

National Testing Agency

Question Paper Name :	B Tech 24th Jan 2026 Shift 2
Subject Name :	B. Tech
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

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

Mathematics Section A

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

Question Number : 1 Question Id : 444792607 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The largest value of n , for which 40^n divides $60!$, is

Options :

4447922065. 12

4447922066. 13

4447922067. 14

4447922068. 11

Question Number : 2 Question Id : 444792617 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 three statements for the function $f: (0, \infty) \rightarrow \mathbb{R}$ defined by

$$f(x) = |\log_e x| - |x - 1|;$$

(I) f is differentiable at all $x > 0$.

(II) f is increasing in $(0, 1)$.

(III) f is decreasing in $(1, \infty)$.

Then,

Options :

4447922105. Only (I) is TRUE.

4447922106. Only (II) and (III) are TRUE.

4447922107. Only (I) and (III) are TRUE.

4447922108. All (I), (II) and (III) are TRUE.

Question Number : 3 Question Id : 444792604 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $P = [p_{ij}]$ and $Q = [q_{ij}]$ be two square matrices of order 3 such that $q_{ij} = 2^{(i+j-1)} p_{ij}$ and $\det(Q) = 2^{10}$. Then the value of $\det(\text{adj}(\text{adj } P))$ is:

Options :

4447922053. 16

4447922054. 81

4447922055. 32

4447922056. 124

Question Number : 4 Question Id : 444792609 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $X = \{x \in \mathbb{N} : 1 \leq x \leq 19\}$ and for some $a, b \in \mathbb{R}$, $Y = \{ax + b : x \in X\}$.

If the mean and variance of the elements of Y are 30 and 750, respectively, then the sum of all possible values of b is

Options :

4447922073. 20

4447922074. 60

4447922075. 80

4447922076. 100

Question Number : 5 Question Id : 444792612 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the angles made with the positive x -axis by two straight lines drawn from the point $P(2, 3)$ and meeting the line $x + y = 6$ at a distance $\sqrt{\frac{2}{3}}$ from the point P be

θ_1 and θ_2 . Then the value of $(\theta_1 + \theta_2)$ is:

Options :

4447922085. $\frac{\pi}{3}$

4447922086. $\frac{\pi}{2}$

4447922087. $\frac{\pi}{6}$

4447922088. $\frac{\pi}{12}$

Question Number : 6 Question Id : 444792605 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a_1, a_2, a_3, a_4 be an A.P. of four terms such that each term of the A.P. and its common difference l are integers. If $a_1 + a_2 + a_3 + a_4 = 48$ and

$a_1 a_2 a_3 a_4 + l^4 = 361$, then the largest term of the A.P. is equal to

Options :

4447922057. 21

4447922058. 23

4447922059. 24

4447922060. 27

Question Number : 7 Question Id : 444792608 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The letters of the word "UDAYPUR" are written in all possible ways with or without meaning and these words are arranged as in a dictionary. The rank of the word "UDAYPUR" is

Options :

4447922069. 1578

4447922070. 1579

4447922071. 1580

4447922072. 1581

Question Number : 8 Question Id : 444792613 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 all values of α , for which the shortest distance between the lines

$$\frac{x+1}{\alpha} = \frac{y-2}{-1} = \frac{z-4}{-\alpha} \text{ and } \frac{x}{\alpha} = \frac{y-1}{2} = \frac{z-1}{2\alpha} \text{ is } \sqrt{2}, \text{ is}$$

Options :

4447922089. - 6

4447922090. 6

4447922091. - 8

4447922092. 8

Question Number : 9 Question Id : 444792601 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the domain of the function $f(x) = \sin^{-1}\left(\frac{1}{x^2 - 2x - 2}\right)$, is

$(-\infty, \alpha] \cup [\beta, \gamma] \cup [\delta, \infty)$, then $\alpha + \beta + \gamma + \delta$ is equal to

Options :

4447922041. 2

4447922042. 3

4447922043. 4

4447922044. 5

Question Number : 10 Question Id : 444792610 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the length of the latus rectum of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, ($a > b$), be 30. If its eccentricity is the maximum value of the function $f(t) = -\frac{3}{4} + 2t - t^2$, then $(a^2 + b^2)$ is equal to

Options :

4447922077. 256

4447922078. 496

4447922079. 516

4447922080. 276

Question Number : 11 Question Id : 444792614 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a} = 2\hat{i} - \hat{j} - \hat{k}$, $\vec{b} = \hat{i} + 3\hat{j} - \hat{k}$ and $\vec{c} = 2\hat{i} + \hat{j} + 3\hat{k}$. Let $\vec{v}$ be the vector in the plane of the vectors $\vec{a}$ and $\vec{b}$, such that the length of its projection on the vector $\vec{c}$ is $\frac{1}{\sqrt{14}}$. Then $|\vec{v}|$ is equal to

Options :

4447922093. 7

4447922094. 13

4447922095. $\frac{\sqrt{21}}{2}$

4447922096. $\frac{\sqrt{35}}{2}$

Question Number : 12 Question Id : 444792602 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x$, $x \neq 0$, where $m = \sum_{i=1}^9 (i)^2$. Then $f(5) - f(2)$ is equal to

Options :

4447922045. -9

4447922046. 9

4447922047. 18

Question Number : 13 Question Id : 444792619 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(\alpha)$ denote the area of the region in the first quadrant bounded by $x = 0$, $x = 1$, $y^2 = x$ and $y = |\alpha x - 5| - |1 - \alpha x| + \alpha x^2$. Then $(f(0) + f(1))$ is equal to

Options :

4447922113. 7

4447922114. 9

4447922115. 12

4447922116. 14

Question Number : 14 Question Id : 444792603 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The smallest positive integral value of a , for which all the roots of $x^4 - ax^2 + 9 = 0$ are real and distinct, is equal to

Options :

4447922049. 3

4447922050. 7

4447922051. 4

4447922052. 9

Question Number : 15 Question Id : 444792615 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a} = 2\hat{i} - 5\hat{j} + 5\hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + 3\hat{k}$. If $\vec{c}$ is a vector such that

$2(\vec{a} \times \vec{c}) + 3(\vec{b} \times \vec{c}) = \vec{0}$ and $(\vec{a} - \vec{b}) \cdot \vec{c} = -97$, then $|\vec{c} \times \hat{k}|^2$ is equal to

Options :

4447922097. 193

4447922098. 205

4447922099. 218

4447922100. 233

Question Number : 16 Question Id : 444792616 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $[t]$ denote the greatest integer less than or equal to t . If the function

$$f(x) = \begin{cases} b^2 \sin \left(\frac{\pi}{2} \left[\frac{\pi}{2} (\cos x + \sin x) \cos x \right] \right), & x < 0 \\ \frac{\sin x - \frac{1}{2} \sin 2x}{x^3}, & x > 0 \\ a, & x = 0 \end{cases}$$

is continuous at $x = 0$, then $a^2 + b^2$ is equal to

Options :

4447922101. $\frac{3}{4}$

4447922102. $\frac{9}{16}$

4447922103. $\frac{1}{2}$

4447922104. $\frac{5}{8}$

Question Number : 17 Question Id : 444792618 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x) = \int \frac{7x^{10} + 9x^8}{(1+x^2+2x^9)^2} dx, x > 0, \lim_{x \rightarrow 0} f(x) = 0$ and $f(1) = \frac{1}{4}$.

If $A = \begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{4} & f'(1) & 1 \\ \alpha^2 & 4 & 1 \end{bmatrix}$ and $B = \text{adj}(\text{adj } A)$ be such that $|B| = 81$, then α^2 is

equal to

Options :

4447922109. 1

4447922110. 2

4447922111. 3

4447922112. 4

Question Number : 18 Question Id : 444792606 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$\left(\frac{1}{3} + \frac{4}{7} \right) + \left(\frac{1}{3^2} + \frac{1}{3} \times \frac{4}{7} + \frac{4^2}{7^2} \right) + \left(\frac{1}{3^3} + \frac{1}{3^2} \times \frac{4}{7} + \frac{1}{3} \times \frac{4^2}{7^2} + \frac{4^3}{7^3} \right) + \dots$ upto infinite terms,

is equal to

Options :

4447922061. $\frac{6}{5}$

4447922062. $\frac{4}{3}$

4447922063. $\frac{5}{2}$

4447922064. $\frac{7}{4}$

Question Number : 19 Question Id : 444792620 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $y = y(x)$ be a differentiable function in the interval $(0, \infty)$ such that $y(1) = 2$,

and $\lim_{t \rightarrow x} \left(\frac{t^2 y(x) - x^2 y(t)}{x - t} \right) = 3$ for each $x > 0$. Then $2y(2)$ is equal to

Options :

4447922117. 23

4447922118. 12

4447922119. 18

4447922120. 27

Question Number : 20 Question Id : 444792611 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 parabola $x^2 = 4y$, in the line $x - y = 1$ be $(y + a)^2 = b(x - c)$, $a, b, c \in \mathbb{N}$. Then $a + b + c$ is equal to

Options :

4447922081. 4

4447922082. 6

4447922083. 8

4447922084. 12

Mathematics Section B

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

Question Shuffling Allowed :
Is Section Default? :

Yes
No

Question Number : 21 Question Id : 444792624 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The number of elements in the set

$\{x \in [0, 180^\circ] : \tan(x + 100^\circ) = \tan(x + 50^\circ) \tan x \tan(x - 50^\circ)\}$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 22 Question Id : 444792621 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $z = (1 + i)(1 + 2i)(1 + 3i) \dots (1 + ni)$, where $i = \sqrt{-1}$. If $|z|^2 = 44200$, then n 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 Id : 444792623 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let (h, k) lie on the circle $C : x^2 + y^2 = 4$ and the point $(2h + 1, 3k + 2)$ lie on an ellipse with eccentricity e . Then the value of $\frac{5}{e^2}$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 24 Question Id : 444792625 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $f(x)$ satisfies the relation $f(x) = e^x + \int_0^1 (y + xe^x) f(y) dy$, then $e + f(0)$ 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 Id : 444792622 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let S be a set of 5 elements and $P(S)$ denote the power set of S . Let E be an event of choosing an ordered pair (A, B) from the set $P(S) \times P(S)$ such that $A \cap B = \emptyset$. If

the probability of the event E is $\frac{3^p}{2^q}$, where $p, q \in \mathbb{N}$, then $p + q$ is equal to _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Physics Section A

Section Number :

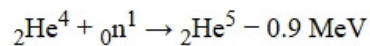
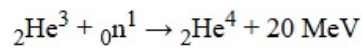
3

Section type :

Online

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

Question Number : 26 Question Id : 444792643 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
The binding energy for the following nuclear reactions are expressed in MeV.



If X_3 , X_4 , X_5 denote the stability of ${}_2\text{He}^3$, ${}_2\text{He}^4$ and ${}_2\text{He}^5$, respectively, then the correct order is :

Options :

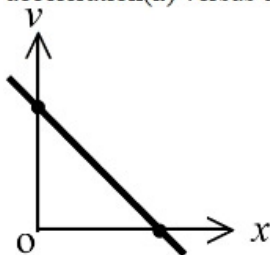
4447922194. $X_4 < X_5 < X_3$

4447922195. $X_4 > X_5 > X_3$

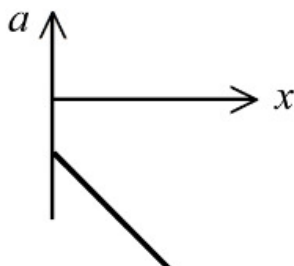
4447922196. $X_4 = X_5 = X_3$

4447922197. $X_4 > X_5 < X_3$

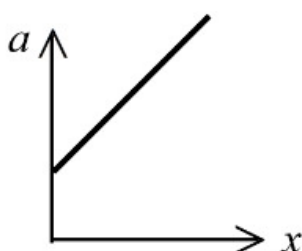
Question Number : 27 Question Id : 444792628 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
The velocity (v) – Distance (x) graph is shown in figure. Which graph represents acceleration(a) versus distance (x) variation of this system?



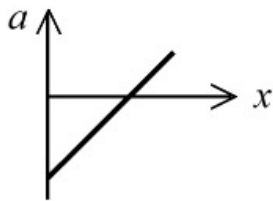
Options :



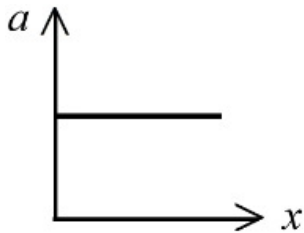
4447922134.



4447922135.



4447922136.



4447922137.

Question Number : 28 Question Id : 444792636 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A regular hexagon is formed by six wires each of resistance $r \, \Omega$ and the corners are joined to the centre by wires of same resistance. If the current enters at one corner and leaves at the opposite corner, the equivalent resistance of the hexagon between the two opposite corners will be

Options :

4447922166. $\frac{3}{4}r$

4447922167. $\frac{3}{5}r$

4447922168. $\frac{4}{5}r$

4447922169. $\frac{5}{8}r$

Question Number : 29 Question Id : 444792641 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Distance between an object and three times magnified real image is 40 cm. The focal length of the mirror used is _____ cm.

Options :

4447922186. -10

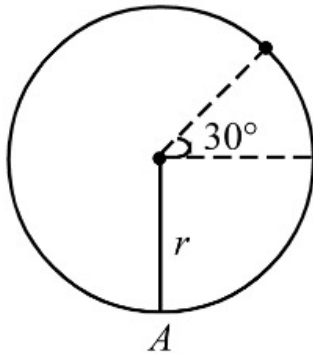
4447922187. $-15/2$

4447922188. -15

4447922189. -20

Question Number : 30 Question Id : 444792630 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In case of vertical circular motion of a particle by a thread of length r if the tension in the thread is zero at an angle 30° shown in figure, the velocity at the bottom point (A) of the circular path is
(g = gravitational acceleration)



Options :

4447922142. $\sqrt{\frac{5}{2}gr}$

4447922143. $\sqrt{5gr}$

4447922144. $\sqrt{\frac{7}{2}gr}$

4447922145. $\sqrt{4gr}$

Question Number : 31 Question Id : 444792633 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The fifth harmonic of a closed organ pipe is found to be in unison with the first harmonic of an open pipe. The ratio of lengths of closed pipe to that of the open pipe is $5/x$. The value of x is _____.

Options :

4447922154. 2

4447922155. 3

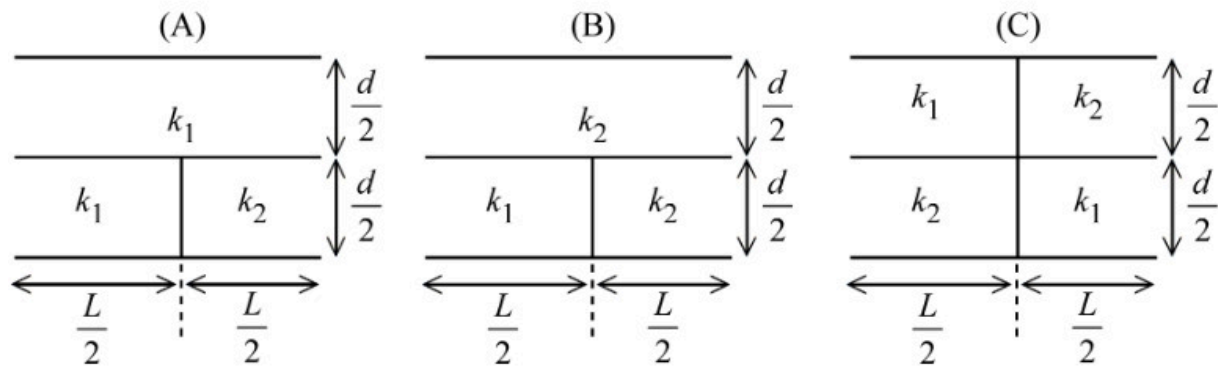
4447922156. 4

4447922157. 1

Question Number : 32 Question Id : 444792637 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Three parallel plate capacitors each with area A and separation d are filled with two dielectric (k_1 and k_2) in the following fashion. Which of the following is true?

($k_1 > k_2$)



Options :

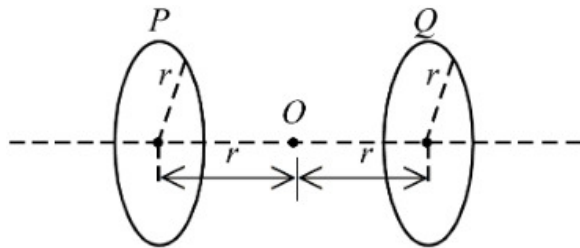
4447922170. $C_A > C_C > C_B$

4447922171. $C_C > C_B > C_A$

4447922172. $C_B > C_C > C_A$

4447922173. $C_C > C_A > C_B$

Question Number : 33 Question Id : 444792635 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical



Two identical circular loops P and Q each of radius r are lying in parallel planes such that they have common axis. The current through P and Q are I and $4I$ respectively in clockwise direction as seen from O . The net magnetic field at O is:

Options :

4447922162. $\frac{3\mu_0 I}{4\sqrt{2}r}$ towards P

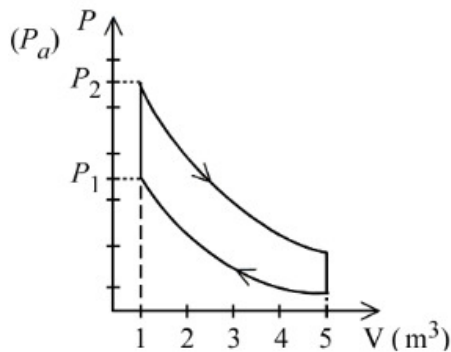
4447922163. $\frac{3\mu_0 I}{4\sqrt{2}r}$ towards Q

4447922164. $\frac{\mu_0 I}{4\sqrt{2}r}$ towards P

4447922165. $\frac{\mu_0 I}{4\sqrt{2}r}$ towards Q

Question Number : 34 Question Id : 444792632 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

10 mole of an ideal gas is undergoing the process shown in the figure. The heat involved in the process from P_1 to P_2 is α Joule ($P_1 = 21.7$ Pa and $P_2 = 30$ Pa, $C_v = 21$ J/K.mol, $R = 8.3$ J/mol.K). The value of α is _____.



Options :

4447922150. 15

4447922151. 21

4447922152. 24

4447922153. 28

Question Number : 35 Question Id : 444792626 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a vernier callipers, 50 vernier scale divisions are equal to 48 main scale divisions. If one main scale division = 0.05 mm, then the least count of the vernier callipers is _____ mm.

Options :

4447922126. 0.02

4447922127. 0.002

4447922128. 0.05

4447922129. 0.005

Question Number : 36 Question Id : 444792629 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A flexible chain of mass m hangs between two fixed points at the same level. The inclination of the chain with the horizontal at the two points of support is 30° . Considering the equilibrium of each half of the chain, the tension of the chain at the lowest point is _____.

Options :

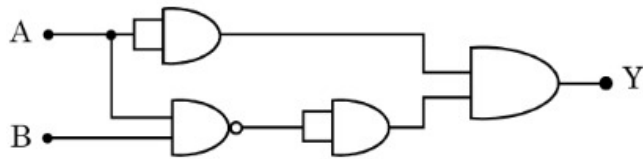
4447922138. $\frac{\sqrt{3}}{2}mg$

4447922139. $\sqrt{3}mg$

4447922140. $\frac{1}{2}mg$

Question Number : 37 Question Id : 444792644 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Identify the correct truth table of the given logic circuit.



Options :

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

4447922198.

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

4447922199.

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

4447922200.

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

4447922201.

Question Number : 38 Question Id : 444792634 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A moving coil galvanometer of resistance $100\ \Omega$ shows a full scale deflection for a current of $1\ \text{mA}$. The value of resistance required to convert this galvanometer into an ammeter, showing full scale deflection for a current of $5\ \text{mA}$, is _____ Ω

Options :

4447922158. 2.5

4447922159. 0.5

4447922160. 10

4447922161. 25

Question Number : 39 Question Id : 444792638 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A point source is kept at the center of a spherically enclosed detector. If the volume of the detector increased by 8 times, the intensity will

Options :

4447922174. increase by 8 times

4447922175. increase by 64 times

4447922176. decrease by 8 times

4447922177. decrease by 4 times

Question Number : 40 Question Id : 444792639 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Five persons P_1, P_2, P_3, P_4 and P_5 recorded object distance (u) and image distance (v) using same convex lens having power +5D as (25,96), (30,62), (35,37), (45,35) and (50,32) respectively. Identify correct statement

Options :

4447922178. Readings recorded by all persons are correct

4447922179. Readings recorded by P_3 person are incorrect

4447922180. Readings recorded by P_3 and P_2 persons are incorrect

4447922181. Readings recorded by P_4 and P_5 persons are incorrect

Question Number : 41 Question Id : 444792640 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the Young's double slit experiment the intensity produced by each one of the individual slits is I_0 . The distance between two slits is 2 mm . The distance of screen from slits is 10 m. The wavelength of light is $6000 \text{ \AA}$. The intensity of light on the screen in front of one of the slits is _____.

Options :

4447922182. $\frac{I_0}{2}$

4447922183. I_0

4447922184. $2I_0$

4447922185. $4I_0$

Question Number : 42 Question Id : 444792631 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A cubical block of density $\rho_b = 600 \text{ kg/m}^3$ floats in a liquid of density $\rho_e = 900 \text{ kg/m}^3$. If the height of block is $H = 8.0 \text{ cm}$ then height of the submerged part is _____ cm.

Options :

4447922146. 4.3

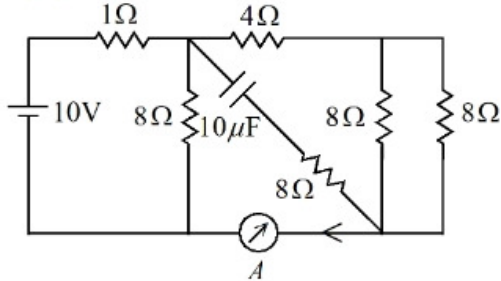
4447922147. 5.3

4447922148. 6.3

4447922149. 7.3

Question Number : 43 Question Id : 444792645 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The reading of the ammeter (A) in steady state in the following circuit (assuming negligible internal resistance of the ammeter) is _____ A.



Options :

4447922202. 1

4447922203. $1/2$

4447922204. 2

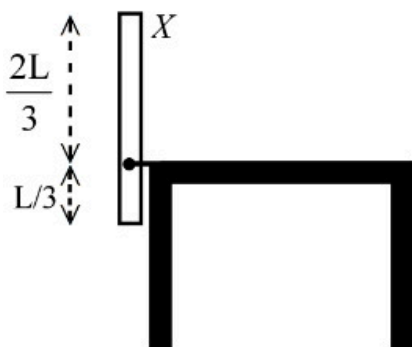
4447922205. 0

Question Number : 44 Question Id : 444792627 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A thin uniform rod (X) of mass M and length L is pivoted at a height $\left(\frac{L}{3}\right)$ as

shown in the figure. The rod is allowed to fall from a vertical position and lie horizontally on the table. The angular velocity of this rod when it hits the table top, is _____.

(g = gravitational acceleration)



Options :

4447922130. $\sqrt{\frac{3}{2} \frac{g}{L}}$

4447922131. $\frac{3}{\sqrt{2}} \sqrt{\frac{g}{L}}$

4447922132. $\sqrt{\frac{3g}{L}}$

4447922133. $\frac{1}{\sqrt{2}} \sqrt{\frac{g}{L}}$

Question Number : 45 Question Id : 444792642 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When a light of a given wavelength falls on a metallic surface the stopping potential for photoelectrons is 3.2 V. If a second light having wavelength twice of first light is used, the stopping potential drops to 0.7 V. The wavelength of first light is _____ m.

($h = 6.63 \times 10^{-34}$ J.s, $e = 1.6 \times 10^{-19}$ C, $c = 3 \times 10^8$ m/s)

Options :

4447922190. 3.1×10^{-7}

4447922191. 2.5×10^{-7}

4447922192. 2.9×10^{-8}

4447922193. 2.2×10^{-8}

Physics Section B

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
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 444792648 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A soap bubble of surface tension 0.04 N/m is blown to a diameter of 7 cm. If $(15000 - x)$ μ J of work is done in blowing it further to make its diameter 14 cm, then the value of x is _____.

($\pi = 22/7$)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 47 Question Id : 444792649 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A uniform solid cylinder of length L and radius R has moment of inertia about its axis equal to I_1 . A small co-centric cylinder of length $L/2$ and radius $R/3$ carved from this cylinder has moment of inertia about its axis equals to I_2 . The ratio I_1/I_2 is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 48 Question Id : 444792650 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In a meter bridge experiment to determine the value of unknown resistance, first the resistances $2\ \Omega$ and $3\ \Omega$ are connected in the left and right gaps of the bridge and the null point is obtained at a distance l cm from the left. Now when an unknown resistance $x\ \Omega$ is connected in parallel to $3\ \Omega$ resistance, the null point is shifted by 10 cm to the right of wire. The value of unknown resistance x is _____ Ω .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 49 Question Id : 444792647 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

When 300 J of heat given to an ideal gas with $C_p = \frac{7}{2}R$ its temperature raises from $20\ ^\circ\text{C}$ to $50\ ^\circ\text{C}$ keeping its volume constant. The mass of the gas is (approximately) _____ g. ($R = 8.314\ \text{J/mol.K}$)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

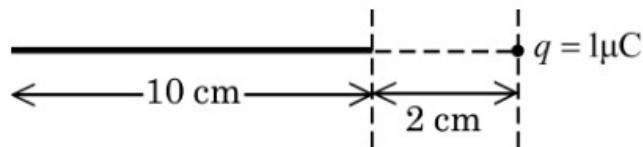
Answers Type : Equal

Text Areas : PlainText

Question Number : 50 Question Id : 444792646 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A point charge $q = 1\ \mu\text{C}$ is located at a distance 2 cm from one end of a thin insulating wire of length 10 cm having a charge $Q = 24\ \mu\text{C}$, distributed uniformly along its length, as shown in figure. Force between q and wire is _____ N.

(Use : $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9\ \text{N.m}^2/\text{C}^2$)



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 : 51 Question Id : 444792670 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the Group analysis of cations, Ba^{2+} & Ca^{2+} are precipitated respectively as

Options :

4447922287. sulphide & sulphide

4447922288. hydroxide & carbonate

4447922289. carbonate & carbonate

4447922290. chromate & sulphide

Question Number : 52 Question Id : 444792668 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: The dipole moment of R-CN is greater than R-NC and R-NC can

undergo hydrolysis under acidic medium to produce $\text{R} - \overset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{OH}$.

Statement II: R-CN hydrolyses under acidic medium to produce a compound which on treatment with SOCl_2 , followed by the addition of NH_3 gives another compound(x). This compound (x) on treatment with NaOCl/NaOH gives a product, that on treatment with $\text{CHCl}_3/\text{KOH}/\Delta$ produces R-NC

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

Options :

4447922279. Both Statement I and Statement II are true

4447922280. Both Statement I and Statement II are false

4447922281. Statement I is true but Statement II is false

4447922282. Statement I is false but Statement II is true

Question Number : 53 Question Id : 444792660 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

"X" is an oxoanion of the lightest element of group 7 (in the periodic table). The metal is in +6 oxidation state in "X". The color of the potassium salt of X is

Options :

4447922247. green

4447922248. purple

4447922249. yellow

4447922250. orange

Question Number : 54 Question Id : 444792659 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Choose the **INCORRECT** statement

Options :

4447922243. Carbon cannot exceed its covalency more than four.

4447922244. Carbon exhibits negative oxidation states along with +4 and +2.

4447922245. Among the isotopes of carbon, ^{13}C is a radioactive isotope.

4447922246. CO_2 is the most acidic oxide among the dioxides of group of 14 elements.

Question Number : 55 Question Id : 444792656 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two liquids A and B form an ideal solution at temperature T K. At T K, the vapour pressures of pure A and B are 55 and 15 kN m⁻² respectively. What is the mole fraction of A in solution of A and B in equilibrium with a vapour in which the mole fraction of A is 0.8?

Options :

4447922231. 0.480

4447922232. 0.663

4447922233. 0.5217

4447922234. 0.340

Question Number : 56 Question Id : 444792669 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 possible tripeptides formed involving alanine (ala), glycine (gly) and valine (val), where no amino acid has been used more than once is:

Options :

4447922283. 3

4447922284. 4

4447922285. 6

4447922286. 8

Question Number : 57 Question Id : 444792651 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

One mole of $\text{Cl}_2(\text{g})$ was passed into 2 L of cold 2M KOH solution. After the reaction, the concentrations of Cl^- , ClO^- and OH^- are respectively (assume volume remains constant)

Options :

4447922211. 1M, 1M, 1M

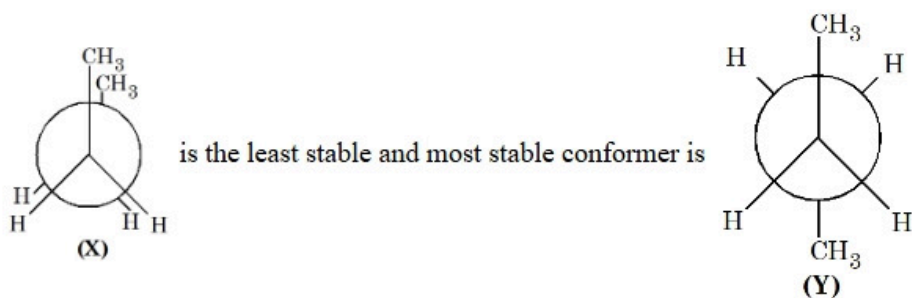
4447922212. 0.5M, 0.5M, 1M

4447922213. 0.5M, 0.5M, 0.5M

4447922214. 0.75M, 0.75M, 1M

Question Number : 58 Question Id : 444792663 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: There are several conformers for n-butane. Out of those conformers,



Statement II: As the dihedral angle increases, torsional strain decreases from (X) to (Y).

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

Options :

4447922259. Both Statement I and Statement II are true

4447922260. Both Statement I and Statement II are false

4447922261. Statement I is true but Statement II is false

4447922262. Statement I is false but Statement II is true

Question Number : 59 Question Id : 444792655 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

At 298 K, the mole percentage of $\text{N}_2(\text{g})$ in air is 80%. Water is in equilibrium with air at a pressure of 10 atm. What is the mole fraction of $\text{N}_2(\text{g})$ in water at 298 K?

(K_{H} for N_2 is 6.5×10^7 mm Hg)

Options :

4447922227. 9.35×10^{-5}

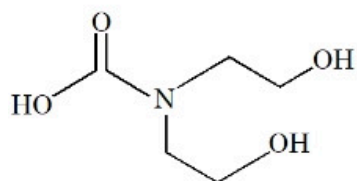
4447922228. 1.23×10^{-7}

4447922229. 9.35×10^5

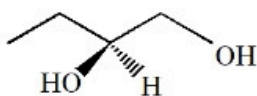
4447922230. 1.17×10^{-4}

Question Number : 60 Question Id : 444792667 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

From the following, how many compounds contain at least one secondary alcohol?



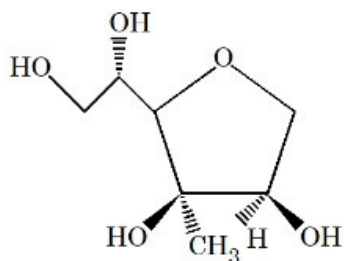
(I)



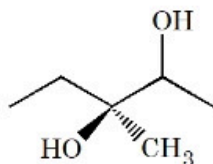
(II)



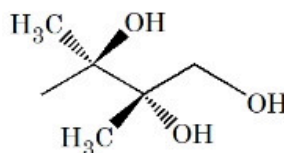
(III)



(IV)



(V)



(VI)

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

Options :

4447922275. Three

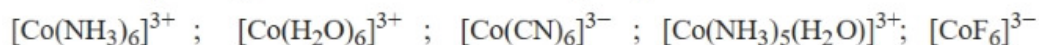
4447922276. Five

4447922277. Two

4447922278. Four

Question Number : 61 Question Id : 444792661 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The wavelength of light absorbed for the following complexes are in the order



(I)

(II)

(III)

(IV)

(V)

Options :

4447922251. III < IV < I < II < V

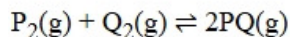
4447922252. III < I < II < IV < V

4447922253. III < I < IV < II < V

4447922254. III < I < IV < V < II

Question Number : 62 Question Id : 444792657 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 gaseous equilibrium in a closed container of volume 'V' at T(K).



2 moles each of $\text{P}_2(\text{g})$, $\text{Q}_2(\text{g})$ and $\text{PQ}(\text{g})$ are present at equilibrium. Now one mole each of ' P_2 ' and ' Q_2 ' are added to the equilibrium keeping the temperature at T(K).

The number of moles of P_2 , Q_2 and PQ at the new equilibrium, respectively, are

Options :

4447922235. 1.66, 1.66, 1.66

4447922236. 2.67, 2.67, 2.67

4447922237. 1.21, 2.24, 1.56

4447922238. 2.56, 1.62, 2.24

Question Number : 63 Question Id : 444792664 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: Cross aldol condensation between two different aldehydes will always produce four different products.

Statement II: When semicarbazide reacts with a mixture of benzaldehyde and acetophenone under optimum pH, it forms a condensation product with acetophenone only.

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

Options :

4447922263. Both Statement I and Statement II are true

4447922264. Both Statement I and Statement II are false

4447922265. Statement I is true but Statement II is false

4447922266. Statement I is false but Statement II is true

Question Number : 64 Question Id : 444792652 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The wavelength of spectral line obtained in the spectrum of Li^{2+} ion, when the transition takes place between two levels whose sum is 4 and difference is 2, is

Options :

4447922215. 2.28×10^{-6} cm

4447922216. 1.14×10^{-6} cm

4447922217. 1.14×10^{-7} cm

4447922218. 2.28×10^{-7} cm

Question Number : 65 Question Id : 444792654 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The heat of atomisation of methane and ethane are 'x' kJ mol⁻¹ and 'y' kJ mol⁻¹ respectively. The longest wavelength (λ) of light capable of breaking the C–C bond can be expressed in SI unit as:

Options :

4447922223. $\frac{N_A hc}{250(4y - 6x)}$

4447922224. $\frac{hc}{1000} \left(\frac{y - 6x}{4} \right)^{-1}$

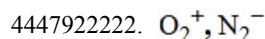
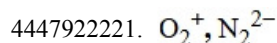
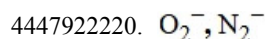
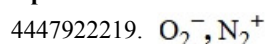
4447922225. $\frac{N_A hc}{250(y - 6x)}$

4447922226. $N_A hc \left(y - \frac{6x}{4} \right)^{-1}$

Question Number : 66 Question Id : 444792653 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

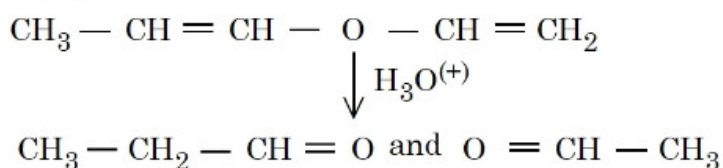
Pair of species among the following having same bond order as well as paramagnetic character will be-

Options :

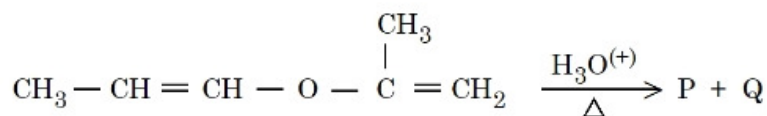


Question Number : 67 Question Id : 444792665 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

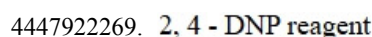
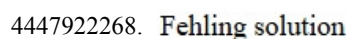
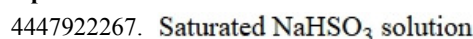
The unsaturated ether on acidic hydrolysis produces carbonyl compounds as shown below:-



Based on this, predict the solution/reagent that will help to distinguish "P" and "Q" obtained in the following reaction:-



Options :



Question Number : 68 Question Id : 444792662 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Find out the statements which are **not** true.

- A. Resonating structures with more number of covalent bonds and lesser charge separation are more stable.
- B. In electromeric effect, an unsaturated system shows +E effect with nucleophile and -E effect with electrophile.
- C. Inductive effect is responsible for high melting point, boiling point and dipole moment of polar compounds.
- D. The greater the number of alkyl groups attached to the doubly bonded carbon atoms, higher is the heat of hydrogenation.
- E. Stability of carbanion increases with the increase in s - character of the carbon carrying the negative charge.

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

Options :

4447922255. B & D only

4447922256. A, C & D only

4447922257. B, D & E only

4447922258. A, D & E only

Question Number : 69 Question Id : 444792658 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The correct order of C, N, O and F in terms of second ionisation potential is

Options :

4447922239. $F < N < C < O$

4447922240. $C < O < N < F$

4447922241. $C < F < N < O$

4447922242. $C < N < F < O$

Question Number : 70 Question Id : 444792666 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A student has planned to prepare acetanilide from aniline using acetic anhydride.

The student has started from 9.3 g of aniline. However, the student has managed to obtain 11 g of dry acetanilide.

The % yield of this reaction is :-

Options :

4447922271. 72.5%

4447922272. 81.5%

4447922273. 97.5%

Chemistry Section B

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
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 444792675 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The half-life of ^{65}Zn is 245 days. After x days, 75% of original activity remained.

The value of x in days is _____. (Nearest integer)

(Given: $\log 3 = 0.4771$ and $\log 2 = 0.3010$)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 72 Question Id : 444792674 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Molar conductivity of a weak acid HQ of concentration 0.18 M was found to be $1/30$ of the molar conductivity of another weak acid HZ with concentration of 0.02 M. If $\lambda^\circ_{\text{Q}^-}$ happened to be equal with $\lambda^\circ_{\text{Z}^-}$, then the difference of the pK_a values of the two weak acids ($\text{pK}_a(\text{HQ}) - \text{pK}_a(\text{HZ})$) is _____. (Nearest integer).

[Given: degree of dissociation (α) $\ll 1$ for both weak acids, λ° : limiting molar conductivity of ions]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 73 Question Id : 444792671 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A chromium complex with a formula $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ has a spin only magnetic moment value of 3.87 BM and its solution conductivity corresponds to 1 : 2 electrolyte. 2.75 g of the complex solution was initially passed through a cation exchanger. The solution obtained after the process was reacted with excess of AgNO_3 . The amount of AgCl formed in the above process is ____ g. (Nearest integer)

[Given: Molar mass in g mol^{-1} Cr : 52; Cl: 35.5, Ag:108, O:16, H:1]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 74 Question Id : 444792673 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript
0.25 g of an organic compound "A" containing carbon, hydrogen and oxygen was analysed using the combustion method. There was an increase in mass of CaCl_2 tube and potash tube at the end of the experiment. The amount was found to be 0.15 g and 0.1837 g, respectively. The percentage of oxygen in compound A is _____. (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

Question Number : 75 Question Id : 444792672 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript
Grignard reagent RMgBr (P) reacts with water and forms a gas (Q). One gram of Q occupies 1.4 dm^3 at STP. (P) on reaction with dry ice in dry ether followed by H_3O^+ forms a compound (Z). 0.1 mole of (Z) will weigh _____ g. (Nearest integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText