National Testing Agency

Question Paper Name :	B Tech 30 Jan 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

Let the solution curve

$$y = y(x)$$

of the differential equation

$$\frac{dy}{dx} - \frac{3x^5\tan^{-1}(x^3)}{(1+x^6)^{3/2}}y = 2x\exp\left\{\frac{x^3 - \tan^{-1}x^3}{\sqrt{(1+x^6)}}\right\}$$ pass through the origin. Then $y(1)$ is equal to :

Options :

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

B. $$\exp\left(\frac{4-\pi}{4\sqrt{2}}\right)$$

C. $\exp\left(\frac{4+\pi}{4\sqrt{2}}\right)$

D. $\exp\left(\frac{\pi-4}{4\sqrt{2}}\right)$

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

The minimum number of elements that must be added to the relation

$$R = \{(a, b), (b, c)\}$$

on the set $\{a, b, c\}$ so that it becomes symmetric and transitive is :

Options :

A. 7

B. 3

C. 4

D. 5

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 the system of linear equations

$$x + y + kz = 2$$
$$2x + 3y - z = 1$$
$$3x + 4y + 2z = k$$

have infinitely many solutions. Then the system

$$(k+1)x + (2k-1)y = 7$$
$$(2k+1)x + (k+5)y = 10$$

has :

Options :

A. unique solution satisfying $x - y = 1$

B. infinitely many solutions

C. no solution

D. unique solution satisfying $x + y = 1$

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

If [t] denotes the greatest integer $\leq$ t, then the value of

$$\frac{3(e-1)}{e}\int_{1}^{2} x^2 e^{[x]+[x^3]}dx$$

is :

Options :

A. $e^8 - e$

B. $e^7 - 1$

C. $e^9 - e$

D. $e^8 - 1$

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

If the coefficient of x^{15} in the expansion of

$$\left(ax^3 + \frac{1}{bx^{1/3}}\right)^{15}$$

is equal to the coefficient of x^{-15} in the expansion of

$$\left(ax^{1/3} - \frac{1}{bx^3}\right)^{15}$$

, where a and b are positive real numbers, then for each such ordered pair (a, b) :

Options :

A. a = 3b

B. ab = 1

C. ab = 3

D. a = b

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

Suppose $f : \mathbb{R} \to (0, \infty)$ be a differentiable function such that

$$5f(x+y) = f(x) \cdot f(y), \forall x, y \in \mathbb{R}$$

. If

$$f(3) = 320$$

, then

$$\sum_{n=0}^{5} f(n)$$

is equal to :

Options :

A. 6875

B. 6525

C. 6575

D. 6825

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 solution of the equation

$$\log_{\cos x} \cot x + 4 \log_{\sin x} \tan x = 1, x \in \left(0, \frac{\pi}{2}\right)$$

, is

$$\sin^{-1}\left(\frac{\alpha + \sqrt{\beta}}{2}\right)$$

, where α, β are integers, then $\alpha + \beta$ is equal to :

Options :

A. 3

B. 6

C. 4

D. 5

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

$$\tan 15^\circ + \frac{1}{\tan 75^\circ} + \frac{1}{\tan 105^\circ} + \tan 195^\circ = 2a$$

, then the value of

$$\left(a + \frac{1}{a}\right)$$

is :

Options :

A. $5 - \frac{3}{2}\sqrt{3}$

B. $4 - 2\sqrt{3}$

C. 2

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

Let a unit vector $\hat{OP}$ make angles α, β, γ with the positive directions of the co-ordinate axes OX, OY, OZ respectively, where

$$\beta \in \left(0, \frac{\pi}{2}\right)$$

. If $\hat{OP}$ is perpendicular to the plane through points (1,2,3), (2,3,4) and (1,5,7), then which one of the following is true?

Options :

A. $\alpha \in \left(\frac{\pi}{2}, \pi\right)$ and $\gamma \in \left(\frac{\pi}{2}, \pi\right)$

B. $\alpha \in \left(0, \frac{\pi}{2}\right)$ and $\gamma \in \left(\frac{\pi}{2}, \pi\right)$

C. $\alpha \in \left(\frac{\pi}{2}, \pi\right)$ and $\gamma \in \left(0, \frac{\pi}{2}\right)$

$$\alpha \in \left(0, \frac{\pi}{2}\right)$$

and

D. $$\gamma \in \left(0, \frac{\pi}{2}\right)$$

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

If an unbiased die, marked with $-2, -1, 0, 1, 2, 3$ on its faces, is thrown five times, then the probability that the product of the outcomes is positive, is :

Options :

A. $\frac{27}{288}$

B. $\frac{521}{2592}$

C. $\frac{440}{2592}$

D. $\frac{881}{2592}$

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

Among the statements :

$$(S1)\ ((p \vee q) \Rightarrow r) \Leftrightarrow (p \Rightarrow r)$$

$$(S2)\ ((p \vee q) \Rightarrow r) \Leftrightarrow ((p \Rightarrow r) \vee (q \Rightarrow r))$$

Options :

A. only (S1) is a tautology

B. neither (S1) nor (S2) is a tautology

C. both (S1) and (S2) are tautologies

D. only (S2) is a tautology

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

$$a_n = \frac{-2}{4n^2 - 16n + 15}$$

, then $a_1 + a_2 + ... + a_{25}$ is equal to :

Options :

A. $\frac{51}{144}$

B. $\frac{49}{138}$

C. $\frac{50}{141}$

D. $\frac{52}{147}$

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

A straight line cuts off the intercepts

$$OA = a$$

and

$$OB = b$$

on the positive directions of x-axis and y axis respectively. If the perpendicular from origin O to this line makes an angle of $\frac{\pi}{6}$ with positive direction of y-axis and the area of $\triangle OAB$ is

$$\frac{98}{3}\sqrt{3}$$

, then $a^2 - b^2$ is equal to :

Options :

A. $\frac{392}{3}$

B. 98

C. 196

D. $\frac{196}{3}$

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

If P(h, k) be a point on the parabola $x = 4y^2$, which is nearest to the point Q(0,33), then the distance of P from the directrix of the parabola

$$y^2 = 4(x + y)$$

is equal to :

Options :

A. 8

B. 2

C. 6

D. 4

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 $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors and $\hat{n}$ is a unit vector perpendicular to $\vec{c}$ such that

$$\vec{a} = \alpha\vec{b} - \hat{n}, (\alpha \neq 0)$$

and

$$\vec{b} \cdot \vec{c} = 12$$

, then $\left|\vec{c} \times (\vec{a} \times \vec{b})\right|$ is equal to :

Options :

A. 15

B. 9

C. 6

D. 12

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 coefficient of x^{301} in $(1+x)^{500} + x(1+x)^{499} + x^2(1+x)^{498} + \ldots + x^{500}$ is :

Options :

A. $^{500}C_{300}$

B. $^{501}C_{200}$

C. $^{500}C_{301}$

D. $^{501}C_{302}$

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

Let

$$A = \begin{pmatrix} m & n \\ p & q \end{pmatrix}, d = |A| \neq 0$$

and

$$|A - d(AdjA)| = 0$$

. Then

Options :

A. $1 + d^2 = m^2 + q^2$

B. $1 + d^2 = (m + q)^2$

C. $(1 + d)^2 = m^2 + q^2$

D. $(1 + d)^2 = (m + q)^2$

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 line l_1 passes through the point (2, 6, 2) and is perpendicular to the plane $2x + y - 2z = 10$. Then the shortest distance between the line l_1 and the line

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

is :

Options :

A. 9

B. 7

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

D. $\frac{13}{3}$

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

The number of points on the curve

$$y = 54x^5 - 135x^4 - 70x^3 + 180x^2 + 210x$$

at which the normal lines are parallel to $x + 90y + 2 = 0$ is :

Options :

A. 2

B. 3

C. 4

D. 0

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

$$y = x + 2, 4y = 3x + 6$$

and $3y = 4x + 1$ be three tangent lines to the circle

$$(x - h)^2 + (y - k)^2 = r^2$$

. Then $h + k$ is equal to :

Options :

A. 6

B. $5\,(1 + \sqrt{2}\,)$

C. 5

D. $5\sqrt{2}$

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

$$\lim_{x \to 0} \frac{48}{x^4} \int_0^x \frac{t^3}{t^6 + 1}\, dt$$

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

Number of 4-digit numbers (the repetition of digits is allowed) which are made using the digits 1, 2, 3 and 5, and are divisible by 15, is equal to _____.

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 $z = 1 + i$ and

$$z_1 = \frac{1 + i\bar{z}}{\bar{z}(1 - z) + \frac{1}{z}}$$

. Then

$$\frac{12}{\pi}\arg(z_1)$$

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

Let α be the area of the larger region bounded by the curve $y^2 = 8x$ and the lines $y = x$ and $x = 2$, which lies in the first quadrant. Then the value of 3α 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

$$S = \{1,2,3,4,5,6\}$$

. Then the number of one-one functions $f : \mathrm{S} \to \mathrm{P(S)}$, where P(S) denote the power set of S, such that $f(n) \subset f(\mathrm{m})$ where $n < m$ 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

Let

$$f^1(x) = \frac{3x+2}{2x+3}, x \in \mathbf{R} - \left\{\frac{-3}{2}\right\}$$

For n $\geq$ 2, define

$$f^n(x) = f^1 o f^{n-1}(x)$$

. If

$$f^5(x) = \frac{ax+b}{bx+a}, \gcd(a,b) = 1$$

, then a + b 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

The mean and variance of 7 observations are 8 and 16 respectively. If one observation 14 is omitted and a and b are respectively mean and variance of remaining 6 observation, then a + 3b − 5 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

Let

$$\sum_{n=0}^{\infty} \frac{n^3((2n)!) + (2n-1)(n!)}{(n!)((2n)!)} = ae + \frac{b}{e} + c$$

, where a, b, c $\in \mathbb{Z}$ and

$$e = \sum_{n=0}^{\infty} \frac{1}{n!}$$

Then $a^2 - b + c$ 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 the equation of the plane passing through the point (1,1,2) and perpendicular to the line

$$x - 3y + 2z - 1 = 0 = 4x - y + z$$

is

$$Ax + By + Cz = 1$$

, then 140(C − B + A) 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

If $\lambda_1 < \lambda_2$ are two values of λ such that the angle between the planes

$$P_1 : \vec{r}(3\hat{i} - 5\hat{j} + \hat{k}) = 7$$

and

$$P_2 : \vec{r} \cdot (\lambda\hat{i} + \hat{j} - 3\hat{k}) = 9$$

is

$$\sin^{-1}\left(\frac{2\sqrt{6}}{5}\right)$$

, then the square of the length of perpendicular from the point $\left(38\lambda_1, 10\lambda_2, 2\right)$ to the plane P_1 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

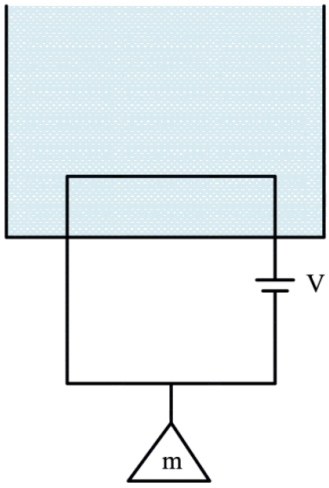
Question Number : 31 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A massless square loop, of wire of resistance 10Ω, supporting a mass of 1 g, hangs vertically with one of its sides in a uniform magnetic field of 10^3G, directed outwards in the shaded region. A dc voltage V is applied to the loop. For what value of V, the magnetic force will exactly balance the weight of the supporting mass of 1 g ?

(If sides of the loop

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

)



Options :

A. 1 V

B. $\frac{1}{10}$V

C. 10 V

D. 100 V

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

The height of liquid column raised in a capillary tube of certain radius when dipped in liquid A vertically is, 5 cm. If the tube is dipped in a similar manner in another liquid B of surface tension and density double the values of liquid A, the height of liquid column raised in liquid B would be _____ m.

Options :

A. 0.05

B. 0.20

C. 0.5

D. 0.10

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

A small object at rest, absorbs a light pulse of power 20 mW and duration 300 ns. Assuming speed of light as 3×10^8 m/s, the momentum of the object becomes equal to :

Options :

A. 1×10^{-17} kg m/s

B. 0.5×10^{-17} kg m/s

C. 3×10^{-17} kg m/s

D. 2×10^{-17} kg m/s

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

Choose the correct relationship between Poisson ratio (σ), bulk modulus (K) and modulus of rigidity (η) of a given solid object :

Options :

A. $\sigma = \frac{3K + 2\eta}{6K + 2\eta}$

B. $\sigma = \frac{3K - 2\eta}{6K + 2\eta}$

C. $\sigma = \frac{6K + 2\eta}{3K - 2\eta}$

D. $\sigma = \frac{6K - 2\eta}{3K - 2\eta}$

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

The pressure (P) and temperature (T) relationship of an ideal gas obeys the equation

$$PT^2 =$$

constant. The volume expansion coefficient of the gas will be :

Options :

A. $3T^2$

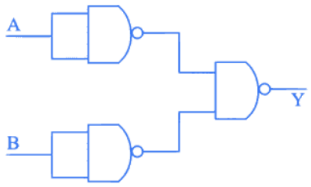
B. $\frac{3}{T^2}$

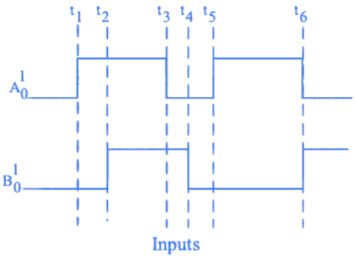
C. $\frac{3}{T^3}$

D. $\frac{3}{T}$

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

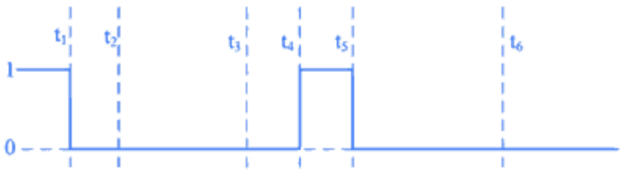
The output waveform of the given logical circuit for the following inputs A and B as shown below, is :



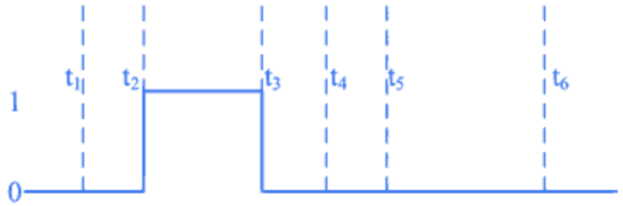


Options :

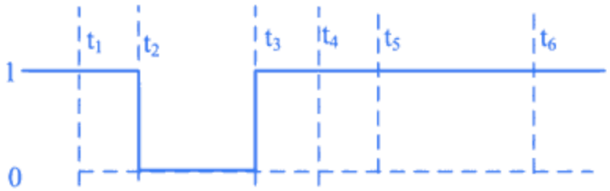
A.



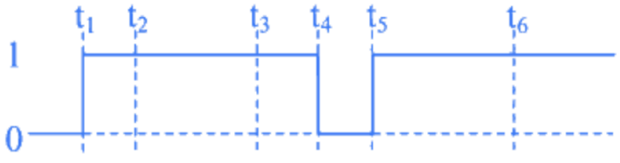
B.



C.



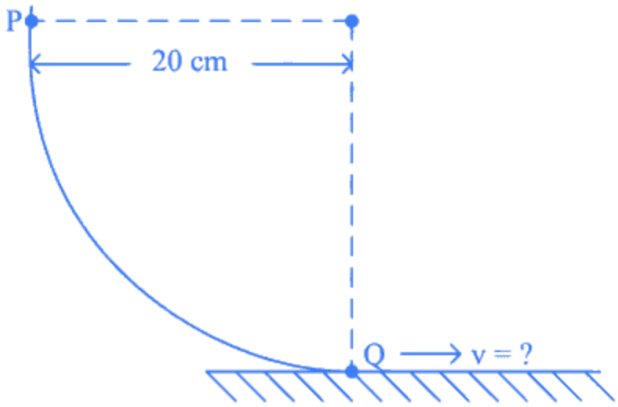
D.



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

As per the given figure, a small ball P slides down the quadrant of a circle and hits the other ball Q of equal mass which is initially at rest. Neglecting the effect of friction and assume the collision to be elastic, the velocity of ball Q after collision will be :

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



Options :

A. 0.25 m/s

B. 4 m/s

C. 0

D. 2 m/s

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

The charge flowing in a conductor changes with time as

$$Q(t) = \alpha t - \beta t^2 + \gamma t^3$$

. Where α, β and γ are constants. Minimum value of current is :

Options :

A. $\beta - \frac{\alpha^2}{3\gamma}$

B. $\alpha - \frac{3\beta^2}{\gamma}$

C. $\alpha - \frac{\beta^2}{3\gamma}$

D. $\alpha - \frac{\gamma^2}{3\beta}$

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

Heat is given to an ideal gas in an isothermal process.

A. Internal energy of the gas will decrease.

B. Internal energy of the gas will increase.

C. Internal energy of the gas will not change.

D. The gas will do positive work.

E. The gas will do negative work.

Choose the correct answer from the options given below :

Options :

A. B and D only

B. C and E only

C. A and E only

D. C and D only

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

Electric field in a certain region is given by $\vec{E} = \left(\frac{A}{x^2}\hat{i} + \frac{B}{y^3}\hat{j}\right)$. The SI unit of A and B are :

Options :

A. $Nm^2C; Nm^3C$

B. $Nm^3C^{-1}; Nm^2C^{-1}$

C. $Nm^3C; Nm^2C$

D. $Nm^2C^{-1}; Nm^3C^{-1}$

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

Two isolated metallic solid spheres of radii R and 2R are charged such that both have same charge density σ. The spheres are then connected by a thin conducting wire. If the new charge density of the bigger sphere is σ'. The ratio

$$\frac{\sigma'}{\sigma}$$

is :

Options :

A. $\frac{5}{3}$

B. $\frac{5}{6}$

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

D. $\frac{4}{3}$

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

Speed of an electron in Bohr's 7^{th} orbit for Hydrogen atom is 3.6×10^6 m/s. The corresponding speed of the electron in 3^{rd} orbit, in m/s is :

Options :

A. $\left(1.8 \times 10^6\right)$

B. $\left(7.5 \times 10^6\right)$

C. $\left(8.4 \times 10^6\right)$

D. $\left(3.6 \times 10^6\right)$

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

The magnetic moments associated with two closely wound circular coils A and B of radius

$$r_A = 10$$

cm and

$$r_B = 20 \text{ cm}$$

respectively are equal if : (Where N_A, I_A and N_B, I_B are number of turn and current of A and B respectively)

Options :

A. $4\,N_A I_A = N_B I_B$

B. $2\,N_A I_A = N_B I_B$

C. $N_A = 2\,N_B$

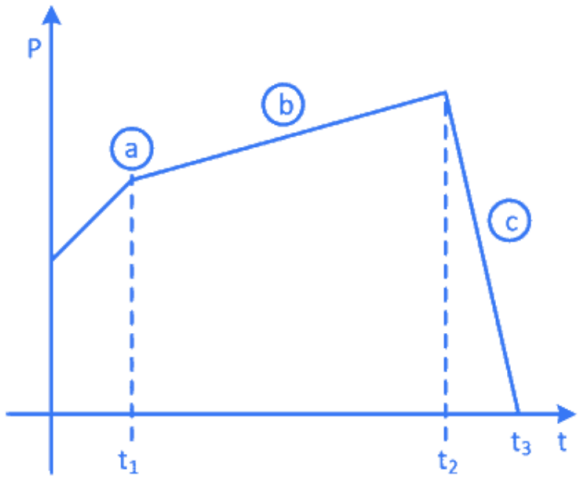
D. $N_A I_A = 4\,N_B I_B$

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

The figure represents the momentum time (p – t) curve for a particle moving along an axis under the influence of the force. Identify the regions on the graph where the magnitude of the force is maximum and minimum respectively?

If

$$(t_3 - t_2) < t_1$$



Options :

A. b and c

B. c and a

C. a and b

D. c and b

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

If the gravitational field in the space is given as

$$\left(-\frac{K}{r^2}\right)$$

. Taking the reference point to be at

$$r = 2\ cm$$

with gravitational potential

$$V = 10\ J/kg$$

. Find the gravitational potential at

$$r = 3\ cm$$

in SI unit (Given, that

$$K = 6\ Jcm/kg$$

)

Options :

A. 9

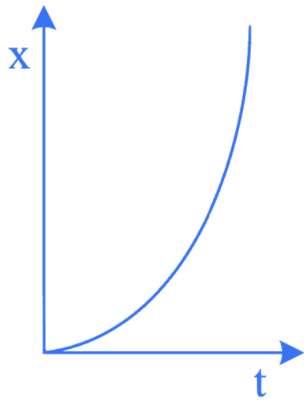
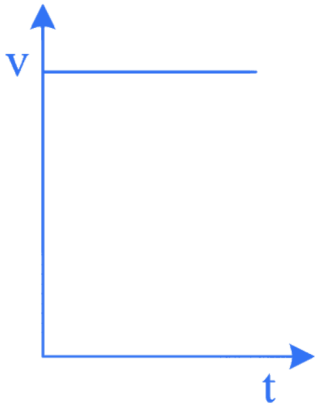
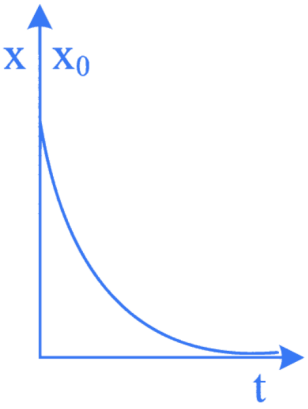
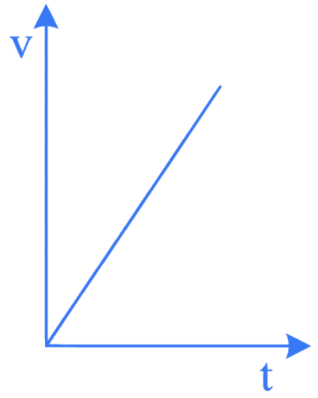
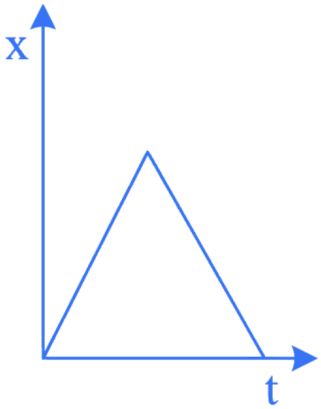
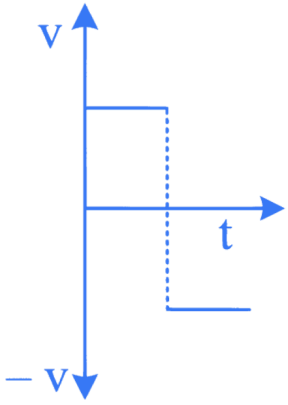
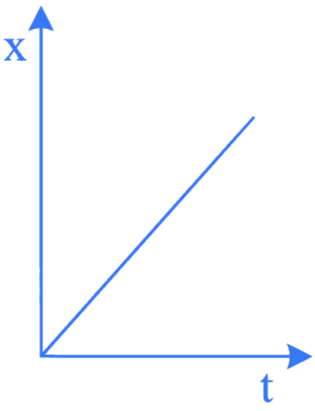
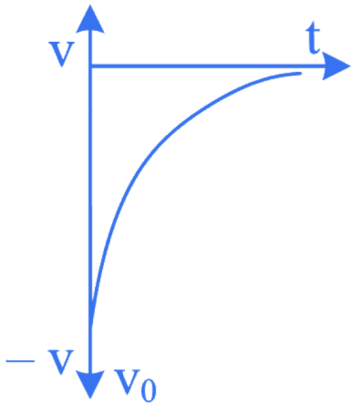
B. 11

C. 10

D. 12

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

Match Column-I with Column-II :

	Column-I (x-t graphs)		**Column-II (v-t graphs)**
A.		I.	
B.		II.	
C.		III.	
D.		IV.	

Choose the correct answer from the options given below:

Options :

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

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

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

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

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

A ball of mass 200 g rests on a vertical post of height 20 m. A bullet of mass 10 g, travelling in horizontal direction, hits the centre of the ball. After collision both travels independently. The ball hits the ground at a distance 30 m and the bullet at a distance of 120 m from the foot of the post. The value of initial velocity of the bullet will be (if

$$g = 10 \text{ m/s}^2$$

) :

Options :

A. 120 m/s

B. 360 m/s

C. 400 m/s

D. 60 m/s

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

A person has been using spectacles of power -1.0 dioptre for distant vision and a separate reading glass of power 2.0 dioptres. What is the least distance of distinct vision for this person :

Options :

A. 50 cm

B. 40 cm

C. 30 cm

D. 10 cm

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

In a series LR circuit with

$$X_L = R$$

, power factor P_1. If a capacitor of capacitance C with

$$X_C = X_L$$

is added to the circuit the power factor becomes P_2. The ratio of P_1 to P_2 will be :

Options :

A. $1 : \sqrt{2}$

B. 1 : 3

C. 1 : 2

D. 1 : 1

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

A sinusoidal carrier voltage is amplitude modulated. The resultant amplitude modulated wave has maximum and minimum amplitude of 120 V and 80 V respectively. The amplitude of each sideband is :

Options :

A. 15 V

B. 20 V

C. 5 V

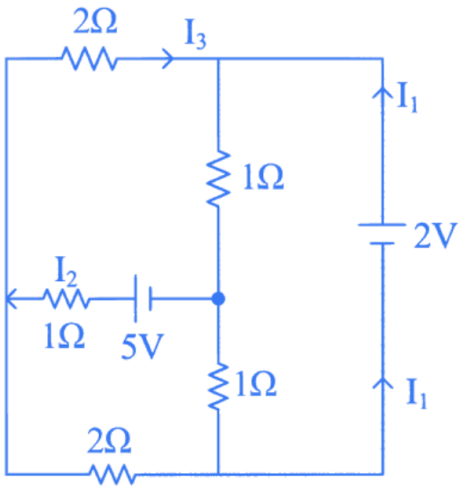
D. 10 V

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 the following circuit, the magnitude of current I_1, is _____ A.



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

In an experiment for estimating the value of focal length of converging mirror, image of an object placed at 40 cm from the pole of the mirror is formed at distance 120 cm from the pole of the mirror. These distances are measured with a modified scale in which there are 20 small divisions in 1 cm. The value of error in measurement of focal length of the mirror is

$$\frac{1}{K}\text{ cm}$$

. The value of K is _____.

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

The general displacement of a simple harmonic oscillator is

$$x = A\sin\omega t$$

. Let T be its time period. The slope of its potential energy (U) - time (t) curve will be maximum when

$$t = \frac{T}{\beta}$$

. The value of β is _____.

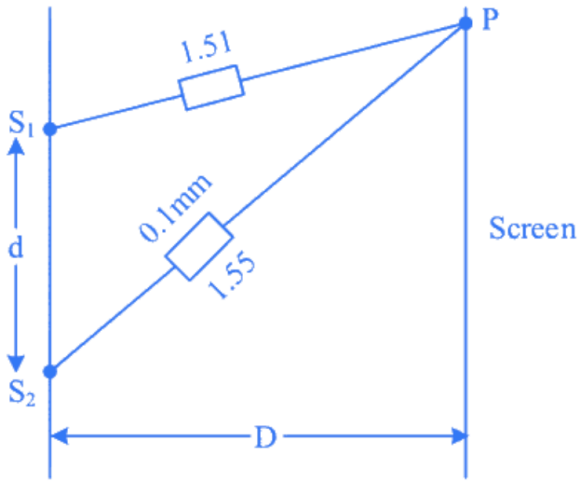
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

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

In Young's double slit experiment, two slits S_1 and S_2 are 'd' distance apart and the separation from slits to screen is D (as shown in figure). Now if two transparent slabs of equal thickness 0.1 mm but refractive index 1.51 and 1.55 are introduced in the path of beam

$$(\lambda = 4000 \overset{o}{\text{A}}$$

) from S_1 and S_2 respectively. The central bright fringe spot will shift by _____ number of fringes.



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 thin uniform rod of length 2 m, cross sectional area 'A' and density 'd' is rotated about an axis passing through the centre and perpendicular to its length with angular velocity ω. If value of ω in terms of its rotational kinetic energy E is

$$\sqrt{\frac{\alpha E}{Ad}}$$

then value of α is _____.

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 horse rider covers half the distance with 5 m/s speed. The remaining part of the distance was travelled with speed 10 m/s for half the time and with speed 15 m/s for other half of the time. The mean speed of the rider averaged over the whole time of motion is

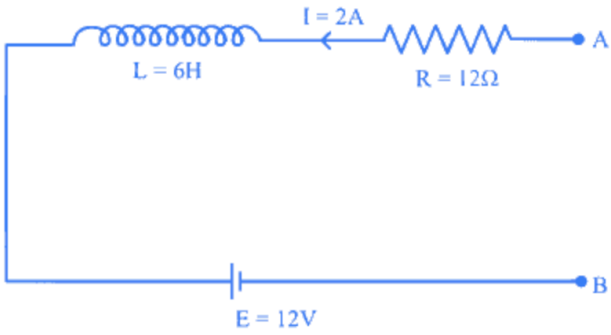
$$\frac{x}{7} \text{ m/s}$$

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



As per the given figure, if

$$\frac{dI}{dt} = -1\ A/s$$

then the value of V_{AB} at this instant will be _____ V.

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

In a screw gauge, there are 100 divisions on the circular scale and the main scale moves by 0.5 mm on a complete rotation of the circular scale. The zero of circular scale lies 6 divisions below the line of graduation when two studs are brought in contact with each other. When a wire is placed between the studs, 4 linear scale divisions are clearly visible while 46^{th} division the circular scale coincide with the reference line. The diameter of the wire is _____ $\times 10^{-2}$ mm.

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 point source of light is placed at the centre of curvature of a hemispherical surface. The source emits a power of 24 W. The radius of curvature of hemisphere is 10 cm and the inner surface is completely reflecting. The force on the hemisphere due to the light falling on it is _____ $\times\ 10^{-8}$ N.

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 capacitor of capacitance 900μF is charged by a 100 V battery. The capacitor is disconnected from the battery and connected to another uncharged identical capacitor such that one plate of uncharged capacitor connected to positive plate and another plate of uncharged capacitor connected to negative plate of the charged capacitor. The loss of energy in this process is measured as $x \times 10^{-2}$ J. 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

To inhibit the growth of tumours, identify the compounds used from the following :

A. EDTA

B. Coordination Compounds of Pt

C. D - Penicillamine

D. Cis - Platin

Choose the correct answer from the option given below :

Options :

A. A and B Only

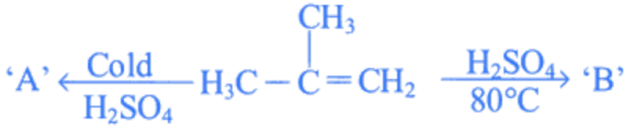
B. C and D Only

C. B and D Only

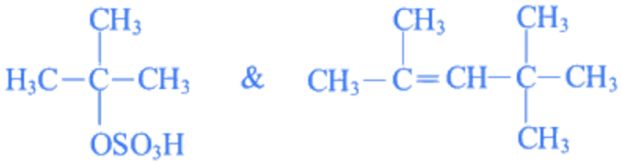
D. A and C Only

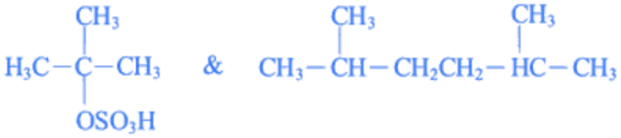
Question Number : 62 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

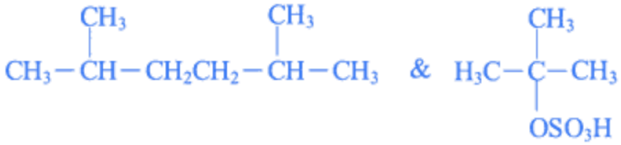
The major products 'A' and 'B', respectively, are

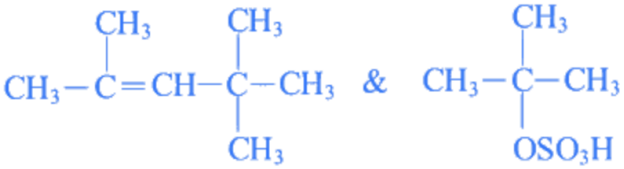


Options :

A. 

B. 

C. 

D. 

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

In the wet tests for identification of various cations by precipitation, which transition element cation doesn't belong to group IV in qualitative inorganic analysis?

Options :

A. Co^{2+}

B. Ni^{2+}

C. Zn^{2+}

D. Fe^{3+}

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

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

Assertion (A) : Ketoses give Seliwanoff's test faster than Aldoses.

Reason (R) : Ketoses undergo β-elimination followed by formation of furfural.

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

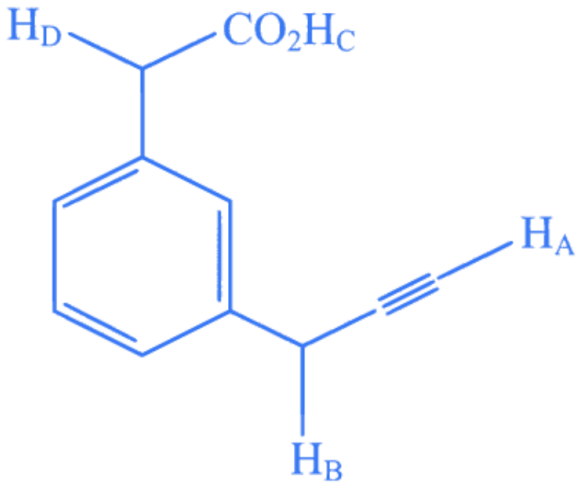
B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

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

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

What is the correct order of acidity of the protons marked A – D in the given compounds ?



Options :

A. $H_D > H_C > H_B > H_A$

B. $H_C > H_A > H_D > H_B$

C. $H_C > H_D > H_B > H_A$

D. $H_C > H_D > H_A > H_B$

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

Which of the following is correct order of ligand field strength?

Options :

A. $S^{2-} < C_2O_4^{2-} < NH_3 <$ en $< CO$

B. $CO <$ en $< NH_3 < C_2O_4^{2} < S^{2-}$

C. $S^{2-} < NH_3 <$ en $< CO < C_2O_4^{2}$

D. $NH_3 <$ en $< CO < S^{2-} < C_2O_4^{2}$

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

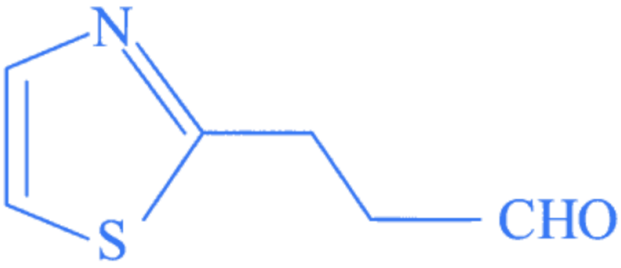
Which of the following compounds would give the following set of qualitative analysis ?

(i) Fehling's Test : Positive

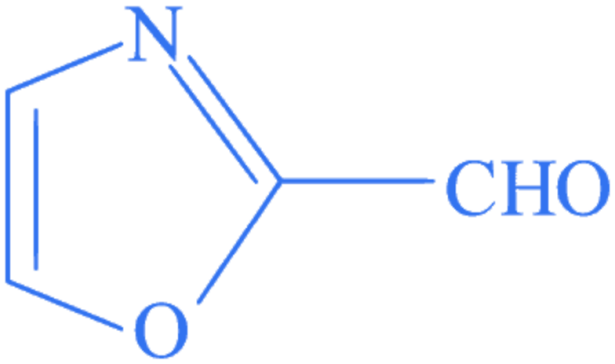
(ii) Na fusion extract upon treatment with sodium nitroprusside gives a blood red colour but not prussian blue.

Options :

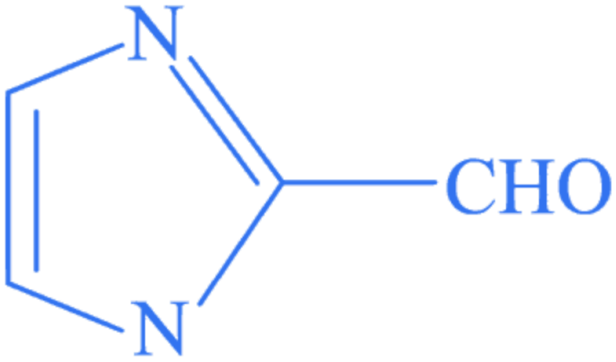
A.



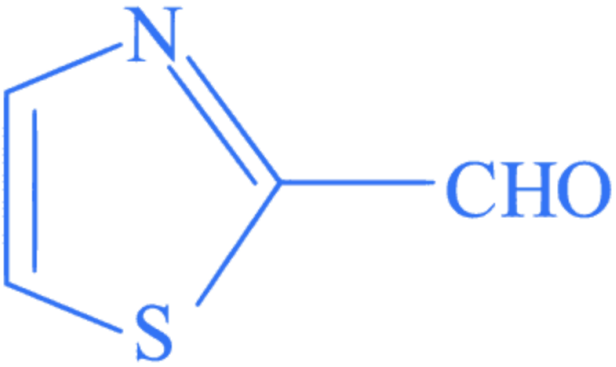
B.



C.



D.



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

During the qualitative analysis of SO_3^{2-} using dilute H_2SO_4, SO_2 gas is evolved which turns $K_2Cr_2O_7$ solution (acidified with dilute H_2SO_4) :

Options :

A. blue

B. black

C. red

D. green

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

For OF_2 molecule consider the following :

A. Number of lone pairs on oxygen is 2 .

B. FOF angle is less than 104.5°.

C. Oxidation state of O is -2.

D. Molecule is bent 'V' shaped.

E. Molecular geometry is linear.

correct options are:

Options :

A. A, C, D only

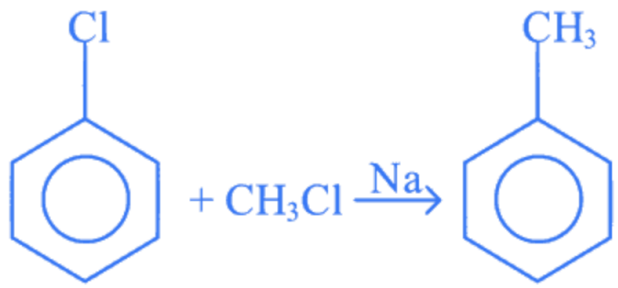
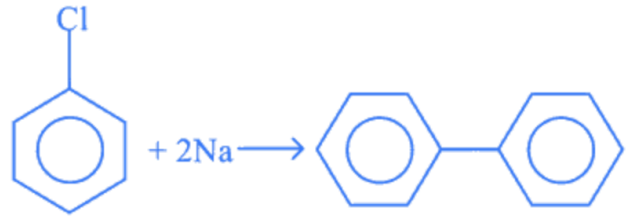
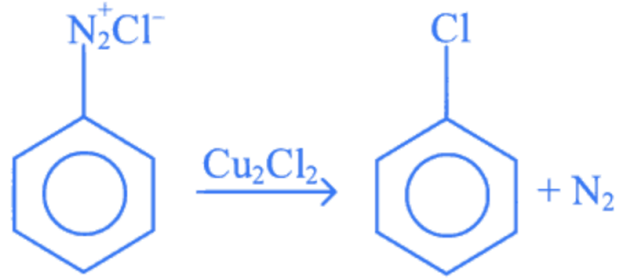
B. A, B, D only

C. C, D, E only

D. B, E, A only

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

Match List I with List II

	List I		**List II**
A.		I.	Fittig reaction
B.		II.	Wurtz Fittig reaction
C.		III.	Finkelstein reaction
D.	$C_5H_5C1 + NaI \rightarrow C_2H_5I + NaCl$	IV.	Sandemyer reaction

Choose the correct answer from the options given below :

Options :

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

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

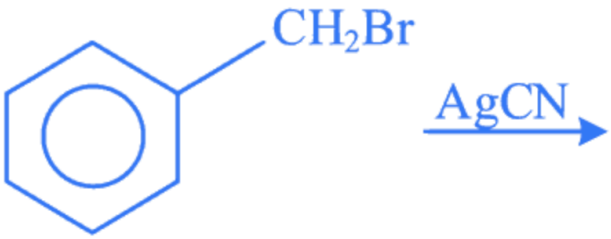
C. A - II, B - I, C - III, D - IV

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

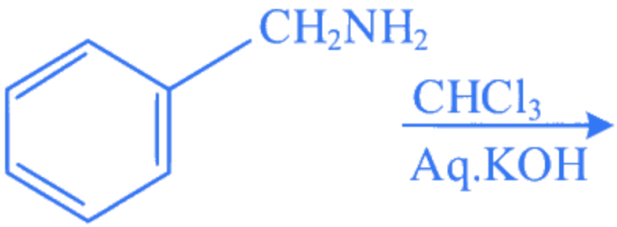
Question Number : 71 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Benzyl isocyanide can be obtained by :

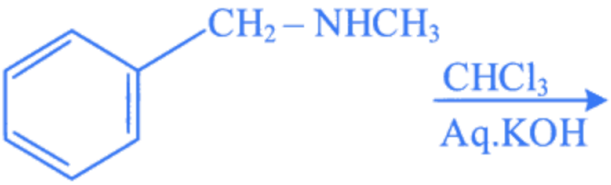
A.



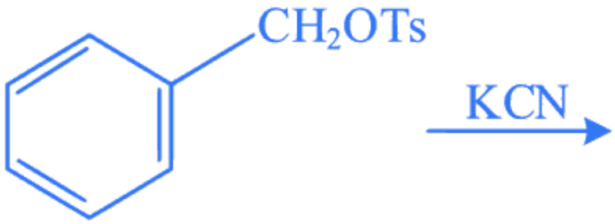
B.



C.



D.



Choose the correct answer from the options given below :

Options :

A. B and C

B. A and D

C. A and B

D. Only B

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

Match List I with List II

	List I (Atomic number)		**List II (Block of periodic table)**
A.	37	I.	p-block
B.	78	II.	d-block
C.	52	III.	f-block
D.	65	IV.	s-block

Choose the correct answer from the options given below :

Options :

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

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

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

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

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 (molecules/ions)		**List II (No. of lone pairs of e^- on central atom)**
A.	IF_7	I.	Three
B.	$\overline{ICl}_4$	II.	One
C.	XeF_6	III.	Two
D.	XeF_2	IV.	Zero

Choose the correct answer from the options given below :

Options :

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

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

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

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

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

Caprolactam when heated at high temperature in presence of water, gives

Options :

A. Dacron

B. Nylon 6

C. Teflon

D. Nylon 6,6

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

Formation of photochemical smog involves the following reaction in which A, B and C are respectively.

$$\text{i. } NO_2 \xrightarrow{h\upsilon} A + B$$
$$\text{ii. } B + O_2 \rightarrow C$$
$$\text{iii. } A + C \rightarrow NO_2 + O_2$$

Choose the correct answer from the options given below :

Options :

A. $NO, O \ \& \ O_3$

B. $N, O_2 \ \& \ O_3$

C. $O, N_2O \ \& \ NO$

D. $O, NO \ \& \ NO_3^-$

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

In the extraction of copper, its sulphide ore is heated in a reverberatory furnace after mixing with silica to:

Options :

A. remove FeO as $FeSiO_3$

B. remove calcium as $CaSiO_3$

C. decrease the temperature needed for roasting of Cu_2S

D. separate CuO as $CuSiO_3$

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

Amongst the following compounds, which one is an antacid?

Options :

A. Ranitidine

B. Brompheniramine

C. Terfenadine

D. Meprobamate

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

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

Assertion (A) : In expensive scientific instruments, silica gel is kept in watch-glasses or in semipermeable membrane bags.

Reason (R) : Silica gel adsorbs moisture from air via adsorption, thus protects the instrument from water corrosion (rusting) and / or prevents malfunctioning.

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 true but (R) is false

C. (A) is false but (R) is true

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

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

Lithium aluminium hydride can be prepared from the reaction of :

Options :

A. LiCl and Al_2H_6

B. LiH and $Al(OH)_3$

C. LiH and Al_2Cl_6

D. LiCl, Al and H_2

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

The alkaline earth metal sulphate(s) which are readily soluble in water is/are :

A. $BeSO_4$

B. $MgSO_4$

C. $CaSO_4$

D. $SrSO_4$

E. $BaSO_4$

Choose the correct answer from the options given below :

Options :

A. A and B

B. B and C

C. B only

D. A only

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

Some amount of dichloromethane $\left(CH_2Cl_2\right)$ is added to 671.141 mL of chloroform $\left(CHCl_3\right)$ to prepare 2.6×10^{-3}M solution of CH_2Cl_2(DCM). The concentration of DCM is _____ ppm (by mass).

Given :

atomic mass : C = 12

H = 1

Cl = 35.5

density of

$$CHCl_3 = 1.49 \text{ g cm}^{-3}$$

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

If compound A reacts with B following first order kinetics with rate constant 2.011×10^{-3} s^{-1}. The time taken by A (in seconds) to reduce from 7 g to 2 g will be _____. (Nearest Integer)

$$[\log 5 = 0.698, \log 7 = 0.845, \log 2 = 0.301]$$

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

600 mL of 0.01 M HCl is mixed with 400 mL of 0.01 M H_2SO_4. The pH of the mixture is _____ $\times 10^{-2}$. (Nearest integer)

[Given

$$\log 2 = 0.30$$
$$\log 3 = 0.48$$
$$\log 5 = 0.69$$
$$\log 7 = 0.84$$
$$\log 11 = 1.04]$$

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

When 2 litre of ideal gas expands isothermally into vacuum to a total volume of 6 litre, the change in internal energy is _____ J. (Nearest integer)

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

Consider the cell

$$Pt_{(s)} |H_2(g, 1\ atm)|H^+(aq, 1M)||Fe^{3+}(aq), Fe^{2+}(aq) | Pt(s)$$

When the potential of the cell is 0.712 V at 298 K, the ratio $\left[Fe^{2+}\right]/\left[Fe^{3+}\right]$ is _____. (Nearest integer)

Given :

$$Fe^{3+} + e^- = Fe^{2+}, E^{\theta}Fe^{3+}, Fe^{2+} | Pt = 0.771$$
$$\frac{2.303RT}{F} = 0.06\ V$$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes

Answers Type : Equal
Text Areas : PlainText

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

A trisubstituted compound 'A', $C_{10}H_{12}O_2$ gives neutral $FeCl_3$ test positive. Treatment of compound 'A' with NaOH and CH_3Br gives $C_{11}H_{14}O_2$, with hydroiodic acid gives methyl iodide and with hot conc. NaOH gives a compound B, $C_{10}H_{12}O_2$. Compound 'A' also decolorises alkaline $KMnO_4$. The number of π bond/s present in the compound 'A' 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

The number of electrons involved in the reduction of permanganate to manganese dioxide in acidic medium 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

A solution containing 2 g of a non-volatile solute in 20 g of water boils at 373.52 K. The molecular mass of the solute is _____ $g\ mol^{-1}$. (Nearest integer)

Given, water boils at 373 K, K_b for water

$$= 0.52\ K\ kg\ mol^{-1}$$

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 energy of one mole of photons of radiation of frequency 2×10^{12} Hz in $J\ mol^{-1}$ is _____. (Nearest integer)

[Given :

$$h = 6.626 \times 10^{-34}\ Js$$
$$N_A = 6.022 \times 10^{23}\ mol^{-1}$$

]

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

A 300 mL bottle of soft drink has 0.2 M CO_2 dissolved in it. Assuming CO_2 behaves as an ideal gas, the volume of the dissolved CO_2 at STP is _____ mL. (Nearest integer)

Given : At STP, molar volume of an ideal gas is 22.7 L mol^{-1}

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