National Testing Agency

Question Paper Name :	B Tech 1 Feb 2023 Shift 1
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

The value of

$$\frac{1}{1!50!}+\frac{1}{3!48!}+\frac{1}{5!46!}+\ \ldots .+\frac{1}{49!2!}+\frac{1}{51!1!}$$

is :

Options :

A. $\frac{2^{51}}{50!}$

B. $\frac{2^{51}}{51!}$

C. $\frac{2^{50}}{50!}$

D. $\frac{2^{50}}{51!}$

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

Let S be the set of all solutions of the equation

$$\cos^{-1}(2x) - 2\cos^{-1}\left(\sqrt{1-x^2}\ \right) = \pi, x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$$

. Then

$$\sum_{x \in S} 2\sin^{-1}\left(x^2 - 1\right)$$

is equal to :

Options :

A. $$\pi - 2\sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$$

B. $$\pi - \sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$$

C. $$\frac{-2\pi}{3}$$

D. None

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

Let R be a relation on $\mathbb{R}$, given by

$$R = \{(a, b) : 3a - 3b + \sqrt{7}$$

is an irrational number $\}$. Then R is

Options :

A. an equivalence relation

B. reflexive and symmetric but not transitive

C. reflexive and transitive but not symmetric

D. reflexive but neither symmetric nor transitive

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

The shortest distance between the lines

$$\frac{x-5}{1}=\frac{y-2}{2}=\frac{z-4}{-3}$$

and

$$\frac{x+3}{1}=\frac{y+5}{4}=\frac{z-1}{-5}$$

is :

Options :

A. $7\sqrt{3}$

B. $5\sqrt{3}$

C. $4\sqrt{3}$

D. $6\sqrt{3}$

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 S denote the set of all real values of λ such that the system of equations

$$\lambda x+y+z=1$$
$$x+\lambda y+z=1$$
$$x+y+\lambda z=1$$

is inconsistent, then

$$\sum_{\lambda \in S}\left(|\lambda|^2+|\lambda|\right)$$

is equal to

Options :

A. 12

B. 2

C. 4

D. 6

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

$$S = \left\{ x : x \in \mathbb{R} \text{ and } (\sqrt{3} + \sqrt{2})^{x^2-4} + (\sqrt{3} - \sqrt{2})^{x^2-4} = 10 \right\}$$

. Then $n(S)$ is equal to

Options :

A. 6

B. 4

C. 0

D. 2

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

If the center and radius of the circle

$$\left| \frac{z-2}{z-3} \right| = 2$$

are respectively (α, β) and γ, then $3(\alpha + \beta + \gamma)$ is equal to :

Options :

A. 12

B. 10

C. 11

D. 9

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

The mean and variance of 5 observations are 5 and 8 respectively. If 3 observations are 1, 3, 5, then the sum of cubes of the remaining two observations is :

Options :

A. 1792

B. 1216

C. 1456

D. 1072

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

Let

$$f(x) = 2x + \tan^{-1}x$$

and

$$g(x) = \log_e(\sqrt{1+x^2} + x), x \in [0,3]$$

. Then

Options :

A. there exists $\hat{x} \in [0,3]$ such that

$$f'(\hat{x}) < g'(\hat{x})$$

B. there exist $0 < x_1 < x_2 < 3$ such that

$$f(x) < g(x), \forall x \in (x_1, x_2)$$

C. $$\min f'(x) = 1 + \max g'(x)$$

D. $$\max f(x) > \max g(x)$$

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

$$f(x) = \begin{vmatrix} 1+\sin^2 x & \cos^2 x & \sin 2x \\ \sin^2 x & 1+\cos^2 x & \sin 2x \\ \sin^2 x & \cos^2 x & 1+\sin 2x \end{vmatrix}, x \in \left[\frac{\pi}{6}, \frac{\pi}{3}\right]$$

. If α and β respectively are the maximum and the minimum values of f, then

Options :

A. $$\alpha^2 - \beta^2 = 4\sqrt{3}$$

B. $$\beta^2 - 2\sqrt{\alpha} = \frac{19}{4}$$

C. $$\beta^2 + 2\sqrt{\alpha} = \frac{19}{4}$$

D. $$\alpha^2 + \beta^2 = \frac{9}{2}$$

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 area enclosed by the closed curve C given by the differential equation

$$\frac{dy}{dx} + \frac{x+a}{y-2} = 0, y(1) = 0$$

is 4π.

Let P and Q be the points of intersection of the curve C and the y-axis. If normals at P and Q on the curve C intersect x-axis at points R and S respectively, then the length of the line segment RS is :

Options :

A. $\frac{4\sqrt{3}}{3}$

B. $2\sqrt{3}$

C. 2

D. $\frac{2\sqrt{3}}{3}$

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

If the orthocentre of the triangle, whose vertices are (1, 2), (2, 3) and (3, 1) is (α, β), then the quadratic equation whose roots are $\alpha + 4\beta$ and $4\alpha + \beta$, is :

Options :

A. $x^2 - 20x + 99 = 0$

B. $x^2 - 22x + 120 = 0$

C. $x^2 - 19x + 90 = 0$

D. $x^2 - 18x + 80 = 0$

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

If

$$y = y(x)$$

is the solution curve of the differential equation

$$\frac{dy}{dx} + y\tan x = x\sec x, 0 \le x \le \frac{\pi}{3}, y(0) = 1$$

, then

$$y\left(\frac{\pi}{6}\right)$$

is equal to

Options :

A. $$\frac{\pi}{12} - \frac{\sqrt{3}}{2}\log_e\left(\frac{2\sqrt{3}}{e}\right)$$

B. $$\frac{\pi}{12} + \frac{\sqrt{3}}{2}\log_e\left(\frac{2\sqrt{3}}{e}\right)$$

C. $$\frac{\pi}{12} + \frac{\sqrt{3}}{2}\log_e\left(\frac{2}{e\sqrt{3}}\right)$$

D. $$\frac{\pi}{12} - \frac{\sqrt{3}}{2}\log_e\left(\frac{2}{e\sqrt{3}}\right)$$

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

$$\lim_{n \to \infty}\left[\frac{1}{1+n} + \frac{1}{2+n} + \frac{1}{3+n} + \ldots + \frac{1}{2n}\right]$$

is equal to

Options :

A. 0

B. $$\log_e 2$$

C. $$\log_e\left(\frac{2}{3}\right)$$

D. $$\log_e\left(\frac{3}{2}\right)$$

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

The sum of 10 terms of the series

$$\frac{1}{1+1^2+1^4}+\frac{2}{1+2^2+2^4}+\frac{3}{1+3^2+3^4}+....$$

is

Options :

A. $\frac{58}{111}$

B. $\frac{56}{111}$

C. $\frac{55}{111}$

D. $\frac{59}{111}$

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

The combined equation of the two lines $ax+by+c=0$ and

$$a'x+b'y+c'=0$$

can be written as

$$(ax+by+c)(a'x+b'y+c')=0$$

.

The equation of the angle bisectors of the lines represented by the equation $2x^2+xy-3y^2=0$ is :

Options :

A. $3x^2+xy-2y^2=0$

B. $x^2-y^2-10xy=0$

C. $x^2-y^2+10xy=0$

D. $3x^2+5xy+2y^2=0$

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

In a binomial distribution $B(n, p)$, the sum and the product of the mean and the variance are 5 and 6 respectively, then $6(n+p-q)$ is equal to :

Options :

A. 52

B. 50

C. 51

D. 53

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

The negation of the expression $q \vee \left((\sim q) \wedge p \right)$ is equivalent to

Options :

A. $(\sim p) \wedge (\sim q)$

B. $(\sim p) \vee q$

C. $p \wedge (\sim q)$

D. $(\sim p) \vee (\sim q)$

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

For a triangle ABC, the value of $\cos 2A + \cos 2B + \cos 2C$ is least. If its inradius is 3 and incentre is M, then which of the following is NOT correct?

Options :

A. $\vec{MA} . \vec{MB} = -18$

B. $\sin 2A + \sin 2B + \sin 2C = \sin A + \sin B + \sin C$

C. perimeter of ΔABC is $18\sqrt{3}$

D. area of ΔABC is $\frac{27\sqrt{3}}{2}$

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

Let the image of the point $P(2,-1,3)$ in the plane $x+2y-z=0$ be Q.

Then the distance of the plane $3x+2y+z+29=0$ from the point Q is :

Options :

A. $2\sqrt{14}$

B. $\frac{22\sqrt{2}}{7}$

C. $\frac{24\sqrt{2}}{7}$

D. $3\sqrt{14}$

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

If

$$\int_0^1 \left(x^{21}+x^{14}+x^7\right)\left(2x^{14}+3x^7+6\right)^{1/7}dx=\frac{1}{l}(11)^{m/n}$$

where $l, m, n \in \mathbb{N}$, m and n are coprime then $l+m+n$ is equal to _____.

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

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

Let

$$a_1=8, a_2, a_3, \ \ldots\ , a_n$$

be an A.P. If the sum of its first four terms is 50 and the sum of its last four terms is 170 , then the product of its middle two terms 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 $f : \mathbb{R} \to \mathbb{R}$ be a differentiable function such that

$$f'(x) + f(x) = \int_0^2 f(t)dt$$

. If

$$f(0) = e^{-2}$$

, then $2f(0) - f(2)$ 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

The remainder, when $19^{200} + 23^{200}$ is divided by 49 , is _____.

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

The number of 3-digit numbers, that are divisible by either 2 or 3 but not divisible by 7, is _____.

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

The number of words, with or without meaning, that can be formed using all the letters of the word ASSASSINATION so that the vowels occur together, is _____.

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

Let A be the area bounded by the curve

$$y = x|x - 3|$$

, the x-axis and the ordinates $x = -1$ and $x = 2$. Then $12A$ 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

$A(2,6,2), B(-4,0,\lambda), C(2,3,-1)$ and $D(4,5,0), |\lambda| \leq 5$ are the vertices of a quadrilateral $ABCD$. If its area is 18 square units, then $5-6\lambda$ 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

If

$$f(x) = x^2 + g'(1)x + g''(2)$$

and

$$g(x) = f(1)x^2 + xf'(x) + f''(x)$$

, then the value of $f(4) - g(4)$ is equal to _____.

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

Let

$$\vec{v} = \alpha\hat{i} + 2\hat{j} - 3\hat{k}, \vec{w} = 2\alpha\hat{i} + \hat{j} - \hat{k}$$

and $\vec{u}$ be a vector such that

$$|\vec{u}| = \alpha > 0$$

. If the minimum value of the scalar triple product

$$\left[\vec{u} \quad \vec{v} \quad \vec{w}\right]$$

is $-\alpha\sqrt{3401}$, and

$$|\vec{u} \cdot \hat{i}|^2 = \frac{m}{n}$$

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

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

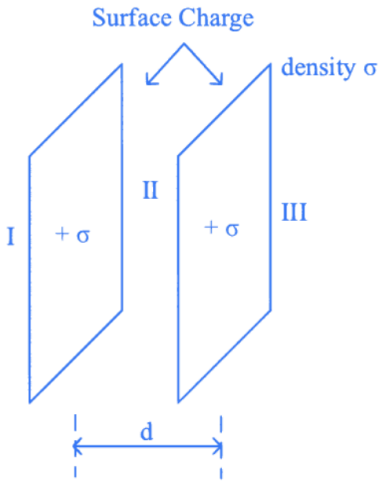
Physics Section A

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

Let σ be the uniform surface charge density of two infinite thin plane sheets shown in figure. Then the electric fields in three different region E_I, E_{II} and E_{III} are:



Options :

A. $\vec{E}_I = 0, \vec{E}_{II} = \frac{\sigma}{\epsilon_0}\hat{n}, E_{III} = 0$

B. $\vec{E}_I = \frac{\sigma}{2\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{\sigma}{2\epsilon_0}\hat{n}$

C. $\vec{E}_I = -\frac{\sigma}{\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{\sigma}{\epsilon_0}\hat{n}$

D. $\vec{E}_I = \frac{2\sigma}{\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{2\sigma}{\epsilon_0}\hat{n}$

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

'n' polarizing sheets are arranged such that each makes an angle 45° with the preceeding sheet. An unpolarized light of intensity I is incident into this arrangement. The output intensity is found to be $I/64$. The value of n will be:

Options :

A. 4

B. 5

C. 3

D. 6

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

Match List - I with List - II :

	List I		**List II**
A.	AC generator	I.	Presence of both L and C
B.	Transformer	II.	Electromagnetic Induction
C.	Resonance phenomenon to occur	III.	Quality factor
D.	Sharpness of resonance	IV.	Mutual Induction

Choose the correct answer from the options given below :

Options :

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

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

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

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

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

Match List I with List II:

	List I		**List II**
A.	Intrinsic semiconductor	I.	Fermi-level near the valence bond
B.	n-type semiconductor	II.	Fermi-level in the middle of valence and conduction band.
C.	p-type semiconductor	III.	Fermi-level near the conduction band
D.	Metals	IV.	Fermi-level inside the conduction band

Choose the correct answer from the options given below :

Options :

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

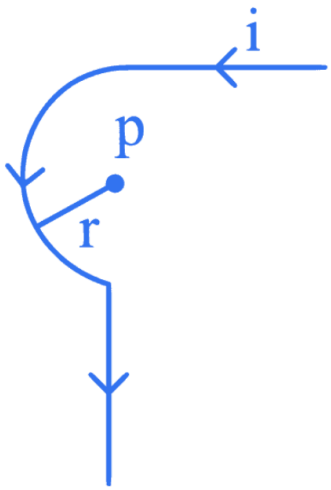
B. A-II, B-I, C-III, D-IV

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

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

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

Find the magnetic field at the point P in figure. The curved portion is a semicircle connected to two long straight wires.



Options :

A. $\frac{\mu_0 i}{2r}\left(\frac{1}{2}+\frac{1}{2\pi}\right)$

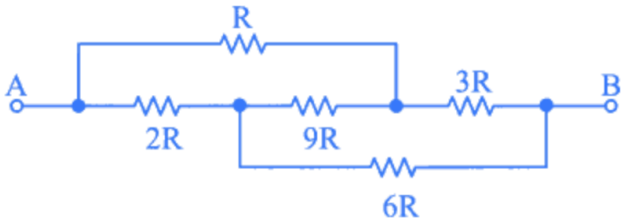
B. $\frac{\mu_0 i}{2r}\left(1+\frac{2}{\pi}\right)$

C. $\frac{\mu_0 i}{2r}\left(\frac{1}{2}+\frac{1}{\pi}\right)$

D. $\frac{\mu_0 i}{2r}\left(1+\frac{1}{\pi}\right)$

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

The equivalent resistance between *A* and *B* of the network shown in figure;



Options :

A. 21 R

B. $\frac{8}{3}$ R

C. $11\frac{2}{3}$ R

D. 14 R

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

If earth has a mass nine times and radius twice to that of a planet P. Then

$$\frac{v_e}{3}\sqrt{x} \text{ ms}^{-1}$$

will be the minimum velocity required by a rocket to pull out of gravitational force of P, where v_e is escape velocity on earth. The value of x is

Options :

A. 1

B. 3

C. 2

D. 18

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

A steel wire with mass per unit length 7.0×10^{-3} kg m^{-1} is under tension of 70 N. The speed of transverse waves in the wire will be:

Options :

A. 10 m/s

B. 50 m/s

C. 100 m/s

D. 200π m/s

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

An object moves with speed v_1, v_2 and v_3 along a line segment AB, BC and CD respectively as shown in figure. Where AB = BC and AD = 3AB, then average speed of the object will be:



Options :

A. $\frac{v_1 v_2 v_3}{3(v_1 v_2 + v_2 v_3 + v_3 v_1)}$

B. $\frac{(v_1 + v_2 + v_3)}{3}$

C. $\frac{(v_1 + v_2 + v_3)}{3v_1v_2v_3}$

D. $\frac{3v_1v_2v_3}{(v_1v_2 + v_2v_3 + v_3v_1)}$

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 child stands on the edge of the cliff 10 m above the ground and throws a stone horizontally with an initial speed of 5 ms^{-1}. Neglecting the air resistance, the speed with which the stone hits the ground will be ms^{-1} (given,

$$g = 10\ ms^{-2}$$

).

Options :

A. 20

B. 25

C. 30

D. 15

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 proton moving with one tenth of velocity of light has a certain de Broglie wavelength of λ. An alpha particle having certain kinetic energy has the same de-Brogle wavelength λ. The ratio of kinetic energy of proton and that of alpha particle is:

Options :

A. 1 : 4

B. 2 : 1

C. 4 : 1

D. 1 : 2

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

Given below are two statements:

Statement I: Acceleration due to gravity is different at different places on the surface of earth.

Statement II: Acceleration due to gravity increases as we go down below the earth's surface.

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

Options :

A. Both Statement I and Statement II are true

B. Both Statement I and Statement II are false

C. Statement I is false but Statement II is true

D. Statement I is true but Statement II is false

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 sample of gas at temperature T is adiabatically expanded to double its volume. The work done by the gas in the process is

$$\left(\text{given}, \gamma = \frac{3}{2}\right)$$

:

Options :

A. $W = TR[\sqrt{2} - 2]$

B. $W = \frac{T}{R}[\sqrt{2} - 2]$

C. $W = \frac{R}{T}[2 - \sqrt{2}\ ]$

D. $W = RT[2 - \sqrt{2}\ ]$

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

A block of mass 5 kg is placed at rest on a table of rough surface. Now, if a force of 30 N is applied in the direction parallel to surface of the table, the block slides through a distance of 50 m in an interval of time 10 s. Coefficient of kinetic friction is (given,

$$g = 10\ \text{ms}^{-2}$$

):

Options :

A. 0.25

B. 0.75

C. 0.60

D. 0.50

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

Match List I with List II :

	List I		**List II**
A.	Microwaves	I.	Radio active decay of the nucleus
B.	Gamma rays	II.	Rapid acceleration and deceleration of electron in aerials
C.	Radio waves	III.	Inner shell electrons
D.	X-rays	IV.	Klystron valve

Choose the correct answer from the options given below :

Options :

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

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

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

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

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

The mass of proton, neutron and helium nucleus are respectively 1.0073 u, 1.0087 u and 4.0015 u. The binding energy of helium nucleus is :

Options :

A. 28.4 MeV

B. 56.8 MeV

C. 7.1 MeV

D. 14.2 MeV

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

$$\left(P+\frac{a}{V^2}\right)(V-b)=RT$$

represents the equation of state of some gases. Where P is the pressure, V is the volume, T is the temperature and a, b, R are the constants. The physical quantity, which has dimensional formula as that of $\frac{b^2}{a}$, will be:

Options :

A. Energy density

B. Bulk modulus

C. Modulus of rigidity

D. Compressibility

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

The average kinetic energy of a molecule of the gas is

Options :

A. proportional to volume

B. dependent on the nature of the gas

C. proportional to absolute temperature

D. proportional to pressure

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

A mercury drop of radius 10^{-3} m is broken into 125 equal size droplets. Surface tension of mercury is $0.45\ \text{Nm}^{-1}$. The gain in surface energy is :

Options :

A. 28×10^{-5} J

B. 17.5×10^{-5} J

C. 5×10^{-5} J

D. 2.26×10^{-5} J

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

Which of the following frequencies does not belong to FM broadcast ?

Options :

A. 106 MHz

B. 89 MHz

C. 64 MHz

D. 99 MHz

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

Two equal positive point charges are separated by a distance $2a$. The distance of a point from the centre of the line joining two charges on the equatorial line (perpendicular bisector) at which force experienced by a test charge q_0 becomes maximum is

$$\frac{a}{\sqrt{x}}$$

. The value of x is _____.

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 charge particle of 2 μC accelerated by a potential difference of 100 V enters a region of uniform magnetic field of magnitude 4 mT at right angle to the direction of field. The charge particle completes semicircle of radius 3 cm inside magnetic field. The mass of the charge particle is _____ $\times 10^{-18}$ kg

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

A light of energy 12.75 eV is incident on a hydrogen atom in its ground state. The atom absorbs the radiation and reaches to one of its excited states. The angular momentum of the atom in the excited state is

$$\frac{x}{\pi} \times 10^{-17} \text{ eVs}$$

. The value of x is _____ (use

$$h = 4.14 \times 10^{-15} \text{ eVs}, c = 3 \times 10^{8} \text{ ms}^{-1}$$

).

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

A thin cylindrical rod of length 10 cm is placed horizontally on the principle axis of a concave mirror of focal length 20 cm. The rod is placed in a such a way that mid point of the rod is at 40 cm from the pole of mirror. The length of the image formed by the mirror will be

$$\frac{x}{3} \text{ cm}$$

. The value of x 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 small particle moves to position $5\hat{i} - 2\hat{j} + \hat{k}$ from its initial position $2\hat{i} + 3\hat{j} - 4\hat{k}$ under the action of force $5\hat{i} + 2\hat{j} + 7\hat{k}$ N. The value of work done will be _____ J.

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

A series LCR circuit is connected to an ac source of 220 V, 50 Hz. The circuit contain a resistance

$$\text{R} = 100\ \Omega$$

and an inductor of inductive reactance

$$\text{X}_\text{L} = 79.6\ \Omega$$

. The capacitance of the capacitor needed to maximize the average rate at which energy is supplied will be _____ μF.

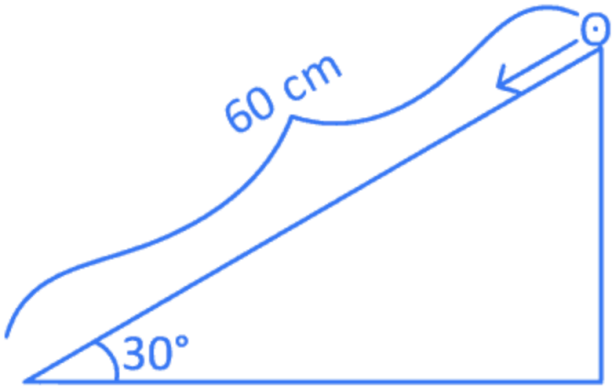
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

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

A solid cylinder is released from rest from the top of an inclined plane of inclination 30° and length 60 cm. If the cylinder rolls without slipping, its speed upon reaching the bottom of the inclined plane is _____ ms^{-1}. (Given

$$g = 10\ ms^{-2}$$

)



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

The amplitude of a particle executing SHM is 3 cm. The displacement at which its kinetic energy will be 25% more than the potential energy is: _____ cm

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 certain pressure 'P' is applied to 1 litre of water and 2 litre of a liquid separately. Water gets compressed to 0.01% whereas the liquid gets compressed to 0.03%. The ratio of Bulk modulus of water to that of the liquid is $\frac{3}{x}$. The value of x is _____.

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

In an experiment to find emf of a cell using potentiometer, the length of null point for a cell of emf 1.5 V is found to be 60 cm. If this cell is replaced by another cell of emf E, the length-of null point increases by 40 cm. The value of E is $\frac{x}{10}V$. The value of x is _____.

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

Chemistry Section A

Section Number :	5
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

Which of the following complex will show largest splitting of d-orbitals?

Options :

A. $[Fe(C_2O_4)_3]^{3-}$

B. $[Fe(CN)_6]^{3-}$

C. $[Fe(NH_3)_6]^{3+}$

D. $[FeF_6]^{3-}$

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

Which of the following are the example of double salt?

A. $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$

B. $CuSO_4 \cdot 4NH_3 \cdot H_2O$

C. $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$

D. $Fe(CN)_2 \cdot 4KCN$

Choose the correct answer :

Options :

A. A, B and D only

B. B and D only

C. A and B only

D. A and C only

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

Highest oxidation state of Mn is exhibited in Mn_2O_7. The correct statements about Mn_2O_7 are

(A) Mn is tetrahedrally surrounded by oxygen atoms.

(B) Mn is octahedrally surrounded by oxygen atoms.

(C) Contains Mn-O-Mn bridge.

(D) Contains Mn-Mn bond.

Choose the correct answer from the options given below :

Options :

A. A and C only

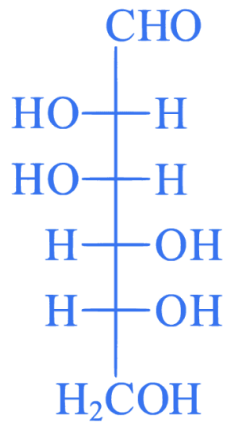
B. A and D only

C. B and C only

D. B and D only

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

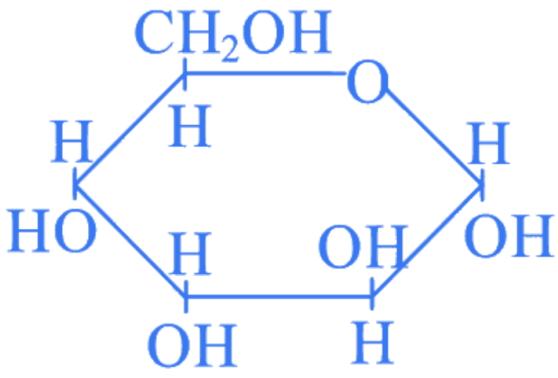
The correct representation in six membered pyranose form for the following sugar [X] is



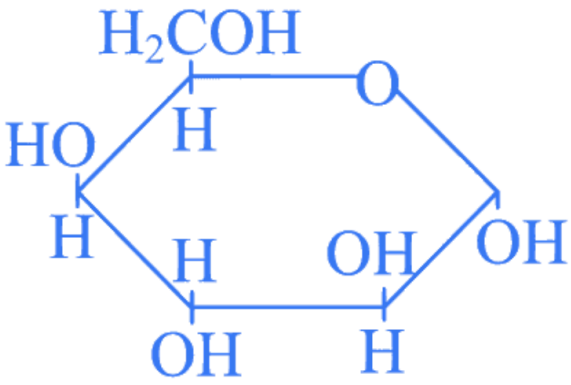
Sugar [X]

Options :

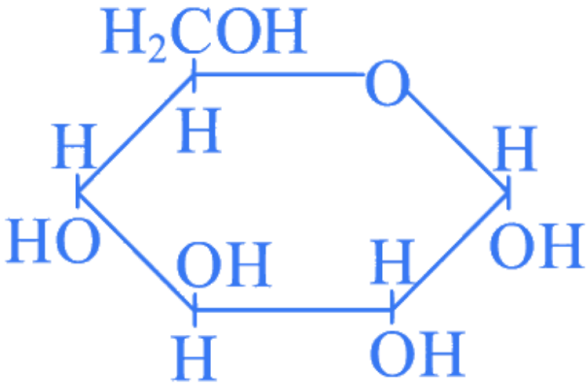
A.



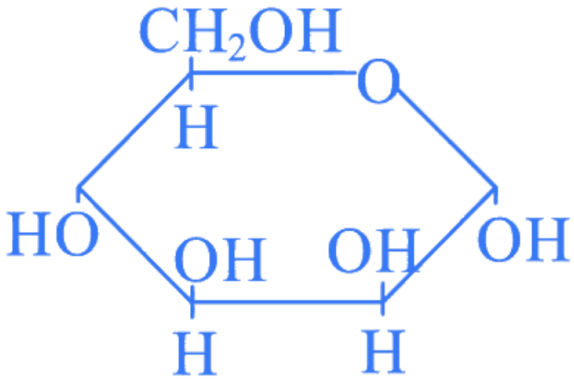
B.



C.

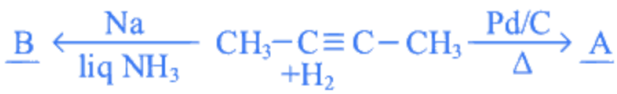


D.



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

But-2-yne is reacted separately with one mole of Hydrogen as shown below :



A. A is more soluble than B.

B. The boiling point & melting point of A are higher and lower than B respectively.

C. A is more polar than B because dipole moment of A is zero.

D. Br_2 adds easily to B than A.

Identify the **incorrect** statements from the options given below :

Options :

A. A and B only

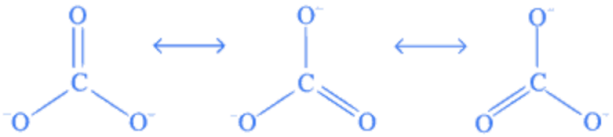
B. A, C & D only

C. B, C & D only

D. C and D only

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

Resonance in carbonate ion $\left(CO_3^{2-}\right)$ is



Which of the following is true?

Options :

A. It is possible to identify each structure individually by some physical or chemical method.

B. All these structures are in dynamic equilibrium with each other.

C. Each structure exists for equal amount of time.

D. CO_3^{2-} has a single structure i.e., resonance hybrid of the above three structures.

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

Match List I with List II

	List I		**List II**
	Test		Functional group / Class of Compound
A.	Molisch's Test	I.	Peptide
B.	Biuret Test	II.	Carbohydrate
C.	Carbylamine Test	III.	Primary amine
D.	Schiff's Test	IV.	Aldehyde

Choose the correct answer from the options given below :

Options :

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

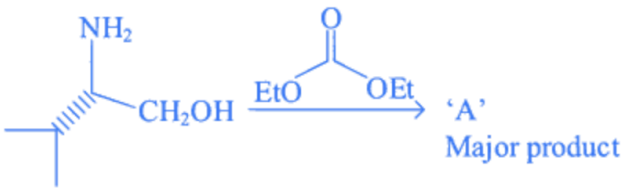
B. (A) - II, (B) - I, (C) - III, (D) - IV

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

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

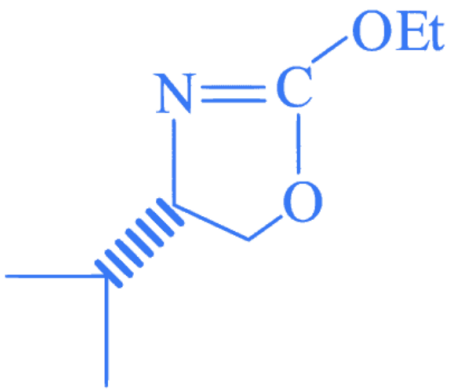
Question Number : 68 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the following reaction, 'A' is

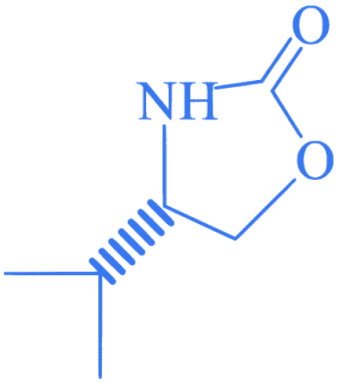


Options :

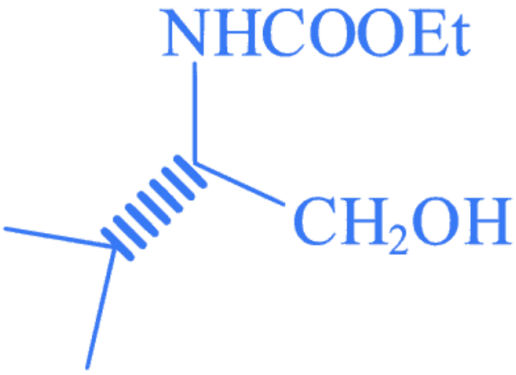
A.



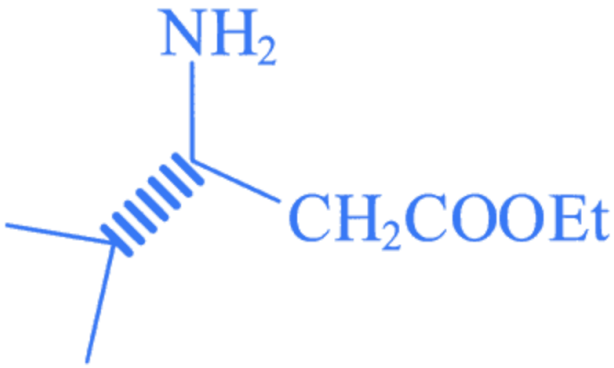
B.



C.



D.



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

A solution of $FeCl_3$ when treated with $K_4[Fe(CN)_6]$ gives a prussium blue precipitate due to the formation of :

Options :

A. $Fe[Fe(CN)_6]$

B. $Fe_4[Fe(CN)_6]_3$

C. $Fe_3[Fe(CN)_6]_2$

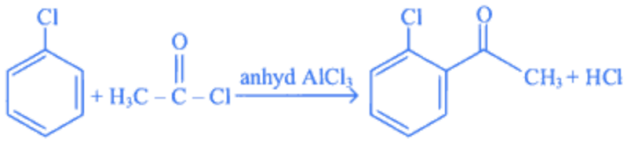
D. $K[Fe_2(CN)_6]$

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

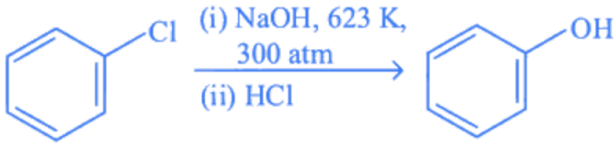
Identify the incorrect option from the following

Options :

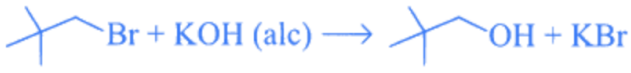
A.



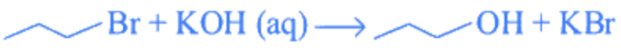
B.



C.

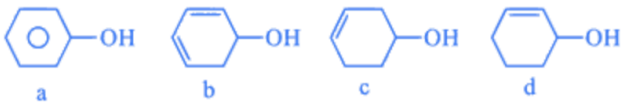


D.



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

Decreasing order of dehydration of the following alcohols is



Options :

A. $d > b > c > a$

B. $b > d > c > a$

C. $a > d > b > c$

D. $b > a > d > c$

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

How can photochemical smog be controlled?

Options :

A. By using catalytic convertors in the automobiles/industry.

B. By complete combustion of fuel.

C. By using tall chimneys.

D. By using catalyst.

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

Match List I with List II :

	List I		**List II**
A.	Slaked lime	I.	NaOH
B.	Dead burnt plaster	II.	$Ca(OH)_2$
C.	Caustic soda	III.	$Na_2CO_3 \cdot 10H_2O$
D.	Washing soda	IV.	$CaSO_4$

Choose the correct answer from the options given below :

Options :

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

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

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

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

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

Match List I with List II

	List I		**List II**
A.	Tranquilizers	I.	Anti blood clotting
B.	Aspirin	II.	Salvarsan
C.	Antibiotic	III.	antidepressant drugs
D.	Antiseptic	IV.	soframicine

Choose the correct answer from the options given below:

Options :

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

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

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

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

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: one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: In an Ellingham diagram, the oxidation of carbon to carbon monoxide shows a negative slope with respect to temperature.

Reason R: CO tends to get decomposed at higher temperature.

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

Options :

A. A is correct but R is not correct

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

C. A is not correct but R is correct

D. Both A and R are correct and R is the correct explanation of A

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

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

Assertion A : Hydrogen is an environment friendly fuel.

Reason R : Atomic number of hydrogen is 1 and it is a very light element.

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

Options :

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

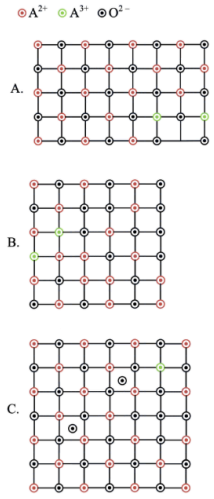
B. A is false but R is true

C. A is true but R is false

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

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

Which of the following represents the lattice structure of $A_{0.95}O$ containing A^{2+}, A^{3+} and O^{2-} ions?



Options :

A. B only

B. A and B only

C. A only

D. B and C only

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

Choose the correct statement(s) :

A. Beryllium oxide is purely acidic in nature.

B. Beryllium carbonate is kept in the atmosphere of CO_2.

C. Beryllium sulphate is readily soluble in water.

D. Beryllium shows anomalous behaviour.

Choose the correct answer from the options given below :

Options :

A. A only

B. B, C and D only

C. A, B and C only

D. A and B only

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:

Statement I : Chlorine can easily combine with oxygen to form oxides; and the product has a tendency to explode.

Statement II : Chemical reactivity of an element can be determined by its reaction with oxygen and halogens.

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

Options :

A. Statement I is true but Statement II is false

B. Both the Statements I and II are false

C. Statement I is false but Statement II is true

D. Both the Statements I and II are true

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

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

Assertion A: Amongst He, Ne, Ar and Kr; 1g of activated charcoal adsorbs more of Kr.

Reason R: The critical volume $V_c\left(cm^3\ mol^{-1}\right)$ and critical pressure P_c (atm) is highest for Krypton but the compressibility factor at critical point Z_c is lowest for Krypton.

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

D. A is true but R is false

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

25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M $AgNO_3$ solution when titrated using K_2CrO_4 as an indicator. What is the depression in freezing point of KCl solution of the given concentration? _____ (Nearest integer).

(Given :

$$K_f = 2.0\ K\ kg\ mol^{-1}$$

)

Assume 1) 100% ionization and 2) density of the aqueous solution as 1 g mL^{-1}

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

Electrons in a cathode ray tube have been emitted with a velocity of 1000 m s^{-1}. The number of following statements which is/are true about the emitted radiation is _____.

Given :

$$h = 6 \times 10^{-34} \text{ J s}, m_e = 9 \times 10^{-31} \text{ kg}$$

.

(A) The de-Broglie wavelength of the electron emitted is 666.67 nm.

(B) The characteristic of electrons emitted depend upon the material of the electrodes of the cathode ray tube.

(C) The cathode rays start from cathode and move towards anode.

(D) The nature of the emitted electrons depends on the nature of the gas present in cathode ray tube.

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

At what pH, given half cell $MnO_4^-(0.1\text{ M}) \mid Mn^{2+}(0.001\text{ M})$ will have electrode potential of 1.282 V? _____ (Nearest Integer)

Given

$$E^o_{MnO_4^-|Mn^{2+}} = 1.54 \text{ V}, \frac{2.303RT}{F} = 0.059\text{V}$$

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

A and B are two substances undergoing radioactive decay in a container. The half life of A is 15 min and that of B is 5 min. If the initial concentration of B is 4 times that of A and they both start decaying at the same time, how much time will it take for the concentration of both of them to be same? _____ min.

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

At 25°C, the enthalpy of the following processes are given :

$H_2(g) + O_2(g)$	→	2OH(g)	$\Delta H^\circ = 78\ kJ\ mol^{-1}$
$H_2(g) + \frac{1}{2}O_2(g)$	→	$H_2O(g)$	$\Delta H^\circ = -242\ kJ\ mol^{-1}$
$H_2(g)$	→	2H(g)	$\Delta H^\circ = 436\ kJ\ mol^{-1}$
$\frac{1}{2}O_2(g)$	→	O(g)	$\Delta H^\circ = 249\ kJ\ mol^{-1}$

What would be the value of X for the following reaction ? _____ (Nearest integer)

$$H_2O(g) \rightarrow H(g) + OH(g)\ \Delta H^\circ = X\ kJ\ mol^{-1}$$

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

Sum of oxidation states of bromine in bromic acid and perbromic acid is _____.

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

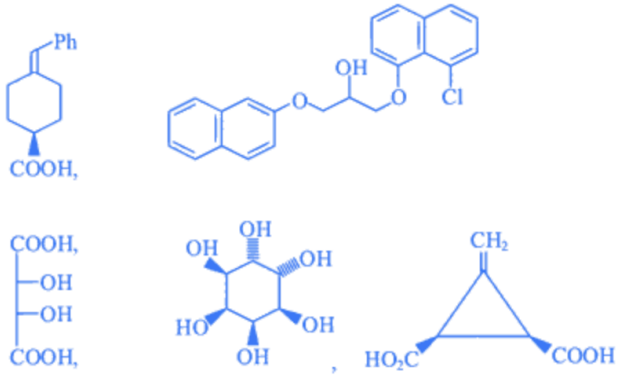
Question Number : 87 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Number of isomeric compounds with molecular formula $C_9H_{10}O$ which (i) do not dissolve in NaOH (ii) do not dissolve in HCl. (iii) do not give orange precipitate with 2,4-DNP (iv) on hydrogenation give identical compound with molecular formula $C_9H_{12}O$ is _____.

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

The total number of chiral compound/s from the following is _____.



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

(i)

$$X(g) \rightleftharpoons Y(g) + Z(g) \quad K_{p1} = 3$$

(ii)

$$A(g) \rightleftharpoons 2\,B(g) \quad K_{p2} = 1$$

If the degree of dissociation and initial concentration of both the reactants X(g) and A(g) are equal, then the ratio of the total pressure at equilibrium

$$\left(\frac{p_1}{p_2}\right)$$

is equal to x : 1. The value of x is _____ (Nearest integer)

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

The density of 3M solution of NaCl is 1.0 g mL^{-1}. Molality of the solution is _____ $\times 10^{-2}$ m. (Nearest integer).

Given: Molar mass of Na and Cl is 23 and 35.5 g mol^{-1} respectively.

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