National Testing Agency

Question Paper Name :	B Tech 6th Apr 2026 Shift 1
Subject Name :	B. Tech
Creation Date :	2026-04-06 14:36:27
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	69527828
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 Id :	695278151
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
Sub-Section Id :	695278151
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Id : 6952782136 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $[\cdot]$ denote the greatest integer function. If the domain of the function $f(x)=\sin^{-1}\left(\frac{x+[x]}{3}\right)$ is $[\alpha, \beta)$, then $\alpha^2+\beta^2$ is equal to:

Options :

6952787496. 2

6952787497. 5

6952787498. 10

6952787499. 13

Question Number : 2 Question Id : 6952782137 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let one root of the quadratic equation in x:
$(k^2 - 15k + 27)x^2 + 9(k - 1)x + 18 = 0$
be twice the other. Then the length of the latus rectum of the parabola $y^2 = 6kx$ is equal to:

Options :

6952787500. 4

6952787501. 6

6952787502. 8

6952787503. 12

Question Number : 3 Question Id : 6952782138 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let e_1 and e_2 be two distinct roots of the equation $x^2 - ax + 2 = 0$. Let the sets
$\{a \in \mathbb{R} : e_1$ and e_2 are the eccentricities of hyperbolas$\} = (\alpha, \beta)$, and
$\{a \in \mathbb{R} : e_1$ and e_2 are the eccentricities of an ellipse and a hyperbola, respectively$\} = (\gamma, \infty)$.
Then $\alpha^2 + \beta^2 + \gamma^2$ is equal to:

Options :

6952787504. 18

6952787505. 22

6952787506. 26

6952787507. 34

Question Number : 4 Question Id : 6952782139 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the set of all values of $k \in \mathbb{R}$ such that the equation $z(\bar{z} + 2 + i) + k(2 + 3i) = 0$, $z \in \mathbb{C}$, has at least one solution, be the interval $[\alpha, \beta]$. Then $9(\alpha + \beta)$ is equal to:

Options :

6952787508. -10

6952787509. -8

6952787510. $10\sqrt{13}$

6952787511. $8\sqrt{13}$

Question Number : 5 Question Id : 6952782140 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 $1^3 - 2^3 + 3^3 - \ldots + 15^3$ is:

Options :

6952787512. 1706

6952787513. 1856

6952787514. 1982

6952787515. 2403

Question Number : 6 Question Id : 6952782141 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 the first ten terms of an A.P. is 160 and the sum of the first two terms of a G.P. is 8. If the first term of the A.P. is equal to the common ratio of the G.P. and the first term of the G.P. is equal to common difference of the A.P., then the sum of all possible values of the first term of the G.P. is:

Options :

6952787516. $\frac{34}{9}$

6952787517. $\frac{34}{13}$

6952787518. $\frac{32}{9}$

6952787519. $\frac{32}{13}$

Question Number : 7 Question Id : 6952782142 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 4-letter words, with or without meaning, each consisting of two vowels and two consonants that can be formed from the letters of the word INCONSEQUENTIAL, without repeating any letter, is:

Options :

6952787520. 2670

6952787521. 2840

6952787522. 2920

6952787523. 3600

Question Number : 8 Question Id : 6952782143 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the coefficients of the middle terms in the binomial expansions of $(1 + \alpha x)^{26}$ and $(1 - \alpha x)^{28}$, $\alpha \neq 0$, are equal, then the value of α is:

Options :

6952787524. 1

6952787525. $\frac{14}{13}$

6952787526. $\frac{27}{7}$

6952787527. $\frac{7}{27}$

Question Number : 9 Question Id : 6952782144 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A data consists of 20 observations $x_1, x_2, ..., x_{20}$. If $\sum_{i=1}^{20}(x_i+5)^2 = 2500$ and $\sum_{i=1}^{20}(x_i-5)^2 = 100$, then the ratio of mean to standard deviation of this data is:

Options :

6952787528. 2:1

6952787529. 3:1

6952787530. 3:2

6952787531. 4:1

Question Number : 10 Question Id : 6952782145 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A bag contains (N + 1) coins − N fair coins, and one coin with 'Head' on both sides. A coin is selected at random and tossed. If the probability of getting 'Head' is $\frac{9}{16}$, then N is equal to:

Options :

6952787532. 5

6952787533. 7

6952787534. 8

6952787535. 9

Question Number : 11 Question Id : 6952782146 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the eccentricity e of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, passing through $\left(6,4\sqrt{3}\right)$, satisfies $15(e^2 + 1) = 34e$, then the length of the latus rectum of the hyperbola $\frac{x^2}{b^2}-\frac{y^2}{2\left(a^2+1\right)}=1$ is:

Options :

6952787536. 10

6952787537. 20

6952787538. 25

6952787539. 30

Question Number : 12 Question Id : 6952782147 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let chord PQ of length $3\sqrt{13}$ of the parabola $y^2 = 12x$ be such that the ordinates of points P and Q are in the ratio 1:2. If the chord PQ subtends an angle α at the focus of the parabola, then $\sin\alpha$ is equal to:

Options :

6952787540. $\frac{3}{5}$

6952787541. $\frac{4}{5}$

6952787542. $\frac{5}{13}$

6952787543. $\frac{12}{13}$

Question Number : 13 Question Id : 6952782148 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $0 < \alpha < 1, \beta = \frac{1}{3\alpha}$ and $\tan^{-1}(1-\alpha) + \tan^{-1}(1-\beta) = \frac{\pi}{4}$. Then $6(\alpha + \beta)$ is equal to:

Options :

6952787544. 6

6952787545. 7

6952787546. 8

6952787547. 9

Question Number : 14 Question Id : 6952782149 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $S = \left\{\theta \in (-2\pi, 2\pi) : \cos\theta + 1 = \sqrt{3}\sin\theta\right\}$.

Then $\sum_{\theta \in S} \theta$ is equal to:

Options :

6952787548. $-\frac{2\pi}{3}$

6952787549. $-\frac{4\pi}{3}$

6952787550. $\frac{2\pi}{3}$

6952787551. $\frac{4\pi}{3}$

Question Number : 15 Question Id : 6952782150 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(1, 6, a) in the line $L: \frac{x}{1} = \frac{y-1}{2} = \frac{z-a+1}{b}, b > 0,$ be $\left(\frac{a}{3}, 0, a+c\right)$. If S(α, β, γ), α > 0, is the point on L such that the distance of S from the foot of perpendicular from the point P on L is $2\sqrt{14}$, then α + β + γ is equal to:

Options :

6952787552. 19

6952787553. 20

6952787554. 21

6952787555. 22

Question Number : 16 Question Id : 6952782151 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a line L be perpendicular to both the lines $L_1: \frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $L_2: \frac{x-2}{1} = \frac{y-4}{4} = \frac{z-6}{7}$.

If θ is the acute angle between the lines L and $L_3: \frac{x-\frac{8}{7}}{2} = \frac{y-\frac{4}{7}}{1} = \frac{z}{2}$, then tan θ is equal to:

Options :

6952787556. $\frac{3}{2}\sqrt{2}$

6952787557. $\frac{5}{2}\sqrt{2}$

6952787558. $\frac{5}{3}\sqrt{2}$

6952787559. $\frac{4}{3}\sqrt{2}$

Question Number : 17 Question Id : 6952782152 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 $\lim_{x \to 0} \left(\frac{x^2 \sin^2 x}{x^2 - \sin^2 x}\right)$ is:

Options :

6952787560. 2

6952787561. 3

6952787562. 4

6952787563. 6

Question Number : 18 Question Id : 6952782153 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 the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \left(\frac{32\cos^4 x}{1+e^{\sin x}} \right) dx$ is:

Options :

6952787564. $4\pi + 2$

6952787565. $3\pi + 8$

6952787566. $3\pi + 4$

6952787567. $4\pi + 3$

Question Number : 19 Question Id : 6952782154 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The area of the region $\{(x, y) : 0 \le y \le 6 - x, y^2 \ge 4x - 3, x \ge 0\}$ is:

Options :

6952787568. 8

6952787569. 9

6952787570. 12

6952787571. 15

Question Number : 20 Question Id : 6952782155 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let e be the base of natural logarithm and let $f : \{1, 2, 3, 4\} \to \{1, e, e^2, e^3\}$ and $g : \{1, e, e^2, e^3\} \to \left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$ be two bijective functions such that f is strictly decreasing and g is strictly increasing. If $\phi(x) = \left[f^{-1}\left\{ g^{-1}\left(\frac{1}{2}\right)\right\}\right]^x$, then the area of the region R = $\{(x, y): x^2 \le y \le \phi(x), 0 \le x \le 1\}$ is:

Options :

6952787572. $\frac{3 - \log_e(2)}{3\log_e(2)}$

6952787573. $\frac{1}{3\log_e(2)}$

6952787574. $3 + \log_e(2)$

6952787575. $\frac{3 + \log_e(2)}{2 + \log_e(3)}$

Mathematics Section B

Section Id :	695278152
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	5
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	695278152
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 6952782156 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $A=\begin{bmatrix}-1 & 1 & -1\\ 1 & 0 & 1\\ 0 & 0 & 1\end{bmatrix}$ satisfy

$$A^2+\alpha\left(adj\left(adj(A)\right)\right)+\beta\left(adj(A)\left(adj\left(adj(A)\right)\right)\right)=\begin{bmatrix}2 & -2 & 2\\ -2 & 0 & -1\\ 0 & 0 & -1\end{bmatrix}$$ for

some $\alpha, \beta \in \mathbb{R}$.

Then $(\alpha-\beta)^2$ is equal to _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 22 Question Id : 6952782157 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let the centre of the circle $x^2+y^2+2gx+2fy+25=0$ be in the first quadrant and lie on the line $2x-y=4$. Let the area of an equilateral triangle inscribed in the circle be $27\sqrt{3}$. Then the square of the length of the chord of the circle on the line $x=1$ is_____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 23 Question Id : 6952782158 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=\hat{j}-\hat{k}$ and $\vec{c}$ be three vectors such that $\vec{a}\times\vec{c}=\vec{b}$ and $\vec{a}\cdot\vec{c}=3$, then $\vec{c}\cdot\left(\vec{a}-2\vec{b}\right)$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 24 Question Id : 6952782159 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For the functions $f(\theta) = \alpha \tan^2\theta + \beta \cot^2\theta$, and

$g(\theta) = \alpha \sin^2\theta + \beta \cos^2\theta$, $\alpha > \beta > 0$, let $\min\limits_{0<\theta<\frac{\pi}{2}} f(\theta) = \max\limits_{0<\theta<\pi} g(\theta)$. If the first term of a G.P. is $\left(\frac{\alpha}{2\beta}\right)$, its common ratio is $\left(\frac{2\beta}{\alpha}\right)$ and the sum of its first 10 terms is $\frac{m}{n}$, $\gcd(m, n) = 1$, then $m + n$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 25 Question Id : 6952782160 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $y = y(x)$ be the solution of the differential equation $\left(x^2 - x\sqrt{x^2-1}\right)dy + \left(y\left(x - \sqrt{x^2-1}\right) - x\right)dx = 0$, $x \geq 1$. If $y(1)=1$, then the greatest integer less than $y\left(\sqrt{5}\right)$ is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Physics Section A

Section Id :	695278153
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
Sub-Section Id :	695278153
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 6952782161 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The density ρ of a uniform cylinder is determined by measuring its mass m, length l and diameter d. The measured values of m, l and d are 97.42 ± 0.02 g, 8.35 ± 0.05 mm and 20.20 ± 0.02 mm, respectively. Calculated percentage fractional error in ρ is _____.

Options :

6952787581. 0.63%

6952787582. 0.82%

6952787583. 0.72%

6952787584. 0.25%

Question Number : 27 Question Id : 6952782162 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The potential energy of a particle changes with distance x from a fixed origin as $V = \frac{A\sqrt{x}}{x+B}$, where A and B are constant with appropriate dimensions. The dimensions of AB are_____.

Options :

6952787585. $[M^1 L^{5/2} T^{-2}]$

6952787586. $[M^{3/2} L^{5/2} T^{-2}]$

6952787587. $[M^1 L^2 T^{-2}]$

6952787588. $[M^1 L^{7/2} T^{-2}]$

Question Number : 28 Question Id : 6952782163 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The rain drop of mass 1 g, starts with zero velocity from a height of 1 km. It hits the ground with a speed of 5 m/s. The work done by the unknown resistive force is _____J.
(take g = 10 m/s^2)

Options :

6952787589. -8.75

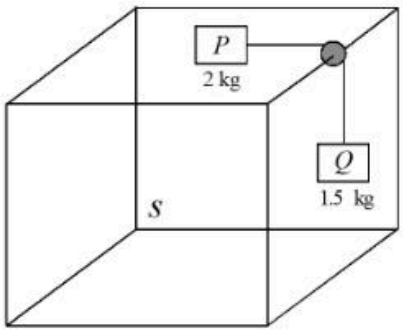
6952787590. -8.35

6952787591. -9.55

6952787592. -9.98

Question Number : 29 Question Id : 6952782164 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two blocks (P and Q) with respectively masses 2 kg and 1.5 kg are joined by a massless thread. These blocks are mounted on a frictionless pully which is fixed on the edge of a cube (S), as shown in the figure below. Block P is positioned on the top surface which has no friction and block Q is in contact with side-surface, having coefficient friction μ. The cube (S) moves towards the right with acceleration of $\frac{g}{2}$, where g is gravitational acceleration. During this movement the block P and Q remain stationary. The value of μ is _____.
(take g = 10 m/s^2)



Options :

6952787593. 0.33

6952787594. 0.67

6952787595. 1

6952787596. 0.5

Question Number : 30 Question Id : 6952782165 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A lift of mass 1600 kg is supported by thick iron wire. If the maximum stress which the wire can withstand is 4×10^8 N/m^2 and its radius is 4 mm, then maximum acceleration the lift can take is _____ m/s^2.
(take g = 10 m/s^2 and $\pi = 3.14$)

Options :

6952787597. 2.56

6952787598. 3.89

6952787599. 4.32

6952787600. 5.16

Question Number : 31 Question Id : 6952782166 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A solid sphere of radius 4 cm and mass 5 kg is rotating (rotation axis is passing through the centre of the sphere) with an angular velocity of 1200 rpm. It is brought to rest in 10 s by applying a constant torque. The torque applied and the number of rotations it made before it comes to rest are _____ and _____ respectively.

Options :

6952787601. $0.128\ \pi$ Nm, 100

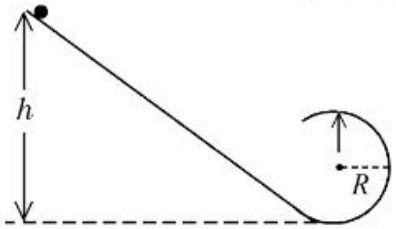
6952787602. $0.0128\ \pi$ Nm, 50

6952787603. $0.128\ \pi$ Nm, 50

6952787604. $0.0128\ \pi$ Nm, 100

Question Number : 32 Question Id : 6952782167 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A smooth inclined plane ends in a vertical circular loop, as shown in the figure. A small body is released from height h as shown. If the body exerts a force of three times its weight on the plane at the highest point of circle then the height $h = \alpha R$. The value of α is _____.



Options :

6952787605. 2

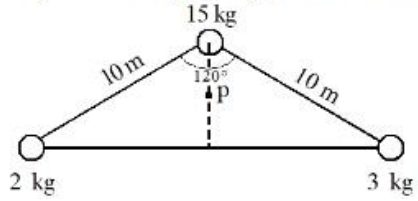
6952787606. 4

6952787607. 3

6952787608. 6

Question Number : 33 Question Id : 6952782168 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The position of center of mass of three masses 2 kg, 3 kg and 15 kg placed with respect to mid point (p) of normal bisector, as shown in the figure is_____.



Options :

6952787609. $\left(\frac{\sqrt{3}}{4}, 1.25\right)$

6952787610. $\left(\frac{\sqrt{3}}{4}, 1.0\right)$

6952787611. $(0,0)$

6952787612. $(1.25,0)$

Question Number : 34 Question Id : 6952782169 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The two wires A and B of equal cross-section but of different materials are joined together. The ratio of Young's modulus of wire A and wire B is 20/11. When the joined wire is kept under certain tension the elongations in the wires A and B are equal. If the length of wire A is 2.2 m, then the length of wire B is _____m.

Options :

6952787613. 1.1

6952787614. 2.22

6952787615. 1.21

6952787616. 4.44

Question Number : 35 Question Id : 6952782170 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two closed vessels of same volume are joined through a narrow tube and both vessels are filled with air of pressure 90 kPa and temperature 400 K. Keeping the temperature of one vessel constant at 400 K the second vessel temperature is raised to 500 K. The final pressure in the vessels is _____kPa.

Options :

6952787617. 100

6952787618. 120

6952787619. 90

6952787620. 105

Question Number : 36 Question Id : 6952782171 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In interference experiment the path difference between two interfering waves at a point A on the screen is $\lambda/3$, where λ is the wavelength of these waves, and at another point B the path difference is $\lambda/6$. The ratio of intensities at points A and B is_____.

Options :

6952787621. 3

6952787622. 4

6952787623. 1/3

6952787624. 1/4

Question Number : 37 Question Id : 6952782172 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A particle is executing simple harmonic motion. Its amplitude is A and time period is 5 sec. The time required by it to move from $x = A$ to $x = \frac{A}{\sqrt{2}}$ is _____ sec.

Options :

6952787625. 1/4

6952787626. 5/4

6952787627. 5/8

6952787628. 3/8

Question Number : 38 Question Id : 6952782173 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A thin half ring of radius 35 cm is uniformly charged with a total charge of Q coulomb. If the magnitude of the electric field at centre of the half ring is 100 V/m, then the value of Q is _____ nC.

($\epsilon_0 = 8.85 \times 10^{-12}$ C^2/Nm^2 and $\pi = 3.14$)

Options :

6952787629. 2.14

6952787630. 2.44

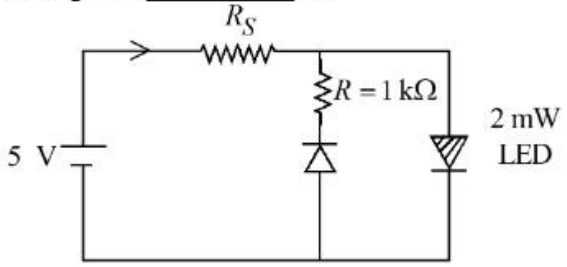
6952787631. 3.25

6952787632. 0.7

Question Number : 39 Question Id : 6952782174 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The maximum rated power of the LED is 2 mW and it is used in the circuit with input voltage of 5 V as shown in the figure below. The current through resistance R_S is 0.5 mA.

The minimum value of the resistance of R_S, to ensure that the LED is not damaged is _____ kΩ.



Options :

6952787633. 6

6952787634. 2

6952787635. 4

6952787636. 5

Question Number : 40 Question Id : 6952782175 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A point light source emits E.M. waves in free space. A detector, placed at a distance of L m, measures the intensity as I_o. The detector is now shifted to another location on the same spherical surface ensuring the angle between original location and new location as 45°. The measured intensity at new location will be _____.

Options :

6952787637. $\frac{I_o}{4}$

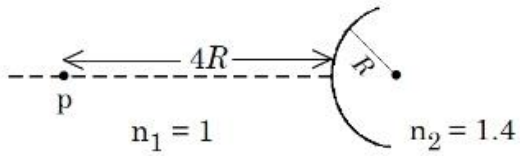
6952787638. I_o

6952787639. $\frac{I_o}{\sqrt{2}}$

6952787640. $\frac{I_o}{2}$

Question Number : 41 Question Id : 6952782176 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A spherical interface lens of radius R separates two media of refractive indices 1 and 1.4 respectively as shown in the figure below. A point source is placed at a distance of $4R$ in front of spherical interface. The magnitude of the magnification of point source image is _____.



Options :

6952787641. 1.66

6952787642. 2.33

6952787643. 2.66

6952787644. 1.33

Question Number : 42 Question Id : 6952782177 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A small cube of side 1 mm is placed at the centre of a circular loop of radius 10 cm carrying a current of 2 A. The magnetic energy stored inside the cube is $\alpha \times 10^{-14}$ J. The value of α is _____.
($\mu_o = 4\pi \times 10^{-7}$ Tm/A, $\pi = 3.14$)

Options :

6952787645. 6.28

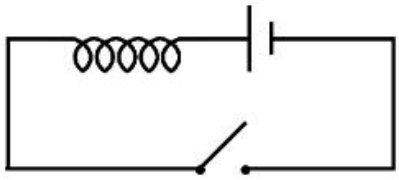
6952787646. 6.28×10^{-6}

6952787647. 628

6952787648. 6.28×10^{-4}

Question Number : 43 Question Id : 6952782178 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An inductor of inductance 10 mH having resistance of 100 Ω is connected to battery of E.M.F. 1.0 V through a switch as shown in the figure below. After switch is closed, the ratio of instantaneous voltages across the inductor when the current passing through it is 2 mA and 4 mA is _____.



Options :

6952787649. 4/3

6952787650. 3/4

6952787651. 5/3

6952787652. 3/5

Question Number : 44 Question Id : 6952782179 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The ratio of momentum of the photons of the 1^{st} and 2^{nd} line of Balmer series of Hydrogen atoms is α/β. The possible values of α and β are:-

Options :

6952787653. 27 and 20

6952787654. 3 and 16

6952787655. 5 and 36

6952787656. 20 and 27

Question Number : 45 Question Id : 6952782180 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A LCR series circuit driven with E_{rms} = 90 V at frequency f_d = 30 Hz has resistance R = 80 Ω, an inductance with inductive reactance X_L = 20.0 Ω and capacitance with capacitive reactance X_C = 80.0 Ω. The power factor of the circuit is_____.

Options :

6952787657. 0.8

6952787658. 0.64

6952787659. 0.9

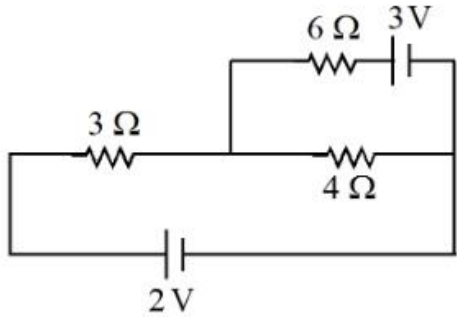
6952787660. 0.5

Physics Section B

Section Id :	695278154
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	5
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	695278154
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 6952782181 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Refer to the circuit diagram given below. The heat generated across the 6 Ω resistance in 100 second is $\frac{\alpha}{100}$ J . The value of α is _____. (Nearest integer)



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 47 Question Id : 6952782182 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An unpolarized light of intensity I_0 passes through polarizer and then through a certain optically active solution and finally it goes to analyser. If the angle between analyser and polariser is 0° and intensity of light emerged from analyser is $\frac{3}{8} I_{0,}$ the angle of rotation of the light by the solution with respect to analyser is _____ degrees.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 48 Question Id : 6952782183 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The energy released when $\frac{7}{17.13}$ kg of $^{7}_{3}Li$ is converted into $^{4}_{2}He$ by proton bombardment is $\alpha \times 10^{32}$ eV. The value of α is ____. (Nearest integer)
(Mass of $^{7}_{3}Li$ = 7.0183 u, mass of $^{4}_{2}He$ = 4.004 u, mass of proton = 1.008 u and 1 u = 931 MeV/c^2 and Avogadro number = 6.0×10^{23})

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 49 Question Id : 6952782184 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A three coulomb charge moves from the point (0, −2, −5) to the point (5, 1, 2) in an electric field expressed as $\vec{E} = 2x\hat{i} + 3y^2\hat{j} + 4\hat{k}$ N/C. The work done in moving the charge is _____J.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 50 Question Id : 6952782185 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A certain gas is isothermally compressed to $\left(\frac{1}{3}\right)^{rd}$ of its initial volume (V_o = 3 litre) by applying required pressure. If the bulk modulus of the gas is 3×10^5 N/m^2, the magnitude of work done on the gas is _____J.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Chemistry Section A

Section Id :	695278155
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
Sub-Section Id :	695278155
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 6952782186 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An oxide of iron contains 69.9% iron, its empirical formula, is:

(Given : Molar mass of Fe and O are 56 and 16 g mol^{-1} respectively.)

Options :

6952787666. FeO

6952787667. Fe_2O_3

6952787668. Fe_3O_4

6952787669. FeO_3

Question Number : 52 Question Id : 6952782187 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If shortest wavelength of hydrogen atom in Lyman series is x, then longest wavelength in Balmer series of He^+ is:

Options :

6952787670. $\frac{9x}{5}$

6952787671. $\frac{36x}{5}$

6952787672. $\frac{x}{4}$

6952787673. $\frac{5x}{9}$

Question Number : 53 Question Id : 6952782188 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match the **LIST-I** with **LIST-II**

	List-I Orbital		**List-II Radial nodes and nodal plane**
A.	2s	I.	1 Radial node + two nodal planes
B.	3s	II.	1 Radial node + one nodal plane
C.	3p	III.	2 Radial nodes + No nodal plane
D.	4d	IV.	1 Radial node + No nodal plane

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

Options :

6952787674. A-IV, B-I, C-III, D-II

6952787675. A-IV, B-II, C-III, D-I

6952787676. A-III, B-I, C-IV, D-II

6952787677. A-IV, B-III, C-II, D-I

Question Number : 54 Question Id : 6952782189 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The pairs among
$A = \left[SO_3^{2-}, CO_3^{2-} \right]$, $B = \left[O_2^{2-}, F_2 \right]$, $C = \left[CN^-, CO \right]$, $D = \left[NH_3, H_3O^+ \right]$ and
$E = \left[MnO_4^{2-}, CrO_4^{2-} \right]$ that do not have similar Lewis dot structure are

Options :

6952787678. A, B and E

6952787679. A and E

6952787680. B, C and D

6952787681. C and D

Question Number : 55 Question Id : 6952782190 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange the following isothermal processes in order of the magnitude of the work (p − V) involved between states 1 and 2.

A. Expansion in single stage w_A
B. Expansion in multi stages w_B
C. Compression in single stage w_C
D. Compression in multi stages w_D

Choose the correct option.

Options :

6952787682. $|w_B| > |w_A| > |w_C| > |w_D|$

6952787683. $|w_C| > |w_D| > |w_A| > |w_B|$

6952787684. $|w_C| > |w_D| > |w_B| > |w_A|$

6952787685. $|w_B| > |w_A| > |w_D| > |w_C|$

Question Number : 56 Question Id : 6952782191 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When 0.25 moles of a non-volatile, non-ionizable solute was dissolved in 1 mole of a solvent the vapor pressure of solution was x % of vapor pressure of pure solvent. What is x %?

Options :

6952787686. 50%

6952787687. 60%

6952787688. 70%

6952787689. 80%

Question Number : 57 Question Id : 6952782192 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

One mole each of He and A(g) are taken in a 10 L closed flask and heated to 400 K to establish the following equilibrium.

$A(g) \rightleftharpoons B(g)$

K_c for this reaction at 400 K is 4.0. The partial pressures (in atm) of He and B(g) are respectively (at equilibrium)

(Assume He, A(g) and B(g) behave as ideal gases)

(Given : $R = 0.082$ L atm K^{-1} mol^{-1})

Options :

6952787690. 3.28, 2.624

6952787691. 2.624, 3.28

6952787692. 3.28, 0.656

6952787693. 0.656, 6.56

Question Number : 58 Question Id : 6952782193 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following data.

Electrolyte	Λ°_m (S cm^2 mol^{-1})
$BaCl_2$	x_1
H_2SO_4	x_2
HCl	x_3

$BaSO_4$ is sparingly soluble in water. If the conductivity of the saturated $BaSO_4$ solution is x S cm^{-1} then the solubility product of $BaSO_4$ can be given as

(Here $\Lambda_m = \Lambda^\circ_m$)

Options :

6952787694. $\frac{10^6 x^2}{\alpha^2 \left(x_1 + x_2 - 2x_3\right)^2}$

6952787695. $\frac{x^2}{\left(x_1 + x_2 - 2x_3\right)^2}$

6952787696. $\frac{\alpha^2 \left(x_1 + x_2 - 2x_3\right)^2}{10^6 x^2}$

6952787697. $\frac{x^2}{\left(x_1 + x_2 + 2x_3\right)^2}$

Question Number : 59 Question Id : 6952782194 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: Aluminium is more electropositive than thallium as the standard electrode potential value of $E^{\circ}_{Al^{3+}/Al}$ is negative and $E^{\circ}_{Tl^{3+}/Tl}$ is positive.

Statement II: The sum of first three ionization enthalpies of boron is very high when compared to that of aluminium. Due to this reason boron forms covalent compounds only and aluminium forms Al^{3+} ion.

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

Options :

6952787698. Both Statement I and Statement II are true

6952787699. Both Statement I and Statement II are false

6952787700. Statement I is true but Statement II is false

6952787701. Statement I is false but Statement II is true

Question Number : 60 Question Id : 6952782195 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The **correct** statements among the following are.

A. Basic vanadium oxide is used in the manufacture of H_2SO_4.
B. The spin-only magnetic moment value of the transition metal halide employed in Ziegler-Natta polymerization is 2.84 BM.
C. The p-block metal compound employed in Ziegler-Natta polymerization has the metal in +3 oxidation state.
D. The number of electrons present in the outer most 'd' orbital of metal halide employed in Wacker process is 8.

Choose the correct answer from the options given below:

Options :

6952787702. A and B Only

6952787703. A, C and D Only

6952787704. C and D Only

6952787705. B, C and D Only

Question Number : 61 Question Id : 6952782196 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match the **LIST-I** with **LIST-II**

List-I Electronic configuration of tetrahedral metal ion		List-II Crystal Field Stabilization Energy (Δ_t)	
A.	d^2	I.	− 0.6
B.	d^4	II.	− 0.8
C.	d^6	III.	− 1.2
D.	d^8	IV.	− 0.4

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

Options :

6952787706. A-III, B-IV, C-II, D-I

6952787707. A-III, B-I, C-IV, D-II

6952787708. A-III, B-IV, C-I, D-II

6952787709. A-II, B-I, C-IV, D-III

Question Number : 62 Question Id : 6952782197 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 true about the energy of the given d-orbitals of a tetrahedral complex?

A. $d_{xy} = d_{xz} > d_{x^2-y^2}$
B. $d_{xy} = d_{yz} > d_{z^2}$
C. $d_{x^2-y^2} > d_{z^2} > d_{xz}$
D. $d_{x^2-y^2} = d_{z^2} < d_{xz}$

Choose the correct answer from the given below:

Options :

6952787710. A, B and D only

6952787711. A and B only

6952787712. B and D only

6952787713. B, C and D only

Question Number : 63 Question Id : 6952782198 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

R_f value for 2-methylpropene in a solvent system (Ethyl acetate + ether) is 0.42.

2-methylpropene is treated with dilute H_2SO_4 to give major organic product (X).

R_f value for (X) in the same solvent system under identical condition will be:

Options :

6952787714. 0.42

6952787715. 0.82

6952787716. 0.62

6952787717. 0.12

Question Number : 64 Question Id : 6952782199 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: 2,6-diethylcyclohexanone and 6-methyl-2-n-propylcyclohexanone are metamers.

Statement II: 2,2,6,6 - tetramethylcyclohexanone exhibits keto-enol tautomerism.

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

Options :

6952787718. Both Statement I and Statement II are true

6952787719. Both Statement I and Statement II are false

6952787720. Statement I is true but Statement II is false

6952787721. Statement I is false but Statement II is true

Question Number : 65 Question Id : 6952782200 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: Methane can be prepared by decarboxylation of sodium ethanoate, Kolbe's electrolysis of sodium acetate and reaction of CH_3MgBr with water.

Statement II: Methane cannot be prepared from unsaturated hydrocarbons and by Wurtz reaction.

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

Options :

6952787722. Both Statement I and Statement II are true

6952787723. Both Statement I and Statement II are false

6952787724. Statement I is true but Statement II is false

6952787725. Statement I is false but Statement II is true

Question Number : 66 Question Id : 6952782201 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: 3-phenylpropene reacts with HBr and gives secondary alkyl bromide having a chiral carbon atom as the major product.

Statement II: Aryl chlorides and aryl cyanides can be prepared by Sandmeyer reaction as well as Gattermann reaction.

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

Options :

6952787726. Both Statement I and Statement II are true

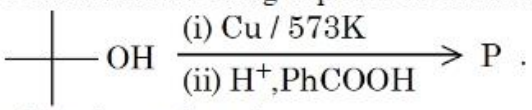
6952787727. Both Statement I and Statement II are false

6952787728. Statement I is true but Statement II is false

6952787729. Statement I is false but Statement II is true

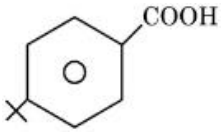
Question Number : 67 Question Id : 6952782202 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

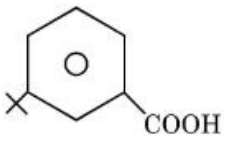
Consider the following sequence of reactions

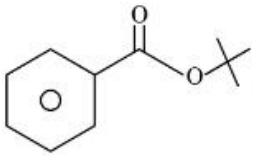


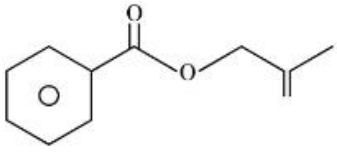
The major product P is:

Options :

6952787730. 

6952787731. 

6952787732. 

6952787733. 

Question Number : 68 Question Id : 6952782203 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange the following compounds according to increasing order of boiling points.

n - C_4H_9OH (A), n - $C_4H_9NH_2$ (B), n - C_4H_{10} (C) and $C_2H_5NHC_2H_5$(D).

Options :

6952787734. $C < B < A < D$

6952787735. $D < C < B < A$

6952787736. $C < D < B < A$

6952787737. $D < B < A < C$

Question Number : 69 Question Id : 6952782204 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match the **LIST-I** with **LIST-II**

	List-I Deficiency Disease		**List-II Vitamin**
A.	Scurvy	I.	Pyridoxine
B.	Convulsions	II.	Vitamin A
C.	Cheilosis	III.	Ascorbic Acid
D.	Xerophthalmia	IV.	Riboflavin

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

Options :

6952787738. A-I, B-III, C-II, D-IV

6952787739. A-I, B-III, C-IV, D-II

6952787740. A-III, B-I, C-IV, D-II

6952787741. A-III, B-I, C-II, D-IV

Question Number : 70 Question Id : 6952782205 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match the **LIST-I** with **LIST-II**

	List-I Amino acid		**List-II Positive reaction/Test for functional group present in side chain of amino acid**
A.	Glutamine	I.	Hinsberg's test
B.	Lysine	II.	Neutral $FeCl_3$ test
C.	Tyrosine	III.	Ceric ammonium nitrate test
D.	Serine	IV.	Hoffman bromamide degradation

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

Options :

6952787742. A-IV, B-II, C-I, D-III

6952787743. A-IV, B-I, C-II, D-III

6952787744. A-III, B-II, C-I, D-IV

6952787745. A-IV, B-I, C-III, D-II

Chemistry Section B

Section Id :	695278156
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	5
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	695278156
Question Shuffling Allowed :	Yes
Is Section Default? :	No

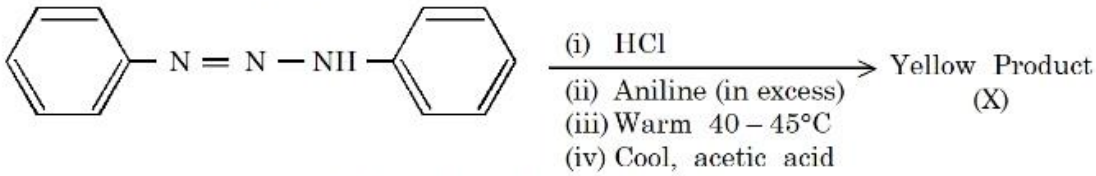
Question Number : 71 Question Id : 6952782206 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

First and second ionization enthalpies of lithium are 520 kJ mol^{-1} and 7297 kJ mol^{-1} respectively. Energy required to convert 3.5 mg lithium (g) into $Li^{2+}(g)$ [$Li(g) \rightarrow Li^{2+}(g)$] is _____ kJ mol^{-1} . (nearest integer)
[Molar mass of Li = 7 g mol^{-1}]

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 72 Question Id : 6952782207 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following sequence of reactions.



The percentage of nitrogen in the yellow product (X) formed is _____%.
(Nearest Integer)
(Given Molar mass in g mol^{-1} H:1, C:12, N:14)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 73 Question Id : 6952782208 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

4.7 g of phenol is heated with Zn to give product X. If this reaction goes to 60% completion then the number of moles of compound X formed will be
____ $\times 10^{-2}$.(Nearest Integer)
(Given molar mass in g mol^{-1} : H:1, C:12, O:16)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 74 Question Id : 6952782209 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Sucrose hydrolyses in acidic medium into glucose and fructose by first order rate law with $t_{1/2} = 3$ hour. The percentage of sucrose remaining after 6 hours is _____. (Nearest integer)
(Given : log 2 = 0.3010 and log 3 = 0.4771)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 75 Question Id : 6952782210 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the reaction $X \rightleftharpoons Y$ at 300 K. If ΔH^{θ} and K are 28.40 kJ mol^{-1} and 1.8×10^{-7} at the same temperature, then the magnitude of ΔS^{θ} for the reaction in J K^{-1} mol^{-1} is_____. (Nearest integer)
(Given : R = 8.3 J K^{-1} mol^{-1}, ln 10 = 2.3, log 3 = 0.48, log 2 = 0.30)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1