 10^{-1}$. (Nearest integer)

Given **54**
Answer :

Question Type : **SA**
Question ID : **444792598**
Status : **Answered**

Q.73 In Dumas method for estimation of nitrogen, 0.50 g of an organic compound gave 70 mL of nitrogen collected at 300 K and 715 mm pressure. The percentage of nitrogen in the organic compound is ____ %.
(Aqueous tension at 300 K is 15 mm).

Given **14**
Answer :

Question Type : **SA**
Question ID : **444792597**
Status : **Answered**

Q.74 Consider two Group IV metal ions X^{2+} and Y^{2+}.

A solution containing 0.01 M X^{2+} and 0.01 M Y^{2+} is saturated with H_2S. The pH at which the metal sulphide YS will form as a precipitate is _____. (Nearest integer)

(Given: K_{sp} (XS) = 1×10^{-22} at 25°C, K_{sp} (YS) = 4×10^{-16} at 25°C, $[H_2S]$ = 0.1M in solution, $K_{a1} \times K_{a2}$ (H_2S) = 1.0×10^{-21} , log 2 = 0.30, log 3 = 0.48, log 5 = 0.70)

Given --
Answer :

Question Type : **SA**
Question ID : **444792599**
Status : **Not Answered**

Q.75 X and Y are the number of electrons involved, respectively during the oxidation of I^- to I_2 and S^{2-} to S by acidified $K_2Cr_2O_7$. The value of X + Y is ____.

Given --
Answer :

Question Type : **SA**
Question ID : **444792596**
Status : **Not Answered**

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