National Testing Agency

Question Paper Name :	B Tech 30 Jan 2023 Shift 2
Subject Name :	B. Tech
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Maximum Duration :	0
Group Minimum Duration :	180
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300

Mathematics Section A

Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $a_1 = 1, a_2, a_3, a_4, \ \ldots\ldots$ be consecutive natural numbers.

Then $\tan^{-1}\left(\frac{1}{1+a_1a_2}\right) + \tan^{-1}\left(\frac{1}{1+a_2a_3}\right) + \ \ldots\ldots + \tan^{-1}\left(\frac{1}{1+a_{2021}a_{2022}}\right)$ is equal to :

Options :

A. $\frac{\pi}{4} - \cot^{-1}(2022)$

B. $\frac{\pi}{4} - \tan^{-1}(2022)$

C. $\cot^{-1}(2022) - \frac{\pi}{4}$

D. $\tan^{-1}(2022) - \frac{\pi}{4}$

Question Number : 2 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For $\alpha, \beta \in \mathbb{R}$, suppose the system of linear equations

$$x - y + z = 5$$
$$2x + 2y + \alpha z = 8$$
$$3x - y + 4z = \beta$$

has infinitely many solutions. Then α and β are the roots of :

Options :

A. $x^2 + 18x + 56 = 0$

B. $x^2 - 10x + 16 = 0$

C. $x^2 + 14x + 24 = 0$

D. $x^2 - 18x + 56 = 0$

Question Number : 3 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The number of ways of selecting two numbers a and $b, a \in \{2,4,6, \ldots ., 100\}$ and $b \in \{1,3,5, \ldots .., 99\}$ such that 2 is the remainder when $a + b$ is divided by 23 is :

Options :

A. 186

B. 54

C. 108

D. 268

Question Number : 4 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let S be the set of all values of a_1 for which the mean deviation about the mean of 100 consecutive positive integers $a_1, a_2, a_3, \ldots ., a_{100}$ is 25 . Then S is :

Options :

A. $\{9\}$

B. ϕ

C. $\{99\}$

D. N

Question Number : 5 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $a, b, c > 1, a^3, b^3$ and c^3 be in A.P., and $\log_a b, \log_c a$ and $\log_b c$ be in G.P. If the sum of first 20 terms of an A.P., whose first term is $\frac{a+4b+c}{3}$ and the common difference is $\frac{a-8b+c}{10}$ is -444, then abc is equal to :

Options :

A. 343

B. 216

C. $\frac{343}{8}$

D. $\frac{125}{8}$

Question Number : 6 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f, g and h be the real valued functions defined on $\mathbb{R}$ as

$$f(x) = \begin{cases} \frac{x}{|x|}, & x \neq 0 \\ 1, & x = 0 \end{cases}$$

$$g(x) = \begin{cases} \frac{\sin(x+1)}{(x+1)}, & x \neq -1 \\ 1, & x = -1 \end{cases}$$

and $h(x) = 2[x] - f(x)$, where $[x]$ is the greatest integer $\leq x$. Then the

value of $\lim\limits_{x \to 1} g(h(x-1))$ is :

Options :

A. 1

B. -1

C. $\sin(1)$

D. 0

Question Number : 7 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let q be the maximum integral value of p in [0,10] for which the roots of the equation $x^2 - px + \frac{5}{4}p = 0$ are rational. Then the area of the region $\left\{(x, y) : 0 \leq y \leq (x - q)^2, 0 \leq x \leq q\right\}$ is :

Options :

A. $\frac{125}{3}$

B. 243

C. 164

D. 25

Question Number : 8 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the functions $f(x) = \frac{x^3}{3} + 2bx + \frac{ax^2}{2}$

and $g(x) = \frac{x^3}{3} + ax + bx^2, a \neq 2b$

have a common extreme point, then $a + 2b + 7$ is equal to :

Options :

A. 6

B. $\frac{3}{2}$

C. 3

D. 4

Question Number : 9 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The parabolas : $ax^2 + 2bx + cy = 0$ and $dx^2 + 2ex + fy = 0$ intersect on the line $y = 1$. If a, b, c, d, e, f are positive real numbers and a, b, c are in G.P., then :

Options :

A. $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in A.P.

B. $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in G.P.

C. d, e, f are in A.P.

D. d, e, f are in G.P.

Question Number : 10 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a}$ and $\vec{b}$ be two vectors, Let $|\vec{a}| = 1, |\vec{b}| = 4$ and $\vec{a} \cdot \vec{b} = 2$. If $\vec{c} = (2\vec{a} \times \vec{b}) - 3\vec{b}$, then the value of $\vec{b} \cdot \vec{c}$ is :

Options :

A. -48

B. -60

C. -84

D. -24

Question Number : 11 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The range of the function $f(x) = \sqrt{3-x} + \sqrt{2+x}$ is :

Options :

A. $[2\sqrt{2}, \sqrt{11}]$

B. $[\sqrt{5}, \sqrt{13}]$

C. $[\sqrt{2}, \sqrt{7}]$

D. $[\sqrt{5}, \sqrt{10}]$

Question Number : 12 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The solution of the differential equation

$\frac{dy}{dx} = -\left(\frac{x^2+3y^2}{3x^2+y^2}\right), y(1) = 0$ is :

Options :

A. $\log_e|x+y| + \frac{xy}{(x+y)^2} = 0$

B. $\log_e|x+y| - \frac{xy}{(x+y)^2} = 0$

C. $\log_e|x+y| + \frac{2xy}{(x+y)^2} = 0$

D. $\log_e|x+y| - \frac{2xy}{(x+y)^2} = 0$

Question Number : 13 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $x = (8\sqrt{3} + 13)^{13}$ and $y = (7\sqrt{2} + 9)^{9}$. If $[t]$ denotes the greatest integer $\leq t$, then :

Options :

A. $[x]$ is odd but $[y]$ is even

B. $[x]$ and $[y]$ are both odd

C. $[x] + [y]$ is even

D. $[x]$ is even but $[y]$ is odd

Question Number : 14 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A vector $\vec{v}$ in the first octant is inclined to the x-axis at 60°, to the y-axis at 45 and to the z-axis at an acute angle. If a plane passing through the points $(\sqrt{2}, -1, 1)$ and (a, b, c), is normal to $\vec{v}$, then :

Options :

A. $a + b + \sqrt{2}\, c = 1$

B. $\sqrt{2}\, a + b + c = 1$

C. $\sqrt{2}\, a - b + c = 1$

D. $a + \sqrt{2}\, b + c = 1$

Question Number : 15 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If a plane passes through the points $(-1, k, 0), (2, k, -1), (1,1,2)$ and is parallel to the line $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{z+1}{-1}$, then the value of $\frac{k^2+1}{(k-1)(k-2)}$ is :

Options :

A. $\frac{17}{5}$

B. $\frac{6}{13}$

C. $\frac{13}{6}$

D. $\frac{5}{17}$

Question Number : 16 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$\lim_{n\to\infty}\frac{3}{n}\left\{4+\left(2+\frac{1}{n}\right)^2+\left(2+\frac{2}{n}\right)^2+\ \ldots\ +\left(3-\frac{1}{n}\right)^2\right\}$ is equal to :

Options :

A. 0

B. $\frac{19}{3}$

C. 19

D. 12

Question Number : 17 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements:

P : I have fever

Q: I will not take medicine

R : I will take rest.

The statement "If I have fever, then I will take medicine and I will take rest" is equivalent to :

Options :

A. $((\sim P)\vee\ \sim Q)\wedge((\sim P)\vee\ \sim R)$

B. $(P\vee\ \sim Q)\wedge(P\vee\ \sim R)$

C. $((\sim P)\vee\ \sim Q)\wedge((\sim P)\vee R)$

D. $(P\vee Q)\wedge((\sim P)\vee R)$

Question Number : 18 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let A be a point on the x-axis. Common tangents are drawn from A to the curves $x^2+y^2=8$ and $y^2=16x$. If one of these tangents touches the two curves at Q and R, then $(QR)^2$ is equal to :

Options :

A. 76

B. 81

C. 64

D. 72

Question Number : 19 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\lambda \in \mathbb{R}, \vec{a} = \lambda\hat{i} + 2\hat{j} - 3\hat{k}, \vec{b} = \hat{i} - \lambda\hat{j} + 2\hat{k}$.

If $((\vec{a} + \vec{b}) \times (\vec{a} \times \vec{b})) \times (\vec{a} - \vec{b}) = 8\hat{i} - 40\hat{j} - 24\hat{k}$,

then $|\lambda(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b})|^2$ is equal to :

Options :

A. 136

B. 140

C. 144

D. 132

Question Number : 20 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If P is a 3×3 real matrix such that $P^T = aP + (a-1)I$, where $a > 1$, then :

Options :

A. $|AdjP| = 1$

B. $|AdjP| > 1$

C. $|AdjP| = \frac{1}{2}$

D. P is a singular matrix

Mathematics Section B

Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $A = \{1,2,3,5,8,9\}$. Then the number of possible functions $f : A \to A$ such that $f(m \cdot n) = f(m) \cdot f(n)$ for every $m, n \in A$ with $m \cdot n \in A$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes

Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 22 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The number of seven digits odd numbers, that can be formed using all the

seven digits 1, 2, 2, 2, 3, 3, 5 is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 23 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let A be the area of the region

$\left\{(x, y): y \geq x^2, y \geq (1-x)^2, y \leq 2x(1-x)\right\}$.

Then 540 A is equal to :

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 24 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the value of real number $a > 0$ for which $x^2 - 5ax + 1 = 0$ and $x^2 - ax - 5 = 0$

have a common real root is $\frac{3}{\sqrt{2\beta}}$ then β is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 25 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $P(a_1, b_1)$ and $Q(a_2, b_2)$ be two distinct points on a circle with center $C(\sqrt{2}, \sqrt{3})$. Let O be the origin and OC be perpendicular to both CP and CQ. If the area of the triangle OCP is $\frac{\sqrt{35}}{2}$, then $a_1^2 + a_2^2 + b_1^2 + b_2^2$ is equal to :

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 26 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let a line L pass through the point $P(2,3,1)$ and be parallel to the line $x + 3y - 2z - 2 = 0 = x - y + 2z$. If the distance of L from the point $(5,3,8)$ is α, then $3\alpha^2$ is equal to :

Response Type : Numeric
Evaluation Required For SA : Yes

Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 27 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A bag contains six balls of different colours. Two balls are drawn in succession with replacement. The probability that both the balls are of the same colour is p. Next four balls are drawn in succession with replacement and the probability that exactly three balls are of the same colour is q. If $p : q = m : n$, where m and n are coprime, then $m + n$ is equal to :

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 28 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\int \sqrt{\sec 2x - 1}\ dx = \alpha \log_e \left| \cos 2x + \beta + \sqrt{\cos 2x \left(1 + \cos \frac{1}{\beta} x\right)} \right| +$ constant, then $\beta - \alpha$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 29 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

50^{th} root of a number x is 12 and 50^{th} root of another number y is 18 . Then the remainder obtained on dividing $(x + y)$ by 25 is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 30 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The 8^{th} common term of the series

$$S_1 = 3 + 7 + 11 + 15 + 19 + \ \ldots ..$$

$$S_2 = 1 + 6 + 11 + 16 + 21 + \ \ldots ..$$

is :

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Physics Section A

Section Number : 3
Section type : Online

Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 31 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A vehicle travels 4 km with speed of 3 km/h and another 4 km with speed of 5 km/h, then its average speed is

Options :

A. 3.75 km/h

B. 4.25 km/h

C. 3.50 km/h

D. 4.00 km/h

Question Number : 32 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

List I		**List II**	
A.	Torque	I.	$kgm^{-1}\,s^{-2}$
B.	Energy density	II.	$kg\,ms^{-1}$
C.	Pressure gradient	III.	$kg\,m^{-2}\,s^{-2}$
D.	Impulse	IV.	$kg\,m^{2}\,s^{-2}$

Choose the correct answer from the options given below:

Options :

A. A-IV, B-I, C-III, D-II

B. A-IV, B-I, C-II, D-III

C. A-I, B-IV, C-III, D-II

D. A-IV, B-III, C-I, D-II

Question Number : 33 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An object is allowed to fall from a height R above the earth, where R is the radius of earth. Its velocity when it strikes the earth's surface, ignoring air resistance, will be

Options :

A. $\sqrt{\frac{gR}{2}}$

B. $\sqrt{gR}$

C. $\sqrt{2gR}$

D. $2\sqrt{gR}$

Question Number : 34 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A force is applied to a steel wire 'A', rigidly clamped at one end. As a result elongation in the wire is 0.2 mm. If same force is applied to another steel wire ' B ' of double the length and a diameter 2.4 times that of the wire ' A ', the elongation in the wire ' B ' will be (wires having uniform circular cross sections)

Options :

A. 6.9×10^{-2} mm

B. 6.06×10^{-2} mm

C. 2.77×10^{-2} mm

D. 3.0×10^{-2} mm

Question Number : 35 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An electron accelerated through a potential difference V_1 has a de-Broglie wavelength of λ. When the potential is changed to V_2, its de-Broglie wavelength increases by 50%. The value of $\left(\frac{V_1}{V_2}\right)$ is equal to

Options :

A. $\frac{3}{2}$

B. 4

C. 3

D. $\frac{9}{4}$

Question Number : 36 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A machine gun of mass 10 kg fires 20 g bullets at the rate of 180 bullets per minute with a speed of 100 m s^{-1} each. The recoil velocity of the gun is

Options :

A. 0.02 m/s

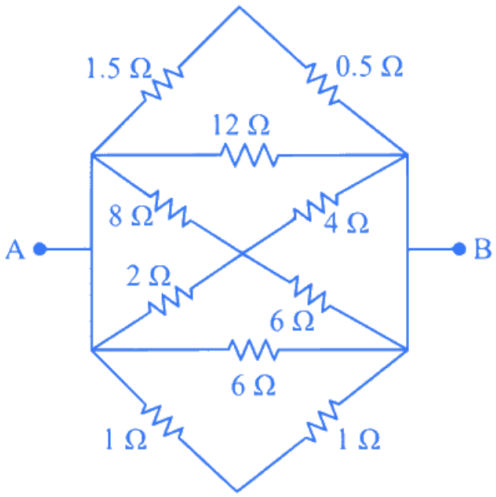
B. 1.5 m/s

C. 2.5 m/s

D. 0.6 m/s

Question Number : 37 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The equivalent resistance between *A* and *B* is _____.



Options :

A. $\frac{1}{2}\Omega$

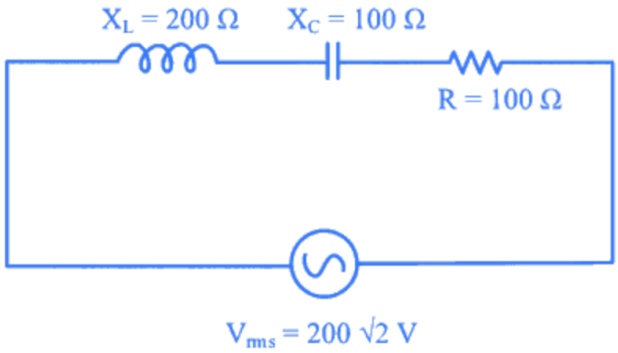
B. $\frac{2}{3}\Omega$

C. $\frac{3}{2}\Omega$

D. $\frac{1}{3}\Omega$

Question Number : 38 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the given circuit, rms value of current (I_{rms}) through the resistor R is:



Options :

A. $2\sqrt{2}$ A

B. 2 A

C. $\frac{1}{2}$ A

D. 20 A

Question Number : 39 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A thin prism P_1 with an angle 6° and made of glass of refractive index 1.54 is combined with another prism P_2 made from glass of refractive index 1.72 to produce dispersion without average deviation. The angle of prism P_2 is

Options :

A. 4.5°

B. 7.8°

C. 1.3°

D. 6°

Question Number : 40 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A point source of 100 W emits light with 5% efficiency. At a distance of 5 m from the source, the intensity produced by the electric field component is:

Options :

A. $\frac{1}{40\pi}\frac{W}{m^2}$

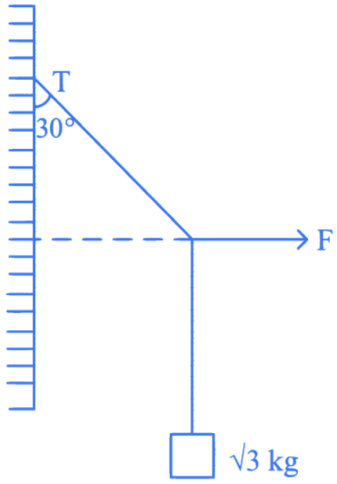
B. $\frac{1}{10\pi}\frac{W}{m^2}$

C. $\frac{1}{20\pi}\frac{W}{m^2}$

D. $\frac{1}{2\pi}\frac{W}{m^2}$

Question Number : 41 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A block of $\sqrt{3}$ kg is attached to a string whose other end is attached to the wall. An unknown force F is applied so that the string makes an angle of 30° with the wall. The tension T is: (Given g = 10 ms^{-2})



Options :

A. 15 N

B. 10 N

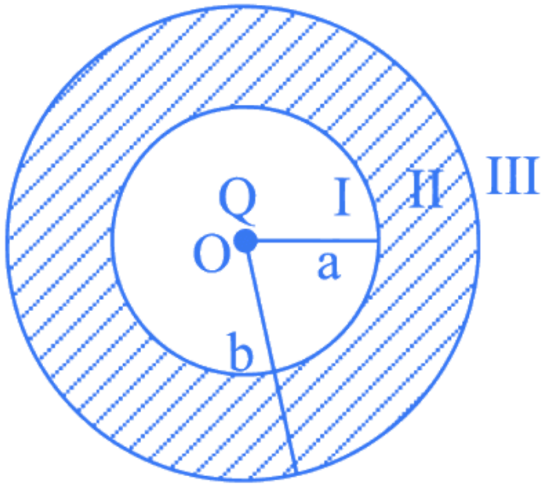
C. 25 N

D. 20 N

Question Number : 42 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

As shown in the figure, a point charge Q is placed at the centre of conducting spherical shell of inner radius a and outer radius b. The electric field due to charge Q in three different regions I, II and III is given by:

(I : $r < a$, II : $a < r < b$, III: $r > b$)



Options :

A. $E_I = 0, E_{II} = 0, E_{III} \neq 0$

B. $E_I \neq 0, E_{II} = 0, E_{III} = 0$

C. $E_I \neq 0, E_{II} = 0, E_{III} \neq 0$

D. $E_I = 0, E_{II} = 0, E_{III} = 0$

Question Number : 43 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A flask contains hydrogen and oxygen in the ratio of 2 : 1 by mass at temperature 27°C. The ratio of average kinetic energy per molecule of hydrogen and oxygen respectively is:

Options :

A. 1 : 1

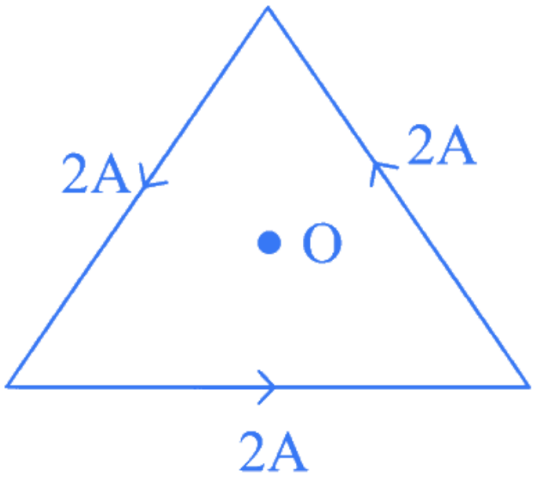
B. 4 : 1

C. 1 : 4

D. 2 : 1

Question Number : 44 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

As shown in the figure, a current of 2 A flowing in an equilateral triangle of side $4\sqrt{3}$ cm. The magnetic field at the centroid O of the triangle is



(Neglect the effect of earth's magnetic field)

Options :

A. $4\sqrt{3} \times 10^{-4}$ T

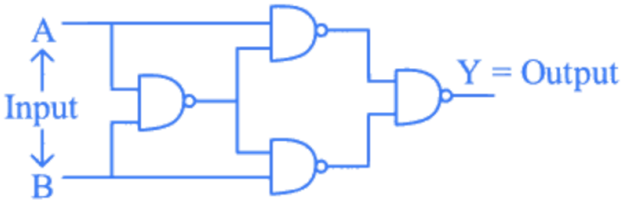
B. $4\sqrt{3} \times 10^{-5}$ T

C. $3\sqrt{3} \times 10^{-5}$ T

D. $\sqrt{3} \times 10^{-4}$ T

Question Number : 45 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The output Y for the inputs A and B of circuit is given by



Truth table of the shown circuit is:

Options :

A.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

B.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

C.

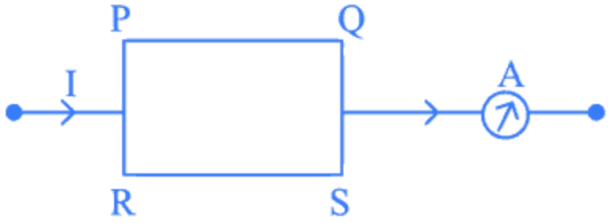
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

D.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

Question Number : 46 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A current carrying rectangular loop PQRS is made of uniform wire. The length $PR = QS = 5$ cm and $PQ = RS = 100$ cm. If ammeter current reading changes from I to $2I$, the ratio of magnetic forces per unit length on the wire PQ due to wire RS in the two cases respectively $\left(f_{PQ}^{I} : f_{PQ}^{2t}\right)$ is:



Options :

A. 1 : 4

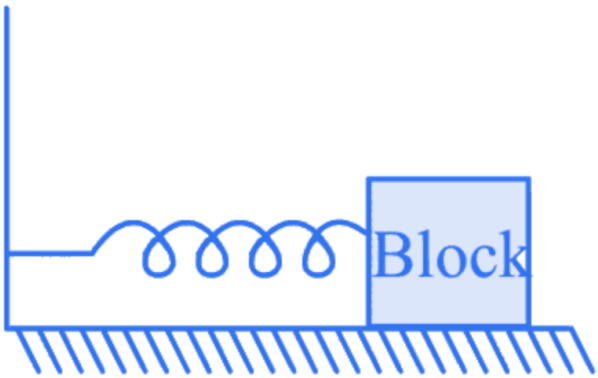
B. 1 : 3

C. $1:2$

D. $1:5$

Question Number : 47 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a simple harmonic motion in a mass spring system shown, the surface is frictionless. When the mass of the block is 1 kg, the angular frequency is ω_1. When the mass block is 2 kg the angular frequency is ω_2. The ratio ω_2/ω_1 is



Options :

A. $1/\sqrt{2}$

B. $1/2$

C. 2

D. $\sqrt{2}$

Question Number : 48 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

List I	**List II**
A. Attenuation	I. Combination of a receiver and transmitter.
B. Transducer	II. process of retrieval of information from the carrier wave at receiver
C. Demodulation	III. converts one form of energy into another
D. quad Repeater	IV. Loss of strength of a signal while propagating through a medium.

Choose the correct answer from the options given below:

Options :

A. A-I, B-II, C-III, D-IV

B. A-IV, B-III, C-I, D-II

C. A-IV, B-III, C-II, D-I

D. A-II, B-III, C-IV, D-I

Question Number : 49 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: The nuclear density of nuclides $^{10}_{5}$B, $^{6}_{3}$Li, $^{56}_{26}$Fe, $^{20}_{10}$Ne and $^{209}_{83}$Bi can be arranged as $\rho^{N}_{Bi} > \rho^{N}_{Fe} > \rho^{N}_{Ne} > \rho^{N}_{B} > \rho^{N}_{Li}$

Reason R: The radius R of nucleus is related to its mass number A as $R = R_0 A^{1/3}$, where R_0 is a constant.

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

Options :

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 false but **R** is true

D. **A** is true but **R** is false

Question Number : 50 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: Efficiency of a reversible heat engine will be highest at $-273°C$ temperature of cold reservoir.

Reason R: The efficiency of Carnot's engine depends not only on the temperature of the cold reservoir but it depends on the temperature of the hot reservoir too and is given as $\eta = \left(1 - \frac{T_2}{T_1}\right)$

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

Options :

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 false but **R** is true

D. A is true but **R** is false

Physics Section B

Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In an ac generator, a rectangular coil of 100 turns each having area 14×10^{-2} m^2 is rotated at 360 rev/min about an axis perpendicular to a uniform magnetic field of magnitude 3.0 T. The maximum value of the emf produced will be _____ V.

$\left(\text{Take } \pi = \frac{22}{7}\right)$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 52 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A faulty thermometer reads 5°C in melting ice and 95°C in stream. The correct temperature on absolute scale will be _____ K when the faulty thermometer reads 41°C.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

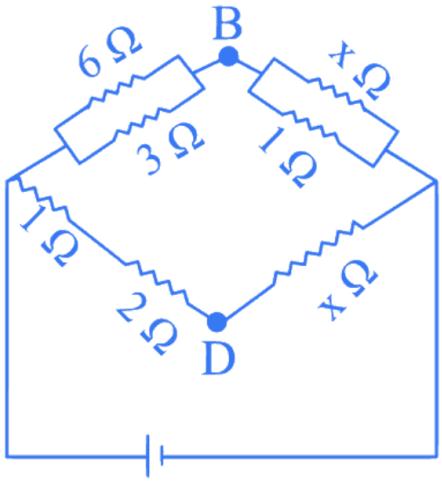
Question Number : 53 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In a Young's double slit experiment, the intensities at two points, for the path differences $\frac{\lambda}{4}$ and $\frac{\lambda}{3}$ (λ being the wavelength of light used) are I_1 and I_2 respectively. If I_0 denotes the intensity produced by each one of the individual slits, then $\frac{I_1 + I_2}{I_0} =$ _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 54 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

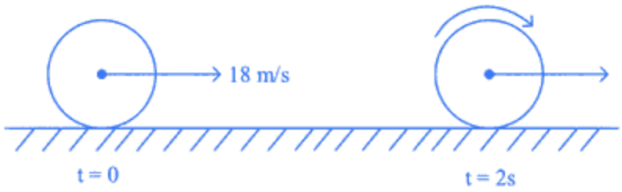
If the potential difference between B and D is zero, the value of x is $\frac{1}{n}\Omega$. The value of n is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 55 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A uniform disc of mass 0.5 kg and radius r is projected with velocity 18 m/s at t = 0 s on a rough horizontal surface. It starts off with a purely sliding motion at t = 0 s. After 2 s it acquires a purely rolling motion (see figure). The total kinetic energy of the disc after 2 s will be _____ J (given, coefficient of friction is 0.3 and $g = 10\ m/s^2$).



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 56 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The velocity of a particle executing SHM varies with displacement (x) as $4v^2 = 50 - x^2$. The time period of oscillations is $\frac{x}{7}s$. The value of x is _____. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 57 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A body of mass 2 kg is initially at rest. It starts moving unidirectionally under the influence of a source of constant power P. Its displacement in 4 s is $\frac{1}{3}\alpha^2\sqrt{P}\ m$. The value of α will be _____.

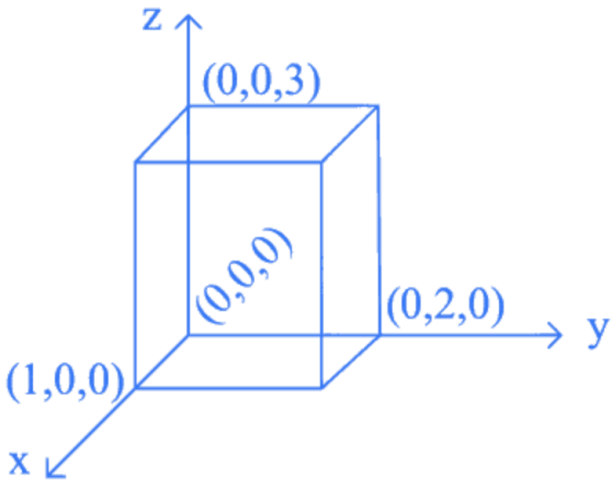
Response Type : Numeric

Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 58 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

As shown in figure, a cuboid lies in a region with electric field $E = 2x^2\hat{i} - 4y\hat{j} + 6\hat{k}$ N/C. The magnitude of charge within the cuboid is $n \in_0 C$.

The value of n is _____ (if dimension of cuboid is $1 \times 2 \times 3$ m^3)



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 59 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A stone tied to 180 cm long string at its end is making 28 revolutions in horizontal circle in every minute. The magnitude of acceleration of stone is $\frac{1936}{x} ms^{-2}$. The value of x _____. (Take $\pi = \frac{22}{7}$)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 60 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A radioactive nucleus decays by two different process. The half life of the first process is 5 minutes and that of the second process is 30 s. The effective half-life of the nucleus is calculated to be $\frac{\alpha}{11}$ s. The value of α is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Chemistry Section A

Section Number :

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 61 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Formulae for Nessler's reagent is :

Options :

A. $KHgI_3$

B. HgI_2

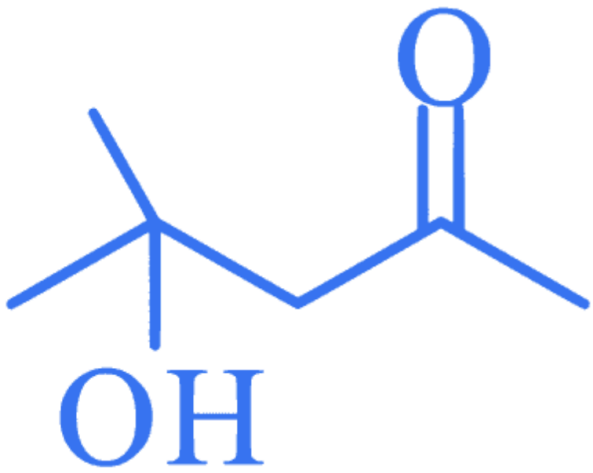
C. KHg_2I_2

D. K_2HgI_4

Question Number : 62 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A:



can be easily reduced using Zn − Hg/HCl to



Reason R : Zn − Hg/HCl is used to reduce carbonyl group to $-CH_2-$ group.

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

Options :

A. Both *A* and R are true and R is the correct explanation of A

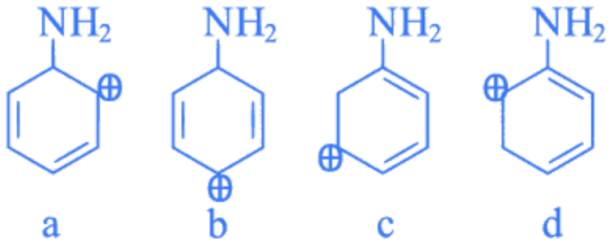
B. A is false but R is true

C. A is true but R is false

D. Both A and R are true but R is not the correct explanation of A

Question Number : 63 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The most stable carbocation for the following is:



Options :

A. b

B. d

C. c

D. a

Question Number : 64 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

List I (Complexes)		**List II (Hybridisation)**	
A.	$[Ni(CO)_4]$	I.	sp^3
B.	$[Cu(NH_3)_4]^{2+}$	II.	dsp^2
C.	$[Fe(NH_3)_6]^{2+}$	III.	sp^3d^2
D.	$[Fe(H_2O)_6]^{2+}$	IV.	d^2sp^3

Options :

A. A-I, B-II, C-III, D-IV

B. A-II, B-I, C-III, D-IV

C. A-I, B-II, C-IV, D-III

D. A-II, B-I, C-IV, D-III

Question Number : 65 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The $Cl - Co - Cl$ bond angle values in a fac- $[Co(NH_3)_3Cl_3]$ complex is/are :

Options :

A. 90° & 120°

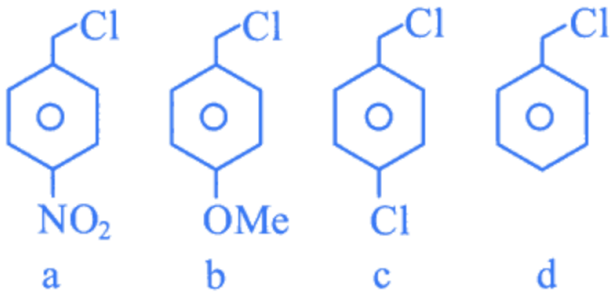
B. 90°

C. 180°

D. 90° & 180°

Question Number : 66 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Decreasing order towards SN 1 reaction for the following compounds is:



Options :

A. $a > c > d > b$

B. d > b > c > a

C. $a > b > c > d$

D. b > d > c > a

Question Number : 67 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$KMnO_4$ oxidises I^- in acidic and neutral/faintly alkaline solutions, respectively, to :

Options :

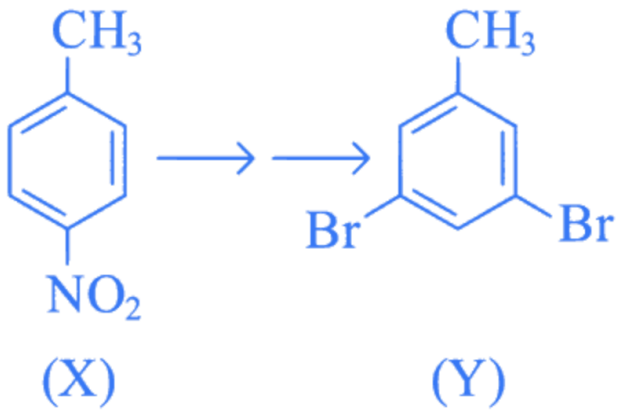
A. IO_3^- & IO_3^-

B. I_2 & I_2

C. I_2 & IO_3^-

D. IO_3^- & I_2

Question Number : 68 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical



(X) (Y)

In the above conversion of compound (X) to product (Y), the sequence of reagents to be used will be:

Options :

A. (i) Br_2, Fe (ii) Fe, H^+ (iii) $LiAlH_4$

B. (i) Br_2(aq) (ii) $LiAlH_4$ (iii) H_3O^+

C. (i) Fe, H^+ (ii) Br_2 (aq) (iii) HNO_2 (iv) H_3PO_2

D. (i) Fe, H^+ (ii) Br_2(aq) (iii) HNO_2 (iv) CuBr

Question Number : 69 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

List I (Mixture)		**List II (Separation Technique)**	
A.	$CHCl_3 + C_6H_5NH_2$	I.	Steam distillation
B.	$C_6H_{14} + C_5H_{12}$	II.	Differential extraction
C.	$C_6H_5NH_2 + H_2O$	III.	Distillation
D.	Organic compound in H_2O	IV.	Fractional distillation

Options :

A. A-III, B-I, C-IV, D-II

B. A-II, B-I, C-III, D-IV

C. A-IV, B-I, C-III, D-II

D. A-III, B-IV, C-I, D-II

Question Number : 70 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Maximum number of electrons that can be accommodated in shell with $n = 4$ are:

Options :

A. 50

B. 32

C. 72

D. 16

Question Number : 71 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Bond dissociation energy of "E-H" bond of the "H_2E " hydrides of group 16 elements (given below), follows order.

A. O

B. S

C. Se

D. Te

Choose the correct from the options given below:

Options :

A. A > B > C > D

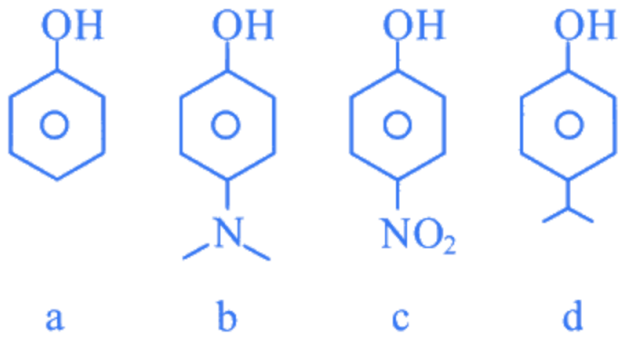
B. D > C > B > A

C. B > A > C > D

D. A > B > D > C

Question Number : 72 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The correct order of pK_a values for the following compounds is:



Options :

A. $a > b > c > d$

B. $c > a > d > b$

C. $b > d > a > c$

D. $b > a > d > c$

Question Number : 73 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

1 L, 0.02M solution of $\left[Co(NH_3)_5SO_4\right]Br$ is mixed with 1 L, 0.02M solution of $\left[Co(NH_3)_5Br\right]SO_4$. The resulting solution is divided into two equal parts (X) and treated with excess of $AgNO_3$ solution and $BaCl_2$ solution respectively as shown below:

1 L Solution (X) + $AgNO_3$ solution (excess) $\longrightarrow$ Y

1 L Solution (X) + $BaCl_2$ solution (excess) $\longrightarrow$ Z

The number of moles of Y and Z respectively are

Options :

A. 0.01,0.01

B. 0.01,0.02

C. 0.02,0.01

D. 0.02,0.02

Question Number : 74 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The wave function (Ψ) of 2 s is given by

$$\Psi_{2\,s} = \frac{1}{2\sqrt{2\pi}}\left(\frac{1}{a_0}\right)^{1/2}\left(2-\frac{r}{a_0}\right)e^{-r/2a_0}$$

At $r = r_0$, radial node is formed. Thus, r_0 in terms of a_0

Options :

A. $r_0 = a_0$

B. $r_0 = 4a_0$

C. $r_0 = 2a_0$

D. $r_0 = \frac{a_0}{2}$

Question Number : 75 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements:

Statement I: During Electrolytic refining, the pure metal is made to act as anode and its impure metallic form is used as cathode.

Statement II: During the Hall-Heroult electrolysis process, purified Al_2O_3 is mixed with Na_3AlF_6 to lower the melting point of the mixture.

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

Options :

A. Statement I is correct but Statement II is incorrect

B. Statement I is incorrect but Statement II is correct

C. Both Statement I and Statement II are incorrect

D. Both Statement I and Statement II are correct

Question Number : 76 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The water quality of a pond was analyzed and its BOD was found to be 4. The pond has :

Options :

A. Very clean water

B. Highly polluted water

C. Water has high amount of fluoride compounds

D. Slightly polluted water

Question Number : 77 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Chlorides of which metal are soluble in organic solvents :

Options :

A. K

B. Be

C. Ca

D. Mg

Question Number : 78 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following reaction is correct?

Options :

A. $4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 4NO_2 + O_2$

B. $2LiNO_3 \longrightarrow 2Li + 2NO_2 + O_2$

C. $4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 2\,N_2O_4 + O_2$

D. $2LiNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$

Question Number : 79 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: Antihistamines do not affect the secretion of acid in stomach.

Reason R : Antiallergic and antacid drugs work on different receptors.

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

Options :

A. A is false but *R* is true

B. Both A and R are true but R is not the correct explanation of A

C. Both A and R are true and R is the correct explanation of A

D. A is true but R is false

Question Number : 80 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Boric acid is solid, whereas BF_3 is gas at room temperature because of :

Options :

A. Strong van der Waal's interaction in Boric acid

B. Strong covalent bond in BF_3

C. Strong hydrogen bond in Boric acid

D. Strong ionic bond in Boric acid

Chemistry Section B

Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 81 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The strength of 50 volume solution of hydrogen peroxide is _____ g/L (Nearest integer).

Given:

Molar mass of H_2O_2 is 34 g mol^{-1}

Molar volume of gas at STP = 22.7 L

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

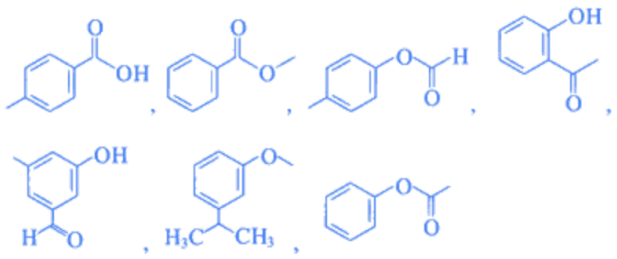
Question Number : 82 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A short peptide on complete hydrolysis produces 3 moles of glycine (G), two moles of leucine (L) and two moles of valine (V) per mole of peptide. The number of peptide linkages in it are _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 83 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Number of compounds from the following which will not dissolve in cold $NaHCO_3$ and NaOH solutions but will dissolve in hot NaOH solution is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 84 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An organic compound undergoes first-order decomposition. If the time taken for the 60% decomposition is 540 s, then the time required for 90% decomposition will be _____ s. (Nearest integer).

Given: $\ln 10 = 2.3; \log 2 = 0.3$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 85 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

1 mole of ideal gas is allowed to expand reversibly and adiabatically from a temperature of 27°C. The work done is 3 kJ mol^{-1}. The final temperature of the gas is _____ K (Nearest integer).

Given $C_V = 20\ J\ mol^{-1}\ K^{-1}$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 86 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The electrode potential of the following half cell at 298 K

$X\left|X^{2+}(0.001M)\right\|Y^{2+}(0.01M)\left|Y\right.$ is _____ $\times 10^{-2}$ V (Nearest integer)

Given: $E^0_{X^{2+}\,|\,X} = -2.36$ V

$E^0_{Y^{2+}\,|\,Y} = +0.36$ V

$\frac{2.303RT}{F} = 0.06$ V

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 87 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following equation:

$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g), \Delta H = -190$ kJ

The number of factors which will increase the yield of SO_3 at equilibrium from the following is _____.

A. Increasing temperature

B. Increasing pressure

C. Adding more SO_2

D. Adding more O_2

E. Addition of catalyst

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 88 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Lead storage battery contains 38% by weight solution of H_2SO_4. The van't Hoff factor is 2.67 at this concentration. The temperature in Kelvin at which the solution in the battery will freeze is _____. (Nearest integer).

Given $K_f = 1.8$ K kg mol^{-1}

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 89 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The graph of $\log \frac{x}{m}$ vs $\log p$ for an adsorption process is a straight line inclined at an angle of 45° with intercept equal to 0.6020. The mass of gas adsorbed per unit mass of adsorbent at the pressure of 0.4 atm is _____ $\times 10^{-1}$ (Nearest integer).

Given: $\log 2 = 0.3010$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 90 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Iron oxide FeO, crystallises in a cubic lattice with a unit cell edge length of 5.0 Å. If density of the FeO in the crystal is 4.0 g cm^{-3}, then the number of FeO units present per unit cell is _____. (Nearest integer)

Given: Molar mass of Fe and O is 56 and 16 g mol^{-1} respectively. $N_A = 6.0 \times 10^{23}$ mol^{-1}

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText