National Testing Agency

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B. Tech

Group Number :	1
Group Id :	6952786
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 :	69527831
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 :	69527831
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 695278376 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the function $f: [1,\infty) \to [1, \infty)$ defined by $f(x) = (x-1)^4 + 1$, among the two statements:

(I) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x)\}$ contains exactly two elements, and

(II) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x+1)\}$ is an empty set,

Options :

6952781276. only (I) is TRUE

6952781277. only (II) is TRUE

6952781278. both (I) and (II) are TRUE

6952781279. neither (I) nor (II) is TRUE

Question Number : 2 Question Id : 695278377 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $S = \{z \in \mathbb{C} : z^2 + 4z + 16 = 0\}$. Then $\sum_{z \in S} |z + \sqrt{3}\,i|^2$ is equal to:

Options :

6952781280. 42

6952781281. 23

6952781282. 27

6952781283. 38

Question Number : 3 Question Id : 695278378 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the system of equations:

$x + y + z = 5$

$x + 2y + 3z = 9$

$x + 3y + \lambda z = \mu$

has infinitely many solutions, then the value of $\lambda + \mu$ is:

Options :

6952781284. 16

6952781285. 18

6952781286. 19

6952781287. 21

Question Number : 4 Question Id : 695278379 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\alpha = 1$ and $\beta = 1 + i\sqrt{2}$, where $i = \sqrt{-1}$ are two roots of the equation

$x^3 + ax^2 + bx + c = 0, a, b, c \in \mathbb{R}$, then $\int_{-1}^{1} \left(x^3 + ax^2 + bx + c\right) dx$ is equal to:

Options :

6952781288. -2

6952781289. -4

6952781290. -8

6952781291. -10

Question Number : 5 Question Id : 695278380 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the quadratic equation $(\lambda + 2)x^2 - 3\lambda x + 4\lambda = 0, \lambda \neq -2$, has two positive roots, then the number of possible integral values of λ is:

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Options :

6952781292. 1

6952781293. 2

6952781294. 3

6952781295. 4

Question Number : 6 Question Id : 695278381 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A=\begin{bmatrix}1 & 2 & 7\\ 4 & -2 & 8\\ 3 & 8 & -7\end{bmatrix}$ and $\det(A-\alpha I)=0$, where α is a real number. If the largest possible value of α is p, then the circle $(x-p)^2+(y-2p)^2=320$, intersects the co-ordinate axes at

Options :

6952781296. 1 point

6952781297. 2 points

6952781298. 3 points

6952781299. 4 points

Question Number : 7 Question Id : 695278382 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\alpha=\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+...\infty$ and $\beta=\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+...\infty$. Then the value of $(0.2)^{\log_{\sqrt{5}}(\alpha)}+(0.04)^{\log_5(\beta)}$ is equal to:

Options :

6952781300. 4

6952781301. 5

6952781302. 8

6952781303. 25

Question Number : 8 Question Id : 695278383 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For 10 observations $x_1, x_2, ..., x_{10}$, if $\sum_{i=1}^{10}(x_i+2)^2=180$ and $\sum_{i=1}^{10}(x_i-1)^2=90$, then their standard deviation is:

Options :

6952781304. 2

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6952781305. $\sqrt{3}$

6952781306. $2\sqrt{2}$

6952781307. 3

Question Number : 9 Question Id : 695278384 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the expansion of $\left(9x-\frac{1}{3\sqrt{x}}\right)^{18}$, $x>0$, if the term independent of x is (221)k, then k is equal to:

Options :

6952781308. 84

6952781309. 78

6952781310. 168

6952781311. 198

Question Number : 10 Question Id : 695278385 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let P (3cos α, 2sin α), $\alpha \neq 0$, be a point on the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$, Q be a point on the circle $x^2+y^2-14x-14y+82=0$ and R be a point on the line $x+y=5$ such that the centroid of the triangle PQR is $\left(2+\cos\alpha, 3+\frac{2}{3}\sin\alpha\right)$. Then the sum of the ordinates of all possible points R is:

Options :

6952781312. 6

6952781313. 2

6952781314. 4

6952781315. 8

Question Number : 11 Question Id : 695278386 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $H: \frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ be a hyperbola such that the distance between its foci is 6 and the distance between its directrices is $\frac{8}{3}$. If the line $x=\alpha$ intersects the hyperbola H at the points A and B such that the area of the triangle AOB is $4\sqrt{15}$, where O is the origin, then α^2 equals

Options :

6952781316. 12

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6952781317. 16

6952781318. 24

6952781319. 25

Question Number : 12 Question Id : 695278387 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$\max\limits_{0 \le x \le \pi}\left(16\sin\left(\frac{x}{2}\right)\cos^3\left(\frac{x}{2}\right)\right)$ is equal to:

Options :

6952781320. $\frac{3\sqrt{3}}{2}$

6952781321. $3\sqrt{3}$

6952781322. $4\sqrt{3}$

6952781323. $6\sqrt{3}$

Question Number : 13 Question Id : 695278388 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The shortest distance between the lines

$\vec{r} = \left(\frac{1}{3}\hat{i} + 2\hat{j} + \frac{8}{3}\hat{k}\right) + \lambda\left(2\hat{i} - 5\hat{j} + 6\hat{k}\right)$

and $\vec{r} = \left(-\frac{2}{3}\hat{i} - \frac{1}{3}\hat{k}\right) + \mu\left(\hat{j} - \hat{k}\right), \lambda, \mu \in \mathbb{R}$, is:

Options :

6952781324. $\sqrt{5}$

6952781325. 3

6952781326. $2\sqrt{3}$

6952781327. $\sqrt{15}$

Question Number : 14 Question Id : 695278389 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\left(2\alpha + 1, \alpha^2 - 3\alpha, \frac{\alpha - 1}{2}\right)$ is the image of $(\alpha, 2\alpha, 1)$ in the line

$\frac{x-2}{3} = \frac{y-1}{2} = \frac{z}{1}$, then the possible value(s) of α is (are)

Options :

6952781328. Only 3

6952781329. Only 3 and -1

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6952781330. Only 3, $\frac{1}{4}$ and -1

6952781331. Only 3 and $\frac{1}{4}$

Question Number : 15 Question Id : 695278390 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\hat{u}$ and $\hat{v}$ be unit vectors inclined at an acute angle such that $\left|\hat{u}\times\hat{v}\right|=\frac{\sqrt{3}}{2}$. If $\vec{A}=\lambda\,\hat{u}+\hat{v}+\left(\hat{u}\times\hat{v}\right)$, then λ is equal to:

Options :

6952781332. $\frac{4}{3}\left(\vec{A}\cdot\hat{u}\right)-\frac{2}{3}\left(\vec{A}\cdot\hat{v}\right)$

6952781333. $\frac{2}{3}\left(\vec{A}\cdot\hat{u}\right)-\frac{1}{3}\left(\vec{A}\cdot\hat{v}\right)$

6952781334. $\frac{4}{3}\left(\vec{A}\cdot\hat{u}\right)+\frac{2}{3}\left(\vec{A}\cdot\hat{v}\right)$

6952781335. $\left(\vec{A}\cdot\hat{u}\right)-\frac{1}{2}\left(\vec{A}\cdot\hat{v}\right)$

Question Number : 16 Question Id : 695278391 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let for some $\alpha\in\mathbb{R}$, $f:\mathbb{R}\to\mathbb{R}$ be a function satisfying $f(x+y)=f(x)+2y^2+y+\alpha xy$ for all $x, y\in\mathbb{R}$. If $f(0)=-1$ and $f(1)=2$, then the value of $\sum_{n=1}^{5}\left(\alpha+f\left(n\right)\right)$ is:

Options :

6952781336. 110

6952781337. 140

6952781338. 150

6952781339. 170

Question Number : 17 Question Id : 695278392 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let

$A=\{(a, b, c) : a, b, c$ are non-negative integers and $a+b+2c=22\}$.

Then $n(A)$ is equal to:

Options :

6952781340. 121

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6952781341. 124

6952781342. 144

6952781343. 169

Question Number : 18 Question Id : 695278393 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 bounded by the curves $x + 3y^2 = 0$ and $x + 4y^2 = 1$ is equal to:

Options :

6952781344. $\frac{1}{3}$

6952781345. $\frac{2}{3}$

6952781346. $\frac{4}{3}$

6952781347. $\frac{5}{3}$

Question Number : 19 Question Id : 695278394 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 the solution of the differential equation:

$$\frac{dy}{dx} + \left(\frac{6x^2 + \left(3x^2 + 2x^3 + 4\right)e^{-2x}}{\left(x^3 + 2\right)\left(2 + e^{-2x}\right)} \right) y = 2 + e^{-2x},$$

$x \in (-1, 2)$, satisfying $y(0) = \frac{3}{2}$. If $y(1) = \alpha(2 + e^{-2})$, then α is equal to:

Options :

6952781348. $\frac{13}{8}$

6952781349. $\frac{6}{13}$

6952781350. $\frac{12}{13}$

6952781351. $\frac{13}{12}$

Question Number : 20 Question Id : 695278395 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The integral $\int_0^1 \cot^{-1}\left(1 + x + x^2\right) dx$ is equal to:

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Options :

6952781352. $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$

6952781353. $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

6952781354. $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$

6952781355. $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

Mathematics Section B

Section Id :	69527832
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 :	69527832
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 695278396 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

From a month of 31 days, 3 different dates are selected at random. If the probability that these dates are in an increasing A.P. is equal to $\frac{a}{b}$, where $a, b \in$ N and $gcd\,(a, b) = 1$, then $a + b$ is equal to _____

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

Question Number : 22 Question Id : 695278397 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $f(x)=\begin{cases} e^{x-1} & , x<0 \\ x^2-5x+6 & , x\geq 0 \end{cases}$ and $g(x)=f(|x|)+|f(x)|$. If the number of points where g is not continuous and is not differentiable are α and β respectively, then $\alpha + \beta$ is equal to _____

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

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Text Areas : PlainText
Possible Answers :
1

Question Number : 23 Question Id : 695278398 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let A, B be points on the two half-lines $x - \sqrt{3}|y| = \alpha$, $\alpha > 0$ at a distance of α from their point of intersection P. The line segment AB meets the angle bisector of the given half-lines at the point Q. If $PQ = \frac{9}{2}$ and R is the radius of the circumcircle of ΔPAB, then $\frac{\alpha^2}{R}$ 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 : 695278399 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let A, B and C be the vertices of a variable right angled triangle inscribed in the parabola $y^2 = 16x$. Let the vertex B containing the right angle be (4, 8) and the locus of the centroid of ΔABC be a conic C_o. Then three times the length of latus rectum of C_o is _____

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 : 695278400 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let f be a twice differentiable function such that

$$f(x) = \int_0^x \tan(t-x)\,dt - \int_0^x f(t)\tan t\,dt,\ x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right).$$

Then $f''\left(\frac{\pi}{6}\right) + 12\,f'\left(-\frac{\pi}{6}\right) + f\left(\frac{\pi}{6}\right)$ is equal to _____

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

Physics Section A

Section Id : 69527833
Section Number : 3

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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 :	69527833
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 695278401 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		List-II	
A.	Planck's constant	I.	$M L^2 T^{-2}$
B.	Stopping potential	II.	T^{-1}
C.	Work function	III.	$M L^2 T^{-1}$
D.	Threshold frequency	IV.	$M L^2 T^{-3} A^{-1}$

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

Options :

6952781361. A-III, B-IV, C-I, D-II

6952781362. A-I, B-II, C-III, D-IV

6952781363. A-IV, B-III, C-I, D-II

6952781364. A-I, B-IV, C-III, D-II

Question Number : 27 Question Id : 695278402 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two cars *A* and *B* are moving in the same direction along a straight line with speeds 100 km/h and 80 km/h, respectively such that car *A* is moving ahead of car *B*. A person in car *B* throws a stone with a speed *v* so that it hits the car *A* with a speed of 5 m/s. The value of *v* is _____ km/h.

Options :

6952781365. 18

6952781366. 28

6952781367. 38

6952781368. 48

Question Number : 28 Question Id : 695278403 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

At $t = 0$, a body of mass 100 g starts moving under the influence of a force $\left(5\hat{i}+10\hat{j}\right)$N. After 2 s its position is $\left(2x\hat{i}+5y\hat{j}\right)$ m. The ratio $x : y$ is_____.

Options :

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6952781369. $1:2$

6952781370. $2:5$

6952781371. $5:2$

6952781372. $5:4$

Question Number : 29 Question Id : 695278404 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If x and y coordinates of a projectile as a function of time (t) are given as $24t$ and $43.6t - 4.9t^2$, respectively, then the angle (in degrees) made by the projectile with horizontal when $t = 2$ s is _____.

Options :

6952781373. 60

6952781374. 45

6952781375. 30

6952781376. 75

Question Number : 30 Question Id : 695278405 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The height in terms of radius of the earth (R), at which the acceleration due to gravity becomes $\frac{g}{9}$, where g is acceleration due to gravity on earth's surface, is _____.

Options :

6952781377. $\sqrt{3}R$

6952781378. $2\sqrt{2}R$

6952781379. $2R$

6952781380. $\frac{4}{9}R$

Question Number : 31 Question Id : 695278406 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A metal string A is suspended from a rigid support and its free end is attached to a block of mass M. Second block having mass 2M is suspended at the bottom of the first block using a string B. The area of cross sections of strings A and B are same. The ratio of lengths of strings of A to B is 2 and the ratio of their Young's moduli (Y_A/ Y_B) is 0.5. The ratio of elongations in A to B is _____.

Options :

6952781381. 1

6952781382. 4

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6952781383. 8

6952781384. 6

Question Number : 32 Question Id : 695278407 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A water spray gun is attached to a hose of cross sectional area 30 cm^2. The gun comprises of 10 perforations each of cross sectional area of 15 mm^2. If the water flows in the hose with the speed of 50 cm/s, calculate the speed at which the water flows out from each perforation. (Neglect any edge effects)

Options :

6952781385. 100 m/s

6952781386. 10 m/s

6952781387. 1000 m/s

6952781388. 15×10^2 m/s

Question Number : 33 Question Id : 695278408 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: If the average kinetic energy of H_2 and O_2 molecules, kept in two different sized containers are same, then their temperatures will be same.

Reason R: The r.m.s. speed of H_2 and O_2 molecules are same at same temperature.

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

Options :

6952781389. Both **A** and **R** are true and **R** is the correct explanation of **A**

6952781390. Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

6952781391. **A** is true but **R** is false

6952781392. **A** is false but **R** is true

Question Number : 34 Question Id : 695278409 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The temperature of a metal strip having coefficient of linear expansion α is increased from T_1 to T_2 resulting in increase of its length by ΔL_1. The temperature is further increased from T_2 to T_3 such that the increase in its length is ΔL_2.

Given $T_3 + T_1 = 2T_2$ and $T_2 - T_1 = \Delta T$, the value of ΔL_2 is _____.

Options :

6952781393. $\Delta L_1[1+ 2\alpha^2 (\Delta T)^2]$

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6952781394. $\Delta L_1[1+\alpha^2(\Delta T)^2]$

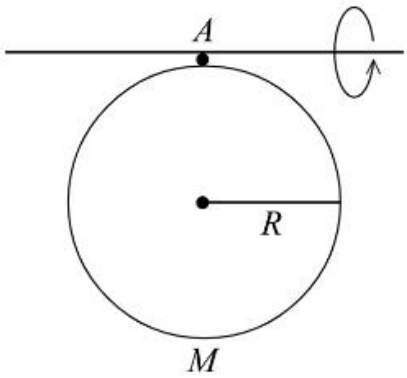
6952781395. $\Delta L_1[1+2\alpha\Delta T]$

6952781396. $\Delta L_1[1+\alpha\Delta T]$

Question Number : 35 Question Id : 695278410 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A uniform disc of radius R and mass M is free to oscillate about the axis A as shown in the figure. For small oscillations the time period is _____.

(g is acceleration due to gravity)



Options :

6952781397. $2\pi\sqrt{\frac{5R}{4g}}$

6952781398. $2\pi\sqrt{\frac{2R}{3g}}$

6952781399. $2\pi\sqrt{\frac{3R}{2g}}$

6952781400. $2\pi\sqrt{\frac{3R}{g}}$

Question Number : 36 Question Id : 695278411 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A rigid dipole undergoes a simple harmonic motion about its centre in the presence of an electric field $\vec{E}_1 = E_0\hat{x}$. If another electric field $\vec{E}_2 = 2E_0(\hat{y}+\hat{z})$ is introduced to the system, what will be the percentage change in the frequency of the oscillation (approximate)?

Options :

6952781401. 73%

6952781402. 63%

6952781403. 83%

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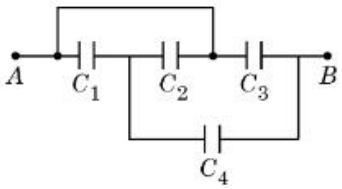
6952781404. 53%

Question Number : 37 Question Id : 695278412 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

From the circuit given below, the capacitance between terminals A and B shown in the circuit is _____ μF.
(take $C_1 = C_2 = C_3 = 1$ μF and $C_4 = 2$ μF.)



Options :

6952781405. 2

6952781406. 7/2

6952781407. 7/3

6952781408. 5/2

Question Number : 38 Question Id : 695278413 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: In electrostatics, a conductor does not store any net charge inside.

Reason R: Inside the capacitor (with no dielectric medium), the free charge carriers, if placed between the plates of capacitor, experience force and drift.

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

Options :

6952781409. Both **A** and **R** are true and **R** is the correct explanation of **A**

6952781410. Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

6952781411. **A** is true but **R** is false

6952781412. **A** is false but **R** is true

Question Number : 39 Question Id : 695278414 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A solenoid has a core made of material with relative permeability 400. The magnetic field produced in the interior of solenoid is 1.0 T. The magnetic intensity in SI units is $\alpha \times 10^5$. The value of α is _____.

(Free space permeability $\mu_0 = 4\pi \times 10^{-7}$ SI units.)

Options :

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6952781413. $\frac{25}{\pi}$

6952781414. $\frac{1}{16\pi}$

6952781415. $\frac{1}{\pi}$

6952781416. $\frac{1}{4\pi}$

Question Number : 40 Question Id : 695278415 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A magnetic field vector in an electromagnetic wave is represented by $\vec{B} = B_0 \sin\left(2\pi vt - \frac{2\pi x}{\lambda}\right)\hat{j}$. Its associated electric field vector is _____.

Options :

6952781417. $\vec{E} = -v\lambda B_0 \sin\left(2\pi vt - \frac{2\pi x}{\lambda}\right)\hat{k}$

6952781418. $\vec{E} = -v\lambda B_0 \sin\left(2\pi vt - \frac{2\pi x}{\lambda}\right)\hat{i}$

6952781419. $\vec{E} = v\lambda B_0 \sin\left(2\pi vt - \frac{2\pi x}{\lambda}\right)\hat{k}$

6952781420. $\vec{E} = v\lambda B_0 \sin\left(2\pi vt - \frac{2\pi x}{\lambda}\right)\hat{i}$

Question Number : 41 Question Id : 695278416 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A convex lens is made from glass material having refractive index of 1.4 with same radius of curvature on both sides. The ratio of its focal length and radius of curvature is _____.

Options :

6952781421. 0.5

6952781422. 2.5

6952781423. 0.8

6952781424. 1.25

Question Number : 42 Question Id : 695278417 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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An unpolarized light of certain intensity passes through a combination of two polarizers whose transmission axes are at 30° and 90°, respectively, with respect to the horizontal axis. A third polarizer with its transmission axis at 60° with the horizontal axis is placed between the two existing polarizers. The ratio of the output intensities with and without the third polarizer is _____.

Options :

6952781425. 3/4

6952781426. 4/3

6952781427. 9/4

6952781428. 4/9

Question Number : 43 Question Id : 695278418 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In Rutherford's alpha-particle scattering experiment, only a few alpha particles rebound back because

A. The size of gold nucleus is very small as compared to the size of gold atom.
B. Alpha particle and gold nucleus have equal charge.
C. The impact parameter is minimum for a few alpha particles.
D. A few alpha particles have very high kinetic energy.
E. Only a few alpha particles undergo head-on collision with the nuclei.

Choose the correct answer from the options given below:

Options :

6952781429. A, B Only

6952781430. B, E Only

6952781431. C, D Only

6952781432. A, C, E Only

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Question Number : 44 Question Id : 695278419 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The de Broglie wavelength associated with an electron accelerated through a potential difference V is λ_e and the de Broglie wavelength associated with a proton accelerated through the same potential difference is λ_p . If their corresponding masses are m_e and m_p, respectively, then the ratio of their de Broglie wavelengths $\left(\frac{\lambda_e}{\lambda_p}\right)$ is _____.

Options :

6952781433. $\sqrt{\frac{m_p}{m_e}}$

6952781434. $\sqrt{\frac{m_e}{m_p}}$

6952781435. $\frac{m_p}{m_e}$

6952781436. $\left(\frac{m_p}{m_e}\right)^2$

Question Number : 45 Question Id : 695278420 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion A: A diode under reverse-biased condition provides very small current which is nearly independent of voltage until a critical limit at which the current increases drastically.

Reason R: Below the critical voltage limit, only majority charge carriers flow which increases drastically above critical voltage.

choose the ***correct*** answer from the options given below

Options :

6952781437. Both **A** and **R** are true and **R** is the correct explanation of **A**

6952781438. Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

6952781439. **A** is true but **R** is false

6952781440. **A** is false but **R** is true

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Physics Section B

Section Id :	69527834
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 :	69527834
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 695278421 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A diode has Zener voltage of 10 V and maximum power dissipation of 0.5 W, then the minimum resistance to be used in series with this diode for safety when it is connected to a 25 V power supply is _____Ω.

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 : 695278422 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A gun mounted on the ground fires bullets in all directions with same speed. The farthest distance the bullets could reach is 6.4 m. The speed of the bullets from the gun is _____m/s.

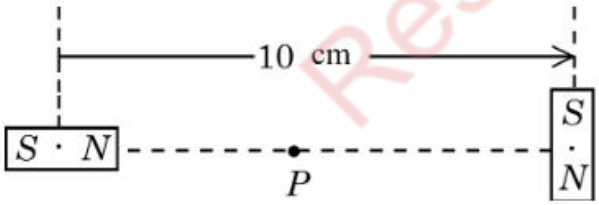
(take g = 10 m/s^2)

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 : 695278423 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Two identical small bar magnets each of dipole moment $3\sqrt{5}$ J/T are placed at a center to center separation of 10 cm, with their axes perpendicular to each other as shown in figure. The value of magnetic field at the point P midway between the magnets is $\alpha \times 10^{-3}$ T. The value of α is _____.

($\mu_0 = 4\pi \times 10^{-7}$ Tm/A)



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 : 695278424 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A circular coil of radius 2 cm and 125 turns carries a current of 1 A. The coil is placed in a uniform magnetic field of magnitude 0.4 T. The axis of the coil makes an angle of 30° with the direction of the magnetic field. The torque acting on the coil is $\alpha \times 10^{-4}$ N.m. The value of α is_____.
($\pi = 3.14$)

Response Type : Numeric

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

Question Number : 50 Question Id : 695278425 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In a double slit experiment, when one of the slits is covered by a transparent mica sheet of refractive index 1.56, the central fringe shifts to the position of 7^{th} bright fringe, obtained with both slits uncovered. If the light source wavelength is 450 nm, the thickness of mica sheet is $\alpha \times 10^{-9}$ m. The value of α is _____.

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 :	69527835
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 :	69527835
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 695278426 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 total number of atoms present in

(A) 2 moles of cyclohexane

(B) 684 g of sucrose

(C) 90.8 L of dihydrogen at STP

is:

Options :

6952781446. $C > A > B$

6952781447. $C > B > A$

6952781448. $B > C > A$

6952781449. $B > A > C$

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Question Number : 52 Question Id : 695278427 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The species having identical radii according to the Bohr's theory are:

A. H (first orbit)
B. He^{+} (first orbit)
C. He^{+} (Second orbit)
D. Li^{2+} (first orbit)
E. Be^{3+} (Second orbit)

Choose the correct answer from the options given below:

Options :

6952781450. A and C Only

6952781451. A and E Only

6952781452. B and E Only

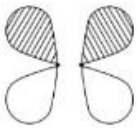
6952781453. C and D Only

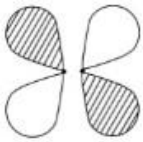
Question Number : 53 Question Id : 695278428 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

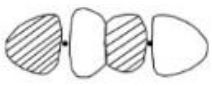
Which of the following pictorial diagram most correctly represents the π^* (π - antibonding) molecular orbital between two atoms if the internuclear axis is taken to be in the z-direction ($\xrightarrow{\text{z-axis}}$) ?

Options :

6952781454. 

6952781455. 

6952781456. 

6952781457. 

Question Number : 54 Question Id : 695278429 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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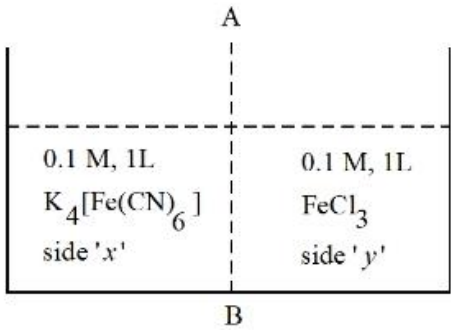
At 27 °C, 0.1 M, 1 L $K_4[Fe(CN)_6]$ aqueous solution and 0.1 M, 1 L $FeCl_3$ aqueous solution are placed in a container separated by a semi permeable membrane AB. Assume complete dissociation of both the solutes. Which of the following statement is ***correct***?



Options :

6952781458. Blue color is formed on both sides.

6952781459. Ionic solutes in aqueous solution can pass through semi-permeable membrane.

6952781460. Solution on side 'y' is hypotonic.

6952781461. To cause the reverse flow of solvent during osmosis, external pressure (any value) should be applied to side '*x*'.

Question Number : 55 Question Id : 695278430 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

20 mL of a solution of acetic acid required 28.4 mL of 0.1 M NaOH for its neutralization. A solution (X) was prepared by mixing 20 mL of the above acetic acid and 14.2 mL of 0.1 M NaOH solution. What is the pH of the solution (X)? (pK_a value of acetic acid is 4.75).

Options :

6952781462. 7.0

6952781463. 4.75

6952781464. 3.5

6952781465. 4.82

Question Number : 56 Question Id : 695278431 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 Reaction		**List-II Mechanism**
A.	Williamson Synthesis	I.	Electrophilic addition
B.	Friedel Craft Reaction	II.	Free radical substitution
C.	Bromination of vinyl benzene	III.	Nucleophilic substitution
D.	Chlorination of toluene in light	IV.	Electrophilic substitution

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

Options :

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6952781466. A-III, B-I, C-II, D-IV

6952781467. A-III, B-IV, C-II, D-I

6952781468. A-III, B-IV, C-I, D-II

6952781469. A-I, B-III, C-IV, D-II

Question Number : 57 Question Id : 695278432 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The 1st ionization enthalpy for Mg is +737 kJ/mol. The most probable estimated value of the 2nd ionization enthalpy of Mg is _____.

Options :

6952781470. −906 kJ/mol

6952781471. −856 kJ/mol

6952781472. +1450 kJ/mol

6952781473. +590 kJ/mol

Question Number : 58 Question Id : 695278433 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The electronegativity of a group 13 element 'E' is same as that of Ge (on Pauling scale and upto one decimal point). The **CORRECT** statements about E^{3+} are

A. It can act as a reducing agent.
B. It can act as an oxidizing agent.
C. E^{3+} is more stable than E^{+}.
D. The standard electrode potential value for E^{3+}/E is positive.

Choose the correct answer from the options given below:

Options :

6952781474. A and C Only

6952781475. B and C Only

6952781476. B and D Only

6952781477. A and D Only

Question Number : 59 Question Id : 695278434 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Pairs of elements with the same number of electrons in their respective 4f orbital are

[Atomic number. Eu-63, Gd-64, Dy-66, Ho-67, Tm-69, Yb-70, Lu-71, Hf-72]

A. (Eu and Gd)
B. (Dy and Ho)
C. (Yb and Hf)
D. (Lu and Tm)

Choose the correct answer from the options given below:

Options :

6952781478. B and C Only

6952781479. A and B Only

6952781480. A and D Only

6952781481. A and C Only

Question Number : 60 Question Id : 695278435 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the metal complexes $[Ni(en)_3]^{2+}$ (A), $[NiCl_4]^{2-}$ (B) and $[Ni(NH_3)_6]^{2+}$(C). Choose the **CORRECT** option by considering the number of unpaired electrons present in (A), (B) and (C) respectively and the order of frequency of absorption.

Options :

6952781482. 2, 2, 2 and (A) > (C) > (B)

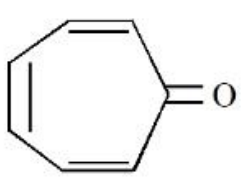
6952781483. 0, 2, 0 and (A) > (C) > (B)

6952781484. 2, 2, 0 and (B) > (C) > (A)

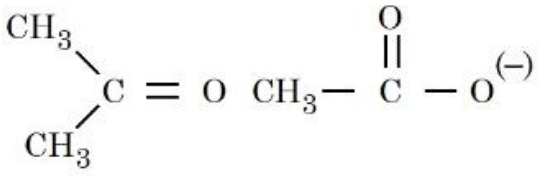
6952781485. 2, 2, 2 and (C) > (A) > (B)

Question Number : 61 Question Id : 695278436 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 molecules/species:



(x)



(y)

(z)

The correct order of carbon – oxygen double bond length is :

Options :

6952781486. x > y > z

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6952781487. $y > z > x$

6952781488. $z > x > y$

6952781489. $x > z > y$

Question Number : 62 Question Id : 695278437 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider $|x|$ is the difference in oxidation states of Mn in highest manganese fluoride and highest manganese oxide. The ions with $|x|$ number of unpaired electrons from the following are:

A. Sc^{3+}
B. Zn^{2+}
C. V^{2+}
D. Fe^{2+}
E. Co^{2+}

Choose the correct answer from the options given below:

Options :

6952781490. A and B Only

6952781491. C, D and E Only

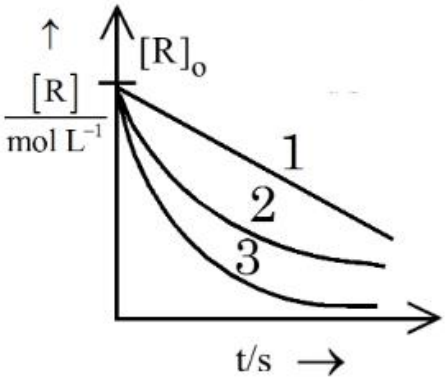
6952781492. C and E Only

6952781493. B and E Only

Question Number : 63 Question Id : 695278438 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the given graph showing variation of reactant concentration with time.

Three different reactions were started with identical initial concentration of reactants. Which of the following statement is correct?



Options :

6952781494. The order of all the three reactions is same.

6952781495. The rate constant of reaction 3 is larger than the rate constant of reaction 2 if the order of reaction is same for both.

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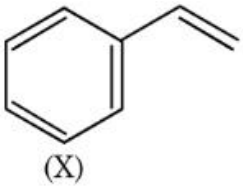
6952781496. The SI unit of rate constant of reaction 1 is s^{-1}.

6952781497. Thermal decomposition of HI on gold surface is an example of reaction 2.

Question Number : 64 Question Id : 695278439 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical



(X)

(i) Br_2 / $CHCl_3$
(ii) $NaNH_2$ excess
(iii) CH_3I
(iv) H_2, Na/NH_3 (l)

→ Major Product (Y)

Compound (X) is subjected to the sequence of reactions as shown above. Molar mass of the major product (Y) formed is _____ g mol^{-1}.

(Given molar mass in g mol^{-1} C:12, H: 1, O: 16)

Options :

6952781498. 90

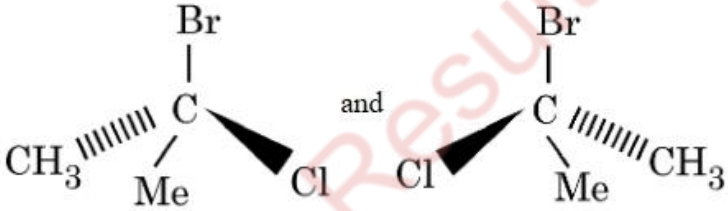
6952781499. 118

6952781500. 160

6952781501. 125

Question Number : 65 Question Id : 695278440 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The following structures are



Options :

6952781502. enantiomers.

6952781503. identical molecules.

6952781504. diastereomers.

6952781505. meso compounds.

Question Number : 66 Question Id : 695278441 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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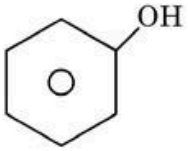
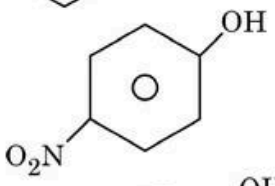
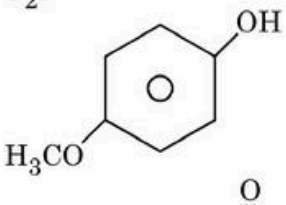
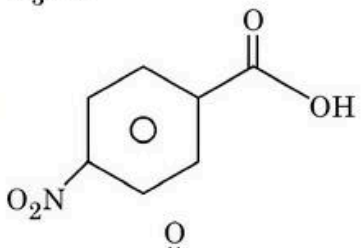
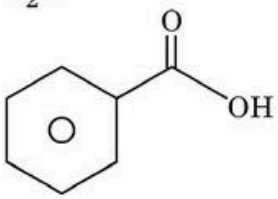
The descending order of acidity among the following compounds is:

A. 

B. 

C. 

D. 

E. 

Choose the correct answer from the options given below:

Options :

6952781506. $B > D > E > A > C$

6952781507. $D > B > E > A > C$

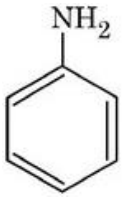
6952781508. $C > A > B > D > E$

6952781509. $D > E > B > A > C$

Question Number : 67 Question Id : 695278442 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The strongest conjugate acid will result from:

Options :

6952781510. 

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6952781511. 

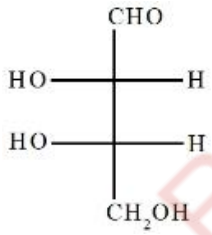
6952781512. 

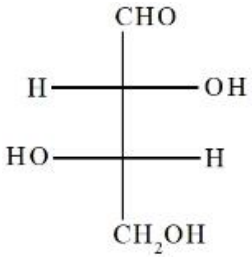
6952781513. 

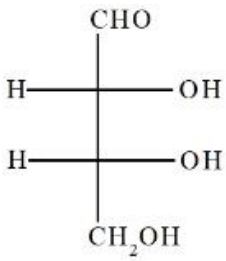
Question Number : 68 Question Id : 695278443 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A D-aldotetrose on oxidation with concentrated HNO_3 resulted in optically inactive dicarboxylic acid. The structure of the D-aldotetrose is:

Options :

6952781514. 

6952781515. 

6952781516. 

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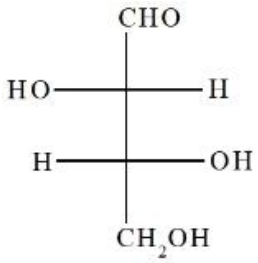


6952781517.

Question Number : 69 Question Id : 695278444 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Among Fe^{3+}, Pb^{2+}, Cu^{2+} and Mn^{2+}, identify the one that gets precipitated out while passing H_2S in presence of NH_4OH as group reagent. The highest possible oxidation state of the corresponding metal is

Options :

6952781518. $+3$

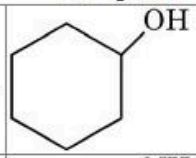
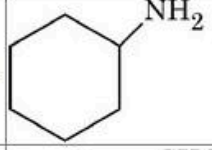
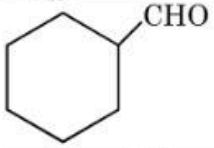
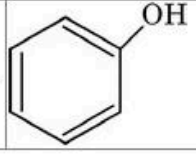
6952781519. $+4$

6952781520. $+2$

6952781521. $+7$

Question Number : 70 Question Id : 695278445 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 Compound		**List-II Test**
A.		I.	Hinsberg's reagent test
B.		II.	Phthalein dye test
C.		III.	Lucas test
D.		IV.	Tollen's test

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

Options :

6952781522. A-III, B-I, C-IV, D-II

6952781523. A-III, B-IV, C-I, D-II

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6952781524. A-I, B-III, C-II, D-IV

6952781525. A-I, B-II, C-III, D-IV

Chemistry Section B

Section Id :	69527836
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 :	69527836
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 695278446 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If 3.365g of ethanol (*l*) is burnt completely in a bomb calorimeter at 298.15 K, the heat produced is 99.472 kJ. The $|\Delta H_f^\circ|$ of ethanol at 298.15 K is

_____ $\times 10^2$ kJ mol^{-1}. (Nearest integer)

Given: Standard enthalpy for combustion of graphite = -393.5 kJ mol^{-1}

Standard enthalpy of formation of water (l) = -285.8 kJ mol^{-1}

Molar mass in g mol^{-1} of C, H, O are 12 , 1 and 16 respectively

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 : 695278447 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For the following reaction at 50 °C and at 2 atm pressure,

$2N_2O_5(g) \rightleftharpoons 2N_2O_4(g) + O_2(g)$

N_2O_5 is 50% dissociated.

The magnitude of standard free energy change at this temperature is x.

x = _____ J mol^{-1} [Nearest integer].

Given : R = 8.314 J mol^{-1} K^{-1}, log 2 = 0.30, log 3 = 0.48, ln10 = 2.303,
°C + 273 = K

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

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Possible Answers :

1

Question Number : 73 Question Id : 695278448 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An electrochemical cell, consist of the following two redox couples, M^{x+} (aq)/M(s) $[E^{\Theta}_{red} = +0.15\,V]$ and Fe^{3+}(aq)/Fe(s) $[E^{\Theta}_{red} = -0.036\,V]$. The cell EMF ($E_{cell}$) is recorded to be 0.2057 V. If the reaction quotient of the electrochemical reaction is found to be 10^{-2}, then the value of x is _____.(Nearest integer)

[Given : M is a p-block metal and $\frac{2.303RT}{F} = 0.059$ V]

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 : 695278449 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For a first order reaction A → B

t/min	[A]/M
0	0.6500
x	0.0650
20	0.00065

x = _____ min. (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 : 75 Question Id : 695278450 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In sulphur estimation, 2.0×10^{-3} mol of an organic compound (X) (molar mass 76 g mol^{-1}) gave 0.4813 g of barium sulphate (molar mass 233 g mol^{-1}). The percentage of sulphur in the compound (X) is _____ $\times 10^{-1}$ % (Nearest integer)

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

1

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National Testing Agency

Question Paper Name :	B Tech 2nd Apr 2026 Shift 2
Subject Name :	B. Tech
Creation Date :	2026-04-03 12:09:09
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6911213
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 :	69112113
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 :	69112113
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 691121151 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let α, β be the roots of the equation $x^2 - 3x + r = 0$, and $\frac{\alpha}{2}, 2\beta$ be the roots of the equation $x^2 + 3x + r = 0$.

If the roots of the equation $x^2 + 6x = m$ are $2\alpha + \beta + 2r$ and $\alpha - 2\beta - \frac{r}{2}$, then m is equal to :

Options :

691121511. -135

691121512. -567

691121513. 135

691121514. 567

Question Number : 2 Question Id : 691121152 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the circles $C_1:|z|=r$ and $C_2:|z-3-4i|=5$, $z\in\mathbb{C}$, be such that C_2 lies within C_1. If z_1 moves on C_1, z_2 moves on C_2 and $\min|z_1-z_2|=2$, then $\max|z_1-z_2|$ is equal to :

Options :

691121515. 12

691121516. 17

691121517. 22

691121518. 24

Question Number : 3 Question Id : 691121153 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the system of equations

$x+5y+6z=4,$

$2x+3y+4z=7,$

$x+6y+az=b$

has infinitely many solutions, then the point (a, b) lies on the line

Options :

691121519. $y-x=3$

691121520. $x-y=3$

691121521. $x+y=11$

691121522. $x+y=12$

Question Number : 4 Question Id : 691121154 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $a_1, a_2, a_3, \ldots$ be an A.P. and $g_1=a_1, g_2, g_3, \ldots$ be an increasing G.P. If $a_1=a_2+g_2=1$ and $a_3+g_3=4$, then $a_{10}+g_5$ is equal to :

Options :

691121523. 81

691121524. 76

691121525. 62

691121526. 55

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Question Number : 5 Question Id : 691121155 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The sum $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\cdots$ up to 8 terms, is :

Options :

691121527. 70

691121528. 71

691121529. 72

691121530. 73

Question Number : 6 Question Id : 691121156 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If for $3 \leq r \leq 30$, $\left({}^{30}C_{30-r}\right)+3\left({}^{30}C_{31-r}\right)+3\left({}^{30}C_{32-r}\right)+\left({}^{30}C_{33-r}\right)={}^{m}C_{r}$, then m equals :

Options :

691121531. 31

691121532. 32

691121533. 33

691121534. 34

Question Number : 7 Question Id : 691121157 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let p_n denote the total number of triangles formed by joining the vertices of an n-side regular polygon. If $p_{n+1}-p_n=66$, then the sum of all distinct prime divisors of n is :

Options :

691121535. 7

691121536. 8

691121537. 5

691121538. 6

Question Number : 8 Question Id : 691121158 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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A man throws a fair coin repeatedly. He gets 10 points for each head he throws and 5 points for each tail he throws. If the probability that he gets exactly 30 points is $\frac{m}{n}$, gcd $(m, n)=1$, then $m+n$ is equal to :

Options :

691121539. 53

691121540. 55

691121541. 107

691121542. 105

Question Number : 9 Question Id : 691121159 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The mean and variance of n observations are 8 and 16, respectively. If the sum of the first $(n-1)$ observations is 48 and the sum of squares of the first $(n-1)$ observations is 496, then the value of n is :

Options :

691121543. 21

691121544. 16

691121545. 13

691121546. 7

Question Number : 10 Question Id : 691121160 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a circle pass through the origin and its centre be the point of intersection of two mutually perpendicular lines $x+(k-1)y+3=0$ and $2x+k^2y-4=0$. If the line $x-y+2=0$ intersects the circle at the points A and B, then $(AB)^2$ is equal to :

Options :

691121547. 10

691121548. 27

691121549. 18

691121550. 34

Question Number : 11 Question Id : 691121161 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Let O be the origin, and P and Q be two points on the rectangular hyperbola $xy = 12$ such that the mid point of the line segment PQ is $\left(\frac{1}{2}, -\frac{1}{2}\right)$. Then the area of the triangle OPQ equals :

Options :

691121551. $\frac{3}{2}$

691121552. $\frac{5}{2}$

691121553. $\frac{7}{2}$

691121554. $\frac{9}{2}$

Question Number : 12 Question Id : 691121162 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the parabola $y = x^2 + px + q$ passing through the point $(1, -1)$ be such that the distance between its vertex and the x-axis is minimum. Then the value of $p^2 + q^2$ is :

Options :

691121555. 2

691121556. 4

691121557. 5

691121558. 8

Question Number : 13 Question Id : 691121163 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $P = \{\theta \in [0, 4\pi] : \tan^2\theta \neq 1\}$ and $S = \{a \in \mathbf{Z} : 2(\cos^8\theta - \sin^8\theta)\sec 2\theta = a^2, \theta \in P\}$. Then n(S) is :

Options :

691121559. 0

691121560. 1

691121561. 2

691121562. 3

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Question Number : 14 Question Id : 691121164 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the vectors $\vec{a} = -\hat{i} + \hat{j} + 3\hat{k}$ and $\vec{b} = \hat{i} + 3\hat{j} + \hat{k}$. For some $\lambda, \mu \in \mathbf{R}$, let $\vec{c} = \lambda\vec{a} + \mu\vec{b}$.

If $\vec{c} \cdot \left(3\hat{i} - 6\hat{j} + 2\hat{k}\right) = 10$ and $\vec{c} \cdot \left(\hat{i} + \hat{j} + \hat{k}\right) = -2$, then $|\vec{c}|^2$ is equal to :

Options :

691121563. 8

691121564. 12

691121565. 14

691121566. 15

Question Number : 15 Question Id : 691121165 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the point A be the foot of perpendicular drawn from the point P(a, b, 0) on the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-\alpha}{3}$. If the midpoint of the line segment PA is $\left(0, \frac{3}{4}, \frac{-1}{4}\right)$, then the value of $a^2+b^2+\alpha^2$ is equal to :

Options :

691121567. 1

691121568. 2

691121569. 6

691121570. 9

Question Number : 16 Question Id : 691121166 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two adjacent sides of a parallelogram PQRS are given by $\overrightarrow{PQ} = \hat{j} + \hat{k}$ and $\overrightarrow{PS} = \hat{i} - \hat{j}$. If the side PS is rotated about the point P by an acute angle α in the plane of the parallelogram so that it becomes perpendicular to the side PQ, then $\sin^2\left(\frac{5\alpha}{2}\right) - \sin^2\left(\frac{\alpha}{2}\right)$ is equal to :

Options :

691121571. $\frac{1}{2}$

691121572. $\frac{\sqrt{3}}{2}$

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691121573. $\frac{\sqrt{3}}{4}$

691121574. $\frac{2\sqrt{3}}{5}$

Question Number : 17 Question Id : 691121167 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 $\int_0^{20\pi}(\sin^4 x + \cos^4 x)dx$ is equal to :

Options :

691121575. $\frac{15\pi}{2}$

691121576. 25π

691121577. 15π

691121578. $\frac{25\pi}{2}$

Question Number : 18 Question Id : 691121168 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x)$ be a polynomial of degree 5, and have extrema at $x=1$ and $x=-1$. If $\lim\limits_{x\to 0}\left(\frac{f(x)}{x^3}\right)=-5$, then $f(2)-f(-2)$ is equal to :

Options :

691121579. 0

691121580. 50

691121581. 92

691121582. 112

Question Number : 19 Question Id : 691121169 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x)=\int\left(\frac{16x+24}{x^2+2x-15}\right)dx$. If $f(4)=14\log_e(3)$ and $f(7)=\log_e(2^\alpha\cdot 3^\beta)$, $\alpha, \beta \in \mathbf{N}$, then $\alpha+\beta$ is equal to :

Options :

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691121583. 31

691121584. 37

691121585. 39

691121586. 41

Question Number : 20 Question Id : 691121170 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $x = x(y)$ be the solution of the differential equation $2y^2\frac{dx}{dy} - 2xy + x^2 = 0,\ y > 1, x(e) = e$.

Then $x(e^2)$ is equal to :

Options :

691121587. $\frac{3}{2}e^2$

691121588. $\frac{2}{3}e^2$

691121589. e^2

691121590. $2e^2$

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Mathematics Section B

Section Id :	69112114
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 :	69112114
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 691121171 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $A = \{2, 3, 4, 5, 6\}$. Let R be a relation on the set $A \times A$ given by $(x, y)R(z, w)$ if and only if x divides z and $y \leq w$. Then the number of elements in R is _____.

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 : 691121172 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the matrices $A=\begin{bmatrix}2 & -2\\ 4 & -2\end{bmatrix}$ and $B=\begin{bmatrix}3 & 9\\ 1 & 3\end{bmatrix}$. If matrices P and Q are such that $PA=B$ and $AQ=B$, then the absolute value of the sum of the diagonal elements of $2(P+Q)$ 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 : 691121173 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let A be the point (3, 0) and circles with variable diameter AB touch the circle $x^2+y^2=36$ internally. Let the curve C be the locus of the point B. If the eccentricity of C is e, then $72e^2$ 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 : 24 Question Id : 691121174 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the area of the region bounded by $16x^2-9y^2=144$ and $8x-3y=24$ is A, then $3(A+6\log_e(3))$ 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 : 691121175 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The number of points in the interval [2, 4], at which the function $f(x)=\left[x^2-x-\frac{1}{2}\right]$, where $[\cdot]$ denotes the greatest integer function, is discontinuous, 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 : 69112115

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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 :	69112115
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 691121176 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Dimensions of universal gravitational constant (G) in terms of Planck's constant (h), distance (L), mass (M) and time (T) are _____.

Options :

691121596. $[hTLM^{-2}]$

691121597. $[hT^{-1}LM^{-2}]$

691121598. $[hTL^{2}M^{-2}]$

691121599. $[h^{-1}T^{-1}LM^{-2}]$

Question Number : 27 Question Id : 691121177 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A 0.5 kg mass is in contact against the inner wall of a cylindrical drum of radius 4 m rotating about its vertical axis. The minimum rotational speed of the drum to enable the mass to remain stuck to the wall (without falling) is 5 rad/s. The coefficient of friction between the drum's inner wall surface and mass is _____. (Take $g = 10\ m/s^2$)

Options :

691121600. 0.1

691121601. 0.5

691121602. 0.7

691121603. 0.3

Question Number : 28 Question Id : 691121178 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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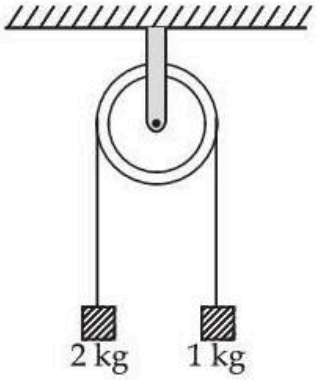
Two blocks of masses 2 kg and 1 kg respectively, are tied to the ends of a string which passes over a light frictionless pulley as shown in the figure below. The masses are held at rest at the same horizontal level and then released. The distance traversed by the centre of mass in 2 s is _____m. (Take $g = 10\ m/s^2$)



Options :

691121604. 3.33

691121605. 3.12

691121606. 2.22

691121607. 1.42

Question Number : 29 Question Id : 691121179 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A particle having charge 10^{-9} C moving in *x-y* plane in fields of $0.4\ \hat{j}$ N/C and $4 \times 10^{-3}\ \hat{k}$ T experiences a force of $\left(4\hat{i} + 2\hat{j}\right) \times 10^{-10}$ N. The velocity of the particle at that instant is _____ m/s.

Options :

691121608. $50\hat{i} + 100\hat{j}$

691121609. $100\hat{i} + 50\hat{j}$

691121610. $-50\hat{i} + 100\hat{j}$

691121611. $50\hat{i} - 100\hat{j}$

Question Number : 30 Question Id : 691121180 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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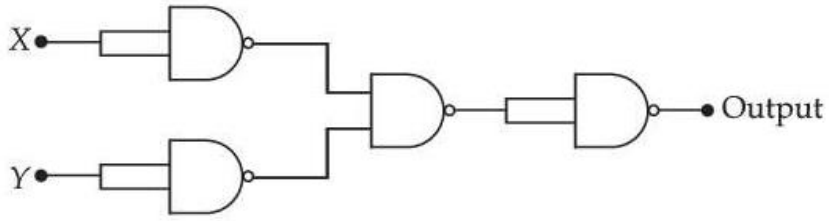
If X and Y are the inputs, the given circuit works as _____.



Options :

691121612. OR gate

691121613. AND gate

691121614. NAND gate

691121615. NOR gate

Question Number : 31 Question Id : 691121181 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If a body of mass 1 kg falls on the earth from infinity, it attains velocity (v) and kinetic energy (k) on reaching the surface of earth. The values of v and k respectively are _____ .
(Take radius of earth to be 6400 km and $g = 9.8\ m/s^2$)

Options :

691121616. 11.2 km/s; 6.27×10^7 J

691121617. 11.2 km/s; 12.54×10^7 J

691121618. 8.8 km/s; 6.27×10^7 J

691121619. 8.8 km/s; 12.54×10^7 J

Question Number : 32 Question Id : 691121182 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a screw gauge the zero of main scale reference line coincides with the fifth division of the circular scale when two studs are in contact. There are 100 divisions in circular scale and pitch of screw gauge is 0.1 mm. When diameter of a sphere is measured, the reading of main scale is 5 mm and 50^{th} division of circular scale coincides with the reference line of main scale. The diameter of sphere is _____ mm.

Options :

691121620. 5.045

691121621. 5.055

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691121622. 5.450

691121623. 5.550

Question Number : 33 Question Id : 691121183 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The surface tension of a soap bubble is 0.03 N/m. The work done in increasing the diameter of bubble from 2 cm to 6 cm is $\alpha\pi \times 10^{-4}$ J. The value of α is _____. (Take $\pi = 3.14$)

Options :

691121624. 0.86

691121625. 0.64

691121626. 1.92

691121627. 7.68

Question Number : 34 Question Id : 691121184 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A mixture of carbon dioxide and oxygen has volume 8310 cm^3, temperature 300 K, pressure 100 kPa and mass 13.2 g. The number of moles of carbon dioxide and oxygen gases in the mixture respectively are _____.

(Assume both carbon dioxide and oxygen gases behave like ideal gases) [R = 8.31 J/mol.K]

Options :

691121628. 0.15 and 0.18

691121629. 0.25 and 0.08

691121630. 0.21 and 0.12

691121631. 0.13 and 0.20

Question Number : 35 Question Id : 691121185 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If an air bubble of diameter 2 mm rises steadily through a liquid of density 2000 kg/m^3 at a rate of 0.5 cm/s, then the coefficient of viscosity of liquid is _____ Poise. (Take $g = 10\ m/s^2$)

Options :

691121632. 0.88

691121633. 8.8

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691121634. 88.8

691121635. 0.088

Question Number : 36 Question Id : 691121186 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A spherical ball of mass 2 kg falls from a height of 10 m and is brought to rest after penetrating 10 cm into sand. The average force exerted by sand on the ball is _____ N.
(Take $g = 10\ m/s^2$)

Options :

691121636. 1980

691121637. 2020

691121638. 2000

691121639. 1000

Question Number : 37 Question Id : 691121187 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An electromagnetic wave travels in free space along the x-direction. At a particular point in space and time, $\vec{B} = 2\times10^{-7}\ \hat{j}$ T is associated with this wave. The value of corresponding electric field $\vec{E}$ at this point is _____ V/m.

Options :

691121640. $60\ \hat{k}$

691121641. $-60\ \hat{k}$

691121642. $30\ \hat{k}$

691121643. $-600\ \hat{k}$

Question Number : 38 Question Id : 691121188 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two resistors of 200 Ω and 400 Ω are connected in series with a battery of 100 V. A bulb rated at 200 V, 100 W is connected across the 400 Ω resistance. The potential drop across the bulb is _____V.

Options :

691121644. 25

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691121645. 50

691121646. 66.6

691121647. 100

Question Number : 39 Question Id : 691121189 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two metal plates *(A, B)* are kept horizontally with separation of $\left(\frac{12}{\pi}\right)$ cm, with plate A on the top. An atomizer jet sprays oil (density 1.5 g/cm^3) droplets of radius 1 mm horizontally. All oil droplets carry a charge 5 nC. The potentials V_A and V_B are required on plates A and B respectively in order to ensure the droplets do not descend. The values of V_A and V_B are _____.
(Neglect the air resistance to the droplets and take $g = 10\ m/s^2$)

Options :

691121648. 100 *V* and 580 *V*

691121649. 580 *V* and 100 *V*

691121650. 60 *V* and 400 *V*

691121651. 0 *V* and -200 *V*

Question Number : 40 Question Id : 691121190 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two point charges 8 μC and -2 μC are located at $x = 2$ cm and $x = 4$ cm, respectively on the *x*-axis. The ratio of electric flux due to these charges through two spheres of radii 3 cm and 5 cm with their centers at the origin is _____.

Options :

691121652. 4 : 1

691121653. 3 : 4

691121654. 4 : 3

691121655. 4 : 5

Question Number : 41 Question Id : 691121191 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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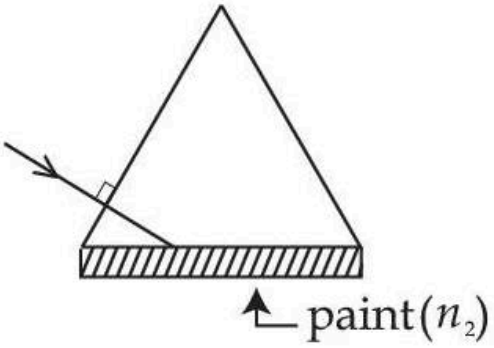
One side of an equilateral prism is painted by a transparent material of refractive index n_2. The refractive index of prism is 1.6. The minimum value of n_2 required for total internal reflection from painted face is _____.



Options :

691121656. $3\sqrt{3}/1.6$

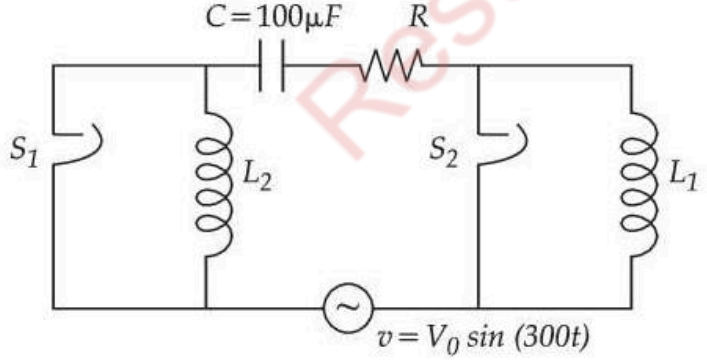
691121657. $\sqrt{3}$

691121658. $3.2/\sqrt{3}$

691121659. $4\sqrt{3}/5$

Question Number : 42 Question Id : 691121192 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The figure given below shows an *LCR* series circuit with two switches S_1 and S_2. When switch S_1 is closed keeping S_2 open, the phase difference (ϕ) between the current and source voltage is 30° and phase difference is 60° when S_2 is closed keeping S_1 open. The value of $(3L_1 - L_2)$ is _____ H.



Options :

691121660. $\frac{9}{2}$

691121661. $\frac{2}{9}$

691121662. $\frac{1}{3}$

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691121663. 3

Question Number : 43 Question Id : 691121193 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A circular current loop of radius R is placed inside square loop of side length L ($L >> R$) such that they are co-planar and their centers coincide. The permeability of free space is μ_0. The mutual inductance between circular loop and square loop is _____.

Options :

691121664. $2\sqrt{2}\frac{\mu_0 L^2}{R}$

691121665. $\sqrt{2}\frac{\mu_0 L^2}{R}$

691121666. $\sqrt{2}\frac{\mu_0 R^2}{L}$

691121667. $2\sqrt{2}\frac{\mu_0 R^2}{L}$

Question Number : 44 Question Id : 691121194 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 per nucleon of $^{209}_{83}Bi$ is _____ MeV.

[Take $m\left(^{209}_{83}Bi\right) = 208.980388$ u, $m_p = 1.007825$ u, $m_n = 1.008665$ u, 1 u = 931 MeV/c^2]

Options :

691121668. 7.48

691121669. 7.84

691121670. 8.79

691121671. 6.94

Question Number : 45 Question Id : 691121195 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The equation of motion of a particle is given by $x = a\sin\left(50t + \pi/3\right)$ cm. The particle will come to rest at time t_1 and it will have zero acceleration at time t_2. The t_1 and t_2 respectively are _____.

Options :

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691121672. $\frac{\pi}{300}\ s, \frac{\pi}{75}\ s$

691121673. $\frac{\pi}{75}\ s, \frac{\pi}{300}\ s$

691121674. $\frac{\pi}{300}\ s, \frac{\pi}{25}\ s$

691121675. $\frac{\pi}{50}\ s, \frac{\pi}{100}\ s$

Physics Section B

Section Id :	69112116
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 :	69112116
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 691121196 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In a Young's double slit experiment, the intensity at some point on the screen is found to be $\frac{3}{4}$ times of the maximum of the interference pattern. The path difference between the interfering waves at this point is $\frac{\lambda}{x}$ where λ is wavelength of the incident light. The value of x is _____.

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 : 691121197 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Using Bohr's model, calculate the ratio of the magnetic fields generated due to the motion of the electrons in the 2^{nd} and 4^{th} orbits of hydrogen atom _____.

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

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Question Number : 48 Question Id : 691121198 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

5 moles of unknown gas is heated at constant volume from 10 °C to 20 °C. The molar specific heat of this gas at constant pressure $c_p = 8$ cal/mol. °C and $R = 8.36$ J/mol.°C. The change in the internal energy of the gas is _____ calorie.

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

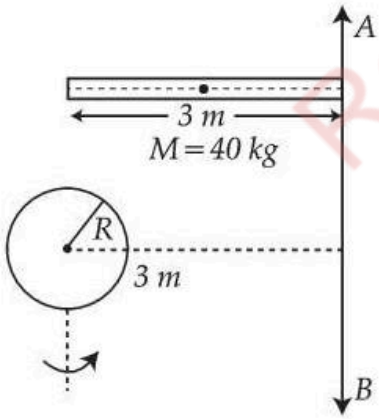
Question Number : 49 Question Id : 691121199 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If sunlight is focused on a paper using convex lens, it starts burning the paper in shortest time when the lens is kept at 30 cm above the paper. If the radius of curvature of the lens is 60 cm then the refractive index of the lens material is $\frac{\alpha}{10}$. The value of α is _____.

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 : 691121200 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Moment of inertia about an axis AB for a rod of mass 40 kg and length 3 m is same as that of a solid sphere of mass of 10 kg and radius R about an axis parallel to AB axis with separation of 3 m as shown in figure below. The value of R is given as $\sqrt{\frac{\alpha}{2}}$. The value of α is _____.



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 : 69112117

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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 :	69112117
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 691121201 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 mass percentage (w/w) of C : H in a hydrocarbon is 12 : 1. It has two carbon atoms. The weight (in g) of $CO_2(g)$ formed when 3.38 g of this hydrocarbon is completely burnt in oxygen is : (Given : Molar mass in g mol^{-1} C : 12, H : 1, , O : 16)

Options :

691121681. 5.68

691121682. 11.44

691121683. 22.74

691121684. 17.05

Question Number : 52 Question Id : 691121202 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The first and second ionization constants of a weak dibasic acid H_2A are 8.1×10^{-8} and 1.0×10^{-13} respectively. 0.1 mol of H_2A was dissolved in 1L of 0.1 M HCl solution. The concentration of HA^- in the resultant solution is :

Options :

691121685. 0.1 M

691121686. 9.53×10^{-6} M

691121687. 8.1×10^{-8} M

691121688. 1.0×10^{-13} M

Question Number : 53 Question Id : 691121203 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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SF_4 is isostructural with :

A. $BrF_4^{\ominus}$

B. CH_4

C. $IF_4^{\oplus}$

D. XeF_4

E. XeO_2F_2

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

Options :

691121689. C Only

691121690. C and E Only

691121691. A and D Only

691121692. B and E Only

Question Number : 54 Question Id : 691121204 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Gas 'A' undergoes change from state 'X' to state 'Y'. In this process, the heat absorbed and work done by the gas is 10 J and 18 J respectively. Now gas is brought back to state 'X' by another process during which 6 J of heat is evolved. In the reverse process of 'Y' to 'X',

Options :

691121693. 18 J of the work is done by the gas 'A'.

691121694. 2 J of the work is done by the gas 'A'.

691121695. 12 J of the work is done on the gas 'A' by the surrounding.

691121696. 14 J of the work is done on the gas 'A' by the surrounding.

Question Number : 55 Question Id : 691121205 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Solution A is prepared by dissolving 1 g of a protein (molar mass = 50000 g mol^{-1}) in 0.5 L of water at 300 K. Its osmotic pressure is x bar. Solution B is made by dissolving 2 g of same protein in 1 L of water at 300 K. Osmotic pressure of solution B is y bar. Entire solution of A is mixed with entire solution of B at same temperature. The osmotic pressure of resultant solution is z bar. x, y and z respectively are :

(R = 0.083 L bar mol^{-1} K^{-1})

Options :

691121697. 9.96×10^{-4}; 9.96×10^{-4}; 9.96×10^{-4}

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691121698. $9.96 \times 10^{-4}; 9.96 \times 10^{-4}; 19.92 \times 10^{-4}$

691121699. $4.98 \times 10^{-4}; 4.98 \times 10^{-4}; 9.96 \times 10^{-4}$

691121700. $4.98 \times 10^{-4}; 4.98 \times 10^{-4}; 4.98 \times 10^{-4}$

Question Number : 56 Question Id : 691121206 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

At 25°C, 20.0 mL of 0.2 M weak monoprotic acid HX is titrated against 0.2 M NaOH. The pH of the solution (a) at the start of the titration (when NaOH has not been added) and (b) when 10 mL of NaOH is added respectively, are :

Given : $K_a = 5 \times 10^{-4}$

$pK_a = 3.3$

$\alpha << 1$

(a) (b)

Options :

691121701. 0.7 2.0

691121702. 2.0 3.3

691121703. 1.1 2.2

691121704. 3.0 2.2

Question Number : 57 Question Id : 691121207 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

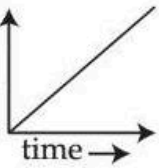
Consider the reaction $aX \rightarrow bY$, for which the rate constant at 30°C is $1 \times 10^{-3}\ mol^{-1}\ L\ s^{-1}$. Which of the following statements are true ?

A. When concentration of 'X' is increased to four times, the rate of reaction becomes 16 times.

B. The reaction is a second order reaction.

C. The half-life period is independent of the concentration of X.

D. Decomposition of N_2O_5 is an example of the above reaction.

E. $\ln\frac{[R_o]}{[R]}$ 

is valid for the above reaction.

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

Options :

691121705. A and B Only

691121706. A, B and C Only

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691121707. A, B, D and E Only

691121708. C and D Only

Question Number : 58 Question Id : 691121208 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The correct set that contains all kinds (basic, acidic, amphoteric and neutral) of oxides is :

Options :

691121709. Na_2O, K_2O, Al_2O_3 and As_2O_3

691121710. Al_2O_3, As_2O_3, CO and NO

691121711. K_2O, Cl_2O_7, As_2O_3 and NO

691121712. Na_2O, N_2O, Al_2O_3 and CO

Question Number : 59 Question Id : 691121209 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 second ionization enthalpy of B, Al and Ga is in the order of B > Al > Ga.

Statement II : The correct order in terms of first ionization enthalpy is Si < Ge < Pb < Sn.

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

Options :

691121713. Both **Statement I** and **Statement II** are true

691121714. Both **Statement I** and **Statement II** are false

691121715. **Statement I** is true but **Statement II** is false

691121716. **Statement I** is false but **Statement II** is true

Question Number : 60 Question Id : 691121210 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 : Among Zn, Mn, Sc and Cu, the energy required to remove the third valence electron is highest for Zn and lowest for Sc.

Statement II : The correct order of the following complexes in terms of CFSE is $[Co(H_2O)_6]^{2+} < [Co(H_2O)_6]^{3+} < [Co(en)_3]^{3+}$.

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

Options :

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691121717. Both **Statement I** and **Statement II** are true

691121718. Both **Statement I** and **Statement II** are false

691121719. **Statement I** is true but **Statement II** is false

691121720. **Statement I** is false but **Statement II** is true

Question Number : 61 Question Id : 691121211 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 complexes will show coordination isomerism ?

A. $[Ag(NH_3)_2][Ag(CN)_2]$

B. $[Co(NH_3)_6][Cr(CN)_6]$

C. $[Co(NH_3)_6][Co(CN)_6]$

D. $[Fe(NH_3)_6][Co(CN)_6]$

E. $[Co(NH_3)_6][Fe(CN)_6]$

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

Options :

691121721. B, C and D Only

691121722. B, D and E Only

691121723. A, C and D Only

691121724. C, D and E Only

Question Number : 62 Question Id : 691121212 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Complete combustion of X g of an organic compound gave 0.25 g of CO_2 and 0.12 g of H_2O. If the % of carbon is 25% and of hydrogen is 4.89%, then X = _____ $\times 10^{-3}$ g. (Nearest integer) (Molar mass of C, H and O are 12, 1 and 16 g mol^{-1} respectively.)

Options :

691121725. 273

691121726. 27

691121727. 2730

691121728. 227

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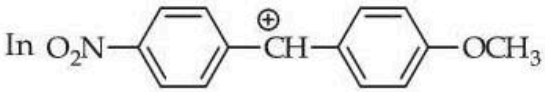
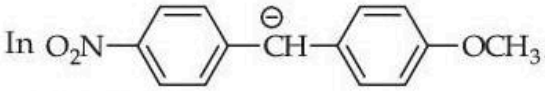
Question Number : 63 Question Id : 691121213 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements :

Statement I : In  , the carbocation is stabilised by +R effect of $-OCH_3$ group.

Statement II : In  , the carbanion is stabilised by −R effect of $-NO_2$ group.

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

Options :

691121729. Both **Statement I** and **Statement II** are true

691121730. Both **Statement I** and **Statement II** are false

691121731. **Statement I** is true but **Statement II** is false

691121732. **Statement I** is false but **Statement II** is true

Question Number : 64 Question Id : 691121214 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The compound (X) on

(i) on heating in the presence of anhydrous $AlCl_3$ and HCl gas gives 2,4-dimethyl pentane

(ii) aromatization gives toulene and

(iii) cyclisation gives methyl cyclohexane

The correct name of compound (X) is :

Options :

691121733. Hept-2-ene

691121734. Hept-1,3,5-triene

691121735. Heptane

691121736. Hept-2,4,6-triene

Question Number : 65 Question Id : 691121215 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Correct statements regarding alkyl halides (R – X) among the following are :

A. Alcohol being less polar solvent as compared to water, alcoholic KOH favours elimination reaction with R – X.

B. Order of reactivity towards S_N1 mechanism is $C_6H_5-CH_2-Cl > C_6H_5-CHCl-C_6H_5$.

C. Non substituted aryl halides exhibit properties similar to alkyl halides.

D. Vinyl chloride is an example of haloalkene and allyl chloride is an example of haloalkyne.

E. R – Cl can be prepared by reacting R – OH with $SOCl_2$ but Ar – Cl cannot be prepared by reacting Ar – OH with $SOCl_2$.

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

Options :

691121737. A, B and C Only

691121738. B and D Only

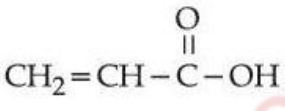
691121739. A and E Only

691121740. D and E Only

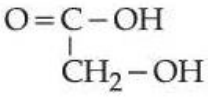
Question Number : 66 Question Id : 691121216 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

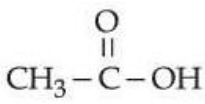
An organic compound "*x*" where molar ratio of C, O and H are equal, on treatment with 50% KOH under reflux followed by acidification produced "*y*". The most likely structure of "*y*" is :
[Molar mass of '*x*' is 58 g mol^{-1}]

Options :

691121741. 

691121742. 

691121743. 

691121744. 

Question Number : 67 Question Id : 691121217 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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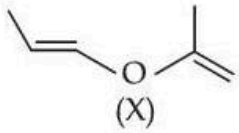
A molecule (X) with following structure under mild acidic condition is hydrolysed to produce (Y) and (Z). Identify the correct statements about (Y) and (Z).



(X)

A. Both (Y) and (Z) have same molar mass.

B. (Y) and (Z) can be distinguished from each other by $NaHCO_3$.

C. (Y) and (Z) react with HCN with same rates.

D. (Y) and (Z) undergo addition reaction with 2,4-DNP.

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

Options :

691121745. A, B and C Only

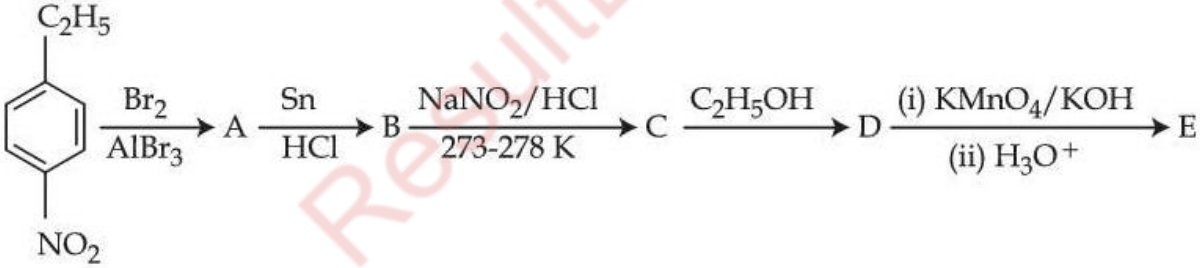
691121746. B and C Only

691121747. C and D Only

691121748. A and D Only

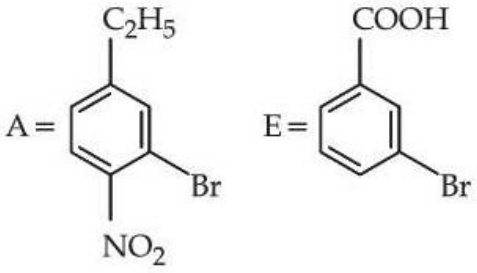
Question Number : 68 Question Id : 691121218 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Identify compounds A and E in the following reaction sequence.



Options :

691121749.



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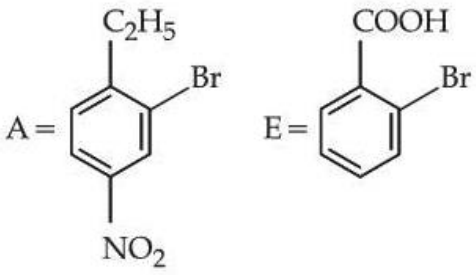
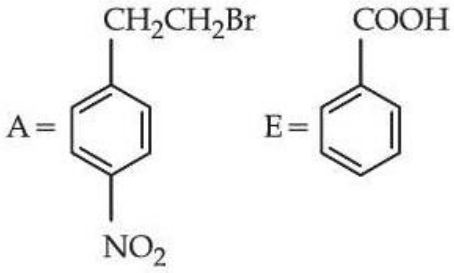
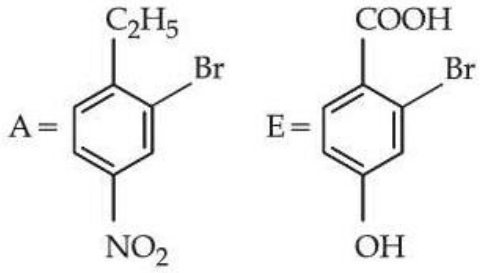
691121750.



691121751.



691121752.



Question Number : 69 Question Id : 691121219 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 pair having amino acid (A) and the hormone (B) that is iodinated derivative of the amino acid (A).

(T and Y represent one letter code for amino acids)

Amino acid (A)	Hormone (B)

Options :

691121753. T Insulin

691121754. T Thyroxine

691121755. Y Thyroxine

691121756. Y Insulin

Question Number : 70 Question Id : 691121220 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Among Fe^{2+}, Fe^{3+}, Cr^{2+} and Zn^{2+}, the ion that shows positive borax bead test and with highest ionisation enthalpy is :

Options :

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691121757. Fe^{2+}

691121758. Zn^{2+}

691121759. Cr^{2+}

691121760. Fe^{3+}

Chemistry Section B

Section Id :	69112118
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 :	69112118
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 691121221 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The surface of sodium metal is irradiated with radiation of wavelength x nm. The kinetic energy of ejected electrons is 2.8×10^{-20} J. The work function of sodium is 2.3 eV. The value of x is _____ $\times 10^2$ nm. (Nearest integer)

(Given : $h = 6.6 \times 10^{-34}$ J s ; 1 eV $= 1.6 \times 10^{-19}$ J; $c = 3.0 \times 10^8$ m s^{-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 : 691121222 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following gas phase reaction being carried out in a closed vessel at 25°C.

$$2A(g) \longrightarrow 4B(g) + C(g)$$

$\frac{\text{time}}{(\text{min})}$	total pressure of the $\frac{\text{system}}{(\text{mm Hg})}$
30	300
∞	600

The pressure of C(g) at 30 minutes time interval would be _____ mm Hg. (nearest integer)

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

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Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 73 Question Id : 691121223 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following two half-cell reactions along with the standard reduction potential given :

$$CO_2 + 6H^+ + 6e^- \longrightarrow CH_3OH + H_2O \qquad E^o_{red} = 0.02\ V$$

$$\frac{1}{2}O_2 + 2H^+ + 2e^- \longrightarrow H_2O \qquad E^o_{red} = 1.23\ V$$

A fuel cell was set up using the above two reactions such that the cell operates under the standard condition of 1 bar pressure and 298 K temperature. The fuel cell works with 80% efficiency. If the work derived from the cell using 1 mol of CH_3OH is used to compress an ideal gas isothermally against a constant pressure of 1 kPa, then the change in the volume of the gas,

$\Delta V =$ _____ m^3. (nearest integer)

Given : $F = 96500\ C\ mol^{-1}$

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

Question Number : 74 Question Id : 691121224 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Number of paramagnetic ions among the following d- and f-block metal ions is _____.

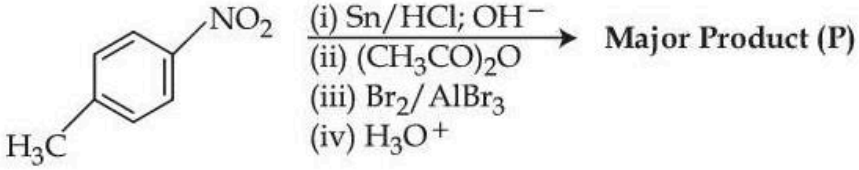
$Mn^{2+}, Cu^{2+}, Zn^{2+}, Yb^{2+}, Sc^{3+}, La^{3+}, Gd^{3+}, Lu^{3+}, Ti^{4+}, Ce^{4+}$

(Atomic number of Mn = 25, Cu = 29, Zn = 30, Yb = 70, Sc = 21, La = 57, Gd = 64, Lu = 71, Ti = 22, Ce = 58)

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 : 691121225 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following reactions sequence



When the product (P) is subjected to Carius analysis using $AgNO_3$, 1.0 g of the product (P) will produce _____ g of the precipitate of AgBr. (Nearest Integer)

(Given : molar mass in g mol^{-1} C : 12, H : 1, O : 16, N : 14, Br : 80, Ag : 108)

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

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Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

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National Testing Agency

Question Paper Name :	B Tech 6th Apr 2026 Shift 2
Subject Name :	B. Tech
Creation Date :	2026-04-07 12:53:50
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	69112117
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 :	69112197
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 :	69112197
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 6911211201 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f: \mathbf{R} \to \mathbf{R}$ be defined as $f(x) = \dfrac{2x^2 - 3x + 2}{3x^2 + x + 3}$. Then f is :

Options :

6911214081. both one-one and onto

6911214082. one-one but not onto

6911214083. onto but not one-one

6911214084. neither one-one nor onto

Question Number : 2 Question Id : 6911211202 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the quadratic equation $(n^2-2n+2)x^2-3x+(n^2-2n+2)^2=0$, $n \in \mathbf{R}$. Let α be the minimum value of the product of its roots and β be the maximum value of the sum of its roots. Then the sum of the first six terms of the G.P., whose first term is α and the common ratio is $\frac{\alpha}{\beta}$, is :

Options :

6911214085. $\frac{61}{37}$

6911214086. $\frac{121}{81}$

6911214087. $\frac{364}{243}$

6911214088. $\frac{1093}{729}$

Question Number : 3 Question Id : 6911211203 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $S=\left\{z \in \mathbb{C} : z^2+\sqrt{6}\,iz-3=0\right\}$. Then $\sum_{z \in S} z^8$ is equal to :

Options :

6911214089. 162

6911214090. 184

6911214091. 262

6911214092. 324

Question Number : 4 Question Id : 6911211204 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 possible values of $\theta \in [0, 2\pi]$, for which the system of equations :

$$x\cos 3\theta - 8y - 12z = 0$$
$$x\cos 2\theta + 3y + 3z = 0$$
$$x + y + 3z = 0$$

has a non-trivial solution, is equal to :

Options :

6911214093. π

6911214094. 2π

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6911214095. 3π

6911214096. 4π

Question Number : 5 Question Id : 6911211205 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A=\begin{bmatrix}1 & 0 & 0\\ 3 & 1 & 0\\ 9 & 3 & 1\end{bmatrix}$ and $B=[b_{ij}]$, $1\le i, j\le 3$. If $B=A^{99}-I$, then the value of $\frac{b_{31}-b_{21}}{b_{32}}$ is :

Options :

6911214097. 99

6911214098. 199

6911214099. 149

6911214100. 159

Question Number : 6 Question Id : 6911211206 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The sum $1+\frac{1}{2}\left(1^2+2^2\right)+\frac{1}{3}\left(1^2+2^2+3^2\right)+\ldots$ upto 10 terms is equal to :

Options :

6911214101. 130

6911214102. 155

6911214103. $\frac{315}{2}$

6911214104. $\frac{325}{2}$

Question Number : 7 Question Id : 6911211207 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A building has ground floor and 10 more floors. Nine persons enter in a lift at the ground floor. The lift goes up to the 10^{th} floor. The number of ways, in which any 4 persons exit at a floor and the remaining 5 persons exit at a different floor, if the lift does not stop at the first and the second floors, is equal to :

Options :

6911214105. 2184

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6911214106. 3064

6911214107. 7056

6911214108. 11340

Question Number : 8 Question Id : 6911211208 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the mean and the variance of seven observations 2, 4, α, 8, β, 12, 14, $\alpha < \beta$, be 8 and 16 respectively. Then the quadratic equation whose roots are $3\alpha+2$ and $2\beta+1$ is :

Options :

6911214109. $x^2-35x+306=0$

6911214110. $x^2-41x+420=0$

6911214111. $x^2-45x+506=0$

6911214112. $x^2-37x+342=0$

Question Number : 9 Question Id : 6911211209 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 6 blue and 6 green balls. Pairs of balls are drawn without replacement until the bag is empty. The probability that each drawn pair consists of one blue and one green ball is :

Options :

6911214113. $\frac{63}{925}$

6911214114. $\frac{17}{231}$

6911214115. $\frac{16}{231}$

6911214116. $\frac{64}{925}$

Question Number : 10 Question Id : 6911211210 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let C be a circle having centre in the first quadrant and touching the x-axis at a distance of 3 units from the origin. If the circle C has an intercept of length $6\sqrt{3}$ on y-axis, then the length of the chord of the circle C on the line $x-y=3$ is :

Options :

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6911214117. 8

6911214118. 6

6911214119. $6\sqrt{2}$

6911214120. $8\sqrt{2}$

Question Number : 11 Question Id : 6911211211 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The eccentricity of an ellipse E with centre at the origin O is $\frac{\sqrt{3}}{2}$ and its directrices are $x = \pm \frac{4\sqrt{6}}{3}$.

Let $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be a hyperbola whose eccentricity is equal to the length of semi-major axis of E, and whose length of latus rectum is equal to the length of minor axis of E. Then the distance between the foci of H is :

Options :

6911214121. $\frac{4\sqrt{2}}{\sqrt{7}}$

6911214122. $\frac{4\sqrt{2}}{7}$

6911214123. $\frac{4}{\sqrt{7}}$

6911214124. $\frac{8}{7}$

Question Number : 12 Question Id : 6911211212 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $x = 9$ be a directrix of an ellipse E, whose centre is at the origin and eccentricity is $\frac{1}{3}$. Let P $(\alpha, 0)$, $\alpha > 0$, be a focus of E and AB be a chord passing through P. Then the locus of the mid point of AB is :

Options :

6911214125. $9y^2 = 8x(1-x)$

6911214126. $3y^2 = 4x(1-x)$

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6911214127. $9y^2 = 8x\,(x-1)$

6911214128. $3y^2 = 4x\,(x-1)$

Question Number : 13 Question Id : 6911211213 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\sin\left(\tan^{-1}(x\sqrt{2})\right) = \cot\left(\sin^{-1}\sqrt{1-x^2}\right)$, $x \in (0, 1)$, then the value of x is :

Options :

6911214129. $\frac{1}{2}$

6911214130. $\frac{1}{3}$

6911214131. $\frac{2}{3}$

6911214132. $\frac{5}{8}$

Question Number : 14 Question Id : 6911211214 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The shortest distance between the lines $\frac{x-4}{1} = \frac{y-3}{2} = \frac{z-2}{-3}$ and $\frac{x+2}{2} = \frac{y-6}{4} = \frac{z-5}{-5}$ is :

Options :

6911214133. $\frac{5\sqrt{6}}{6}$

6911214134. $2\sqrt{5}$

6911214135. $3\sqrt{5}$

6911214136. $4\sqrt{5}$

Question Number : 15 Question Id : 6911211215 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a} = 2\hat{i} + 3\hat{j} + 3\hat{k}$ and $\vec{b} = 6\hat{i} + 3\hat{j} + 3\hat{k}$. Then the square of the area of the triangle with adjacent sides determined by the vectors $\left(2\vec{a} + 3\vec{b}\right)$ and $\left(\vec{a} - \vec{b}\right)$ is :

Options :

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6911214137. 450

6911214138. 900

6911214139. 1800

6911214140. 2400

Question Number : 16 Question Id : 6911211216 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\lim\limits_{x \to 2} \frac{(\tan(x-2))\left(rx^2+(p-2)x-2p\right)}{(x-2)^2} = 5$ for some r, p $\in$ **R**. If the set of all possible values of q, such that the roots of the equation $rx^2 - px + q = 0$ lie in (0, 2), be the interval $(\alpha, \beta]$, then $4(\alpha+\beta)$ equals :

Options :

6911214141. 11

6911214142. 13

6911214143. 17

6911214144. 21

Question Number : 17 Question Id : 6911211217 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A = \begin{bmatrix} 1 & 3 & -1 \\ 2 & 1 & \alpha \\ 0 & 1 & -1 \end{bmatrix}$ be a singular matrix. Let $f(x) = \int_0^x \left(t^2 + 2t + 3\right) dt$, $x \in [1, \alpha]$. If M and m are respectively the maximum and the minimum values of f in $[1, \alpha]$, then $3(M-m)$ is equal to :

Options :

6911214145. 64

6911214146. 68

6911214147. 72

6911214148. 76

Question Number : 18 Question Id : 6911211218 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Let $f: \mathbf{R} \to \mathbf{R}$ be such that $f(xy) = f(x)f(y)$, for all $x, y \in \mathbf{R}$ and $f(0) \neq 0$. Let $g : [1, \infty) \to \mathbf{R}$ be a differentiable function such that

$$x^2 g(x) = \int_1^x \left(t^2 f(t) - t g(t)\right) dt.$$

Then g(2) is equal to :

Options :

6911214149. $\frac{13}{8}$

6911214150. $\frac{11}{16}$

6911214151. $\frac{15}{32}$

6911214152. $\frac{17}{64}$

Question Number : 19 Question Id : 6911211219 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 $\{(x, y) : x^2 - 8x \leq y \leq -x\}$ is :

Options :

6911214153. $\frac{343}{6}$

6911214154. $\frac{637}{6}$

6911214155. $\frac{437}{6}$

6911214156. $\frac{523}{6}$

Question Number : 20 Question Id : 6911211220 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 $\int_{-1}^{1} \left(\frac{x^3 + |x| + 1}{x^2 + 2|x| + 1} \right) dx$ is equal to :

Options :

6911214157. $3 \log_e 2$

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6911214158. $2\log_e 2$

6911214159. $5\log_e 3$

6911214160. $3\log_e 3$

Mathematics Section B

Section Id :	69112198
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 :	69112198
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 6911211221 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $R = \{(x, y) \in \mathbf{N} \times \mathbf{N} : \log_e (x + y) \leq 2\}$. Then the minimum number of elements, required to be added in R to make it a transitive relation, is _____.

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 : 6911211222 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $(1-x^3)^{10} = \sum_{r=0}^{10} a_r x^r (1-x)^{30-2r}$, then $\frac{9a_9}{a_{10}}$ 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 : 23 Question Id : 6911211223 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let the line $x - y = 4$ intersect the circle C : $(x-4)^2 + (y+3)^2 = 9$ at the points Q and R. If $P(\alpha, \beta)$ is a point on C such that $PQ = PR$, then $(6\alpha + 8\beta)^2$ is equal to _____.

Response Type : Numeric

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

Question Number : 24 Question Id : 6911211224 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let the image of the point $P(0,-5,0)$ in the line $\frac{x-1}{2}=\frac{y}{1}=\frac{z+1}{-2}$ be the point R and the image of the point $Q\left(0,\frac{-1}{2},0\right)$ in the line $\frac{x-1}{-1}=\frac{y+9}{4}=\frac{z+1}{1}$ be the point S. Then the square of the area of the parallelogram PQRS is _____.

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 : 6911211225 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $f(x)=\begin{cases}x^3+8; & x<0,\\ x^2-4; & x\geq 0,\end{cases}$ and $g(x)=\begin{cases}(x-8)^{1/3}; & x<0,\\ (x+4)^{1/2}; & x\geq 0.\end{cases}$

Then the number of points, where the function gof is discontinuous, is _____.

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

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Physics Section A

Section Id :	69112199
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 :	69112199
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 6911211226 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The percentage error in the calculated volume of a sphere, if there is 2% error in its diameter measurement, is _____.

Options :

6911214166. 1

6911214167. 2

6911214168. 6

6911214169. 8

Question Number : 27 Question Id : 6911211227 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		**List - II**
A.	Boltzmann constant	I.	$[M^{-1} L^3 T^{-2}]$
B.	Stefan's constant	II.	$[M L^2 T^{-1}]$
C.	Planck's constant	III.	$[M L^2 T^{-2} K^{-1}]$
D.	Gravitational constant	IV.	$[M L^0 T^{-3} K^{-4}]$

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

Options :

6911214170. A-I, B-II, C-III, D-IV

6911214171. A-IV, B-III, C-II, D-I

6911214172. A-III, B-IV, C-II, D-I

6911214173. A-II, B-I, C-IV, D-III

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Question Number : 28 Question Id : 6911211228 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 (A) of mass $5m$ and a spherical shell (B) of mass m, both having same radius, are placed on a rough surface. When a force of same magnitude is applied tangentially at the highest points of A and B, they start rolling without slipping with an acceleration of a_A and a_B, respectively. The ratio of a_A and a_B is _____.

Options :

6911214174. 5 : 21

6911214175. 6 : 10

6911214176. 21 : 25

6911214177. $1:5$

Question Number : 29 Question Id : 6911211229 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A body of mass 1 kg moves along a straight line with a velocity $v = 2x^2$. The work done by the body during displacement from $x = 0$ to 5 m is _____ J.

Options :

6911214178. 0

6911214179. 250

6911214180. 1250

6911214181. 1000

Question Number : 30 Question Id : 6911211230 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A cylinder with adiabatic walls is closed at both ends and is divided into two compartments by a frictionless adiabatic piston. Ideal gas is filled in both (left and right) the compartments at same P, V, T. Heating is started from left side until pressure changes to $^{27}P/_{8}$. If initial volume of each compartment was 9 litres then the final volume in right-hand side compartment is _____ litres. (for this ideal gas $C_P/C_V = 1.5$)

Options :

6911214182. 3

6911214183. 4

6911214184. 14

6911214185. 9

Question Number : 31 Question Id : 6911211231 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For an electromagnetic wave propagating through vacuum, $\vec{k}$, $\vec{E}$ and ω represent propagation vector, electric field and angular frequency, respectively. The magnetic field associated with this wave is represented by :

Options :

6911214186. $\frac{\vec{E} \times \vec{k}}{\omega}$

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6911214187. $\frac{\vec{k} \times \vec{E}}{\omega}$

6911214188. $\omega\left(\vec{E} \times \vec{k}\right)$

6911214189. $\omega\left(\vec{k} \times \vec{E}\right)$

Question Number : 32 Question Id : 6911211232 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two identical bodies A and B of equal masses have initial velocities $\vec{v}_1 = 4\hat{i}$ m/s and $\vec{v}_2 = 4\hat{j}$ m/s respectively. The body A has acceleration $\vec{a}_1 = 6\hat{i} + 6\hat{j}$ m/s^2 while the acceleration of the other body B is zero. The centre of mass of the two bodies moves in _____ path.

Options :

6911214190. circular

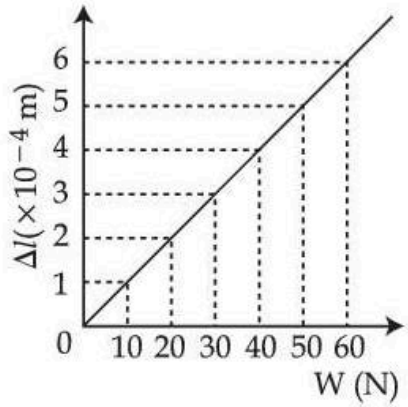
6911214191. parabolic

6911214192. straight line

6911214193. elliptical

Question Number : 33 Question Id : 6911211233 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Figure represents the extension (Δl) of a wire of length 1 meter, suspended from the ceiling of the room at one end with a load W connected to the other end. If the cross-sectional area of the wire is 10^{-5} m^2 then the Young's modulus of the wire is _____ N/m^2.



Options :

6911214194. 1.0×10^{11}

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6911214195. 2.0×10^{10}

6911214196. 1.0×10^{10}

6911214197. 2.0×10^{11}

Question Number : 34 Question Id : 6911211234 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A cylindrical vessel of 40 cm radius is completely filled with water and its capacity is 528 dm^3 (dm : decimeter) The vessel is placed on a solid block of exactly same height as vessel. If a small hole is made at 70 cm below the top of water level, then horizontal range of water falling on the ground in the beginning is _____ cm.

Options :

6911214198. $120\sqrt{2}$

6911214199. $140\sqrt{2}$

6911214200. $140\sqrt{3}$

6911214201. $120\sqrt{3}$

Question Number : 35 Question Id : 6911211235 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If 2 mole of an ideal monoatomic gas at temperature T, is mixed with 6 mole of another ideal monoatomic gas at temperature $2T$ then the temperature of mixture is :

Options :

6911214202. $\frac{5}{2}T$

6911214203. $\frac{5}{4}T$

6911214204. $\frac{7}{2}T$

6911214205. $\frac{7}{4}T$

Question Number : 36 Question Id : 6911211236 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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A spring stretches by 2 mm when it is loaded with a mass of 200 g. From equilibrium position the mass is further pulled down by 2 mm and released. The frequency associated with the system and maxmimum energy in the spring are _____ Hz and _____ J, respectively.
(Take $g = 10\ m/s^2$)

Options :

6911214206. $\frac{5\sqrt{50}}{\pi}$ and 8×10^{-3}

6911214207. $\frac{5\sqrt{50}}{\pi}$ and 8

6911214208. $10\sqrt{50}$ and 2×10^{-3}

6911214209. $\frac{5\sqrt{50}}{\pi}$ and 16×10^{-3}

Question Number : 37 Question Id : 6911211237 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The electric potential as a function of x, y is given by $V = 5(x^2 - y^2)$ V. The electric field at a point (2, 3) m is _____ V/m.

Options :

6911214210. $\left(-20\hat{i} + 30\hat{j}\right)$

6911214211. $\left(20\hat{i} - 30\hat{j}\right)$

6911214212. $\left(20\hat{i} + 45\hat{j}\right)$

6911214213. $\left(-4\hat{i} + 6\hat{j}\right)$

Question Number : 38 Question Id : 6911211238 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A current of 30 A each flows in opposite directions in two conducting wires, placed parallel to each other at a distance of 8 cm. The magnetic field at the mid point between the two wires is _____ μT.

$(\frac{\mu_o}{4\pi} = 10^{-7}\ N/A^2)$

Options :

6911214214. 30

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6911214215. 300

6911214216. 150

6911214217. 0.0

Question Number : 39 Question Id : 6911211239 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A square loop of side 2 cm is placed in a time varying magnetic field with magnitude as $B = 0.4 \sin(300t)$ Tesla. The normal to the plane of loop makes an angle of 60° with the field. The maximum induced emf produced in the loop is _____ mV.

Options :

6911214218. 12

6911214219. 18

6911214220. 21

6911214221. 24

Question Number : 40 Question Id : 6911211240 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A sphere of capacitance 100 pF is charged to a potential of 100 V. Another identical uncharged metal sphere is brought in contact with the charged sphere, then the change in the total energy stored on these spheres, when they touch is $\alpha \times 10^{-7}$ J. The value of α is _____.

(combined capacitance of spheres is 200 pF)

Options :

6911214222. 5

6911214223. $\frac{5}{2}$

6911214224. $\frac{7}{2}$

6911214225. $\frac{9}{2}$

Question Number : 41 Question Id : 6911211241 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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The energy released if hydrogen atoms are combined to form $^{4}_{2}He$ is _____ MeV.

(Take binding energies per nucleon of $^{2}_{1}H$ and $^{4}_{2}He$ as 1.1 MeV and 7.2 MeV, respectively)

Options :

6911214226. 6.1

6911214227. 24.4

6911214228. 26.6

6911214229. 5

Question Number : 42 Question Id : 6911211242 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Angle of minimum deviation is equal to the half of the angle of prism in an equilateral prism. The refractive index of the prism is _____.

Options :

6911214230. 1.5

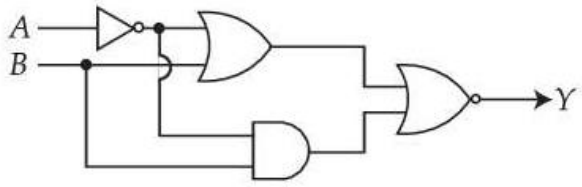
6911214231. $\sqrt{3}$

6911214232. $\sqrt{2}$

6911214233. 1.65

Question Number : 43 Question Id : 6911211243 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Refer to the logic circuit given below. For two inputs $(A=1, B=1)$ and $(A=0, B=1)$, output (Y) will be _____.



Options :

6911214234. 1, 0 respectively

6911214235. 0, 1 respectively

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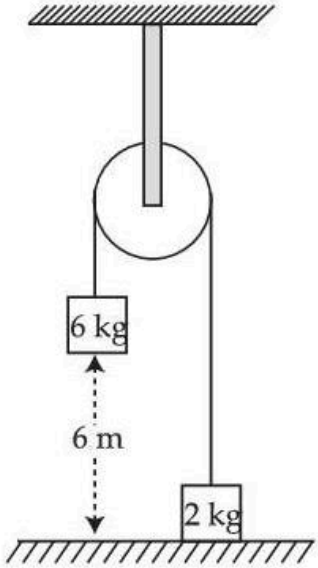
6911214236. 0, 0 respectively

6911214237. 1, 1 respectively

Question Number : 44 Question Id : 6911211244 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The velocity at which 6 kg mass (shown in figure) strikes the ground when it is released from a height of 6 m above the ground is _____ m/s. Assume pulley is massless and string is light and inextensible. (Take $g = 10\ m/s^2$)



Options :

6911214238. 7.74

6911214239. 7.20

6911214240. 6.55

6911214241. 4.50

Question Number : 45 Question Id : 6911211245 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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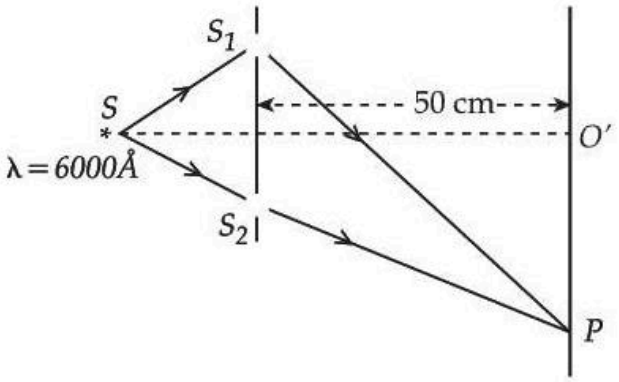
In a Young double slit experiment, the wavelength of incident light is 6000 Å, the separation between slits S_1 and S_2 is 5 cm and the distance between slits plane and screen is 50 cm, as shown in the figure below. If the resultant intensity at P is equal to the intensity due to individual slits, the path difference between interfering waves is _____ Å.



Options :

6911214242. 4000

6911214243. 3000

6911214244. 2000

6911214245. 1000

Physics Section B

Section Id :	691121100
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 :	691121100
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 6911211246 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A block takes t time to slide down a plane inclined at 45° to the horizontal. If the surface is made smooth (frictionless), the block takes time $\frac{t}{2}$ to slide down the plane. The coefficient of friction between the block and the inclined plane is $\left(\frac{\alpha}{100}\right)$. The value of α is _____.

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

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Possible Answers :

1

Question Number : 47 Question Id : 6911211247 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The de Broglie wavelength for an electron accelerated through the potential difference of V_1 volt is λ_1. When the potential difference is changed to V_2 volt, the associated de Broglie wavelength is increased by 50%. If $(V_1/V_2)=(9/\alpha)$, then the value of α is _____.

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 : 6911211248 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A moving coil of galvanometer when shunted with 2 Ω resistance gives a full scale deflection for a current of 500 mA. When a resistance of 470 Ω is connected in series it gives a full scale deflection for 10 V potential applied on it. The value of resistance of galvanometer coil is _____ Ω.

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 : 6911211249 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Two cells of emfs 1 V and 2 V and internal resistance 2 Ω and 1 Ω, respectively connected in parallel, gave a current of 1 A through an external resistance. If the polarity of one cell is reversed, then value of current through the external resistance will be $\frac{\alpha}{5}$ A. The value of α is _____.

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 : 6911211250 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A concave mirror of focal length 10 cm forms an image which is double the size of object when the object is placed at two different positions. The distance between the two positions of the object is _____ cm.

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

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Chemistry Section A

Section Id :	691121101
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 :	691121101
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 6911211251 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 contain the same number of atoms ?

(Given : Molar mass in g mol^{-1} of H, He, O and S are 1, 4, 16 and 32 respectively)

A. 2 g of O_2 gas

B. 4 g of SO_2 gas

C. 1400 mL of O_2 at STP

D. 0.05 L of He at STP

E. 0.0625 mol of H_2 gas

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

Options :

6911214251. A and B only

6911214252. B and C only

6911214253. C and D only

6911214254. A, C and E only

Question Number : 52 Question Id : 6911211252 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The Bohr radius of a hydrogen like species is 70.53 pm. The species and the stationary state (n) are respectively

(Given : Hydrogen atom Bohr radius is 52.9 pm)

Options :

6911214255. Li^{2+}, 3

6911214256. He^{+}, 3

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6911214257. He^+, 2

6911214258. Li^{2+}, 2

Question Number : 53 Question Id : 6911211253 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 number of compounds among SO_2, SO_3, SF_4, SF_6 and H_2S in which sulphur does not obey the Octet rule is 3.

Statement II : Among [H_2O, ClF_3, SF_4], [NH_3, BrF_5, SF_4], [BrF_5, ClF_3, XeF_4] and [XeF_4, ClF_3, H_2O], the number of sets in which all the molecules have one lone pair of electrons on the central atom is 1.

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

Options :

6911214259. Both **Statement I** and **Statement II** are true

6911214260. Both **Statement I** and **Statement II** are false

6911214261. **Statement I** is true but **Statement II** is false

6911214262. **Statement I** is false but **Statement II** is true

Question Number : 54 Question Id : 6911211254 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

Given V_1 and V_2 are initial and final volumes respectively.

	List - I (Isothermal process)		**List - II (Expression)**
A.	Reversible expansion	I.	$q = 0$
B.	Free expansion	II.	$q = nRT \ln \frac{V_2}{V_1}$
C.	Irreversible Compression	III.	$w = -p_{ext}(V_1 - V_2)$
D.	Cyclic reversible	IV.	$\frac{q_{rev}}{T} = 0$

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

Options :

6911214263. A-II, B-III, C-I, D-IV

6911214264. A-II, B-I, C-IV, D-III

6911214265. A-II, B-I, C-III, D-IV

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6911214266. A-I, B-II, C-III, D-IV

Question Number : 55 Question Id : 6911211255 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 :

Chamber 1	Semi-permeable membrane	Chamber 2
18 g glucose in 100 mL aqueous solution		30 g glucose in 250 mL aqueous solution

Statement I : H_2O molecules move from the chamber 1 to chamber 2.

Statement II : The osmotic pressure of a solution prepared by dissolving 50 mg of potassium sulphate (molar mass = 174 g/mol) in 2 L of water (at 27 °C) is 0.0107 bar. (Given: $R = 0.083\ dm^3\ bar\ K^{-1}\ mol^{-1}$ and assume complete dissociation of electrolyte)

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

Options :

6911214267. Both **Statement I** and **Statement II** are true

6911214268. Both **Statement I** and **Statement II** are false

6911214269. **Statement I** is true but **Statement II** is false

6911214270. **Statement I** is false but **Statement II** is true

Question Number : 56 Question Id : 6911211256 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given is a concentrated solution of a weak electrolyte A_xB_y of concentration 'c' and dissociation constant 'K'. The degree of dissociation is given by :

Options :

6911214271. $\left[K \times c^{x+y-1} x^x y^y\right]^{x+y}$

6911214272. $\left(\frac{K}{c^{x+y-1}\ x^x y^y}\right)^{\frac{1}{x+y}}$

6911214273. $\left(\frac{c^{x+y-1}\ x^x y^y}{K}\right)^{x+y}$

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6911214274. $\left(\frac{c^{x+y-1}\,x^x y^y}{K}\right)^{\frac{1}{x+y}}$

Question Number : 57 Question Id : 6911211257 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a general redox reaction

Anode $\quad Red_1 \rightarrow Ox_1^{n_1^+} + n_1 e^-$

Cathode $\quad Ox_2 + n_2 e^- \rightarrow Red_2^{n_2-}$

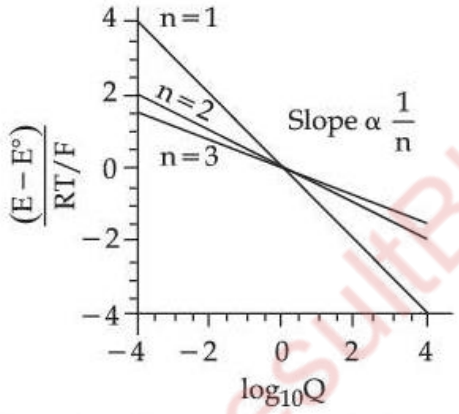
Which of the following statement is **incorrect** ?

Options :

6911214275. The overall reaction can be written as $n_2 Red_1 + n_1\ Ox_2 \rightleftharpoons n_2 Ox_1^{n_1^+} + n_1 Red_2^{n_2-}$

6911214276.

The electrons do not appear in the overall reaction because electrons produced at the anode are consumed at the cathode.



6911214277. Here n is the number of electrons transferred in redox reaction.

6911214278.

If the reaction is carried out reversibly, the electrical work done is equal to the ratio of charge and potential difference through which charge is moved.

Question Number : 58 Question Id : 6911211258 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a period, the first ionisation enthalpy of the element at extreme left and the negative electron gain enthalpy of the extreme right element, except noble gases, are respectively.

Options :

6911214279. lowest and lowest

6911214280. highest and lowest

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6911214281. lowest and highest

6911214282. highest and highest

Question Number : 59 Question Id : 6911211259 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 : $F_2O < H_2O < Cl_2O$ is the correct trend in terms of bond angle.

Statement II : SiF_4, SnF_4 and PbF_4 are ionic in nature.

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

Options :

6911214283. Both **Statement I** and **Statement II** are true

6911214284. Both **Statement I** and **Statement II** are false

6911214285. **Statement I** is true but **Statement II** is false

6911214286. **Statement I** is false but **Statement II** is true

Question Number : 60 Question Id : 6911211260 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 first (Δ_iH_1) and second (Δ_iH_2) ionisation enthalpy values of Cr and Mn are :

A. Δ_iH_1 : Cr > Mn

B. Δ_iH_2 : Cr > Mn

C. Δ_iH_1 : Mn > Cr

D. Δ_iH_2 : Mn > Cr

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

Options :

6911214287. A and B only

6911214288. B and C only

6911214289. A and D only

6911214290. C and D only

Question Number : 61 Question Id : 6911211261 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Which of the following sequences of hybridisation, geometry and magnetic nature are **correct** for the given coordination compounds ?

A. $[NiCl_4]^{2-}$ – sp^3, tetrahedral, paramagnetic

B. $[Ni(NH_3)_6]^{2+}$ – sp^3d^2, octahedral, paramagnetic

C. $[Ni(CO)_4]$ – sp^3, tetrahedral, paramagnetic

D. $[Ni(CN)_4]^{2-}$ – dsp^2, square planar, diamagnetic

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

Options :

6911214291. A, B, C and D

6911214292. B, C and D only

6911214293. A, C and D only

6911214294. A, B and D only

Question Number : 62 Question Id : 6911211262 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 : A mixture of $C_{12}H_{22}O_{11}$ (sugar) and NaCl can be separated by dissolving sugar in alcohol, due to differential solubility.

Statement II : Rose essence from rose petals is seperated by steam distillation due to its high volatility and insolubility in H_2O.

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

Options :

6911214295. Both **Statement I** and **Statement II** are true

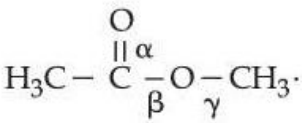
6911214296. Both **Statement I** and **Statement II** are false

6911214297. **Statement I** is true but **Statement II** is false

6911214298. **Statement I** is false but **Statement II** is true

Question Number : 63 Question Id : 6911211263 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Shown below is the structure of methyl acetate with three different α, β and γ carbon - oxygen bonds.



The correct order of bond lengths of these bonds is :

Options :

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6911214299. $\alpha > \beta > \gamma$

6911214300. $\alpha < \beta < \gamma$

6911214301. $\alpha = \beta = \gamma$

6911214302. $\alpha < \beta = \gamma$

Question Number : 64 Question Id : 6911211264 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

'*x*' is the product which is obtained by the hydrolysis of prop-1-yne in the presence of mercuric sulphate under dilute acidic medium at 333 K. '*y*' is the product which is obtained by the reaction of ethane nitrile with methyl magnesium bromide in dry ether followed by hydrolysis. IUPAC name of product obtained from '*x*' and '*y*' in the presence of barium hydroxide followed by heating is :

Options :

6911214303. 2 - Methylpent-4-en-3-one

6911214304. 4 - Methylpent-3-en-2-one

6911214305. 4 - Methylpent-1-ene

6911214306. 2 - Methylpent-3-one

Question Number : 65 Question Id : 6911211265 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An optically active alkyl bromide C_4H_9Br, reacts with ethanolic KOH to form major compound [A] which reacts with bromine to give compound [B]. Compound [B] reacts with ethanolic KOH and sodamide to give compound [C]. One molecule of water adds to compound [C] on warming with mercuric sulphate and dilute sulphuric acid at 333 K to form compound [D]. The functional group in compound D will be confirmed by :

Options :

6911214307. Haloform test

6911214308. Lucas test

6911214309. Silver mirror test

6911214310. Benedict test

Question Number : 66 Question Id : 6911211266 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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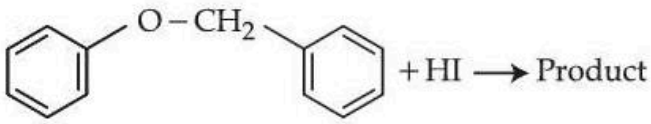
Consider the following reaction.



Statement I : In the above reaction, product formed will be a mixture of benzyl alcohol and iodobenzene.

Statement II : In the above reaction, the $-O-CH_2-$ bond is cleaved to give the product.

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

Options :

6911214311. Both **Statement I** and **Statement II** are true

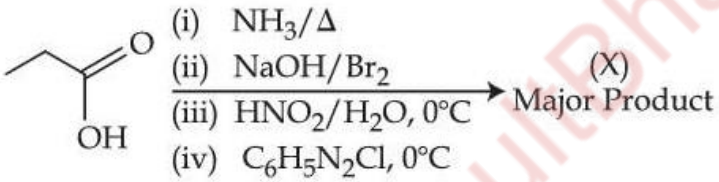
6911214312. Both **Statement I** and **Statement II** are false

6911214313. **Statement I** is true but **Statement II** is false

6911214314. **Statement I** is false but **Statement II** is true

Question Number : 67 Question Id : 6911211267 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 organic reaction sequence. Choose the final product (X) from the following (consider the major product in all intermediate reactions)



Options :

6911214315. Benzene

6911214316. Phenol

6911214317. Propanol

6911214318. Chlorobenzene

Question Number : 68 Question Id : 6911211268 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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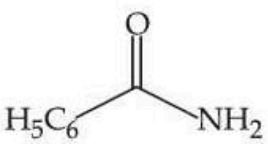
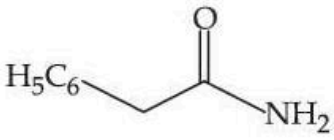
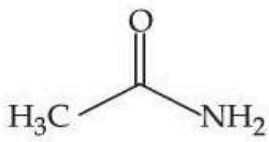
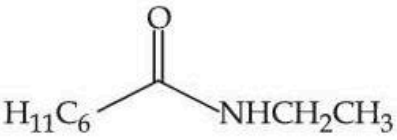
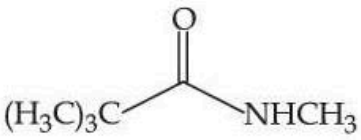
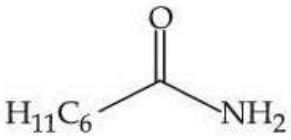
The number of compounds from the following which can undergo reaction with Br_2/KOH (alcoholic) to give respective products and these respective products can also be obtained separately by Gabriel phthalimide reaction is :

Options :

6911214319. 5

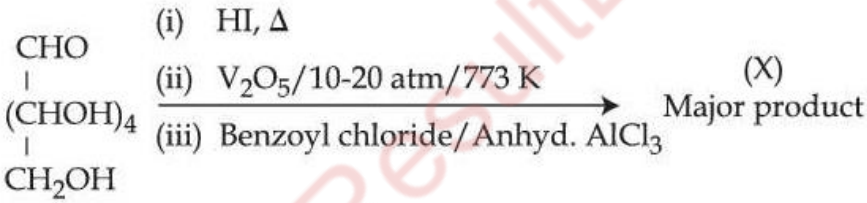
6911214320. 4

6911214321. 3

6911214322. 6

Question Number : 69 Question Id : 6911211269 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 reactions. Total number of electrons in the π bonds and lone pair of electrons in the product (X) is :



Options :

6911214323. 12

6911214324. 16

6911214325. 14

6911214326. 18

Question Number : 70 Question Id : 6911211270 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Treatment of a gas 'X' with a freshly prepared ferrous sulphate solution gives a compound 'Y' as a brown ring. The compounds X and Y are.

Options :

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6911214327. NO and $[Fe(NO)]SO_4$

6911214328. NO_2 and $[Fe(NO_2)]SO_4$

6911214329. N_2O and $[Fe(N_2O)]SO_4$

6911214330. N_2O_4 and $[Fe(N_2O_4)]SO_4$

Chemistry Section B

Section Id :	691121102
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 :	691121102
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 6911211271 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An excess of $AgNO_3$ is added to 100 mL of a 0.05 M solution of tetraaquadichloridochromium (III) chloride. The number of moles of AgCl precipitated will be _____ $\times 10^{-3}$.

(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 : 72 Question Id : 6911211272 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An alkane (Y) requires 8 moles of oxygen for complete combustion and on chlorination with $Cl_2/h\nu$, (Y) gives only one monochlorinated product (Z). The total number of primary carbon atoms in (Y) is _____.

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

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Question Number : 73 Question Id : 6911211273 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

500 mL of $0.2\ M\ MnO_4^-$ solution in basic medium when mixed with 500 mL of 1.5 M KI solution, oxidises iodide ions to liberate molecular iodine. This liberated iodine is then titrated with a standard x M thiosulphate solution in presence of starch till the end point. If 300 mL of thiosulphate was consumed, then the value of x is _____.

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 : 6911211274 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In a closed flask at 600 K, one mole of $X_2Y_4(g)$ attains equilibrium as given below :

$$X_2Y_4(g) \rightleftharpoons 2XY_2(g)$$

At equilibrium, 75% $X_2Y_4(g)$ was dissociated and the total pressure is 1 atm. The magnitude of $\Delta_r G^{\ominus}$ (in kJ mol^{-1}) at this temperature is _____. (Nearest Integer)
(Given : $R = 8.3\ J\ mol^{-1}\ K^{-1}$; $\ln 10 = 2.3$, $\log 2 = 0.3$, $\log 3 = 0.48$, $\log 5 = 0.69$, $\log 7 = 0.84$)

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 : 6911211275 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Decomposition of a hydrocarbon follows the equation $k = (5.5 \times 10^{11} s^{-1})\ e^{\frac{-28000K}{T}}$. The activation energy of reaction is _____ kJ mol^{-1}. (Nearest Integer)
Given : $R = 8.3\ J\ K^{-1}\ mol^{-1}$

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

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National Testing Agency

Question Paper Name :	B Tech 5th Apr 2026 Shift 1
Subject Name :	B. Tech
Creation Date :	2026-04-05 14:04:32
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6952785
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 :	69527825
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 :	69527825
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 695278301 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $a, b \in \mathbb{C}$. Let α, β be the roots of the equation $x^2 + ax + b = 0$. If $\beta - \alpha = \sqrt{11}$ and $\beta^2 - \alpha^2 = 3i\sqrt{11}$, then $(\beta^3 - \alpha^3)^2$ is equal to:

Options :

6952781021. 160

6952781022. 176

6952781023. 194

6952781024. 187

Question Number : 2 Question Id : 695278302 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the sum of the first n terms of an A.P. be $3n^2 + 5n$. Then the sum of squares of the first 10 terms of the A.P. is:

Options :

6952781025. 10220

6952781026. 12860

6952781027. 15220

6952781028. 19780

Question Number : 3 Question Id : 695278303 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let A be a 3×3 matrix such that

$$A^T\begin{bmatrix}1\\0\\1\end{bmatrix}=\begin{bmatrix}5\\2\\2\end{bmatrix}, A^T\begin{bmatrix}0\\0\\1\end{bmatrix}=\begin{bmatrix}3\\1\\1\end{bmatrix}, A\begin{bmatrix}1\\0\\1\end{bmatrix}=\begin{bmatrix}3\\4\\4\end{bmatrix} \text{ and } A\begin{bmatrix}0\\0\\1\end{bmatrix}=\begin{bmatrix}1\\3\\1\end{bmatrix}.$$

If $\det(A) = 1$, then $\det(\text{adj}(A^2 + A))$ is equal to:

Options :

6952781029. 16

6952781030. 25

6952781031. 49

6952781032. 64

Question Number : 4 Question Id : 695278304 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the system of linear equations in x, y, z:

$x + 2y + tz = 0,$

$6x + y + 5tz = 0,$

$3x + t^2y + f(t)z = 0,$

where $f : \mathbb{R} \to \mathbb{R}$ is a differentiable function. If this system has infinitely many solutions for all $t \in \mathbb{R}$, then f

Options :

6952781033. is a constant function

6952781034. is strictly increasing on $\mathbb{R}$

6952781035. is strictly decreasing on $\mathbb{R}$

6952781036. has two critical points

Question Number : 5 Question Id : 695278305 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$\sum_{n=1}^{10}\left(\frac{528}{n(n+1)(n+2)}\right)$ is equal to:

Options :

6952781037. 65

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6952781038. 130

6952781039. 220

6952781040. 440

Question Number : 6 Question Id : 695278306 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\tan A, \tan B$, where $A, B \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, be the roots of the quadratic equation $x^2 - 2x - 5 = 0$. Then $20\sin^2\left(\frac{A+B}{2}\right)$ is equal to:

Options :

6952781041. $10+\sqrt{10}$

6952781042. $10-2\sqrt{10}$

6952781043. $10-3\sqrt{10}$

6952781044. $10-\sqrt{10}$

Question Number : 7 Question Id : 695278307 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A letter is known to have arrived by post either from KANPUR or from ANANTPUR. On the envelope just two consecutive letters AN are visible. The probability, that the letter came from ANANTPUR, is:

Options :

6952781045. $\frac{7}{10}$

6952781046. $\frac{10}{17}$

6952781047. $\frac{12}{19}$

6952781048. $\frac{7}{19}$

Question Number : 8 Question Id : 695278308 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The mean deviation about the mean for the data

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

is equal to:

Options :

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6952781049. $\frac{40}{13}$

6952781050. $\frac{42}{13}$

6952781051. $\frac{44}{13}$

6952781052. $\frac{46}{13}$

Question Number : 9 Question Id : 695278309 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a focus of the ellipse $E: \frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ be S(4, 0) and its eccentricity be $\frac{4}{5}$. If the point P(3, α) lies on E and O is the origin, then the area of ΔPOS is equal to:

Options :

6952781053. 12/5

6952781054. 14/5

6952781055. 24/5

6952781056. 48/5

Question Number : 10 Question Id : 695278310 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let P be a moving point on the circle $x^2 + y^2 - 6x - 8y + 21 = 0$. Then, the maximum distance of P from the vertex of the parabola $x^2 + 6x + y + 13 = 0$ is equal to:

Options :

6952781057. 8

6952781058. 10

6952781059. 12

6952781060. 9

Question Number : 11 Question Id : 695278311 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In an equilateral triangle PQR, let the vertex P be at (3, 5) and the side QR be along the line $x + y = 4$. If the orthocentre of the triangle PQR is (α, β), then 9(α + β) is equal to:

Options :

6952781061. 16

6952781062. 27

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6952781063. 36

6952781064. 48

Question Number : 12 Question Id : 695278312 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 the integral values of p such that the equation $3\sin^2 x + 12\cos x - 3 = p$, $x \in \mathbb{R}$, has at least one solution, is:

Options :

6952781065. -54

6952781066. -60

6952781067. -75

6952781068. -84

Question Number : 13 Question Id : 695278313 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The square of the distance of the point P(5, 6, 7) from the line $\frac{x-2}{2} = \frac{y-5}{3} = \frac{z-2}{4}$ is equal to:

Options :

6952781069. 3

6952781070. 5

6952781071. 6

6952781072. 8

Question Number : 14 Question Id : 695278314 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a} = \sqrt{7}\hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{j} + 2\hat{k}$. If $\vec{r}$ is a vector such that $\vec{r} \times \vec{a} + \vec{a} \times \vec{b} = \vec{0}$ and $\vec{r} \cdot \vec{a} = 0$, then $|3\vec{r}|^2$ is equal to:

Options :

6952781073. 44

6952781074. 54

6952781075. 86

6952781076. 132

Question Number : 15 Question Id : 695278315 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The square of the distance of the point of intersection of the lines $\vec{r} = \left(\hat{i} + \hat{j} - \hat{k}\right) + \lambda\left(a\hat{i} - \hat{j}\right)$, $a \neq 0$ and $\vec{r} = \left(4\hat{i} - \hat{k}\right) + \mu\left(2\hat{i} + a\hat{k}\right)$ from the origin is:

Options :

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6952781077. 5

6952781078. 10

6952781079. 17

6952781080. 26

Question Number : 16 Question Id : 695278316 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 $R = \{(x, y): xy \le 27, 1 \le y \le x^2\}$ is equal to:

Options :

6952781081. $78\log_e 3 - \frac{52}{3}$

6952781082. $54\log_e 3 - \frac{52}{3}$

6952781083. $54\log_e 3 - \frac{26}{3}$

6952781084. $54\log_e 3 + \frac{26}{3}$

Question Number : 17 Question Id : 695278317 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The product of all possible values of α, for which

$$\lim_{x\to 0}\left(\frac{1-\cos(\alpha x)\cos((\alpha+1)x)\cos((\alpha+2)x)}{\sin^2((\alpha+1)x)}\right) = 2,$$ is:

Options :

6952781085. -2

6952781086. 1

6952781087. -1

6952781088. $\frac{5}{4}$

Question Number : 18 Question Id : 695278318 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 $\int_0^{\infty} \frac{\log_e(x)}{x^2+4}\,dx$ is:

Options :

6952781089. $\frac{\pi\log_e(2)}{2}$

6952781090. $\frac{\pi\log_e(2)}{4}$

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6952781091. $1+\pi\log_e(2)$

6952781092. $2+\pi\log_e(2)$

Question Number : 19 Question Id : 695278319 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f:\mathbb{R}\to\mathbb{R}$ be a differentiable function such that $f\left(\frac{x+y}{3}\right)=\frac{f(x)+f(y)}{3}$ for all $x, y\in\mathbb{R}$, and $f'(0)=3$. Then the minimum value of the function $g(x)=3+e^x f(x)$, is:

Options :

6952781093. $3\left(\frac{e+1}{e}\right)$

6952781094. $3\left(\frac{e-1}{e}\right)$

6952781095. $\frac{3-e}{e}$

6952781096. $3e$

Question Number : 20 Question Id : 695278320 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 $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}}\left(\frac{4-\operatorname{cosec}^2 x}{\cos^4 x}\right)dx$ is:

Options :

6952781097. $\frac{11}{\sqrt{3}}$

6952781098. $\frac{16}{\sqrt{3}}$

6952781099. $\frac{32}{3\sqrt{3}}$

6952781100. $\frac{64}{3\sqrt{3}}$

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Mathematics Section B

Section Id :	69527826
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 :	69527826
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 695278321 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let A = {1, 2, 3, 4, 5, 6}. The number of one-one functions $f: A \to A$ such that $f(1) \geq 3, f(3) \leq 4$ and $f(2) + f(3) = 5$, is_____.

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 : 695278322 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Two players A and B play a series of games of badminton. The player, who wins 5 games first, wins the series. Assuming that no game ends in a draw, the number of ways, in which player A wins the series 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 : 695278323 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the sum of the coefficients of x^7 and x^{14} in the expansion of $\left(\frac{1}{x^3} - x^4\right)^n$, $x \neq 0$, is zero, then the value of n is _____ .

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 : 695278324 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\frac{\pi}{4} + \sum_{p=1}^{11} \tan^{-1}\left(\frac{2^{p-1}}{1+2^{2p-1}}\right) = \alpha$, then $\tan\alpha$ is equal to _____.

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

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Possible Answers :

1

Question Number : 25 Question Id : 695278325 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $y = y(x)$ be the solution of the differential equation $x\sin\left(\frac{y}{x}\right)dy = \left(y\sin\left(\frac{y}{x}\right) - x\right)dx$, $y(1) = \frac{\pi}{2}$ and let $\alpha = \cos\left(\frac{y\left(e^{12}\right)}{e^{12}}\right)$. Then the number of integral value of p, for which the equation $x^2 + y^2 - 2px + 2py + \alpha + 2 = 0$ represents a circle of radius $r \leq 6$, 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 :	69527827
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 :	69527827
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 695278326 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 calipers, when both jaws touch each other, zero of the Vernier scale is shifted to the right of zero of the main scale and 7^{th} Vernier division coincides with a main scale reading. If the value of 1 main scale division is 1 mm and there are 10 Vernier scale divisions, then the Vernier caliper has

Options :

6952781106. 0.07 cm negative zero error

6952781107. 0.7 cm negative zero error

6952781108. 0.07 cm positive zero error

6952781109. 0.7 cm positive zero error

Question Number : 27 Question Id : 695278327 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

L, C and R represents physical quantities inductance, capacitance and resistance respectively. The dimensional formula $M L^2 T^{-4} A^{-2}$ corresponds to _____.

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Options :

6952781110. $\frac{R}{\sqrt{LC}}$

6952781111. $\frac{R}{LC}$

6952781112. $\frac{C}{\sqrt{LR}}$

6952781113. $\frac{1}{R}\sqrt{\frac{L}{C}}$

Question Number : 28 Question Id : 695278328 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When one moves from a point 16 km below the earth's surface to a point 16 km above the earth's surface. The change in g is approximately α %. The value of α is _____.

(Take radius of the earth = 6400 km.)

Options :

6952781114. 0.12

6952781115. 0.25

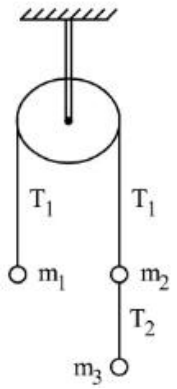
6952781116. 0.50

6952781117. 0.75

Question Number : 29 Question Id : 695278329 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Three masses $m_1 = 4$ kg, $m_2 = 4$ kg and $m_3 = 6$ kg are suspended from a fixed smooth frictionless pully as shown in the figure below. The value of T_1/T_2 is _____

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



Options :

6952781118. 5/3

6952781119. 2/3

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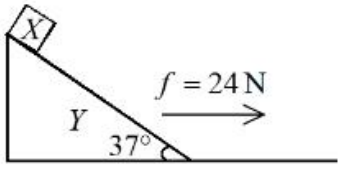
6952781120. $3/5$

6952781121. $2/5$

Question Number : 30 Question Id : 695278330 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A wedge Y with mass of 10 kg and all frictionless surfaces and the inclined surface making 37° with horizontal. A block X with mass 2 kg is placed at the highest point of the wedge as shown in figure is at rest. At $t = 0$ wedge (Y) is pulled toward right with constant force (f) of 24 N. Taking the block X at rest at $t = 0$, the time taken by it to slide down 8.8 m on the slope, while Y is on the move, is_____ s.
(take tan (37°) = 3/4 and g = 10 m/s^2)



Options :

6952781122. 2

6952781123. 4

6952781124. $\sqrt{2}$

6952781125. $2\sqrt{2}$

Question Number : 31 Question Id : 695278331 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The Young's modulus of steel wire of radius r and length L is Y.

If the radius r and length L of the wire are doubled then the value of Y

Options :

6952781126. increases by two times

6952781127. reduces by half

6952781128. remains unchanged

6952781129. becomes one fourth

Question Number : 32 Question Id : 695278332 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Statement I: Change in internal energy of a system containing n mole of ideal gas can be written as $\Delta U = n\, C_v \left(T_f - T_i\right) = \frac{nR}{\gamma - 1}\left(T_f - T_i\right)$, where $\gamma = \frac{C_p}{C_v}$, T_i = initial temperature, T_f = final temperature.

Statement II: Relation between degree of freedom f and γ $(= C_p/C_v)$ is $\left(\gamma = 1 + \frac{2}{f}\right)$

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

Options :

6952781130. Both **A** and **R** are true and **R** is the correct explanation of **A**

6952781131. Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

6952781132. **A** is true but **R** is false

6952781133. **A** is false but **R** is true

Question Number : 33 Question Id : 695278333 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements:

A. Zeroth law of thermodynamics gives concept of temperature
B. First law of thermodynamics gives concept of internal energy
C. In isothermal expansion of ideal gas, $\Delta Q \neq \Delta W$
D. Product of intensive and extensive variables is extensive
E. The ratio of any extensive variable to mass will be an extensive variable

Choose the correct combination of statements from the options given below:

Options :

6952781134. C, D and E Only

6952781135. A, B and C Only

6952781136. A, B and D Only

6952781137. B, C and D Only

Question Number : 34 Question Id : 695278334 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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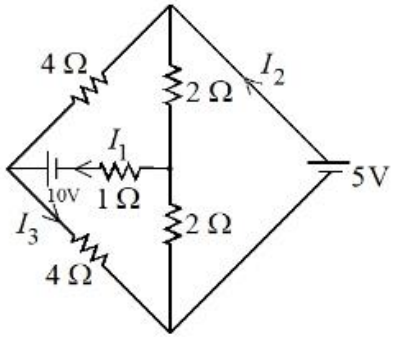
Refer to the figure given below. The values of I_1, I_2 and I_3 are _____.



Options :

6952781138. $I_1 = 2.5$ A, $I_2 = 1.875$ A, $I_3 = 1.875$ A

6952781139. $I_1 = 1.875$ A, $I_2 = 2.5$ A, $I_3 = 1.875$ A

6952781140. $I_1 = 1.875$ A, $I_2 = 1.875$ A, $I_3 = 2.5$ A

6952781141. $I_1 = 2.5$ A, $I_2 = 2.5$ A, $I_3 = 1.875$ A

Question Number : 35 Question Id : 695278335 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An electron of mass m is moving in an electric field $\vec{E} = -2E_o\hat{i}$ (E_o = constant > 0), with an initial velocity $\vec{V} = v_o\hat{i}$ (v_o = constant > 0). If $\lambda_o = \frac{h}{4mv_o}$, its de Broglie wavelength at time t is _____.
(e = charge of electron)

Options :

6952781142. $\frac{4\lambda_o}{\left[1-\frac{E_o e}{2m}\frac{t}{v_o}\right]}$

6952781143. $\frac{4\lambda_o}{\left[1+\frac{E_o e}{2m}\frac{t}{v_o}\right]}$

6952781144. $\frac{4\lambda_o}{\left[1+\frac{2E_o e}{m}\frac{t}{v_o}\right]}$

6952781145. $\frac{4\lambda_o}{\left[1-\frac{2E_o e}{m}\frac{t}{v_o}\right]}$

Question Number : 36 Question Id : 695278336 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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In the hydrogen atom, the electron makes a transition from the higher orbit (i) to a lower orbit (f). The ratio of the radius of the orbits in given by $r_i : r_f = 16 : 4$. The wavelength of photon emitted due to this transition is _____nm.
(Given Rydberg constant = 1.0973×10^7 /m)

Options :

6952781146. 121

6952781147. 242

6952781148. 486

6952781149. 974

Question Number : 37 Question Id : 695278337 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A displacement current of 4.0 A can be set up in the space between two parallel plates of 6 μF capacitor. The rate of change of potential difference across the plates of the capacitor is nearly $\alpha \times 10^6$ V/s. The value of α is _____.

Options :

6952781150. 0.58

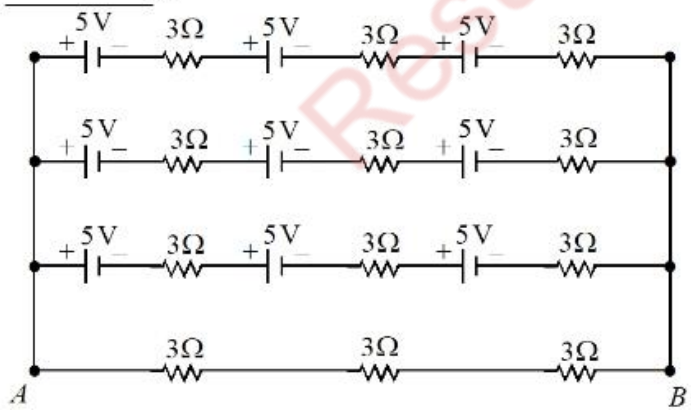
6952781151. 0.67

6952781152. 0.82

6952781153. 0.75

Question Number : 38 Question Id : 695278338 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Refer to the figure given below, current between terminals A and B is _____A.



Options :

6952781154. 12.5

6952781155. 1.25

6952781156. 7.5

6952781157. 5

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Question Number : 39 Question Id : 695278339 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In Young's double slit experiment, the fringe width of the interference pattern produced on the screen is 2.4 μm. If the experiment is carried out in another medium having refractive index 1.2, the fringe width will be ____ μm.

Options :

6952781158. 1.2

6952781159. 2

6952781160. 2.4

6952781161. 2.88

Question Number : 40 Question Id : 695278340 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A ray of light passing through an equilateral prism is having velocity 2.12×10^8 m/s in the prism material, then the minimum angle of deviation is _____ degrees.

Options :

6952781162. 45

6952781163. 30

6952781164. 28

6952781165. 58

Question Number : 41 Question Id : 695278341 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Light source having wavelength 331 nm is used to generate photo-electrons whose stopping potential is 0.2 V. The work function of the used metal in the experiment is $\alpha \times 10^{-19}$ J. The value of α is _____.
($h = 6.62 \times 10^{-34}$ J s, $e = 1.6 \times 10^{-19}$ C and $c = 3 \times 10^8$ m/s)

Options :

6952781166. 3.68

6952781167. 4.68

6952781168. 5.68

6952781169. 2.68

Question Number : 42 Question Id : 695278342 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A compound microscope is designed with two symmetric biconvex lenses. The objective lens is cut vertically, creating two identical plano-convex lenses. One of them is used in place of original objective lens. To retain same magnification keeping the object distance unchanged, the tube length has to be

Options :

6952781170. increased two times

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6952781171. increased $\frac{3}{2}$ times

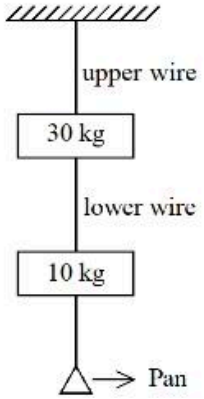
6952781172. decreased two times

6952781173. decreased $\frac{3}{2}$ times

Question Number : 43 Question Id : 695278343 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two wires as shown in the figure below, made of steel and have breaking stress of 12×10^8 N/m^2. Area of cross-section of upper wire is 0.008 cm^2 and of lower wire is 0.004 cm^2. The maximum mass that can be added to pan without breaking any wire is _____ kg.

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



Options :

6952781174. 56

6952781175. 38

6952781176. 96

6952781177. 5.6

Question Number : 44 Question Id : 695278344 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An a.c. source of angular frequency ω is connected across a resistor R and a capacitor C in series. The current is observed as I. Now the frequency of the source is changed to $\omega/4$, (keeping the voltage unchanged) the current is found to be $I/3$. The ratio of resistance to reactance at frequency ω is

Options :

6952781178. $\sqrt{\frac{6}{7}}$

6952781179. $\sqrt{\frac{3}{5}}$

6952781180. $\sqrt{\frac{7}{8}}$

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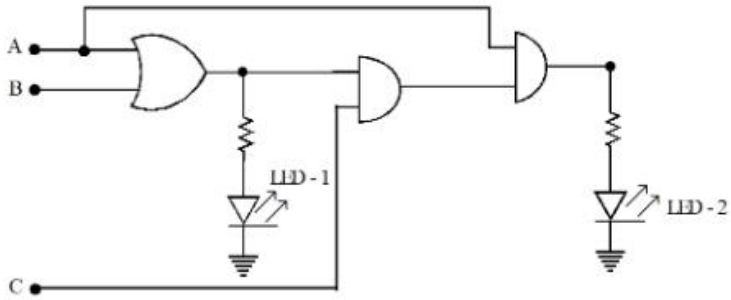
6952781181. $\sqrt{\frac{3}{4}}$

Question Number : 45 Question Id : 695278345 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the given logic circuit, which of the following inputs combination will make both LED−1 and LED−2 to glow?



Options :

6952781182. $A = 0, B = 1, C = 1$

6952781183. $A = 1, B = 0, C = 0$

6952781184. $A = 1, B = 0, C = 1$

6952781185. $A = 1, B = 1, C = 0$

Physics Section B

Section Id :	69527828
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 :	69527828
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 695278346 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A cube has side length 5 cm and modulus of rigidity 10^5 N/m^2. The displacement produced by a force of 10 N in the upper face of cube is _____ mm.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

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Question Number : 47 Question Id : 695278347 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

From 18 m height above the ground a ball is dropped from rest . The height above the ground at which the magnitude of velocity equal to the magnitude of acceleration (in the same set of units) due to gravity is ____ m.

(Take $g = 10\ m/s^2$ and neglect the air resistance)

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 : 695278348 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A transverse wave on a string is described by $y = 3\sin(36t + 0.018x + \pi/4)$. where x, y are in cm and t in seconds. The least distance between the two successive crests in the wave is ____ cm. (Nearest integer)

$(\pi = 3.14)$

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 : 695278349 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The charged particle moving in a uniform magnetic field of $\left(3\hat{i} + 2\hat{j}\right)$T has an acceleration $\left(4\hat{i} - \frac{x}{2}\hat{j}\right) m/s^2$. The value of x is

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

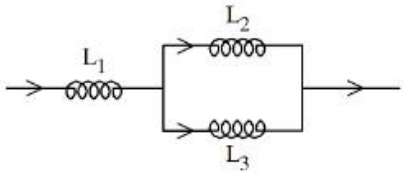
Possible Answers :

1

Question Number : 50 Question Id : 695278350 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In the given circuit below inductance values of L_1, L_2 and L_3 are same. The magnetic energy stored in the entire circuit is (U_t) and that stored in the L_2 inductor is (U_l). U_t / U_l is _____.

(Ignore the mutual inductance if any)



Response Type : Numeric

Evaluation Required For SA : Yes

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Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Chemistry Section A

Section Id :	69527829
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 :	69527829
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 695278351 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

How many grams of residue is obtained by heating 2.76 g of silver carbonate?
(Given : Molar mass of C, O and Ag are 12, 16 and 108 g mol^{-1} respectively)

Options :

6952781191. 1.08 g

6952781192. 2.16 g

6952781193. 3.24 g

6952781194. 4.32 g

Question Number : 52 Question Id : 695278352 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 atomic orbitals of multi electron atoms in order of increasing energy.

A. $n = 3, l = 2, m = +1$
B. $n = 4, l = 0, m = 0$
C. $n = 6, l = 1, m = 0$
D. $n = 5, l = 1, m = +1$
E. $n = 2, l = 1, m = +1$

Choose the correct answer from the options given below:

Options :

6952781195. C < D < B < A < E

6952781196. B < A < E < C < D

6952781197. E < C < D < B < A

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6952781198. $E < B < A < D < C$

Question Number : 53 Question Id : 695278353 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** statements from the following :

A. Heisenberg uncertainty principle is applicable to electrons.
B. The size of $2p_x$ orbital is less than the size of $3p_x$ orbital.
C. The energy of 2s orbital of H atom is equal to the energy of 2s orbital of Li.
D. The electronic configuration of Cr is [Ar] $3d^5\ 4s^1$

Choose the correct answer from the options given below:

Options :

6952781199. A, B and C Only

6952781200. A, B and D Only

6952781201. B, C and D Only

6952781202. A, C and D Only

Question Number : 54 Question Id : 695278354 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What is the mole fraction of water in 10% by weight (w/w) of aqueous urea solution?

[Given: Molar mass of H, O, C and N are 1, 16, 12 and 14 g mol^{-1} respectively.]

Options :

6952781203. 0.825

6952781204. 0.032

6952781205. 0.867

6952781206. 0.967

Question Number : 55 Question Id : 695278355 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

M_3A_2 is a sparingly soluble salt of molar mass y g mol^{-1} and solubility x g L^{-1}.

The ratio of the molar concentration of the anion (A^{3-}) to the solubility product of the salt is

Options :

6952781207. $\frac{1}{54}\cdot\frac{y^4}{x^4}$

6952781208. $\frac{y^5}{108x^4}$

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6952781209. $108 \cdot \frac{x^5}{y^5}$

6952781210. $\frac{1}{108}\frac{y^4}{x^4}$

Question Number : 56 Question Id : 695278356 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 resultant mixtures in increasing order of their pH values

A. 10 mL 0.2 M $Ca(OH)_2$ + 25 mL 0.1 M HCl
B. 10 mL 0.01 M H_2SO_4 + 10 mL 0.01 M $Ca(OH)_2$
C. 10 mL 0.1 M H_2SO_4 + 10 mL 0.1 M KOH

Choose the correct answer from the options given below:

Options :

6952781211. B < C < A

6952781212. C < A < B

6952781213. C < B < A

6952781214. A < C < B

Question Number : 57 Question Id : 695278357 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

First order gas phase reaction

$A \rightarrow B + C$

p_i = initial pressure of gas A, p_t = total pressure of the reaction mixture at time t

Expression of rate constant (k) is

Options :

6952781215. $\frac{1}{t}\ln\frac{p_i}{2p_i - p_t}$

6952781216. $\frac{1}{t}\ln\frac{2p_i}{p_i - p_t}$

6952781217. $\frac{1}{t}\ln\frac{p_i}{3p_i - 2p_t}$

6952781218. $\frac{1}{t}\ln\frac{3p_i}{4p_i - p_t}$

Question Number : 58 Question Id : 695278358 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Given below are two statements:

Statement I: The correct order of electronegativity of fluorine, oxygen and nitrogen is F > O > N.

Statement II: The oxidation state of oxygen in OF_2 is +2 and in Na_2O is −2.

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

Options :

6952781219. Both Statement I and Statement II are true

6952781220. Both Statement I and Statement II are false

6952781221. Statement I is true but Statement II is false

6952781222. Statement I is false but Statement II is true

Question Number : 59 Question Id : 695278359 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct statements from the following are:

A. Nitrogen in oxidation states from +1 to +4 disproportionates in acid medium.
B. Nitrogen has the ability to form dπ - pπ multiple bonds with itself and other elements with small size and high electronegativity.
C. N-N single bond is stronger than P-P single bond.
D. Nitrogen has highest density in its group due to small size.
E. The maximum covalency of nitrogen is four since it has only four valence orbitals for bonding.

Choose the correct answer from the options given below:

Options :

6952781223. B, C and D Only

6952781224. C, D and E Only

6952781225. A, C and E Only

6952781226. A and E Only

Question Number : 60 Question Id : 695278360 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following is **NOT** a physical or chemical characteristics of interstitial compounds?

Options :

6952781227. They have high melting points, higher than those of pure metals.

6952781228. They are very soft and ionic in nature.

6952781229. They retain metallic conductivity.

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6952781230. They are chemically inert and usually non-stoichiometric.

Question Number : 61 Question Id : 695278361 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 about metal carbonyls are

A. The metal-carbon bonds in metal carbonyls possess both σ and π-character.
B. Due to synergic bonding interactions between metal and CO ligand, the metal-carbon bond becomes weak.
C. The metal-carbon σ bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of metal.
D. The metal-carbon π bond is formed by the donation of electrons from filled d-orbital of metal into vacant π* orbital of CO.

Choose the correct answer from the options given below:

Options :

6952781231. A and B Only

6952781232. A, C and D Only

6952781233. B and C Only

6952781234. A and D Only

Question Number : 62 Question Id : 695278362 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: Each electron in e_g orbitals destabilizes the orbitals by $+0.6\ \Delta_o$ and each electron in the t_{2g} orbitals stabilizes the orbitals by $-0.4\ \Delta_o$ in an octahedral field on the basis of crystal field theory.

Statement II: All the d - orbitals of the transition metals have the same energy in their free atomic state but when a complex is formed the ligands destroy the degeneracy of these orbitals on the basis of crystal field theory.

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

Options :

6952781235. Both Statement I and Statement II are correct

6952781236. Both Statement I and Statement II are incorrect

6952781237. Statement I is correct but Statement II is incorrect

6952781238. Statement I is incorrect but Statement II is correct

Question Number : 63 Question Id : 695278363 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Given below are two statements:

Statement I: On the basis of inductive effect, the order of stability of alkyl carbanions is $CH_3^- > CH_3-CH_2^- > (CH_3)_2CH^- > (CH_3)_3C^-$.

Statement II: Allyl and benzyl carbanions are more stabilised by inductive effect and not by resonance effect.

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

Options :

6952781239. Both Statement I and Statement II are correct

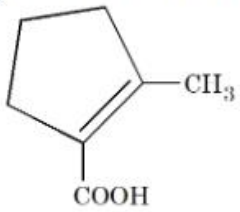
6952781240. Both Statement I and Statement II are incorrect

6952781241. Statement I is correct but Statement II is incorrect

6952781242. Statement I is incorrect but Statement II is correct

Question Number : 64 Question Id : 695278364 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

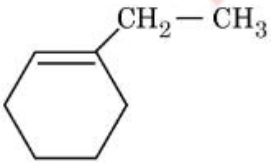
"P" is a hydrocarbon of molecular formula:- C_8H_{14}. On ozonolysis, "P" forms "Q". "Q" on treatment with alkali under reflux condition produces "R", which on treatment with I_2/ NaOH gives a yellow precipitate. Acidification of the solution gives "S". The structure of "S" is given below:-

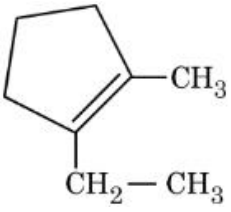


The correct structure of "P" is

Options :

6952781243. 

6952781244. 

6952781245. 

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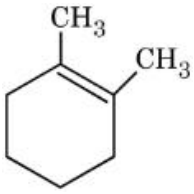
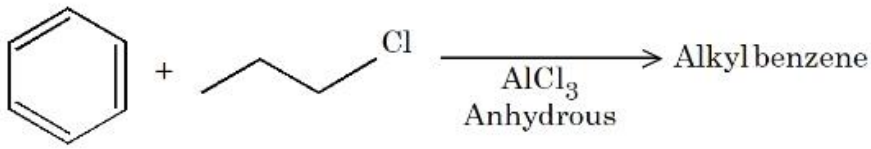
6952781246. 

Question Number : 65 Question Id : 695278365 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the following Friedel Craft's alkylation reaction, which of the statements are **correct**?



A. Major product is n-propyl benzene.
B. iso-propyl carbocation intermediate is also generated.
C. Multiple substitution is inevitable.
D. Introducing electron-donating substituent on benzene will not produce any alkyl benzene.

Choose the correct answer from the options given below:

Options :

6952781247. A and D only

6952781248. B and C only

6952781249. A and C only

6952781250. B and D only

Question Number : 66 Question Id : 695278366 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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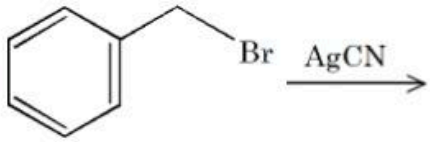
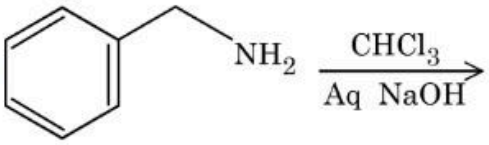
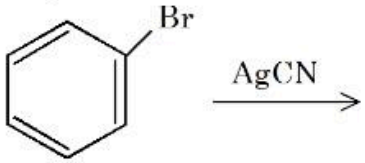
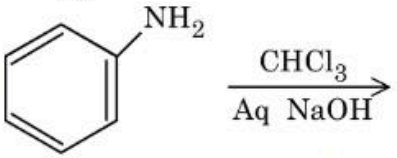
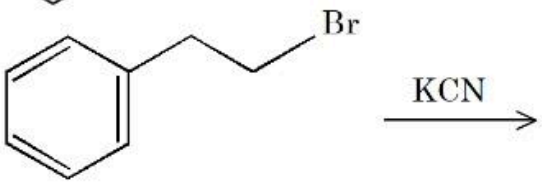
Benzyl isocyanide can be obtained from

A. 

B. 

C. 

D. 

E. 

Choose the correct answer from the options given below:

Options :

6952781251. A and B Only

6952781252. A and C Only

6952781253. B and D Only

6952781254. D and E Only

Question Number : 67 Question Id : 695278367 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider compounds A, B and C with following structural formulae

A = $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - OH$

B = $CH_2 = CH - CH_2 - CH_2 - CH_3$

C = $HO - CH_2 - CH_2 - CH(OH) - CH_3$

For the conversion of B from A, reagent (D) required is _____ and structural formula of product (E) obtained when C undergoes same reaction using excess reagent (D) is _____.

Options :

6952781255.

D	E
Conc. H_2SO_4	$CH_2 = CH - CH(OH)CH_3$

6952781256.

D	E
PCC	$HO - CH_2 - CH_2 - CH = CH_2$

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6952781257.

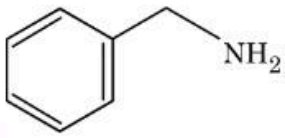
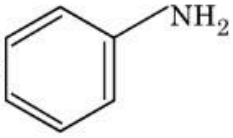
D	E
PCC	$CH_2 = CH - CH = CH_2$

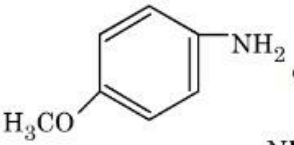
6952781258.

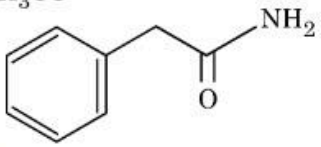
D	E
Conc. H_2SO_4 or H_3PO_4	$CH_2 = CH - CH = CH_2$

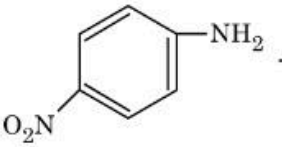
Question Number : 68 Question Id : 695278368 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Identify the **incorrect** statements.

A.  is a stronger base than 

B.  can be synthesized by Gabriel phthalimide synthesis.

C.  $\xrightarrow{Br_2,\ NaOH}$ primary aromatic amine

D.  $\xrightarrow[(ii)\ \Delta]{(i)\ NaNO_2,\ HCl,0°C}$ product will dissolve in NaOH

Choose the correct answer from the options given below:

Options :

6952781259. A and D Only

6952781260. A and C Only

6952781261. B and C Only

6952781262. A and B Only

Question Number : 69 Question Id : 695278369 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** statements.

A. Glucose exists in two anomeric forms.
B. Anomers of glucose differ in configuration at C−1 in cyclic hemiacetal structure.
C. Melting point of α - anomer of glucose is greater than β - anomer.
D. Specific rotation of α - anomer is +19° while for β - anomer is +112°
E. α and β - anomers of glucose are prepared by crystallization of saturated glucose solution at 303 K and 371 K respectively.

Choose the correct answer from the options given below:

Options :

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6952781263. A and B Only

6952781264. B and C Only

6952781265. A, B and D Only

6952781266. A, B and E Only

Question Number : 70 Question Id : 695278370 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: Sodium dichromate and potassium dichromate are classified as primary standards in titrimetric analysis.

Statement II: Phenolphthalein is a weak base, therefore it dissociates in acidic medium.

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

Options :

6952781267. Both Statement I and Statement II are ture

6952781268. Both Statement I and Statement II are false

6952781269. Statement I is true but Statement II is false

6952781270. Statement I is false but Statement II is true

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Chemistry Section B

Section Id :	69527830
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 :	69527830
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 695278371 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following species:

BrF_5, XeF_5^-, BF_4^-, ICl_4^-, XeF_4, SF_4, NH_4^+, ClF_3, XeF_2, ICl_2^-

Number of species having sp^3d hybridized central atom is _____.

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 : 695278372 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In an estimation of sulphur by Carius method 0.2 g of the substance gave 0.6 g of $BaSO_4$. The percentage of sulphur in the substance is _____%.

(Given molar mass in g mol^{-1} S : 32, $BaSO_4$: 231)

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 : 695278373 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

One mole of phenol is treated with dilute HNO_3 at 298 K to give a mixture of products. The mixture is separated by steam distillation. The steam volatile compound (X) is separated. The increase in percentage of oxygen in (X) with respect to phenol is _____$\times 10^{-1}$ %

(Given molar mass in g mol^{-1} H:1, C:12, N:14, 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 : 695278374 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The values of pressure equilibrium constant recorded at different temperatures for the following equilibrium reaction have been given below

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

$\frac{1}{T}(K^{-1})$	$\log_{10}K_p$
0.05	3.5
0.06	2.5
0.07	1.5

The magnitude of $\frac{\Delta H^\circ}{R}$ calculated from the above data is _____. (Nearest integer)

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

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Question Number : 75 Question Id : 695278375 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the half life of a first order reaction is 6.93 minutes then the time required for completion of 99% of the reaction will be _____ minutes .
(Given : log 2 = 0.3010)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

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National Testing Agency

Question Paper Name :	B Tech 5th Apr 2026 Shift 2
Subject Name :	B. Tech
Creation Date :	2026-04-05 19:23:59
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6911217
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 :	69112137
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 :	69112137
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 691121451 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let α, β be the roots of the equation $x^2 - x + p = 0$ and γ, δ be the roots the equation $x^2 - 4x + q = 0$; $p, q \in \mathbf{Z}$. If $\alpha, \beta, \gamma, \delta$ are in G.P., then $|p + q|$ equals :

Options :

6911211531. 16

6911211532. 32

6911211533. 34

6911211534. 38

Question Number : 2 Question Id : 691121452 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $z_1, z_2 \in \mathbb{C}$ be the distinct solutions of the equation $z^2+4z-(1+12i)=0$.
Then $|z_1|^2+|z_2|^2$ is equal to :

Options :

6911211535. 18

6911211536. 22

6911211537. 29

6911211538. 34

Question Number : 3 Question Id : 691121453 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $f: \mathbf{N} \to \mathbf{Z}$ is defined by

$$f(n)=\begin{vmatrix} n & -1 & -5 \\ -2n^2 & 3(2k+1) & 2k+1 \\ -3n^3 & 3k(2k+1) & 3k(k+2)+1 \end{vmatrix}, k \in \mathbf{N},$$

and $\sum_{n=1}^{k} f(n)=98$, then k is equal to :

Options :

6911211539. 3

6911211540. 4

6911211541. 5

6911211542. 6

Question Number : 4 Question Id : 691121454 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let M be a 3×3 matrix such that

$$M\begin{pmatrix}1\\0\\0\end{pmatrix}=\begin{pmatrix}1\\2\\3\end{pmatrix}, M\begin{pmatrix}0\\1\\0\end{pmatrix}=\begin{pmatrix}0\\1\\2\end{pmatrix} \text{ and } M\begin{pmatrix}0\\0\\1\end{pmatrix}=\begin{pmatrix}-1\\1\\1\end{pmatrix}. \text{ If } M\begin{pmatrix}x\\y\\z\end{pmatrix}=\begin{pmatrix}1\\7\\11\end{pmatrix}, \text{ then } x+y+z \text{ equals :}$$

Options :

6911211543. 4

6911211544. 5

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6911211545. 7

6911211546. 11

Question Number : 5 Question Id : 691121455 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the sum of the first 10 terms of the series $\frac{1}{1+1^4\times 4}+\frac{2}{1+2^4\times 4}+\frac{3}{1+3^4\times 4}+\frac{4}{1+4^4\times 4}+.....$ is $\frac{m}{n}$, gcd $(m, n)=1$, then $m+n$ is equal to :

Options :

6911211547. 256

6911211548. 264

6911211549. 276

6911211550. 284

Question Number : 6 Question Id : 691121456 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A_1, A_2, A_3, ..., A_{39}$ be 39 arithmetic means between the numbers 59 and 159. Then the mean of A_{25}, A_{28}, A_{31} and A_{36} is equal to :

Options :

6911211551. 129

6911211552. 136

6911211553. 131.50

6911211554. 134

Question Number : 7 Question Id : 691121457 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The coefficient of x^2 in the expansion of $\left(2x^2+\frac{1}{x}\right)^{10}, x\neq 0$, is :

Options :

6911211555. 3240

6911211556. 3360

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6911211557. 3480

6911211558. 3600

Question Number : 8 Question Id : 691121458 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The probabilities that players A and B of a team are selected for the captaincy for a tournament are 0.6 and 0.4, respectively. If A is selected the captain, the probability that the team wins the tournament is 0.8 and if B is selected the captain, the probability that the team wins the tournament is 0.7. Then the probability, that the team wins the tournament, is :

Options :

6911211559. 0.74

6911211560. 0.76

6911211561. 0.72

6911211562. 0.78

Question Number : 9 Question Id : 691121459 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A box contains 5 blue, 6 yellow and 4 red balls. The number of ways, of drawing 8 balls containing at least two balls of each colour, is :

Options :

6911211563. 4100

6911211564. 4140

6911211565. 4230

6911211566. 4290

Question Number : 10 Question Id : 691121460 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A variable X takes values 0, 0, 2, 6, 12, 20, ..., $n(n-1)$ with frequencies ${}^nC_0, {}^nC_1, {}^nC_2, {}^nC_3, {}^nC_4, {}^nC_5, ..., {}^nC_n$, respectively. If the mean of this data is 60, then its median is :

Options :

6911211567. 56

6911211568. 42

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6911211569. 72

6911211570. 90

Question Number : 11 Question Id : 691121461 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the point P be the vertex of the parabola $y=x^2-6x+12$. If a line passing through the point P intersects the circle $x^2+y^2-2x-4y+3=0$ at the points R and S, then the maximum value of $(PR+PS)^2$ is :

Options :

6911211571. 10

6911211572. 20

6911211573. 25

6911211574. 5

Question Number : 12 Question Id : 691121462 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the directrix of the parabola P : $y^2=8x$, cut x-axis at the point A. Let B (α, β), $\alpha > 1$, be a point on P such that the slope of AB is 3/5. If BC is a focal chord of P, then six times the area of ΔABC is :

Options :

6911211575. 80

6911211576. 160

6911211577. 174

6911211578. 192

Question Number : 13 Question Id : 691121463 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the eccentricity e of a hyperbola satisfy the equation $6e^2-11e+3=0$. If the foci of the hyperbola are (3, 5) and (3, -4), then the length of its latus rectum is :

Options :

6911211579. $11/3$

6911211580. $17/3$

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6911211581. $15/2$

6911211582. $17/2$

Question Number : 14 Question Id : 691121464 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a triangle PQR be such that P and Q lie on the line $\frac{x+3}{8}=\frac{y-4}{2}=\frac{z+1}{2}$ and are at a distance of 6 units from R (1, 2, 3). If (α, β, γ) is the centroid of ΔPQR, then $\alpha+\beta+\gamma$ is equal to :

Options :

6911211583. 4

6911211584. 5

6911211585. 6

6911211586. 8

Question Number : 15 Question Id : 691121465 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the distance of the point (a, 2, 5) from the image of the point (1, 2, 7) in the line $\frac{x}{1}=\frac{y-1}{1}=\frac{z-2}{2}$ is 4, then the sum of all possible values of a is equal to :

Options :

6911211587. 11

6911211588. 9

6911211589. 6

6911211590. 4

Question Number : 16 Question Id : 691121466 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let O be the origin, $\vec{OP}=\vec{a}$ and $\vec{OQ}=\vec{b}$. If R is the point on $\vec{OP}$ such that $\vec{OP}=5\vec{OR}$, and M is the point such that $\vec{OQ}=5\vec{RM}$, then $\vec{PM}$ is equal to :

Options :

6911211591. $\frac{1}{5}\left(\vec{a}-4\vec{b}\right)$

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6911211592. $\frac{1}{5}\left(\vec{b}-4\vec{a}\right)$

6911211593. $\frac{1}{5}\left(-\vec{a}+4\vec{b}\right)$

6911211594. $\frac{1}{5}\left(-\vec{b}+4\vec{a}\right)$

Question Number : 17 Question Id : 691121467 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x)=\lim\limits_{y\to 0}\frac{(1-\cos(xy))\tan(xy)}{y^3}$. Then the number of solutions of the equation $f(x)=\sin x$, $x\in\mathbf{R}$ is :

Options :

6911211595. 0

6911211596. 2

6911211597. 3

6911211598. 1

Question Number : 18 Question Id : 691121468 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $(2^{1-a}+2^{1+a})$, $f(a)$, (3^a+3^{-a}) be in A.P. and α be the minimum value of $f(a)$. Then the value of the integral $\int_{\log_e(\alpha-1)}^{\log_e(\alpha)}\frac{dx}{\left(e^{2x}-e^{-2x}\right)}$ is :

Options :

6911211599. $\frac{1}{2}\log_e\left(\frac{4}{3}\right)$

6911211600. $\frac{1}{4}\log_e\left(\frac{4}{3}\right)$

6911211601. $\frac{1}{2}\log_e\left(\frac{8}{5}\right)$

6911211602. $\frac{1}{4}\log_e\left(\frac{8}{5}\right)$

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Question Number : 19 Question Id : 691121469 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f : [1, \infty) \to \mathbf{R}$ be a differentiable function defined as $f(x) = \int_1^x f(t)dt + (1-x)(\log_e x - 1) + e$.

Then the value of $f(f(1))$ is :

Options :

6911211603. $(1 + e^e)$

6911211604. $(1 + e)$

6911211605. $(1 + e + e^e)$

6911211606. $1 + 2e$

Question Number : 20 Question Id : 691121470 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x)$ and $g(x)$ be twice differentiable functions satisfying $f''(x) = g''(x)$ for all $x \in \mathbf{R}, f'(1) = 2g'(1) = 4$ and $g(2) = 3f(2) = 9$. Then $f(25) - g(25)$ is equal to :

Options :

6911211607. 20

6911211608. 40

6911211609. -20

6911211610. -40

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Mathematics Section B

Section Id :	69112138
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 :	69112138
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 691121471 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $A = \{1, 4, 7\}$ and $B = \{2, 3, 8\}$. Then the number of elements, in the relation $R = \{((a_1, b_1), (a_2, b_2)) \in ((A \times B) \times (A \times B)) : a_1 + b_2 \text{ divides } a_2 + b_1\}$ is _____.

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

Question Number : 22 Question Id : 691121472 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

From the point $(-1, -1)$, two rays are sent making angles of $45°$ with the line $x+y=0$. These rays get reflected from the mirror $x+2y=1$. If the equations of the reflected rays are $ax+by=9$ and $cx+dy=7$, a, b, c, $d \in \mathbf{Z}$, then the value of $ad+bc$ 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 : 691121473 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $S=\left\{\theta \in [-\pi, \pi] : \cos\theta \cos\frac{5\theta}{2} = \cos 7\theta \cos\frac{7\theta}{2}\right\}$, then n(S) 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 : 691121474 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $f: \mathbf{R} \to \mathbf{R}$ be a function such that $f(x) + 3f\left(\frac{\pi}{2} - x\right) = \sin x$, $x \in \mathbf{R}$. Let the maximum value of f on $\mathbf{R}$ be α. If the area of the region bounded by the curves $g(x)=x^2$ and $h(x)=\beta x^3$, $\beta > 0$, is α^2, then $30\beta^3$ 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 : 691121475 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $y=y(x)$ be the solution of the differential equation

$(\tan x)^{1/2}\, dy = \left(\sec^3 x - (\tan x)^{3/2} y\right) dx$, $0 < x < \frac{\pi}{2}$, $y\left(\frac{\pi}{4}\right) = \frac{6\sqrt{2}}{5}$. If $y\left(\frac{\pi}{3}\right) = \frac{4}{5}\alpha$, then α^4 equals _____.

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

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Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Physics Section A

Section Id :	69112139
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 :	69112139
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 691121476 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		**List - II**
A.	Meter (L)	I.	$\sqrt{\frac{hc}{G}}$
B.	Second (S)	II.	$\sqrt{\frac{Gh}{c^5}}$
C.	Kilogram (M)	III.	$\sqrt{\frac{K^2L^2c^3}{Gh}}$
D.	Kelvin (K)	IV.	$\sqrt{\frac{Gh}{c^3}}$

where h (Planck's constant), G (gravitational constant) and c (speed of light in vacuum) as fundamental units.

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

Options :

6911211616. A-II, B-IV, C-I, D-III

6911211617. A-IV, B-II, C-I, D-III

6911211618. A-IV, B-I, C-II, D-III

6911211619. A-III, B-I, C-II, D-IV

Question Number : 27 Question Id : 691121477 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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In an experiment to determine the resistance of a given wire using Ohm's law, the voltmeter and ammeter readings are noted as 10 V and 5 A, respectively. The least counts of voltmeter and ammeter are 500 mV and 200 mA, respectively. The estimated error in the resistance measurement is _____ Ω

Options :

6911211620. 0.25

6911211621. 2

6911211622. 2.5

6911211623. 0.18

Question Number : 28 Question Id : 691121478 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A mass of 1 kg is kept on a inclined plane with 30° inclination with respect to horizontal plane and it is at rest initially. Then the whole assembly is moved up with constant velocity of 4 m/s. The work done by the frictional force in time 2 s is _____ J. (Take $g = 10\ m/s^2$)

Options :

6911211624. 20

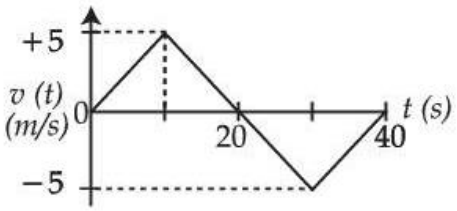
6911211625. 25

6911211626. 30

6911211627. 10

Question Number : 29 Question Id : 691121479 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) versus time (t) plot of a particle is shown in the figure, for a time interval of 40 s. The total distance travelled by the particle and the average velocity during this period are, respectively _____.



Options :

6911211628. 25 m and zero

6911211629. 50 m and zero

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6911211630. 100 m and zero

6911211631. 100 m and 2.5 m/s

Question Number : 30 Question Id : 691121480 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A wheel initially at rest is subjected to a uniform angular acceleration about its axis. In the first 2 s it rotates through an angle θ_1 and in the next 2 s it rotates through an angle θ_2. The ratio $\frac{\theta_2}{\theta_1}$ is _____.

Options :

6911211632. 6

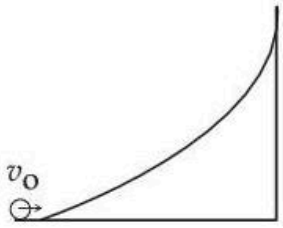
6911211633. 3

6911211634. 4

6911211635. $\frac{1}{3}$

Question Number : 31 Question Id : 691121481 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An object of uniform density rolls up the curved path with the initial velocity v_o as shown in the figure. If the maximum height attained by an object is $\frac{7v_o^2}{10\,g}$ (g = acceleration due to gravity), the object is a _____.



Options :

6911211636. solid cylinder

6911211637. ring

6911211638. disc

6911211639. solid sphere

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Question Number : 32 Question Id : 691121482 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A body of mass m is taken from the surface of earth to a height equal to twice the radius of earth (R_e). The increase in potential energy will be _____.

(g is acceleration due to gravity at the surface of earth)

Options :

6911211640. $\frac{1}{2}mgR_e$

6911211641. $\frac{3}{4}mgR_e$

6911211642. $\frac{1}{4}mgR_e$

6911211643. $\frac{2}{3}mgR_e$

Question Number : 33 Question Id : 691121483 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Eight mercury drops, each of radius r, coalesce to form a bigger drop. The surface energy released in this process is _____. (S is the surface tension of mercury).

Options :

6911211644. $8\pi r^2 S$

6911211645. $16\pi r^2 S$

6911211646. $64\pi r^2 S$

6911211647. $4\pi r^2 S$

Question Number : 34 Question Id : 691121484 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An ideal gas at pressure P and temperature T is expanding such that $PT^3 = \text{constant}$. The coefficient of volume expansion of the gas is _____.

Options :

6911211648. $\frac{2}{T}$

6911211649. $\frac{1}{T}$

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6911211650. $\frac{4}{T}$

6911211651. $\frac{3}{T}$

Question Number : 35 Question Id : 691121485 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		**List - II**
A.	$\sin^2 \omega t$	I.	Periodic with time period $T=\frac{\pi}{\omega}$ but not simple harmonic motion (SHM)
B.	$\sin^3(2\omega t)$	II.	Periodic with time period $T=\frac{2\pi}{\omega}$ but Not SHM
C.	$\sin(\omega t)+\cos(\pi\omega t)$	III.	Periodic with time period $T=\frac{\pi}{\omega}$ and SHM
D.	$\cos \omega t+\cos 2\omega t$	IV.	Non-periodic

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

Options :

6911211652. A-III, B-I, C-IV, D-II

6911211653. A-II, B-I, C-III, D-IV

6911211654. A-III, B-II, C-IV, D-I

6911211655. A-II, B-I, C-IV, D-III

Question Number : 36 Question Id : 691121486 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A metal rod of length L rotates about one end at origin with a uniform angular velocity ω. The magnetic field radially falls off as $B(r)=B_0 e^{-\lambda r}$; λ being a positive constant. The emf induced (neglecting the centripetal force on electrons in the rod) is :

Options :

6911211656. $B_0\omega\left[\frac{1}{\lambda^2}-e^{-\lambda L}\left(\frac{1}{\lambda^2}+\frac{L}{\lambda}\right)\right]$

6911211657. $B_0\omega\left[\frac{1}{\lambda^2}+e^{-\lambda L}\left(\frac{1}{\lambda^2}+\frac{L}{\lambda}\right)\right]$

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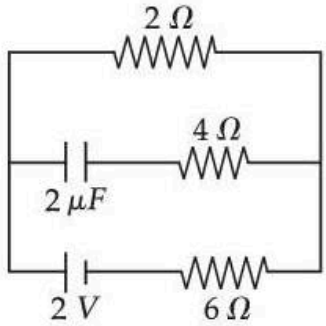
6911211658. $B_0\omega\left[\frac{4}{\lambda^2} - e^{-2\lambda L}\left(\frac{1}{\lambda^2} + \frac{2L}{\lambda}\right)\right]$

6911211659. $B_0\omega\left[\frac{3}{\lambda^2} - e^{-3\lambda L}\left(\frac{3}{\lambda^2} + \frac{L}{\lambda}\right)\right]$

Question Number : 37 Question Id : 691121487 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Under steady state condition the potential difference across the capacitor in the circuit is _____ V.



Options :

6911211660. 0.5

6911211661. 1.5

6911211662. 0

6911211663. 2

Question Number : 38 Question Id : 691121488 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A particle of charge q and mass m is projected from origin with an initial velocity $\vec{v} = \left(\frac{v_0}{\sqrt{2}}\hat{x} + \frac{v_0}{\sqrt{2}}\hat{y}\right)$. There exists a uniform magnetic field $\vec{B} = B_0\hat{z}$ and a space varying electric field $\vec{E} = E_0\, e^{-\lambda x}\hat{x}$ within the region $0 \leq x \leq L$. After travelling a distance such that x-coordinate has changed from $x = 0$ to $x = L$, the change in the kinetic energy is _____.

Options :

6911211664. $\frac{q\,E_0}{\lambda}\left[1 - e^{-\lambda L}\right]$

6911211665. $\left(\frac{v_0\, q\, B_0}{2\lambda}\right)\left[2 - e^{-2\lambda L}\right]$

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6911211666. $\frac{q\,E_0}{\lambda}\left[1+e^{-\lambda L}\right]$

6911211667. $q\left(\frac{E_0+v_0\,B_0}{\lambda}\right)\left[1-e^{-\lambda L/2}\right]$

Question Number : 39 Question Id : 691121489 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

Assertion (A) : The electromagnetic wave exerts pressure on the surface on which they are allowed to fall.

Reason (R) : There is no mass associated with the electromagnetic waves.

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

Options :

6911211668. Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

6911211669. Both **(A)** and **(R)** are true but **(R)** is **not** the correct explanation of **(A)**

6911211670. **(A)** is true but **(R)** is false

6911211671. **(A)** is false but **(R)** is true

Question Number : 40 Question Id : 691121490 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A thin convex lens and a thin concave lens are kept in contact and are co-axial. Which of the following statements is correct for this combination of two lenses ?

Options :

6911211672. behaves as concave lens if $|f_{convex}| > |f_{concave}|$

6911211673. behaves as concave lens if $|f_{convex}| < |f_{concave}|$

6911211674. behaves as convex lens if $|f_{convex}| > |f_{concave}|$

6911211675. Focal length of the lens system will change if the positions of two lenses are interchanged

Question Number : 41 Question Id : 691121491 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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An object AB is placed 15 cm on the left of a convex lens P of focal length 10 cm. Another convex lens Q is now placed 15 cm right of lens P. If the focal length of lens Q is 15 cm, the final image is _____.

Options :

6911211676. virtual, formed at 7.5 cm right of lens Q, with a size bigger than that of AB

6911211677. real, formed at 7.5 cm right of lens Q, with a size same as that of AB

6911211678. formed at infinity.

6911211679. real, formed at 7 cm right of lens Q, with a size smaller than that of AB

Question Number : 42 Question Id : 691121492 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The maximum intensity in a Young's double slit experiment is I_o. Distance between the slits (d) is 5λ, where λ is the wavelength of light used. The intensity of the fringe, exactly opposite to one of the slits on the screen, placed at $D = 10d$ is _____.

Options :

6911211680. $\frac{I_o}{4}$

6911211681. $\frac{I_o}{2}$

6911211682. I_o

6911211683. $\frac{3I_o}{4}$

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Question Number : 43 Question Id : 691121493 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An electron is travelling with a velocity v in free space and when it enters a medium, its velocity is reduced by 20%. The de Broglie wavelength of electron in the medium is $\alpha\lambda_0$, where λ_0 is its de Broglie wavelength in free space. The value of α is _____.

Options :

6911211684. 1.20

6911211685. 1.0

6911211686. 1.25

6911211687. 0.75

Question Number : 44 Question Id : 691121494 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Assuming the experimental mass of ${}^{12}_{6}C$ as 12 u, the mass defect of ${}^{12}_{6}C$ atom is _____MeV/c^2.

(Mass of proton = 1.00727 u. mass of neutron = 1.00866 u, 1 u = 931.5 MeV/c^2 and c is the speed of the light in vacuum).

Options :

6911211688. 127.5

6911211689. 89.03

6911211690. 272.0

6911211691. 92.0

Question Number : 45 Question Id : 691121495 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a semiconductor p-n diode, the doping concentrations on p-side and n-side are 10^{15} atoms/cm^3 and 10^{18} atoms/cm^3, respectively. Which one of the following statements is true ?

Options :

6911211692. Widths of depletion region on either side of the interface are equal

6911211693. The depletion region width is more on p-side compared to that in n-side

6911211694. The depletion region width is more on n-side compared to that in p-side

6911211695. No depletion region forms because of unequal doping concentrations on p and n-sides

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Physics Section B

Section Id :	69112140
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 :	69112140
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 691121496 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A copper wire of length 3 m is stretched by 3 mm by applying an external force. The volume of the wire is 600×10^{-6} m^3. The elastic potential energy stored in the wire in stretched condition would be _____ J.

(Given Young modulus of copper $= 1.1 \times 10^{11}$ N/m^2)

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 : 691121497 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The heat extracted out of x gram of water initially at 50 °C to cool it down to 0 °C is sufficient to evaporate $(1000 - x)$ gram of water also initially at 50 °C. The value of x (closest integer) is _____.

(Take latent heat of water 2256 kJ/kg. K, specific heat capacity of water 4200 J/kg. K)

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 : 691121498 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A series LCR circuit with $R = 20\ \Omega$, $L = 1.6$ H and $C = 40\ \mu$F is connected to a variable frequency a.c. source. The inductive reactance at resonant frequency is _____ Ω.

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 : 691121499 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

When an external resistance of 5 Ω is connected across terminals of a cell, a current of 0.25 A flows through it. When the 5 Ω resistor is replaced by a 2 Ω resistor, a current of 0.5 A flows through it. The internal resistance of the cell is _____ Ω.

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 : 691121500 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

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A circular loop of radius 20 cm and resistance 2 Ω is placed in a time varying magnetic field $\vec{B} = (2t^2 + 2t + 3)$ T. At t = 0, for the plane of the loop being perpendicular to the magnetic field and, the induced current in the loop at $t = 3$ s is $\frac{\alpha}{50}$ A. The value of α is _____.

(Take $\pi = 22/7$)

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 :	69112141
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 :	69112141
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 691121501 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What volume of hydrogen gas at STP would be liberated by action of 50 mL of H_2SO_4 of 50% purity (density = 1.3 g mL^{-1}) on 20 g of zinc ?

Given : Molar mass of H, O, S, Zn are 1, 16, 32, 65 g mol^{-1} respectively.

Options :

6911211701. 5.824 L

6911211702. 7.428 L

6911211703. 6.892 L

6911211704. 8.375 L

Question Number : 52 Question Id : 691121502 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Which of the following statement(s) is/are **true** ?

A. If two orbitals have the same value of $(n+l)$, the orbital with lower value of n will have lower energy.

B. Energies of the orbitals in the same subshell increase with increase in atomic number.

C. The size of $2p_x$ orbital is less than the size of $3p_x$ orbital.

D. Among 5f, 6s, 4d, 5p and 5d orbitals, none of the orbitals have 2 radial nodes.

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

Options :

6911211705. A, B and C only

6911211706. A and C only

6911211707. C and D only

6911211708. A only

Question Number : 53 Question Id : 691121503 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The covalent radii of atoms A and B are r_A and r_B, respectively. The covalent bond length and total length of AB molecule are respectively

Options :

6911211709. $(r_A + r_B),\ 2(r_A + r_B)$

6911211710. $\frac{1}{2}(r_A + r_B),\ (r_A + r_B)$

6911211711. $(r_A + r_B),\ (r_A + r_B)$

6911211712. $2(r_A + r_B),\ \frac{1}{2}(r_A + r_B)$

Question Number : 54 Question Id : 691121504 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Consider the following data for the reaction

$X_2(g) + Y_2(g) \rightleftharpoons 2XY(g)$

at 600 K. The $\Delta_r G^{\ominus}$ (in kJ mol^{-1}) for the reaction is :

Compound	$\Delta_f H^{\ominus}_{600K}$ (kJ mol^{-1})	$S^{\ominus}_{600K}$ (J mol^{-1} K^{-1})
XY(g)	42	200
$X_2(g)$	8	140
$Y_2(g)$	80	250

Options :

6911211713. -21000

6911211714. -10

6911211715. -1000

6911211716. -9.012

Question Number : 55 Question Id : 691121505 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 molar heat capacities measured at 298 K and 1 bar is :

Options :

6911211717. Copper(s) > Bromine(l) > Helium(g)

6911211718. Bromine(l) > Copper(s) > Helium(g)

6911211719. Helium(g) > Bromine(l) > Copper(s)

6911211720. Helium(g) > Bromine(l) = Copper(s)

Question Number : 56 Question Id : 691121506 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The reaction $A(g) \rightleftharpoons B(g) + C(g)$ was initiated with the amount 'a' of A(g). At equilibrium it is found that the amount of A(g) remaining is $(a - x)$ at a total pressure of p.

The equilibrium constant Kp of the reaction can be calculated from the expression :

Options :

6911211721. $\frac{x^2}{a^2 + x^2} \times p$

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6911211722. $\frac{x^2}{a^2-x^2}\times p$

6911211723. $\frac{a+x^2}{x^2}\times p$

6911211724. $\frac{a^2-x^2}{x^2}\times p$

Question Number : 57 Question Id : 691121507 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

One half cell in a voltaic cell is constructed by dipping silver rod in $AgNO_3$ solution of unknown concentration, other half cell is Zn rod dipped in 1 molar solution of $ZnSO_4$.

A voltage of 1.60 V is measured at 298 K for this cell. What is the concentration of Ag^+ ions used in terms of log x ($x = [Ag^+]$) ?

$$E^{\ominus}_{Zn^{2+}/Zn} = -0.76V, \quad E^{\ominus}_{Ag^+/Ag} = +0.80V, \ \frac{2.303RT}{F} = 0.059\,V$$

Options :

6911211725. $\frac{2}{3.9}$

6911211726. $\frac{4}{5.9}$

6911211727. $\frac{2.9}{2}$

6911211728. $\frac{5.9}{4}$

Question Number : 58 Question Id : 691121508 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 number of pairs among [Al_2O_3, Cr_2O_3], [Cl_2O_7, Mn_2O_7], [Na_2O, V_2O_3] and [CO, N_2O] that contain oxides of same nature (acidic, basic, neutral or amphoteric) is 4.

Statement II : Among Na_2O, Al_2O_3, CO and Cl_2O_7, the most basic and acidic oxides are Na_2O and Cl_2O_7, respectively.

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

Options :

6911211729. Both **Statement I** and **Statement II** are true

6911211730. Both **Statement I** and **Statement II** are false

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6911211731. **Statement I** is true but **Statement II** is false

6911211732. **Statement I** is false but **Statement II** is true

Question Number : 59 Question Id : 691121509 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 upon reaction with NaOH forms $[Al(OH)_6]^{3-}$ ion.

Statement II : The geometry of ICl_4^-, ClO_3^- and IBr_2^- is square planar, pyramidal and linear respectively.

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

Options :

6911211733. Both **Statement I** and **Statement II** are true

6911211734. Both **Statement I** and **Statement II** are false

6911211735. **Statement I** is true but **Statement II** is false

6911211736. **Statement I** is false but **Statement II** is true

Question Number : 60 Question Id : 691121510 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 : Presence of large number of unpaired electrons in transition metal atoms results in higher enthalpies of their atomisation.

Statement II : $d_{xy} = d_{xz} = d_{yz} < d_{x^2-y^2} = d_{z^2}$ and $d_{x^2-y^2} = d_{z^2} < d_{xy} = d_{xz} = d_{yz}$ are the d-orbital splittings in $[Fe(H_2O)_6]^{3+}$ and $[Ni(Cl)_4]^{2-}$ complex ions respectively.

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

Options :

6911211737. Both **Statement I** and **Statement II** are correct

6911211738. Both **Statement I** and **Statement II** are incorrect

6911211739. **Statement I** is correct but **Statement II** is incorrect

6911211740. **Statement I** is incorrect but **Statement II** is correct

Question Number : 61 Question Id : 691121511 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Identify the **correct** statements from the following

A. $[Fe(C_2O_4)_3]^{3-}$ is the most stable complex among $[Fe(OH)_6]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[Fe(SCN)_6]^{3-}$

B. The stability of $[Cu(NH_3)_4]^{2+}$ is greater than that of $[Cu(en)_2]^{2+}$

C. The hybridization of Fe in $K_4[Fe(CN)_6]$ is d^2sp^3

D. $[Fe(NO_2)_3Cl_3]^{3-}$ exhibits linkage isomerism

E. NO_2^- and SCN^- ligands are NOT ambidentate ligands

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

Options :

6911211741. A, B, C, D and E

6911211742. B, C and D only

6911211743. A, C and D only

6911211744. A, C and E only

Question Number : 62 Question Id : 691121512 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I **Purification technique**		**List - II** **Used to separate**
A.	Simple distillation	I.	Steam volatile compound
B.	Fractional distillation	II.	Two liquids with large difference in boiling points
C.	Steam distillation	III.	Liquid decomposing at its boiling point
D.	Distillation under reduced pressure	IV.	Two liquids with close boiling points

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

Options :

6911211745. A-II, B-III, C-I, D-IV

6911211746. A-II, B-IV, C-I, D-III

6911211747. A-II, B-IV, C-III, D-I

6911211748. A-IV, B-III, C-II, D-I

Question Number : 63 Question Id : 691121513 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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IUPAC name of the some alkenes are given below.

Find out the correct stability order.

A. 2-Methylbut-2-ene

B. *cis*-But-2-ene

C. 2, 3-Dimethylbut-2-ene

D. Prop-1-ene

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

Options :

6911211749. C > A > B > D

6911211750. C > A > D > B

6911211751. B > D > A > C

6911211752. A > B > C > D

Question Number : 64 Question Id : 691121514 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 IUPAC name of hydrocarbon (x) containing three primary carbon atoms and with molar mass 72 g mol^{-1}.

Options :

6911211753. 1, 1 - Dimethylcyclopropane

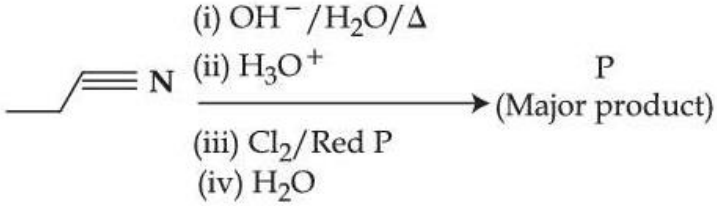
6911211754. 2, 2 - Dimethylpropane

6911211755. 2 - Methylbutane

6911211756. n-pentane

Question Number : 65 Question Id : 691121515 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Complete the following reaction sequence and give the name of major product 'P'.



Options :

6911211757. 2-Chloropropanoic acid

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6911211758. 3-Chloropropanoic acid

6911211759. 1-Chloropropane

6911211760. 2-Chloropropane

Question Number : 66 Question Id : 691121516 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 condensation reaction between $CH_3-CH=O$ and $H_2N-\underset{\underset{H}{|}}{N}-\overset{\overset{O}{||}}{C}-NH_2$ under optimum pH will produce $CH_3-CH=N-\overset{\overset{O}{||}}{C}-\overset{\overset{H}{|}}{N}-NH_2$

Statement II : The molecule, $Ph-CH\begin{matrix}\diagup O-H \\ \diagdown O-CH_3\end{matrix}$ will generate $Ph-CH=O$ in the presence of dilute acid.

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

Options :

6911211761. Both **Statement I** and **Statement II** are true

6911211762. Both **Statement I** and **Statement II** are false

6911211763. **Statement I** is true but **Statement II** is false

6911211764. **Statement I** is false but **Statement II** is true

Question Number : 67 Question Id : 691121517 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 : Heating benzamide with bromine in an ethanolic solution of sodium hydroxide will give benzylamine.

Statement II : Nitration of aniline with HNO_3/H_2SO_4 at 288 K produces *m*-nitroaniline in higher amount than *o*-nitroaniline (pH adjusted).

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

Options :

6911211765. Both **Statement I** and **Statement II** are true

6911211766. Both **Statement I** and **Statement II** are false

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6911211767. **Statement I** is true but **Statement II** is false

6911211768. **Statement I** is false but **Statement II** is true

Question Number : 68 Question Id : 691121518 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Identify the **incorrect** statement about tertiary structure of proteins.

Options :

6911211769. They can be fibrous or globular in structure.

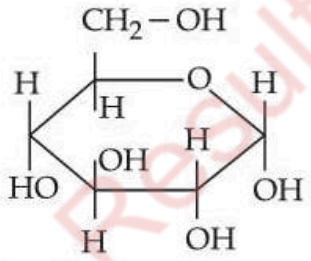
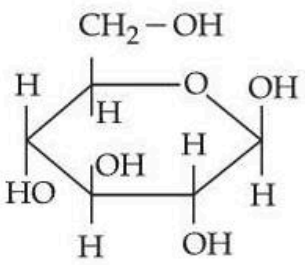
6911211770.
The main forces that stabilize the structure are hydrogen bonding, disulphide links, van der Waals and electrostatic forces of attraction.

6911211771. The structure remains intact when exposed to pH changes.

6911211772.
A linear polypeptide chain will convert to a secondary structure and then further folding of the secondary structure will convert to tertiary structure.

Question Number : 69 Question Id : 691121519 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 :  and  are two anomers of D-(+)-glucose.

Statement II : The open chain forms of D-glucose and D- fructose contain three similar chiral carbons at C_3, C_4 and C_5.

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

Options :

6911211773. Both **Statement I** and **Statement II** are true

6911211774. Both **Statement I** and **Statement II** are false

6911211775. **Statement I** is true but **Statement II** is false

6911211776. **Statement I** is false but **Statement II** is true

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Question Number : 70 Question Id : 691121520 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A paper dipped in a dil. H_2SO_4 solution of 'X' upon treatment with SO_2 gas turns into green. The compound 'X' is :

Options :

6911211777. KI-starch

6911211778. $KMnO_4$

6911211779. $Pb(CH_3COO)_2$

6911211780. $K_2Cr_2O_7$

Chemistry Section B

Section Id :	69112142
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 :	69112142
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 691121521 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The total number of unpaired electrons present in the d^3, d^4 (low spin) d^5 (high spin), d^6 (high spin) and d^7 (low spin) octahedral complex systems is _____.

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 : 691121522 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

RMgI when treated with ice cold water liberated a gas which occupied 1.4 dm^3/g at STP. The gas produced is further reacted with iodine in presence of HIO_3 to give compound (X). Compound (X) in presence of Na and dry ether produced compound (Y). Molar mass of compound (Y) is _____ $g\ mol^{-1}$. (Nearest integer)

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

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1

Question Number : 73 Question Id : 691121523 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

20 g hemoglobin in a 1 L aqueous solution (A) at 300 K is separated from pure water by semi permeable membrane. At equilibrium the height of solution in a tube dipped in a solution (A) is found to be 80.0 mm higher than the tube dipped in water.

The molar mass of hemoglobin is _____ kg mol^{-1}. (Nearest integer)

(Given : $g = 10\ m\ s^{-2}$, $R = 8.3\ kPa\ dm^3\ K^{-1} mol^{-1}$, density of solution $= 1000\ kg\ m^{-3}$)

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 : 691121524 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

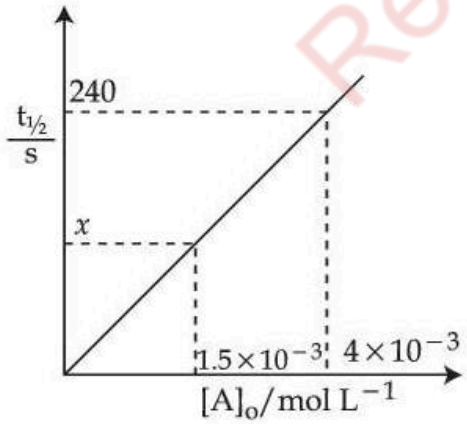
At 298 K, the molar conductivity of $x\%$ (w/w) MX solution (aqueous) is 123.5 S $cm^2\ mol^{-1}$. The conductance of same solution is 1.9×10^{-3} S. The value of x is _____ $\times 10^{-2}$.

(Given : cell constant $= 1.3\ cm^{-1}$; molar mass of MX is 75 g mol^{-1}, density of aqueous solution of MX at 298 K is 1.0 g mL^{-1})

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 : 691121525 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For a reaction A → P at T K, the half life ($t_{1/2}$) is plotted as a function of initial concentration $[A]_o$ of A as given below.



The value of x in the given figure is _____s (Nearest integer)

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

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National Testing Agency

Question Paper Name :	B Tech 8th Apr 2026 Shift 2
Subject Name :	B. Tech
Creation Date :	2026-04-08 18:49:45
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6911218
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 :	69112143
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 :	69112143
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 691121526 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the relation R on the set $\{-2,-1, 0, 1, 2\}$ defined by $(a, b) \in R$ if and only if $1+ab > 0$. Then, among the statements :

I. The number of elements in R is 17

II. R is an equivalence relation

Options :

6911211786. Only I is true

6911211787. Only II is true

6911211788. Both I and II are true

6911211789. Neither I nor II is true

Question Number : 2 Question Id : 691121527 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 values of $z \in \mathbb{C}$, satisfying the equations

$|z-(4+8i)|=\sqrt{10}$ and $|z-(3+5i)|+|z-(5+11i)|=4\sqrt{5}$, is :

Options :

6911211790. 0

6911211791. 2

6911211792. 1

6911211793. 4

Question Number : 3 Question Id : 691121528 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the system of linear equations :

$x+y+z=6,$

$x+2y+5z=10,$

$2x+3y+\lambda z=\mu$

has infinitely many solutions, then the value of $\lambda+\mu$ equals :

Options :

6911211794. 12

6911211795. 16

6911211796. 22

6911211797. 28

Question Number : 4 Question Id : 691121529 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A=\begin{bmatrix}\alpha & 1 & 2\\ 2 & 3 & 0\\ 0 & 4 & 5\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 & 0\\ 0 & -5\alpha & 0\\ 0 & 4\alpha & -2\alpha\end{bmatrix}+\text{adj}(A)$. If $\det(B)=66$, then $\det(\text{adj}(A))$ equals :

Options :

6911211798. 289

6911211799. 361

6911211800. 441

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6911211801. 529

Question Number : 5 Question Id : 691121530 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\alpha = 3+4+8+9+13+14+\ldots$ upto 40 terms. If $(\tan\beta)^{\frac{\alpha}{1020}}$ is a root of the equation $x^2+x-2=0$, $\beta \in \left(0, \frac{\pi}{2}\right)$, then $\sin^2\beta + 3\cos^2\beta$ is equal to :

Options :

6911211802. 2

6911211803. $\frac{7}{4}$

6911211804. $\frac{5}{2}$

6911211805. $\frac{3}{2}$

Question Number : 6 Question Id : 691121531 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A candidate has to go to the examination centre to appear in an examination. The candidate uses only one means of transportation for the entire distance out of bus, scooter and car. The probabilities of the candidate going by bus, scooter and car, respectively, are $\frac{2}{5}$, $\frac{1}{5}$ and $\frac{2}{5}$. The probabilities that the candidate reaches late at the examination centre are $\frac{1}{5}$, $\frac{1}{3}$ and $\frac{1}{4}$ if the candidate uses bus, scooter and car, respectively. Given that the candidate reached late at the examination centre, the probability that the candidate travelled by bus is :

Options :

6911211806. $\frac{11}{37}$

6911211807. $\frac{12}{37}$

6911211808. $\frac{13}{37}$

6911211809. $\frac{14}{37}$

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Question Number : 7 Question Id : 691121532 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A set of four observations has mean 1 and variance 13. Another set of six observations has mean 2 and variance 1. Then, the variance of all these 10 observations is equal to :

Options :

6911211810. 5.96

6911211811. 6.14

6911211812. 6.04

6911211813. 6.24

Question Number : 8 Question Id : 691121533 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $26\left(\frac{2^3}{3}\left({}^{12}C_2\right)+\frac{2^5}{5}\left({}^{12}C_4\right)+\frac{2^7}{7}\left({}^{12}C_6\right)+\ldots+\frac{2^{13}}{13}\left({}^{12}C_{12}\right)\right)=3^{13}-\alpha$, then α is equal to :

Options :

6911211814. 45

6911211815. 48

6911211816. 51

6911211817. 54

Question Number : 9 Question Id : 691121534 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A person has three different bags and four different books. The number of ways, in which he can put these books in the bags so that no bag is empty, is :

Options :

6911211818. 18

6911211819. 36

6911211820. 39

6911211821. 72

Question Number : 10 Question Id : 691121535 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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If a straight line drawn through the point of intersection of the lines $4x+3y-1=0$ and $3x+4y-1=0$, meets the co-ordinate axes at the points P and Q, then the locus of the mid point of PQ is :

Options :

6911211822. $x+y-7=0$

6911211823. $x+y-14xy=0$

6911211824. $2x+y+14xy=0$

6911211825. $x+2y-14xy=0$

Question Number : 11 Question Id : 691121536 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let O be the vertex of the parabola $y^2=4x$ and its chords OP and OQ are perpendicular to each other. If the locus of the mid-point of the line segment PQ is a conic C, then the length of its latus rectum is :

Options :

6911211826. 1

6911211827. 2

6911211828. 4

6911211829. 8

Question Number : 12 Question Id : 691121537 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where inverse trigonometric functions take only the principal values.

Given below are two statements :

Statement I : $\cos(\alpha+\beta) > 0$.

Statement II : $\cos(\alpha) < 0$.

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

Options :

6911211830. Both **Statement I** and **Statement II** are true

6911211831. Both **Statement I** and **Statement II** are false

6911211832. **Statement I** is true but **Statement II** is false

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6911211833. **Statement I** is false but **Statement II** is true

Question Number : 13 Question Id : 691121538 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the function $f(x) = e^{\sin|x|} - |x|$, $x \in \mathbf{R}$, consider the following statements :

Statement I : f is differentiable for all $x \in \mathbf{R}$.

Statement II : f is increasing in $\left(-\pi, -\frac{\pi}{2}\right)$.

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

Options :

6911211834. Both **Statement I** and **Statement II** are true

6911211835. Both **Statement I** and **Statement II** are false

6911211836. **Statement I** is true but **Statement II** is false

6911211837. **Statement I** is false but **Statement II** is true

Question Number : 14 Question Id : 691121539 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a} = 4\hat{i} - \hat{j} + 3\hat{k}$, $\vec{b} = 10\hat{i} + 2\hat{j} - \hat{k}$ and a vector $\vec{c}$ be such that $2(\vec{a} \times \vec{b}) + 3(\vec{b} \times \vec{c}) = \vec{0}$.

If $\vec{a} \cdot \vec{c} = 15$, then $\vec{c} \cdot (\hat{i} + \hat{j} - 3\hat{k})$ is equal to :

Options :

6911211838. -6

6911211839. -5

6911211840. -4

6911211841. -3

Question Number : 15 Question Id : 691121540 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the foot of perpendicular from the point $(\lambda, 2, 3)$ on the line $\frac{x-4}{1} = \frac{y-9}{2} = \frac{z-5}{1}$ be the point $(1, \mu, 2)$. Then the distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z+4}{6}$ and $\frac{x-\lambda}{2} = \frac{y-\mu}{3} = \frac{z+5}{6}$ is equal to :

Options :

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6911211842. $\frac{12}{7}$

6911211843. $\frac{\sqrt{145}}{7}$

6911211844. $\frac{\sqrt{146}}{7}$

6911211845. $\frac{\sqrt{143}}{7}$

Question Number : 16 Question Id : 691121541 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 $\int_0^2 \frac{\sqrt{x(x^2+x+1)}}{(\sqrt{x+1})(\sqrt{x^4+x^2+1})}\,dx$ is equal to :

Options :

6911211846. $\frac{1}{3}\log_e(3-2\sqrt{2})$

6911211847. $\frac{2}{3}\log_e(4+\sqrt{2})$

6911211848. $\frac{2}{3}\log_e(3+2\sqrt{2})$

6911211849. $\frac{1}{3}\log_e(1+6\sqrt{2})$

Question Number : 17 Question Id : 691121542 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 the solution of the differential equation

$x\sqrt{1-x^2}\,dy + \left(y\sqrt{1-x^2} - x\cos^{-1}x\right)dx = 0, x \in (0,1), \lim_{x\to 1^-} y(x) = 1$. Then $y\left(\frac{1}{2}\right)$ equals :

Options :

6911211850. $3-\frac{\pi}{\sqrt{3}}$

6911211851. $4-\sqrt{3}\,\pi$

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6911211852. $4-\frac{2\pi}{\sqrt{3}}$

6911211853. $3-\frac{\pi}{2\sqrt{3}}$

Question Number : 18 Question Id : 691121543 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f:(1,\infty)\to\mathbf{R}$ be a function defined as $f(x)=\frac{x-1}{x+1}$. Let $f^{i+1}(x)=f\left(f^{i}(x)\right)$, $i=1, 2,...,25$, where $f^1(x)=f(x)$. If $g(x)+f^{26}(x)=0$, $x\in(1,\infty)$, then the area of the region bounded by the curves $y=g(x)$, $2y=2x-3$, $y=0$ and $x=4$ is :

Options :

6911211854. $\frac{1}{8}+\log_e 2$

6911211855. $\frac{1}{4}+\log_e 2$

6911211856. $\frac{5}{6}+3\log_e 2$

6911211857. $\frac{5}{6}+\log_e 2$

Question Number : 19 Question Id : 691121544 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $f(x)=\begin{cases}\frac{1}{3}, & x\le \pi/2\\ \frac{b(1-\sin x)}{(\pi-2x)^2}, & x>\pi/2\end{cases}$. If f is continuous at $x=\pi/2$, then the value of $\int_0^{3b-6}|x^2+2x-3|\,dx$ is :

Options :

6911211858. 5

6911211859. 2

6911211860. 3

6911211861. 4

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Question Number : 20 Question Id : 691121545 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\frac{x^2}{f(a^2+7a+3)}+\frac{y^2}{f(3a+15)}=1$ represent an ellipse with major axis along y-axis, where f is a strictly decreasing positive function on $\mathbf{R}$. If the set of all possible values of a is $\mathbf{R}-[\alpha,\beta]$, then $\alpha^2+\beta^2$ is equal to :

Options :

6911211862. 28

6911211863. 40

6911211864. 61

6911211865. 24

Mathematics Section B

Section Id :	69112144
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 :	69112144
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 691121546 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The sum of squares of all the real solutions of the equation $\log_{(x+1)}(2x^2+5x+3)=4-\log_{(2x+3)}(x^2+2x+1)$ 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 : 691121547 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\int_{\pi/6}^{\pi/4}\left(\cot\left(x-\frac{\pi}{3}\right)\cot\left(x+\frac{\pi}{3}\right)+1\right)dx=\alpha\log_e(\sqrt{3}-1)$, then $9\alpha^2$ is equal to _____.

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

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Text Areas : PlainText
Possible Answers :
1

Question Number : 23 Question Id : 691121548 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let a line L_1 pass through the origin and be perpendicular to the lines

$L_2 : \vec{r} = (3 + t)\hat{i} + (2t - 1)\hat{j} + (2t + 4)\hat{k}$ and

$L_3 : \vec{r} = (3 + 2s)\hat{i} + (3 + 2s)\hat{j} + (2 + s)\hat{k}$, $t, s \in \mathbf{R}$.

If (a, b, c), $a \in \mathbf{Z}$, is the point on L_3 at a distance of $\sqrt{17}$ from the point of intersection of L_1 and L_2, then $(a+b+c)^2$ 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 : 24 Question Id : 691121549 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the circle $C : x^2 + y^2 - 6x - 8y - 11 = 0$. Let a variable chord AB of the circle C subtend a right angle at the origin. If the locus of the foot of the perpendicular drawn from the origin on the chord AB is the circle $x^2 + y^2 - \alpha x - \beta y - \gamma = 0$, then $\alpha + \beta + 2\gamma$ 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 : 691121550 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let f be a polynomial function such that

$\log_2(f(x)) = \left(\log_2\left(2 + \frac{2}{3} + \frac{2}{9} + \ldots\ldots \infty\right)\right) \cdot \log_3\left(1 + \frac{f(x)}{f\left(\frac{1}{x}\right)}\right)$, $x > 0$ and $f(6) = 37$. Then $\sum_{n=1}^{10} f(n)$ is equal to _____.

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

Physics Section A

Section Id : 69112145
Section Number : 3
Section type : Online
Mandatory or Optional : Mandatory

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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 :	69112145
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 691121551 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A new unit (α) of length is chosen such that it is equal to the speed of light in vacuum. What is the distance between Venus and Earth in terms of α units if light takes 6 min. 40 s to cover this distance ?

Options :

6911211871. $200\ \alpha$

6911211872. $400\ \alpha$

6911211873. $300\ \alpha$

6911211874. $500\ \alpha$

Question Number : 27 Question Id : 691121552 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the equation $H = \frac{x^p \epsilon^q E^r}{t^s}$

Where H = magnetic field; E = electric field, ϵ = permittivity, x = distance, t = time

The values of p, q, r and s respectively are :

Options :

6911211875. $1, 1, 1, 1$

6911211876. $-1, 1, 2, 1$

6911211877. $1, -1, -2, 1$

6911211878. $-1, -2, -2, 1$

Question Number : 28 Question Id : 691121553 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A car moving with a speed of 54 km/h takes a turn of radius 20 m. A simple pendulum is suspended from the ceiling of the car. Determine the angle made by the string of the pendulum with the vertical during the turning. (Take $g = 10\ m/s^2$)

Options :

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6911211879. $\tan^{-1}(0.5)$

6911211880. $\tan^{-1}(0.75)$

6911211881. $\tan^{-1}(1.125)$

6911211882. $\tan^{-1}(0.25)$

Question Number : 29 Question Id : 691121554 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A gas balloon is going up with a constant velocity of 10 m/s. When this balloon reached a height of 75 m, a stone is dropped from it and balloon keeps moving up with the same velocity. The height of the balloon when the stone hits the ground is _____ m. (Take $g = 10\ m/s^2$)

Options :

6911211883. 85

6911211884. 150

6911211885. 129

6911211886. 125

Question Number : 30 Question Id : 691121555 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A thin biconvex lens is prepared from the glass ($\mu = 1.5$) both curved surfaces of which have equal radii of 20 cm each. Left side surface of the lens is silvered from outside to make it reflecting. To have the position of image and object at the same place, the object should be placed, from the lens at a distance of _____ cm.

Options :

6911211887. 10

6911211888. 12.5

6911211889. 13

6911211890. 13.5

Question Number : 31 Question Id : 691121556 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Two identical bodies, projected with the same speed at two different angles cover the same horizontal range R. If the time of flight of these bodies are 5 s and 10 s, respectively, then the value of R is _____ m. (Take $g = 10\ m/s^2$)

Options :

6911211891. 250

6911211892. 25

6911211893. 500

6911211894. 125

Question Number : 32 Question Id : 691121557 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A solid cylinder having radius R and length L is slipping on a rough horizontal plane. At time $t = 0$ the cylinder has a translational velocity $v_0 = 49\ m/s$, perpendicular to its axis and a rotational velocity $v_0/4R$ about the centre. The time taken by the cylinder to start rolling is _____seconds. (coefficient of kinetic friction $\mu_K = 0.25$ and $g = 9.8\ m/s^2$)

Options :

6911211895. 15

6911211896. 5

6911211897. 10

6911211898. 7.5

Question Number : 33 Question Id : 691121558 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A liquid of density 600 kg/m^3 flowing steadily in a tube of varying cross-section. The cross-section at a point A is 1.0 cm^2 and that at B is 20 mm^2. Both the points A and B are in same horizontal plane, the speed of the liquid at A is 10 cm/s. The difference in pressures at A and B points is _____ Pa.

Options :

6911211899. 18

6911211900. 144

6911211901. 36

6911211902. 72

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Question Number : 34 Question Id : 691121559 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A spherical liquid drop of radius R acquires the terminal velocity v_1 when falls through a gas of viscosity η. Now the drop is broken into 64 identical droplets and each droplet acquires terminal velocity v_2 falling through the same gas. The ratio of terminal velocities v_1/v_2 is _____.

Options :

6911211903. 4

6911211904. 0.25

6911211905. 32

6911211906. 16

Question Number : 35 Question Id : 691121560 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 diatomic gas having rotational modes only is kept in a cylinder with a piston system. The cross-section area of the cylinder is 4 cm^2. The gas is heated slowly to raise the temperature by 1.2 °C during which the piston moves by 25 mm. The amount of heat supplied to the gas is _____ J. (Atmospheric pressure = 100 kPa, $R = 8.3$ J/mol. K) (Neglect mass of the piston)

Options :

6911211907. 24.8

6911211908. 25

6911211909. 15.04

6911211910. 29.98

Question Number : 36 Question Id : 691121561 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Initial pressure and volume of a monoatomic ideal gas are P and V. The change in internal energy of this gas in adiabatic expansion to volume $V_{final} = 27\ V$ is _____ J.

Options :

6911211911. $-2\,PV\left(3\sqrt{3}-1\right)$

6911211912. $\frac{4}{3}PV$

6911211913. $-\frac{4}{3}PV$

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6911211914. $\frac{3}{4}PV$

Question Number : 37 Question Id : 691121562 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The frequency of oscillation of a mass m suspended by a spring is v_1. If the length of the spring is cut to half, the same mass oscillates with frequency v_2. The value of v_2/v_1 is _____.

Options :

6911211915. 1

6911211916. 2

6911211917. $\sqrt{2}$

6911211918. $\sqrt{3}$

Question Number : 38 Question Id : 691121563 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A monochromatic source of light operating at 15 kW emits 2.5×10^{22} photons/s. The region of an electromagnetic spectrum to which the emitted electromagnetic radiation belongs to _____. (Take $h=6.6\times10^{-34}$ J.s and $c=3\times10^{8}$ m/s).

Options :

6911211919. Microwave

6911211920. Infrared

6911211921. Visible

6911211922. Ultraviolet

Question Number : 39 Question Id : 691121564 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A current carrying circular loop of radius 2 cm with unit normal $\hat{n}=\frac{\hat{k}+\hat{i}}{\sqrt{2}}$ is placed in a magnetic field, $\vec{B}=B_0\left(3\hat{i}+2\hat{k}\right)$. If $B_0=4\times10^{-3}$ T and current $I=100\sqrt{2}$ A, the torque experienced by the loop is _____ Wb.A. ($\pi=3.14$)

Options :

6911211923. $16\times10^{-5}\,\hat{k}$

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6911211924. $5024 \times 10^{-7}\ \hat{k}$

6911211925. $5024 \times 10^{-7}\ \hat{i}$

6911211926. $5024 \times 10^{-7}\ \hat{j}$

Question Number : 40 Question Id : 691121565 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A 30 cm long solenoid has 10 turns per cm and area of 5 cm^2. The current through the solenoid coil varies from 2 A to 4 A in 3.14 s. The e.m.f. induced in the coil is $\alpha \times 10^{-5}$ V. The value α is _____.

Options :

6911211927. 60

6911211928. 12

6911211929. 120

6911211930. 34

Question Number : 41 Question Id : 691121566 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two point charges $q_1 = 3\ \mu C$ and $q_2 = -4\ \mu C$ are placed at points $\left(2\hat{i} + 3\hat{j} + 3\hat{k}\right)$ and $\left(\hat{i} + \hat{j} + \hat{k}\right)$ respectively. Force on charge q_2 is _____ N. $\left(\text{Take } \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ SI Units}\right)$

Options :

6911211931. $\left(12\hat{i} + 24\hat{j} + 24\hat{k}\right) \times 10^{-3}$

6911211932. $\left(4\hat{i} + 8\hat{j} + 8\hat{k}\right) \times 10^{-3}$

6911211933. $\left(3\hat{i} + 6\hat{j} + 6\hat{k}\right) \times 10^{-3}$

6911211934. $\left(-4\hat{i} - 8\hat{j} - 8\hat{k}\right) \times 10^{-3}$

Question Number : 42 Question Id : 691121567 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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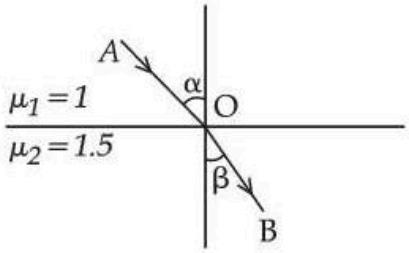
Light ray incident along a vector $\vec{AO}\left(\vec{AO} = 2\hat{i} - 3\hat{j}\right)$ emerges out along vector $\vec{OB}\left(\vec{OB} = C\hat{i} - 4\hat{j}\right)$ as shown in the figure below. The value of C is _____.



Options :

6911211935. 1.6

6911211936. 0.16

6911211937. 11.6

6911211938. 16

Question Number : 43 Question Id : 691121568 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

K_1 and K_2 be the maximum kinetic energies of photoelectrons emitted from a surface of a given material for the light of wavelength λ_1 and λ_2, respectively. If $\lambda_1 = 2\lambda_2$ then the work function of material is given by :

Options :

6911211939. $K_2 + 2K_1$

6911211940. $2K_2 - K_1$

6911211941. $K_1 - 2K_2$

6911211942. $K_2 - 2K_1$

Question Number : 44 Question Id : 691121569 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two radioactive substances A and B of mass numbers 200 and 212 respectively, shows spontaneous α-decay with same Q value of 1 MeV. The ratio of energies of α-rays produced by A and B is _____.

Options :

6911211943. $\frac{2548}{2650}$

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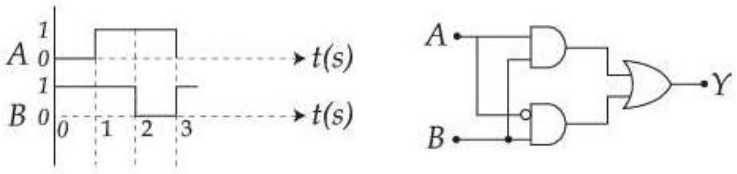
6911211944. $\frac{2706}{2646}$

6911211945. $\frac{2597}{2600}$

6911211946. $\frac{2862}{2499}$

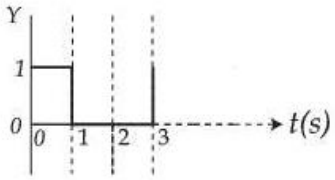
Question Number : 45 Question Id : 691121570 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The output Y for the given inputs A and B to the circuit is :

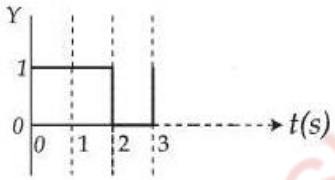


Options :

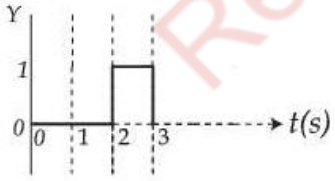
6911211947.



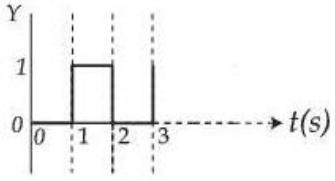
6911211948.



6911211949.



6911211950.



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Physics Section B

Section Id :	69112146
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 :	69112146
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 691121571 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A parallel plate capacitor is having separation between plates 0.885 mm. It has a capacitance of 1 μF when the space between the plates is filled with an insulating material of resistivity 1×10^{13} Ωm and resistance 17.7×10^{14} Ω. Relative permittivity of the insulating material is $\alpha\times10^{7}$. The value of α is _____.

(Take permittivity of free space $=8.85\times10^{-12}$ F/m)

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 : 691121572 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Some distant star is to be observed by some telescope of diameter of objective lens a, at an angular resolution of 3.0×10^{-7} radian. If the wavelength of light from the star reaching the telescope is 500 nm, the minimum diameter of the objective lens of the telescope is _____ cm. (nearest interger)

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 : 691121573 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A 5 mg particle carrying a charge of $5\pi\times10^{-6}\,C$ is moving with velocity of $\left(3\hat{i}+2\hat{k}\right)\times10^{-2}$ m/s in a region having magnetic field $\vec{B}=0.1\,\hat{k}$ Wb/m^2. It moves a distance of α meter along $\hat{k}$ when it completes 5 revolutions. The value of α is _____ .

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 : 691121574 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

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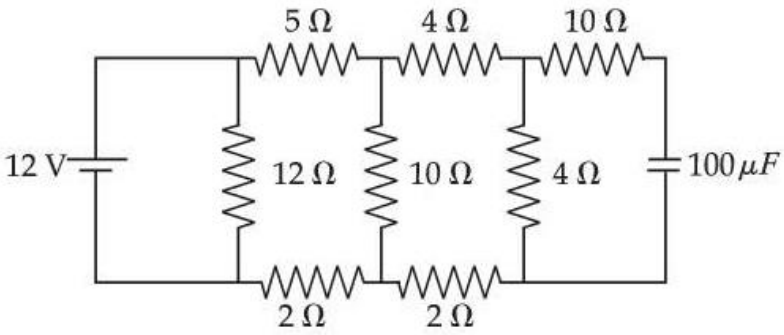
The stored charge in the capacitor in steady state of the following circuit is _____ μC.



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 : 691121575 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Two masses of 3.4 kg and 2.5 kg are accelerated from an initial speed of 5 m/s and 12 m/s, respectively. The distances traversed by the masses in the 5th second are 104 m and 129 m, respectively. The ratio of their momenta after 10 s is $\frac{x}{8}$. The value of x is _____.

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 :	69112147
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 :	69112147
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 691121576 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Match **List - I** with **List - II**.

	List - I		**List - II**
	Mass of substance		**Number of atoms**
A.	1.8 mg water	I.	$2\times10^{-4}\times N_A$
B.	9.8 mg sulphuric acid	II.	$1.5\times10^{-4}\times N_A$
C.	1.8 mg carbon	III.	$3\times10^{-4}\times N_A$
D.	5.85 mg salt (NaCl)	IV.	$7\times10^{-4}\times N_A$

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

Options :

6911211956. A-IV, B-III, C-I, D-II

6911211957. A-III, B-II, C-IV, D-I

6911211958. A-III, B-IV, C-II, D-I

6911211959. A-III, B-IV, C-I, D-II

Question Number : 52 Question Id : 691121577 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 :

Given : Molar mass of C, H, O, Cl are 12, 1, 16 and 35.5 g mol^{-1}, respectively

Statement I : In 30% (w/w) solution of methanol in CCl_4(at T K), the mole fraction of CCl_4 is equal to 0.33.

Statement II : Mixture of methanol and CCl_4 shows positive deviation from Raoult's law.

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

Options :

6911211960. Both **Statement I** and **Statement II** are true

6911211961. Both **Statement I** and **Statement II** are false

6911211962. **Statement I** is true but **Statement II** is false

6911211963. **Statement I** is false but **Statement II** is true

Question Number : 53 Question Id : 691121578 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Bromine trifluoride autoionizes to form $BrF_2^{\oplus}$ and $BrF_4^{\ominus}$. The shapes of the cation and anion are respectively _____, and _____.

Options :

6911211964. bent, square planar

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6911211965. linear, square planar

6911211966. bent, see-saw

6911211967. linear, tetrahedral

Question Number : 54 Question Id : 691121579 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 statements are **not correct** ?

A. For water, magnitude of K_b is more than the magnitude of K_f.

B. The elevation in boiling point of water when a non-volatile solute is added to it is larger in magnitude than its depression in freezing point.

C. Osmotic pressure measurement is preferred over any other colligative property to determine molar mass of proteins and polymers.

D. The dimerised form of benzoic acid in benzene is 

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

Options :

6911211968. A and B only

6911211969. A and D only

6911211970. A, B and D only

6911211971. A, C and D only

Question Number : 55 Question Id : 691121580 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 reactions in which all the reactants and products are present in gaseous state

$2\,xy \rightleftharpoons x_2 + y_2 \quad K_1 = 2.5 \times 10^5$

$xy + \frac{1}{2} z_2 \rightleftharpoons xyz \quad K_2 = 5 \times 10^{-3}$

The value of K_3 for the equilibrium $\frac{1}{2} x_2 + \frac{1}{2} y_2 + \frac{1}{2} z_2 \rightleftharpoons xyz$ is :

Options :

6911211972. 2.5×10^{-3}

6911211973. 2.5×10^{3}

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6911211974. 1.0×10^{-5}

6911211975. 5×10^{-3}

Question Number : 56 Question Id : 691121581 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given at 298 K : $E^{\ominus}_{Fe^{2+}/Fe} = X$ Volt

$E^{\ominus}_{Fe^{3+}/Fe} = Y$ Volt

The $E^{\ominus}_{Fe^{3+}/Fe^{2+}}$ in Volt at 298 K is given by :

Options :

6911211976. $2X - 3Y$

6911211977. $3Y - 2X$

6911211978. $3Y + 2X$

6911211979. $Y + X$

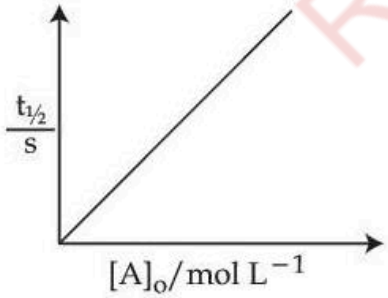
Question Number : 57 Question Id : 691121582 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements :

$R = 8.314\ J\ K^{-1}\ mol^{-1}$ and $1\ cal = 4.2\ J$

Statement I : When $E_a = 12.6$ kcal/mol, the room temperature rate constant is doubled by a 10 °C increase in temperature (298 K to 308 K)

Statement II : For a first order reactions $A \rightarrow B$,



Here $[A]_o$ is the initial concentration of A and $t_{1/2}$ is half life of reaction.

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

Options :

6911211980. Both **Statement I** and **Statement II** are true

6911211981. Both **Statement I** and **Statement II** are false

6911211982. **Statement I** is true but **Statement II** is false

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6911211983. **Statement I** is false but **Statement II** is true

Question Number : 58 Question Id : 691121583 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I Electronic configuration of neutral atom (where n = 2)		**List - II** 1st Ionization Energy (kJ mol^{-1})
A.	ns^2	I.	2080
B.	ns^2np^1	II.	899
C.	ns^2np^3	III.	800
D.	ns^2np^6	IV.	1402

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

Options :

6911211984. A-II, B-III, C-IV, D-I

6911211985. A-IV, B-III, C-II, D-I

6911211986. A-III, B-II, C-IV, D-I

6911211987. A-III, B-II, C-I, D-IV

Question Number : 59 Question Id : 691121584 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Find the **correct** statements related to group 15 hydrides.

A. Reducing nature increases from NH_3 to BiH_3

B. Tendency to donate lone pair of electrons decreases from NH_3 to BiH_3

C. The stability of hydrides decreases from NH_3 to BiH_3

D. HEH bond angle decreases from NH_3 to SbH_3 (E = Elements of group 15)

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

Options :

6911211988. A and B only

6911211989. B and C only

6911211990. A, B, C and D

6911211991. A, C and D Only

Question Number : 60 Question Id : 691121585 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Given below are two statements :

Statement I : The number of pairs among $[Ti^{4+}, V^{2+}]$, $[V^{2+}, Mn^{2+}]$, $[Mn^{2+}, Fe^{3+}]$ and $[V^{2+}, Cr^{2+}]$ in which both ions are coloured is 3.

Statement II : The number of pairs among $[La^{3+}, Yb^{2+}]$, $[Lu^{3+}, Ce^{4+}]$ and $[Ac^{3+}, Lr^{3+}]$ ions in which both are diamagnetic is 3.

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

Options :

6911211992. Both **Statement I** and **Statement II** are correct

6911211993. Both **Statement I** and **Statement II** are incorrect

6911211994. **Statement I** is correct but **Statement II** is incorrect

6911211995. **Statement I** is incorrect but **Statement II** is correct

Question Number : 61 Question Id : 691121586 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 for catalytic properties of transition metals.

Statement I : First row transition metals which act as catalyst utilise their 3d electrons only for formation of bonds between reactant molecules and atoms on the surface of catalyst.

Statement II : There is increase in the concentration of reactants on the surface of catalyst which strengthens the bonds in reacting molecules.

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

Options :

6911211996. Both **Statement I** and **Statement II** are correct

6911211997. Both **Statement I** and **Statement II** are incorrect

6911211998. **Statement I** is correct but **Statement II** is incorrect

6911211999. **Statement I** is incorrect but **Statement II** is correct

Question Number : 62 Question Id : 691121587 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 : Vapours of the liquid with higher boiling point condense before vapours of the liquid with lower boiling points in fractional distillation.

Statement II : The vapours rising up in the fractionating column become richer in high boiling component of the mixture.

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

Options :

6911212000. Both **Statement I** and **Statement II** are true

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6911212001. Both **Statement I** and **Statement II** are false

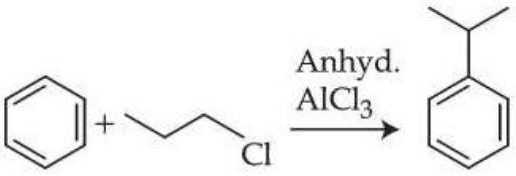
6911212002. **Statement I** is true but **Statement II** is false

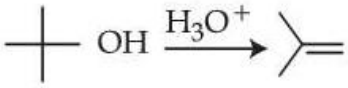
6911212003. **Statement I** is false but **Statement II** is true

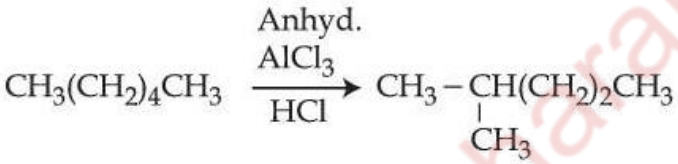
Question Number : 63 Question Id : 691121588 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

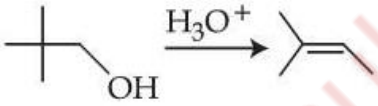
The major product of which of the following reaction is not obtained by rearrangement reaction ?

Options :

6911212004. 

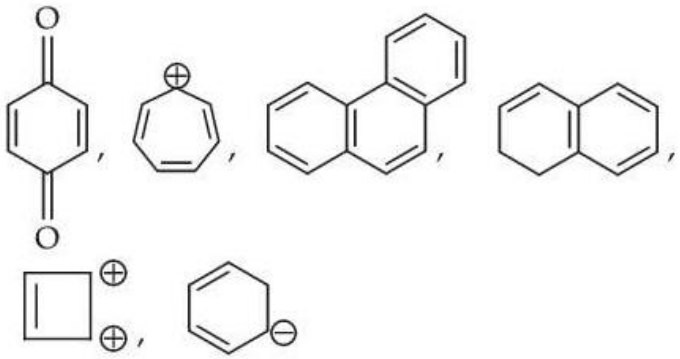
6911212005. 

6911212006. 

6911212007. 

Question Number : 64 Question Id : 691121589 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The total number of aromatic compounds/species from the following is



Options :

6911212008. 6

6911212009. 4

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6911212010. 3

6911212011. 5

Question Number : 65 Question Id : 691121590 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

n-Butane on monochlorination under photochemical condition gives an optically active compound "P". "P" on further chlorination gives dichloro compounds.

The number of dichloro compounds obtained (ignore stereoisomers) is :

Options :

6911212012. 3

6911212013. 4

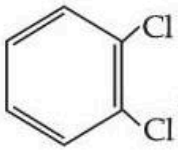
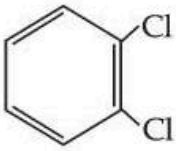
6911212014. 5

6911212015. 6

Question Number : 66 Question Id : 691121591 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 : Due to increase in van der Waals forces, the order of boiling points is $CH_3CH_2CH_2I > CH_3CH_2I > CH_3I$.

Statement II : As  is more symmetric, its melting point is higher than  , however its boiling point is lower than 

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

Options :

6911212016. Both **Statement I** and **Statement II** are true

6911212017. Both **Statement I** and **Statement II** are false

6911212018. **Statement I** is true but **Statement II** is false

6911212019. **Statement I** is false but **Statement II** is true

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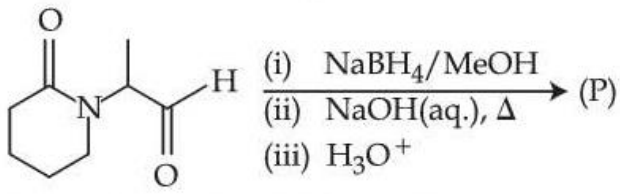
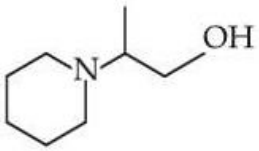
Question Number : 67 Question Id : 691121592 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

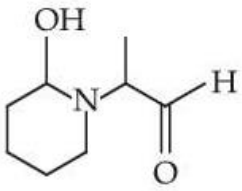
Consider the following reaction.

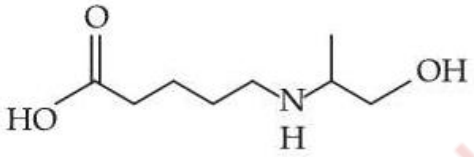


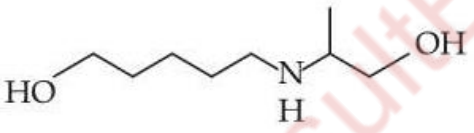
The major product (P) formed is :

Options :

6911212020. 

6911212021. 

6911212022. 

6911212023. 

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Question Number : 68 Question Id : 691121593 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which statements are **True** ?

A. In Hoffmann bromamide degradation, 4 moles of NaOH and 2 moles of Br_2 are consumed per mole of an amide

B. Hoffmann bromamide reaction is not given by alkyl amides.

C. Primary amines can be synthesized by Hoffmann bromamide degradation.

D. Secondary amide on reaction with Br_2 and NaOH will give secondary amine.

E. The by-products of Hoffmann degradation are Na_2CO_3, NaBr and H_2O.

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

Options :

6911212024. A, C and E only

6911212025. B, C and D only

6911212026. C and E only

6911212027. C, D and E only

Question Number : 69 Question Id : 691121594 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The **incorrect** statement from the following with respect to carbohydrates is :

Options :

6911212028. All monosaccharides are reducing sugars.

6911212029. The monosaccharide units obtained from hydrolysis of oligosaccharides are always the same.

6911212030. Starch and cellulose are typical examples of polysaccharides, which are very high molecular weight compounds of more than ten monosaccharide units.

6911212031. Open chain and cyclic structures co-exist at equilibrium that are responsible for certain properties as in the case of D – (+) – glucose.

Question Number : 70 Question Id : 691121595 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 amino acid will give violet coloured complex with neutral ferric chloride solution ?

Options :

6911212032. Threonine

6911212033. Serine

6911212034. Tyrosine

6911212035. Cysteine

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Chemistry Section B

Section Id :	69112148
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 : 69112148
Question Shuffling Allowed : Yes
Is Section Default? : No

Question Number : 71 Question Id : 691121596 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Number of paramagnetic complexes among the following is _____.
$[MnBr_4]^{2-}$, $[NiCl_4]^{2-}$, $[Ni(CN)_4]^{2-}$, $[Ni(CO)_4]$, $[CoF_6]^{3-}$, $[Fe(CN)_6]^{4-}$, $[Mn(CN)_6]^{3-}$, $[Ti(CN)_6]^{3-}$, $[Cu(H_2O)_6]^{2+}$, $[Co(C_2O_4)_3]^{3-}$

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 : 691121597 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

'x' is the product which is obtained from benzene by reacting it with carbon monoxide and hydrogen chloride in the presence of cuprous chloride. 'y' is the major product obtained from the benzene by reacting it with ethanoyl chloride in the presence of anhydrous $AlCl_3$. Product (major) obtained by heating x and y in the presence of alkali is z. Total number of π (pi) electrons in z is _____.

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 : 691121598 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider two radiations of wavelengths

1. $\lambda_1 = 2000$ Å
2. $\lambda_2 = 6000$ Å

The ratio of the energies of these two radiations $\left(\frac{E_1}{E_2}\right)$ 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 : 74 Question Id : 691121599 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

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Consider the reaction

$2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(l) + 2SO_2(g)$

The magnitude of enthalpy change for the reaction in kJ mol^{-1} is _____. (Nearest integer)

Given : $\Delta_f H^{\ominus}(H_2S) = -20.1\ kJ\ mol^{-1}$

$\Delta_f H^{\ominus}(H_2O) = -286.0\ kJ\ mol^{-1}$

$\Delta_f H^{\ominus}(SO_2) = -297.0\ kJ\ mol^{-1}$

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

Question Number : 75 Question Id : 691121600 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Solid carbon, CaO and $CaCO_3$ are mixed and allowed to attain equilibrium at T K.

$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ $\quad Kp_1 = 0.08$ atm

$C(s) + CO_2(g) \rightleftharpoons 2CO(g)$ $\quad Kp_2 = 2$ atm

The partial pressure of CO is _____ $\times 10^{-1}$ atm

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

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National Testing Agency

Question Paper Name :	B Tech 4th Apr 2026 Shift 1
Subject Name :	B. Tech
Creation Date :	2026-04-04 12:31:20
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6952784
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 :	69527819
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 :	69527819
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 695278226 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 $f(x)=\cos^{-1}\left(\frac{4x+2[x]}{3}\right)$ is $[\alpha, \beta]$, then $12(\alpha+\beta)$ is equal to:

Options :

695278766. 6

695278767. 8

695278768. 9

695278769. 4

Question Number : 2 Question Id : 695278227 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the set of all solutions of $|x^2 + x - 9| = |x| + |x^2 - 9|$ is $[\alpha, \beta] \cup [\gamma, \infty)$, then $(\alpha^2 + \beta^2 + \gamma^2)$ is equal to:

Options :

695278770. 9

695278771. 18

695278772. 36

695278773. 72

Question Number : 3 Question Id : 695278228 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let z be a complex number such that $|z + 2| = |z - 2|$ and $\arg\left(\frac{z+3}{z-i}\right) = \frac{\pi}{4}$. Then

$|z|^2$ is equal to:

Options :

695278774. 9

695278775. 4

695278776. 5

695278777. 1

Question Number : 4 Question Id : 695278229 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 functions $f: \{1, 2, 3, 4\} \to \{a, b, c\}$, which are not onto, is:

Options :

695278778. 48

695278779. 45

695278780. 51

695278781. 35

Question Number : 5 Question Id : 695278230 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $S = \left\{ A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} : a, b, c, d \in \{0, 1, 2, 3, 4\} \text{ and } A^2 - 4A + 3I = 0 \right\}$

be a set of 2×2 matrices. Then the number of matrices in S, for which the sum of the diagonal elements is equal to 4, is:

Options :

695278782. 20

695278783. 17

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695278784. 21

695278785. 19

Question Number : 6 Question Id : 695278231 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A=\begin{bmatrix}1 & 1 & 2\\ -2 & 0 & 1\\ 1 & 3 & 5\end{bmatrix}$. Then the sum of all elements of the matrix

$adj(adj\ (2(adjA)^{-1}))$ is equal to:

Options :

695278786. 3

695278787. 4

695278788. -4

695278789. -3

Question Number : 7 Question Id : 695278232 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The first term of an A.P. of 30 non-negative terms is $\frac{10}{3}$. If the sum of this A.P. is the cube of its last term, then its common difference is:

Options :

695278790. $\frac{5}{87}$

695278791. $\frac{25}{83}$

695278792. $\frac{15}{29}$

695278793. $\frac{5}{29}$

Question Number : 8 Question Id : 695278233 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The number of ways, of forming a queue of 4 boys and 3 girls such that all the girls are not together, is:

Options :

695278794. 5040

695278795. 3050

695278796. 3410

695278797. 4320

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Question Number : 9 Question Id : 695278234 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the smallest value of $k \in \mathbb{N}$, for which the coefficient of x^3 in $(1+x)^3+(1+x)^4+(1+x)^5+...+(1+x)^{99}+(1+kx)^{100}$, $x \neq 0$, is $\left(43n+\frac{101}{4}\right)\left({}^{100}C_3\right)$ for some $n \in \mathbb{N}$, be p. Then the value of $p+n$ is:

Options :

695278798. 10

695278799. 11

695278800. 12

695278801. 13

Question Number : 10 Question Id : 695278235 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Suppose that the mean and median of the non-negative numbers 21, 8, 17, a, 51, 103, b, 13, 67, $(a > b)$, are 40 and 21, respectively. If the mean deviation about the median is 26, then $2a$ is equal to:

Options :

695278802. 109

695278803. 117

695278804. 161

695278805. 131

Question Number : 11 Question Id : 695278236 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the line $L_1 : x + 3 = 0$ intersect the lines $L_2 : x - y = 0$ and $L_3 : 3x + y = 0$ at the points A and B, respectively. Let the bisector of the obtuse angle between the lines L_2 and L_3 intersect the line L_1 at the point C. Then $BC^2 : AC^2$ is equal to:

Options :

695278806. 5:1

695278807. 1:5

695278808. 2:3

695278809. 3:2

Question Number : 12 Question Id : 695278237 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the vertex A of a triangle ABC be (1, 2), and the mid-point of the side AB be (5, −1). If the centroid of this triangle is (3, 4) and its circumcenter is (α, β), then $21(\alpha+\beta)$ is equal to:

Options :

695278810. 309

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695278811. 403

695278812. 497

695278813. 524

Question Number : 13 Question Id : 695278238 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Suppose that two chords, drawn from the point (1, 2) on the circle $x^2 + y^2 + x - 3y = 0$ are bisected by the y-axis. If the other ends of these chords are R and S, and the mid point of the line segment RS is (α, β), then $6(\alpha + \beta)$ is equal to:

Options :

695278814. 1

695278815. 3

695278816. 4

695278817. 6

Question Number : 14 Question Id : 695278239 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A line with direction ratios 1, −1, 2 intersects the lines $\frac{x}{2} = \frac{y}{3} = \frac{z+1}{3}$ and $\frac{x+1}{-1} = \frac{y-2}{1} = \frac{z}{4}$ at the points P and Q, respectively. If the length of the line segment PQ is α, then $225\alpha^2$ is equal to:

Options :

695278818. 1024

695278819. 1014

695278820. 1104

695278821. 1204

Question Number : 15 Question Id : 695278240 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The square of the distance of the point (−2, −8, 6) from the line $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z}{-1}$ along the line $\frac{x+5}{1} = \frac{y+5}{-1} = \frac{z}{2}$ is equal to:

Options :

695278822. 3

695278823. 6

695278824. 8

695278825. 12

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Question Number : 16 Question Id : 695278241 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $y = \tan^{-1}\left(\frac{3\cos x - 4\sin x}{4\cos x + 3\sin x}\right) + 2\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right)$, then $\frac{dy}{dx}$ at $x = \frac{\sqrt{3}}{2}$ is equal to:

Options :

695278826. 3

695278827. -1

695278828. 1

695278829. 2

Question Number : 17 Question Id : 695278242 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 real polynomial of degree n such that $f(x) = f'(x)f''(x)$, for all $x \in \mathbb{R}$. If $f(0) = 0$, then $36\left(f'(2) + f''(2) + \int_0^2 f(x)dx\right)$ is equal to:

Options :

695278830. 42

695278831. 46

695278832. 56

695278833. 66

Question Number : 18 Question Id : 695278243 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 $\{(x, y): y \le \pi - |x|, y \le |x \sin x|, y \ge 0\}$ is:

Options :

695278834. $1+\frac{\pi^2}{8}$

695278835. $2+\frac{\pi^2}{4}$

695278836. $\frac{\pi^2}{8}-1$

695278837. $4+\frac{\pi^2}{2}$

Question Number : 19 Question Id : 695278244 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Let $\int_{-2}^{2}\left(|\sin x|+[x\sin x]\right)dx = 2(3-\cos 2)+\beta$, where $[\cdot]$ is the greatest integer function. Then $\beta \sin\left(\frac{\beta}{2}\right)$ equals:

Options :

695278838. 1

695278839. 2

695278840. 4

695278841. 8

Question Number : 20 Question Id : 695278245 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 the solution of the differential equation $\frac{dy}{dx} = \left(1+x+x^2\right)\left(1-y+y^2\right)$, $y(0) = \frac{1}{2}$. Then $(2y(1) - 1)$ is equal to

Options :

695278842. $\sqrt{3}\tan\left(\frac{11\sqrt{3}}{6}\right)$

695278843. $\frac{\sqrt{3}}{2}\tan\left(\frac{11\sqrt{3}}{12}\right)$

695278844. $\sqrt{3}\tan\left(\frac{11\sqrt{3}}{12}\right)$

695278845. $\frac{\sqrt{3}}{2}\tan\left(\frac{11\sqrt{3}}{6}\right)$

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Mathematics Section B

Section Id :	69527820
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 :	69527820
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 695278246 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A coin is tossed 8 times. If the probability that exactly 4 heads appear in the first six tosses and exactly 3 heads appear in the last five tosses is p, then $96p$ 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 : 695278247 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the parabola P : $y^2 = 4kx$ and the ellipse E : $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. Let the line segment joining the points of intersection of P and E, be their latus rectums. If the eccentricity of E is e, then $e^2+2\sqrt{2}$ 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 : 23 Question Id : 695278248 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $A=\frac{\sin 3^\circ}{\cos 9^\circ}+\frac{\sin 9^\circ}{\cos 27^\circ}+\frac{\sin 27^\circ}{\cos 81^\circ}$ and $B = \tan 81^\circ - \tan 3^\circ$, then $\frac{B}{A}$ 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 : 695278249 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $\overrightarrow{a_k}=(\tan\theta_k)\hat{i}+\hat{j}$ and $\overrightarrow{b_k}=\hat{i}-(\cot\theta_k)\hat{j}$, where $\theta_k=\frac{2^{k-1}\pi}{2^n+1}$, for some $n\in\mathbb{N}, n>5$. Then the value of $\frac{\sum_{k=1}^{n}\left|\overrightarrow{a_k}\right|^2}{\sum_{k=1}^{n}\left|\overrightarrow{b_k}\right|^2}$ is _____.

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 : 695278250 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

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The number of points, at which the function

$f(x) = \max\{6x,\ 2+3x^2\} + |x-1|\cos\left|x^2 - \frac{1}{4}\right|,\ x \in (-\pi, \pi)$, is not differentiable, 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 :	69527821
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 :	69527821
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 695278251 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a screw gauge when the circular scale is given five complete rotations it moves linearly by 2.5 mm. If the circular scale has 100 divisions, the least count of screw gauge is _____ mm.

Options :

695278851. 1×10^{-2}

695278852. 1×10^{-3}

695278853. 5×10^{-2}

695278854. 5×10^{-3}

Question Number : 27 Question Id : 695278252 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The increase in the pressure required to decrease the volume (ΔV) of water is 6.3×10^7 N/m^2. The percentage decrease in the volume is _____.
(Bulk modulus of water = 2.1×10^9 N/m^2.)

Options :

695278855. 2 %

695278856. 3 %

695278857. 6 %

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695278858. 4 %

Question Number : 28 Question Id : 695278253 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The time taken by a block of mass m to slide down from the highest point to the lowest point on a rough inclined plane is 50 % more compared to the time taken by the same block on identical inclined smooth plane. Both inclined planes are at 45° with the horizontal. The coefficient of kinetic friction between the rough inclined surface and block is _____.

Options :

695278859. 3/4

695278860. 2/3

695278861. 5/9

695278862. 4/9

Question Number : 29 Question Id : 695278254 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two nuclei of mass number 3 combine with another nucleus of mass number 4 to yield a nucleus of mass number 10. If the binding energy per nucleon for the mass numbers 3, 4 and 10 are 5.6 MeV, 7.4 MeV and 6.1 MeV, respectively, then in the process, ΔMc^2 = _____MeV.

Options :

695278863. 6.9

695278864. 7.9

695278865. 2.2

695278866. 4.3

Question Number : 30 Question Id : 695278255 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 mass M and radius R is divided into two unequal parts. The smaller part having mass $M/8$ is converted into a sphere of radius r and the larger part is converted into a circular disc of thickness t and radius $2R$. If I_1 is moment of inertia of a sphere having radius r about an axis through its centre and I_2 is the moment of inertia of a disc about its diameter, the ratio of their moment of inertia I_2/I_1 = _____.

Options :

695278867. 35

695278868. 70

695278869. 140

695278870. 210

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Question Number : 31 Question Id : 695278256 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The two projectiles are projected with the same initial velocities at the 15° and 30° with respect to the horizontal. The ratio of their ranges is 1:x. The value of x is

Options :

695278871. $\sqrt{2}$

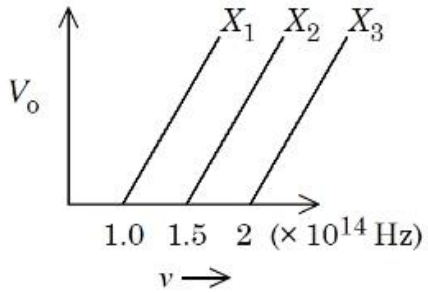
695278872. $\sqrt{3}$

695278873. $2\sqrt{3}$

695278874. $\frac{1}{\sqrt{2}}$

Question Number : 32 Question Id : 695278257 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The graph shows variation of stopping potential V_o with the frequency v of the incident radiation for three photosensitive metals X_1, X_2 and X_3. Which metal will give out electrons with greater kinetic energy, for the same wavelength of incident radiation?



Options :

695278875. X_1

695278876. X_2

695278877. X_3

695278878. All the metals will give out photo electrons with same kinetic energies.

Question Number : 33 Question Id : 695278258 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A slit of width a is illuminated by light of wavelength λ. The linear separation between 1st and 3rd minima in the diffraction pattern produced on a screen placed at a distance D from the slit system is _____.

Options :

695278879. $\frac{D\lambda}{a}$

695278880. $1.5\frac{D\lambda}{a}$

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695278881. $2\frac{D\lambda}{a}$

695278882. $3\frac{D\lambda}{a}$

Question Number : 34 Question Id : 695278259 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A string A of length 0.314 m and Young's modulus 2×10^{10} N/m^2 is connected to another string B of length and Young's modulus both twice of those of A. This series combination of strings is then suspended from a rigid support and its free end is fixed to a load of mass 0.8 kg. The net change in length of the combination is _____mm.
(radius of both the strings is 0.2 mm and acceleration due to gravity =10 m/s^2)
(Mass of both strings is to be neglected as compared to the mass of load)

Options :

695278883. 3

695278884. 2

695278885. 1.9

695278886. 1

Question Number : 35 Question Id : 695278260 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

One gas of n_1 mole of molecules at temperature T_1, volume V_1, and pressure P_1, and another gas of n_2 mole of molecules at temperature T_2, volume V_2, and pressure P_2, are mixed resulting in pressure P and volume V of the mixture. The temperature of the mixture is _____.

Options :

695278887. $(T_1 + T_2)/2$

695278888. $T_1 T_2 PV/(T_2 P_1 V_1 + T_1 P_2 V_2)$

695278889. $(T_2 P_1 V_1 + T_1 P_2 V_2)/(T_1 T_2 PV)$

695278890. $|T_1 - T_2|/2$

Question Number : 36 Question Id : 695278261 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An ideal gas undergoes a process maintaining relation between pressure (P) and volume(V) as $P = P_0\left(1+\left(\frac{V_0}{V}\right)^2\right)^{-1}$, where P_0 and V_0 are constants. If two samples A and B (two moles each) with initial volumes V_0 and $3V_0$ respectively undergo above mentioned process and attain same pressure, then the difference at the temperatures of these samples, $T_B - T_A$ is _____.

(R = gas constant)

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Options :

695278891. $\frac{9P_oV_o}{8R}$

695278892. $\frac{11P_oV_o}{10R}$

695278893. $\frac{7P_oV_o}{6R}$

695278894. $\frac{13P_oV_o}{11R}$

Question Number : 37 Question Id : 695278262 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A voltmeter with internal resistance of $x\ \Omega$ can be used to measure upto 20 V. In order to increase its measuring range to 30 V, the required modification is to_____.

Options :

695278895. connect resistor of $\frac{x}{2}\Omega$, in series with voltmeter.

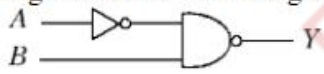
695278896. connect resistor of $\frac{x}{2}\Omega$, in parallel to voltmeter.

695278897. connect a resistor of $x\ \Omega$ in series with voltmeter.

695278898. connect resistor of $2x\ \Omega$ in parallel to voltmeter.

Question Number : 38 Question Id : 695278263 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two 4 bits binary numbers, $A = 1101$ and $B = 1010$ are given in the inputs of a logic circuit shown in figure below. The output (Y) will be :



Options :

695278899. $Y = 1101$

695278900. $Y = 0010$

695278901. $Y = 0111$

695278902. $Y = 1000$

Question Number : 39 Question Id : 695278264 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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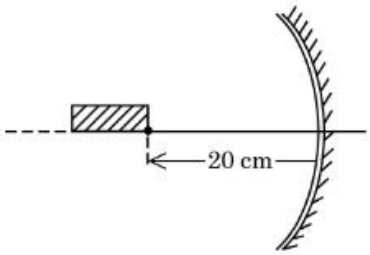
A rod of length 10 cm lies along the principle axis of a concave mirror of focal length 10 cm as shown in figure. The length of the image is _____ cm.



Options :

695278903. 2.5

695278904. 5

695278905. 7.5

695278906. 7

Question Number : 40 Question Id : 695278265 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A parallel plate air capacitor is connected to a battery. The plates are pulled apart at uniform speed v. If x is the separation between the plates at any instant, then the time rate of change of electrostatic energy of the capacitor is proportional to x^{α}, where α is _____.

Options :

695278907. -2

695278908. 1

695278909. -1

695278910. 2

Question Number : 41 Question Id : 695278266 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An insulated wire is wound so that it forms a flat coil with $N = 200$ turns. The radius of the innermost turn is $r_1 = 3$ cm, and of the outermost turn $r_2 = 6$ cm. If 20 mA current flows in it then the magnetic moment will be $\alpha \times 10^{-2}$ A.m^2. The value of α is_____.

Options :

695278911. 4.4

695278912. 2.64

695278913. 3.25

695278914. 1.2

Question Number : 42 Question Id : 695278267 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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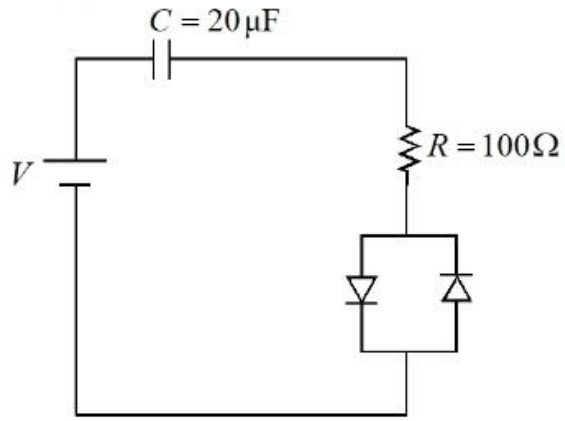
Consider a circuit consisting of a capacitor (20 μF), resistor (100 Ω) and two identical diodes as shown in figure. The resistance of diode under forward biasing condition is 10 Ω. The time constant of the circuit is $\alpha \times 10^{-3}$ s. The value of α is _____



Options :

695278915. 2.2

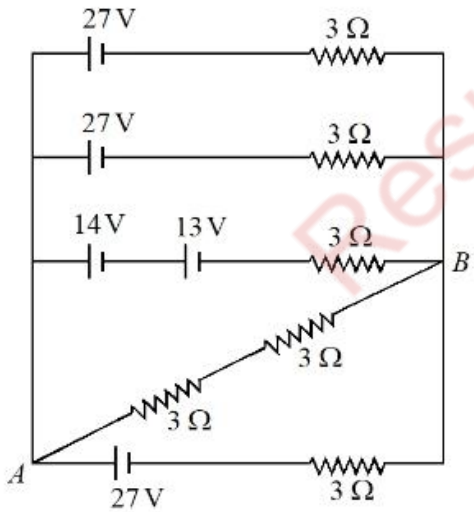
695278916. 2.0

695278917. 2.1

695278918. 2.4

Question Number : 43 Question Id : 695278268 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The voltage and the current between *A* and *B* points shown in the circuit are_____.



Options :

695278919. 24 V, 12 A

695278920. 24 V, 4 A

695278921. 18 V, 12 A

695278922. 27 V, 4 A

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Question Number : 44 Question Id : 695278269 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A telescope with objective diameter R is used to observe a distant star emitting light of wavelength 500 nm, at a resolution of 5×10^{-7} radian. The value of R is _____ cm.

Options :

695278923. 61

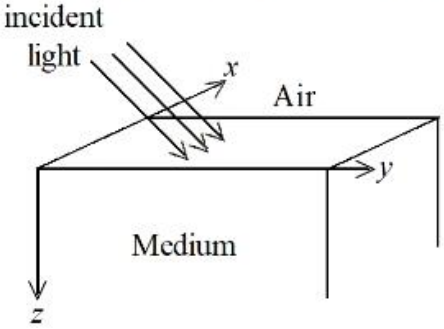
695278924. 122

695278925. 244

695278926. 305

Question Number : 45 Question Id : 695278270 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An unpolarized light is incident on the plane interface of air-dielectric medium shown in figure. If the incident angle is equal to Brewster angle, identify the expression representing reflected wave.



Options :

695278927. $(E_x\hat{i}+E_y\hat{j})\sin\left(kx-kz-\omega t\right)$

695278928. $(E_x\hat{i}+E_z\hat{k})\sin\left(kx+ky-\omega t\right)$

695278929. $(E_x\hat{j}+E_y\hat{k})\sin\left(ky+kz-\omega t\right)$

695278930. $(E_x\hat{i}+E_y\hat{j}+E_z\hat{k})\sin\left(kx+ky-kz-\omega t\right)$

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Physics Section B

Section Id :	69527822
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 :	69527822
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 46 Question Id : 695278271 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A 1 kg block subjected to two simultaneous forces $\left(2\hat{i}+3\hat{j}+4\hat{k}\right)$ N and $\left(3\hat{i}-\hat{j}-2\hat{k}\right)$ N is moved a distance of 25 m along $\left(3\hat{i}-4\hat{j}\right)$ direction. The work done in this process 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 : 47 Question Id : 695278272 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The surface tension of a soap solution is 3.5×10^{-2} N/m. The work required to increase the radius of a soap bubble from 1 cm to 2 cm is $\alpha \times 10^{-6}$ J. The value of α is _____.
$(\pi = 22/7)$

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 : 695278273 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The velocity of a particle executing simple harmonic motion along x-axis is described as $v^2 = 50 - x^2$, where x represents displacement. If the time period of motion is $\frac{x}{7}$ s, the value of x is _____.

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 : 695278274 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A body of mass 2 kg begins to move under the influence of time dependent force $\vec{F} = \left(2t\,\hat{i} + 6t^2\,\hat{j}\right)$ N, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y-axis respectively. The power produced by the force at $t = 2$ s is ____W.

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

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Question Number : 50 Question Id : 695278275 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

An inductor of 10 mH, capacitor of 0.1 μF and a resistor of 100 Ω are connected in series across an *a.c* power supply 220 V, 70 Hz. The power factor of the given circuit is 0.5. The difference in the inductive reactance and capacitance reactance is $\sqrt{3}\ \alpha\ \Omega$. The value of α is _____.

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 :	69527823
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 :	69527823
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 695278276 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Number of moles and number of molecules in 1.4187 L of SO_2 at STP respectively are

Options :

695278936. $0.1266; 3.812 \times 10^{22}$

695278937. $0.0633; 3.812 \times 10^{22}$

695278938. $0.1266; 7.6238 \times 10^{22}$

695278939. $0.0633; 7.6238 \times 10^{22}$

Question Number : 52 Question Id : 695278277 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What is the ratio of wave number of first line (lowest energy line) of Balmer series of H atomic spectrum to first line of its Brackett series?

Options :

695278940. 5:1

695278941. 5:0.81

695278942. 5:1.75

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695278943. 5:27

Question Number : 53 Question Id : 695278278 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following is correct set of 4 quantum numbers of 19^{th} electron in Chromium (Atomic number = 24) in accordance with Aufbau principle?

Options :

695278944. $n = 3, l = 2, m = +2, s = +\frac{1}{2}$

695278945. $n = 3, l = 2, m = -2, s = +\frac{1}{2}$

695278946. $n = 4, l = 1, m = 0, s = +\frac{1}{2}$

695278947. $n = 4, l = 0, m = 0, s = +\frac{1}{2}$

Question Number : 54 Question Id : 695278279 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: For an ideal gas, heat capacity at constant volume is always greater than the heat capacity at constant pressure.

Statement II: In a constant volume process, no work is produced and all the heat withdrawn goes into the chaotic motion and is reflected by a temperature increase of the ideal gas.

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

Options :

695278948. Both Statement I and Statement II are true

695278949. Both Statement I and Statement II are false

695278950. Statement I is true but Statement II is false

695278951. Statement I is false but Statement II is true

Question Number : 55 Question Id : 695278280 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

At T(K), the equilibrium constant of $A_2(g) + B_2(g) \rightleftharpoons C(g)$ is 2.7×10^{-5}. What is the equilibrium constant for $\frac{1}{3}A_2(g) + \frac{1}{3}B_2(g) \rightleftharpoons \frac{1}{3}C(g)$ at the same temperature?

Options :

695278952. $(2.7 \times 10^{-5})^3$

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695278953. 6×10^{-2}

695278954. $\sqrt{2.7 \times 10^{-5}}$

695278955. 3×10^{-2}

Question Number : 56 Question Id : 695278281 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In order to oxidise a mixture of 1 mole each of FeC_2O_4, $Fe_2(C_2O_4)_3$, $FeSO_4$ and $Fe_2(SO_4)_3$ in acidic medium, the number of moles of $KMnO_4$ required is

Options :

695278956. 3

695278957. 2

695278958. 5

695278959. 7

Question Number : 57 Question Id : 695278282 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the first order reaction R → P.
The fraction of molecules decomposed in the given first order reaction can be expressed as

Options :

695278960. $1 - e^{k_1 t}$

695278961. $1 + e^{k_1 t}$

695278962. $1 + e^{-k_1 t}$

695278963. $1 - e^{-k_1 t}$

Question Number : 58 Question Id : 695278283 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A monoatomic anion (A^-) has 45 neutrons and 36 electrons. Atomic mass, group in the periodic table and physical state at room temperature of the element (A) respectively are

Options :

695278964. 80, 17, liquid

695278965. 81, 16, solid

695278966. 80, 16, gas

695278967. 81, 15, gas

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Question Number : 59 Question Id : 695278284 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 covalency of oxygen is generally two but it can exceed upto four. The oxidation state of oxygen in SO_2 is -2 and in OF_2 it is $+2$.

Statement II: The anomalous behaviour of oxygen when compared to the other elements of group 16 is due to its small size and high electronegativity.

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

Options :

695278968. Both Statement I and Statement II are true

695278969. Both Statement I and Statement II are false

695278970. Statement I is true but Statement II is false

695278971. Statement I is false but Statement II is true

Question Number : 60 Question Id : 695278285 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. Mo(VI) and W(VI) are less stable than Cr(VI).
B. Ce^{4+} and Tb^{4+} are oxidant while Eu^{2+} and Yb^{2+} are reductant.
C. Cm and Am have seven unpaired electrons.
D. Actinoid contraction is greater from element to element than lanthanoid contraction.

Choose the correct answer from the options given below:

Options :

695278972. A and B Only

695278973. C and D Only

695278974. B and D Only

695278975. A and C Only

Question Number : 61 Question Id : 695278286 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct statements from the following are

A. Potassium dichromate is an oxidising agent and it oxidises $FeSO_4$ to $Fe_2(SO_4)_3$ in acidic medium.
B. Sodium dichromate can be used as primary standard in volumetric estimation.
C. CrO_4^{2-} and $Cr_2O_7^{2-}$ are interconvertible in aqueous solution by varying the pH of the solution.
D. Cr-O-Cr bond angle in $Cr_2O_7^{2-}$ is 126°.

Choose the correct answer from the options given below:

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Options :

695278976. A, B and C Only

695278977. A, C and D Only

695278978. A and C Only

695278979. B and D Only

Question Number : 62 Question Id : 695278287 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 Complex ion		**List-II Calculated spin only magnetic moment (BM)**
A.	$[Cr(H_2O)_6]^{2+}$	I.	3.87
B.	$[Co(H_2O)_6]^{2+}$	II.	5.92
C.	$[Cu(H_2O)_6]^{2+}$	III.	4.90
D.	$[Mn(H_2O)_6]^{2+}$	IV.	1.73

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

Options :

695278980. A-I, B-III, C-IV, D-II

695278981. A-II, B-I, C-III, D-IV

695278982. A-IV, B-II, C-I, D-III

695278983. A-III, B-I, C-IV, D-II

Question Number : 63 Question Id : 695278288 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Increasing order of electron withdrawing power of following functional groups is:

a. $-CN$
b. $-COOH$
c. $-NO_2$
d. $-I$

Options :

695278984. c < b < d < a

695278985. c < a < b < d

695278986. d < b < a < c

695278987. a < b < c < d

Question Number : 64 Question Id : 695278289 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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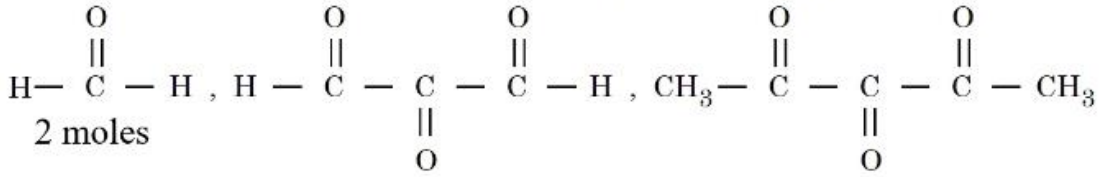
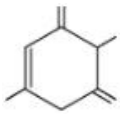
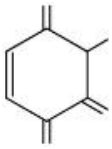
An alkene (X) on ozonolysis followed by reduction gives following products.

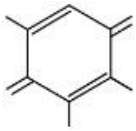


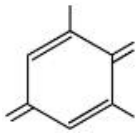
The alkene (X) is:

Options :

695278988. 

695278989. 

695278990. 

695278991. 

Question Number : 65 Question Id : 695278290 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 Name of reaction		List-II Reagent or catalyst used	
A.	Finkelstein reaction	I.	SbF_3
B.	Swarts reaction	II.	Na, dry ether
C.	Sandmeyer's reaction	III.	NaI
D.	Fittig reaction	IV.	Cu_2Cl_2

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

Options :

695278992. A-I, B-IV, C-III, D-II

695278993. A-III, B-I, C-IV, D-II

695278994. A-IV, B-II, C-I, D-III

695278995. A-I, B-III, C-II, D-IV

Question Number : 66 Question Id : 695278291 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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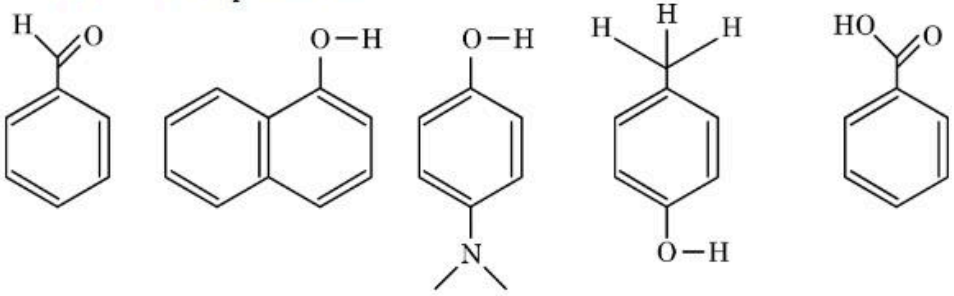
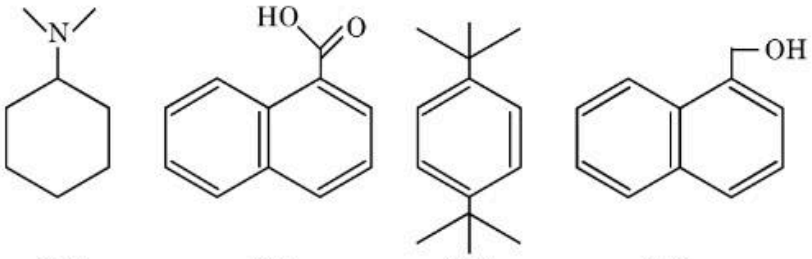
Amongst the following, the total number of compounds soluble in aqueous NaOH at room temperature is:



(I) (II) (III) (IV) (V)



(VI) (VII) (VIII) (IX)

Options :

695278996. 5

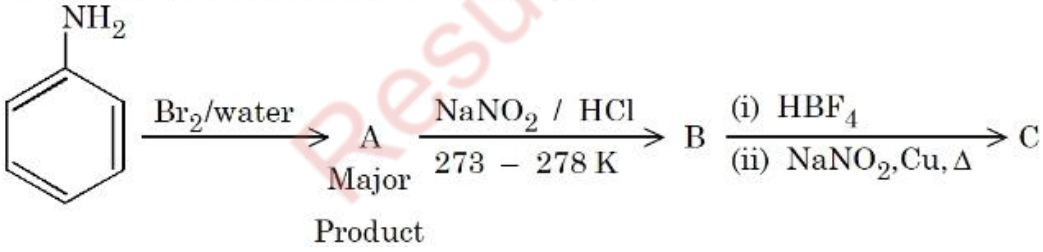
695278997. 4

695278998. 6

695278999. 3

Question Number : 67 Question Id : 695278292 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Product C of the following reaction sequence will be



Options :

6952781000. 1-Bromo-4-nitrobenzene

6952781001. 1, 3, 5-Tribromo-2-nitrobenzene

6952781002. 4-Bromo-1-nitrobenzene

6952781003. 1, 3, 5-Tribromobenzene

Question Number : 68 Question Id : 695278293 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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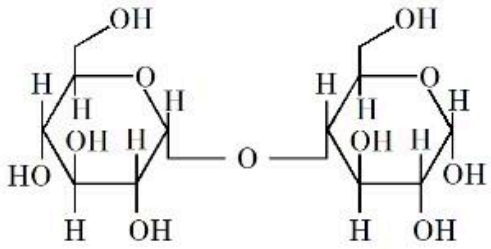
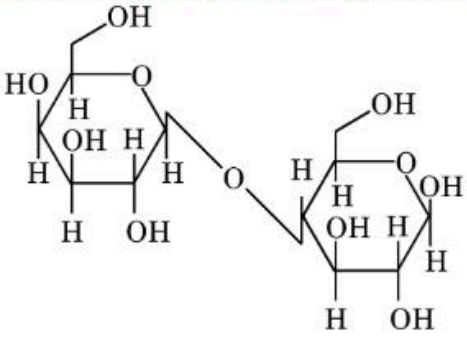
Given below are two statements:

Statement I: The structure of Maltose is given below:



Maltose is a non-reducing sugar.

Statement II: The structure of Lactose is given below:



Lactose is a reducing sugar.

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

Options :

6952781004. Both Statement I and Statement II are true

6952781005. Both Statement I and Statement II are false

6952781006. Statement I is true but Statement II is false

6952781007. Statement I is false but Statement II is true

Question Number : 69 Question Id : 695278294 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 Name of amino acid		**List-II One letter symbol/type**
A.	Arginine	I.	D/Non-essential
B.	Aspartic acid	II.	R/Essential
C.	Lysine	III.	E/Non-essential
D.	Glutamic acid	IV.	K/Essential

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

Options :

6952781008. A-II, B-I, C-IV, D-III

6952781009. A-IV, B-III, C-II, D-I

6952781010. A-III, B-IV, C-I, D-II

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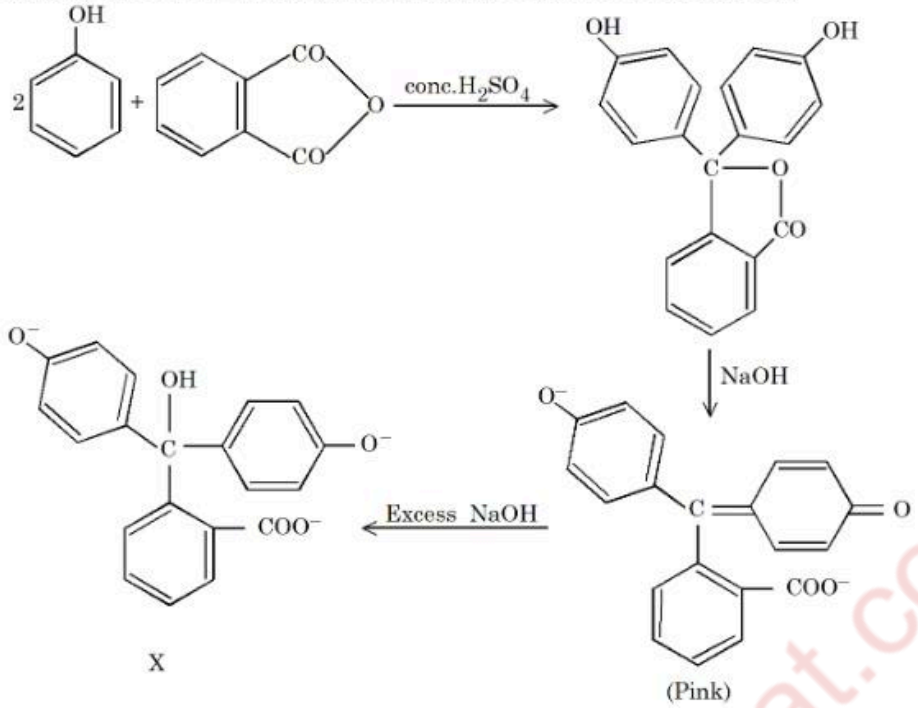
6952781011. A-II, B-IV, C-I, D-III

Question Number : 70 Question Id : 695278295 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Identify the colour of compound 'X' in the sequence of the reaction.



Options :

6952781012. Violet

6952781013. Green

6952781014. Red

6952781015. Colourless

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Chemistry Section B

Section Id :	69527824
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 :	69527824
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 695278296 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

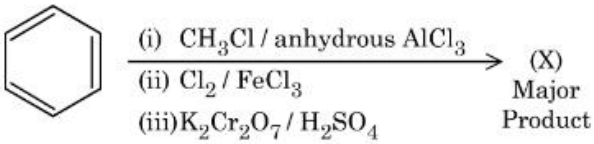
According to Lewis theory, the total number of σ bond-pairs and lone pair of electrons around the central atom of XeO_6^{4-} ion is _____.

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 : 695278297 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the following sequence of reactions to give the major product (X)



P g of the major product (X) formed is reacted with $NaHCO_3$ solution to liberate a gas which occupied 11.2 dm^3 at STP.
P = _____g.
(Given molar mass in g mol^{-1} H:1, C:12, O:16, Cl:35.5)

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 : 695278298 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

2.0 g of a bromo hydrocarbon (X) was subjected to Carius analysis, gave 3.36 g of AgBr. The percentage of carbon in the compound (X) is 26.7%. Total number of carbon atoms in the empirical formula for compound (X) is _____.
(Given molar mass in g mol^{-1} H:1, C:12, Br : 80, Ag : 108)

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 : 695278299 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The pH of a solution obtained by mixing 5 mL of 0.1 M NH_4OH solution with 250 mL of 0.1 M NH_4Cl solution is _____$\times 10^{-2}$.(Nearest integer)
Given: pK_b (NH_4OH) = 4.74

log 2 = 0.30
log 3 = 0.48
log 5 = 0.70

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

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1

Question Number : 75 Question Id : 695278300 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A non-volatile, non-electrolyte solid solute when dissolved in 40 g of a solvent, the vapour pressure of the solvent decreased from 760 mm Hg to 750 mm Hg. If the same solution boils at 320 K, then the number of moles of the solvent present in the solution is _____. (Nearest integer)
[Given: boiling point of the pure solvent = 319.5 K,
K_b of the solvent = 0.3 K kg mol^{-1}]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

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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

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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

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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. $\frac{27}{7}$

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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

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

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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

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

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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 _____.

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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

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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

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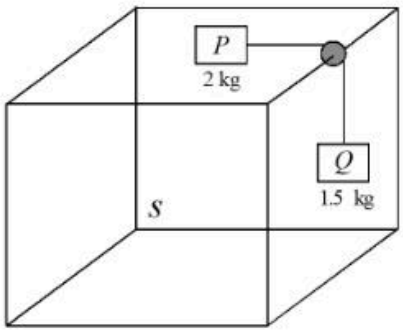
Two blocks (P and Q) with respectively masses 2 kg and 1.5 kg are joined by a massless thread. These blocks are mounted on a frictionless pully which is fixed on the edge of a cube (S), as shown in the figure below. Block P is positioned on the top surface which has no friction and block Q is in contact 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

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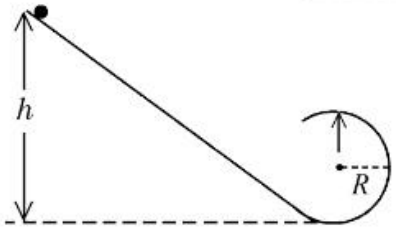
6952787602. $0.0128\ \pi$ Nm, 50

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

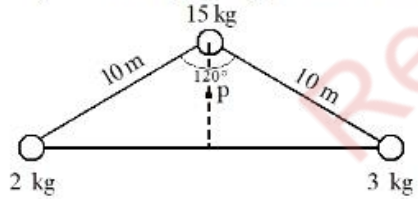
6952787606. 4

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

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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 :

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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

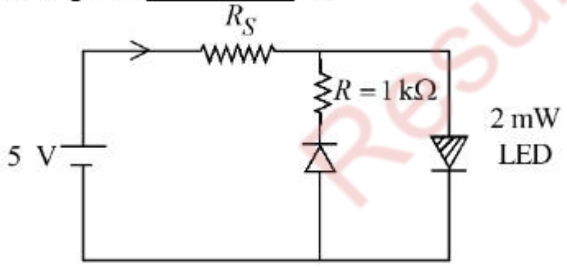
6952787631. 3.25

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

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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. $\frac{I_o}{4}$

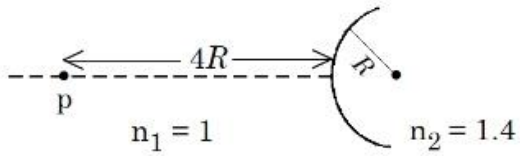
6952787638. I_o

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}

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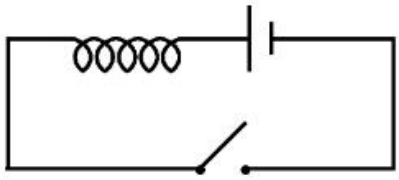
Question Number : 43 Question Id : 6952782178 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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

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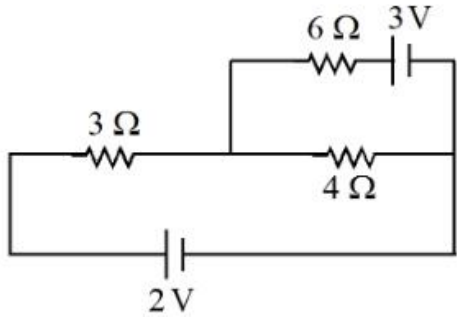
Physics Section B

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_o 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 $\frac{3}{8} I_{o,}$ 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

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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

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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

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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%

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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

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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

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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

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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

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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

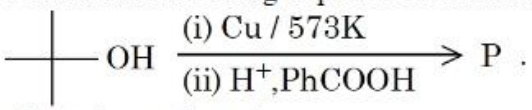
6952787727. Both Statement I and Statement II are false

6952787728. Statement I is true but Statement II is false

6952787729. Statement I is false but Statement II is true

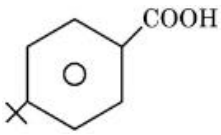
Question Number : 67 Question Id : 6952782202 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

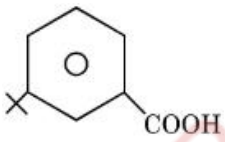
Consider the following sequence of reactions

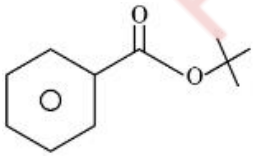


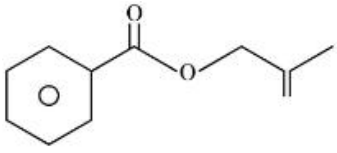
The major product P is:

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 :

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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

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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

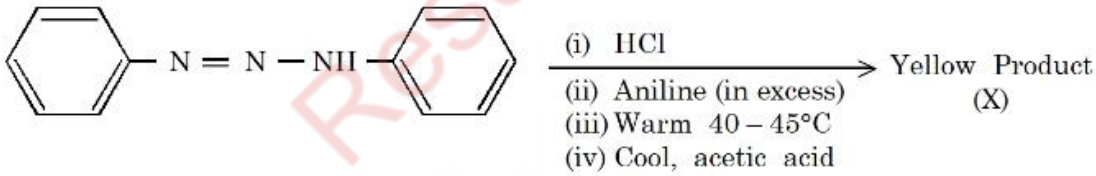
Question Number : 71 Question Id : 6952782206 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

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)

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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

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National Testing Agency

Question Paper Name :	B Tech 2nd Apr 2026 Shift 1
Subject Name :	B. Tech
Creation Date :	2026-04-02 14:02:41
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Id :	6911211
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 :	6911211
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 :	6911211
Question Shuffling Allowed :	Yes
Is Section Default? :	No

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Question Number : 1 Question Id : 6911211 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\alpha, \alpha+2, \alpha \in \mathbf{Z}$, be the roots of the quadratic equation
$x(x+2)+(x+1)(x+3)+(x+2)(x+4)+\ldots.+(x+n-1)(x+n+1)=4n$ for some $n \in \mathbf{N}$.
Then $n+\alpha$ is equal to :

Options :

6911211. 0

6911212. 1

6911213. 2

6911214. 3

Question Number : 2 Question Id : 6911212 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let x and y be real numbers such that $50\left(\frac{2x}{1+3i}-\frac{y}{1-2i}\right)=31+17i$, $i=\sqrt{-1}$. Then the value of $10(x-3y)$ is :

Options :

6911215. 20

6911216. 31

6911217. 35

6911218. 75

Question Number : 3 Question Id : 6911213 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\alpha, \beta \in \mathbf{R}$ be such that the system of linear equations

$$x+2y+z=5$$
$$2x+y+\alpha z=5$$
$$8x+4y+\beta z=18$$

has no solution. Then $\frac{\beta}{\alpha}$ is equal to :

Options :

6911219. -4

69112110. 4

69112111. 8

69112112. -8

Question Number : 4 Question Id : 6911214 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $A=\begin{bmatrix}1 & 2\\ 1 & \alpha\end{bmatrix}$ and $B=\begin{bmatrix}3 & 3\\ \beta & 2\end{bmatrix}$. If $A^2-4A+I=O$ and $B^2-5B-6I=O$, then among the two statements :

(S1): $[(B-A)(B+A)]^T=\begin{bmatrix}13 & 15\\ 7 & 10\end{bmatrix}$

and

(S2): $\det(\text{adj}(A+B))=-5$,

Options :

69112113. only (S1) is correct

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69112114. only (S2) is correct

69112115. both (S1) and (S2) are correct

69112116. both (S1) and (S2) are wrong

Question Number : 5 Question Id : 6911215 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let A be the set of first 101 terms of an A.P., whose first term is 1 and the common difference is 5 and let B be the set of first 71 terms of an A.P., whose first term is 9 and the common difference is 7. Then the number of elements in $A \cap B$, which are divisible by 3, is :

Options :

69112117. 4

69112118. 5

69112119. 6

69112120. 7

Question Number : 6 Question Id : 6911216 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 seven-digit numbers, that can be formed by using the digits 1, 2, 3, 5 and 7 such that each digit is used at least once, is :

Options :

69112121. 15400

69112122. 17800

69112123. 16800

69112124. 29400

Question Number : 7 Question Id : 6911217 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 elements in the set $S = \left\{(r, k) : k \in \mathbf{Z} \text{ and } {}^{36}C_{r+1} = \frac{6\left({}^{35}C_r\right)}{\left(k^2-3\right)}\right\}$, is :

Options :

69112125. 2

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69112126. 4

69112127. 8

69112128. 16

Question Number : 8 Question Id : 6911218 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the mean of the data

Class	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	2	k	28	54	k+1	5

is 21, then k is one of the roots of the equation :

Options :

69112129. $2x^2-23x-10=0$

69112130. $4x^2-35x+24=0$

69112131. $2x^2-19x-10=0$

69112132. $2x^2-35x+98=0$

Question Number : 9 Question Id : 6911219 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the mid points of the sides of a triangle ABC be $\left(\frac{5}{2}, 7\right)$, $\left(\frac{5}{2}, 3\right)$ and (4, 5). If its incentre is (h, k), then 3h + k is equal to :

Options :

69112133. 11

69112134. 12

69112135. 13

69112136. 14

Question Number : 10 Question Id : 69112110 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, a < b, pass through the point (4, 3) and have eccentricity $\frac{\sqrt{5}}{3}$. Then the length of its latus rectum is :

Options :

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69112137. $\frac{4\sqrt{5}}{3}$

69112138. $2\sqrt{5}$

69112139. $\frac{7\sqrt{5}}{3}$

69112140. $\frac{8\sqrt{5}}{3}$

Question Number : 11 Question Id : 69112111 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right) = K$, then the value of $\sin\left(\frac{10K\pi}{3}\right)$ is :

Options :

69112141. $\frac{\sqrt{3}+1}{2\sqrt{2}}$

69112142. $\frac{\sqrt{3}-1}{\sqrt{2}}$

69112143. $\frac{\sqrt{3}}{2}$

69112144. $\frac{1}{2}$

Question Number : 12 Question Id : 69112112 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $S=\{x\in[-\pi,\pi] : \sin x\,(\sin x+\cos x)=a,\ a\in Z\}$. Then n(S) is equal to :

Options :

69112145. 3

69112146. 6

69112147. 7

69112148. 9

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Question Number : 13 Question Id : 69112113 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the point of intersection of the lines $\frac{x+1}{3} = \frac{y+a}{5} = \frac{z+b+1}{7}$ and $\frac{x-2}{1} = \frac{y-b}{4} = \frac{z-2a}{7}$ lies on xy-plane, then the value of $a+b$ is :

Options :

69112149. 2

69112150. 5

69112151. 7

69112152. 9

Question Number : 14 Question Id : 69112114 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}| = 2$ and $|\vec{b}| = 3$, then the maximum value of $3\left|\left(3\vec{a} + 2\vec{b}\right)\right| + 4\left|\left(3\vec{a} - 2\vec{b}\right)\right|$ is :

Options :

69112153. 30

69112154. 36

69112155. 60

69112156. 72

Question Number : 15 Question Id : 69112115 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 passing through the point (1, 1, 1) be perpendicular to both the vectors $2\hat{i} + 2\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. If P(a, b, c) is the foot of perpendicular from the origin on the line L, then the value of $34(a+b+c)$ is :

Options :

69112157. 50

69112158. 80

69112159. 100

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69112160. 120

Question Number : 16 Question Id : 69112116 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\lim\limits_{x\to 2} \dfrac{\sin\left(x^3-5x^2+ax+b\right)}{\left(\sqrt{x-1}-1\right)\log_e(x-1)} = m$, then $a+b+m$ is equal to :

Options :

69112161. 5

69112162. 6

69112163. 8

69112164. 10

Question Number : 17 Question Id : 69112117 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the curve $y=f(x)$ passes through the point $(1, e)$ and satisfies the differential equation $dy=y(2+\log_e x)\,dx$, $x>0$, then $f(e)$ is equal to :

Options :

69112165. e^e

69112166. e^{e^2}

69112167. e^{2e}

69112168. e^{2^e}

Question Number : 18 Question Id : 69112118 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 critical points of the function $f(x)=\begin{cases}\left|\dfrac{\sin x}{x}\right| & , x\neq 0\\ 1 & , x=0\end{cases}$ in the interval $(-2\pi, 2\pi)$ is equal to :

Options :

69112169. 1

69112170. 3

69112171. 5

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69112172. 7

Question Number : 19 Question Id : 69112119 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let [·] denote the greatest integer function. Then the value of $\int_0^3 \left(\frac{e^x+e^{-x}}{[x]!}\right) dx$ is :

Options :

69112173. $e^2 + e^3 - \frac{1}{e^2} - \frac{1}{e^3}$

69112174. $\frac{1}{2}\left(e^2 + e^3 - \frac{1}{e^2} - \frac{1}{e^3}\right)$

69112175. $e^2 + e^3 - \frac{1}{2e^2} - \frac{1}{2e^3}$

69112176. $\frac{1}{2}(e^2 + e^3) - \frac{1}{e^2} - \frac{1}{e^3}$

Question Number : 20 Question Id : 69112120 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 the solution curve of the differential equation $(1 + \sin x)\frac{dy}{dx} + (y+1)\cos x = 0, y(0) = 0$. If the curve $y = y(x)$ passes through the point $\left(\alpha, \frac{-1}{2}\right)$, then a value of α is :

Options :

69112177. $\frac{\pi}{6}$

69112178. $\frac{\pi}{4}$

69112179. $\frac{\pi}{3}$

69112180. $\frac{\pi}{2}$

Mathematics Section B

Section Id :	6911212
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory

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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 :	6911212
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Id : 69112121 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the domain of the function $f(x)=\sqrt{\log_{(0.6)}\left(\left|\frac{2x-5}{x^2-4}\right|\right)}$ is $(-\infty, a] \cup \{b\} \cup [c, d) \cup (e, \infty)$, then the value of $a+b+c+d+e$ is _____.

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 : 69112122 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\sum_{k=1}^{n} a_k = 6n^3$, then $\sum_{k=1}^{6}\left(\frac{a_{k+1}-a_k}{36}\right)^2$ 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 : 23 Question Id : 69112123 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $a, b, c \in \{1, 2, 3, 4\}$. If the probability, that $ax^2+2\sqrt{2}bx+c>0$ for all $x \in \mathbf{R}$, 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 : 24 Question Id : 69112124 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let a circle C have its centre in the first quadrant, intersect the coordinate axes at exactly three points and cut off equal intercepts from the coordinate axes. If the length of the chord of C on the line $x+y=1$ is $\sqrt{14}$, then the square of the radius of C is _____.

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

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Text Areas : PlainText
Possible Answers :
1

Question Number : 25 Question Id : 69112125 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If $\alpha = \int_0^{2\sqrt{3}} \log_2\left(x^2+4\right)dx + \int_2^4 \sqrt{2^x-4}\,dx$, then α^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

Physics Section A

Section Id :	6911213
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 :	6911213
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 26 Question Id : 69112126 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The dimensional formula of $\frac{1}{2}\epsilon_o E^2$ (ϵ_o = permittivity of vacuum and E = electric field) is $M^aL^bT^c$.

The value of $2a-b+c=$_____.

Options :

69112186. 0

69112187. 1

69112188. -1

69112189. 2

Question Number : 27 Question Id : 69112127 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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The diameter of a wire measured by a screw gauge of least count 0.001 cm is 0.08 cm. The length measured by a scale of least count 0.1 cm is 150 cm. When a weight of 100 N is applied to the wire, the extension in length is 0.5 cm, measured by a micrometer of least count 0.001 cm. The error in the measured Young's modulus is $\alpha \times 10^9$ N/m^2. The value of α is _____.
(Ignore the contribution of the load to Young's modulus error calculation)

Options :

69112190. 1.3

69112191. 1.65

69112192. 0.13

69112193. 0.25

Question Number : 28 Question Id : 69112128 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The velocity of a particle is given as $\vec{v} = -x\hat{i} + 2y\hat{j} - z\hat{k}$ m/s. The magnitude of acceleration at point (1, 2, 4) is _____ m/s^2.

Options :

69112194. $\sqrt{6}$

69112195. 9

69112196. $\sqrt{33}$

69112197. 0

Question Number : 29 Question Id : 69112129 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 an object having mass 0.1 kg as a function of time t is given as $\vec{r} = \left(10t^2\hat{i} + 5t^3\hat{j}\right)$ m. At $t = 1$ s, which of the following statements are **correct** ?

A. The linear momentum $\vec{p} = \left(2\hat{i} + 1.5\hat{j}\right)$ kg·m/s.

B. The force acting on the object $\vec{F} = \left(2\hat{i} + 3\hat{j}\right)$N.

C. The angular momentum of the object about its origin $\vec{L} = 15\ \hat{k}$ J s.

D. The torque acting on the object about its origin $\vec{\tau} = 20\ \hat{k}$ N m.

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

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Options :

69112198. A, B and C only

69112199. B, C and D only

691121100. A, C and D only

691121101. A, B and D only

Question Number : 30 Question Id : 69112130 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A planet (P_1) is moving around the star of mass $2M$ in the orbit of radius R. Another planet (P_2) is moving around another star of mass $4M$ in a orbit of radius $2R$. Ratio of time periods of revolution of P_2 and P_1 is _____.

Options :

691121102. $\frac{1}{2}$

691121103. 2

691121104. 4

691121105. $\frac{1}{4}$

Question Number : 31 Question Id : 69112131 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 rotating in a circular path and at any instant its motion can be described as $\theta = \frac{5t^4}{40} - \frac{t^3}{3}$. The angular acceleration of the particle after 10 seconds is _____ rad/s^2.

Options :

691121106. 150

691121107. 120

691121108. 130

691121109. 170

Question Number : 32 Question Id : 69112132 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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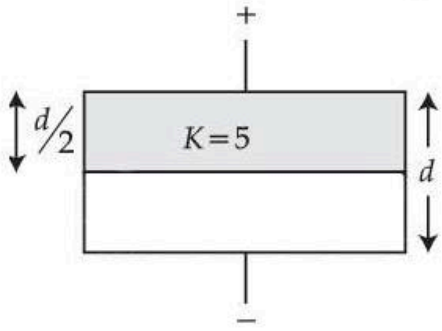
A parallel plate air capacitor has a capacitance C. When it is half filled as show in figure with a dielectric constant $K=5$, the percentage increase in the capacitance is _____.



Options :

691121110. 33.34

691121111. 66.67

691121112. 200

691121113. 400

Question Number : 33 Question Id : 69112133 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Heat is supplied to a diatomic gas at constant pressure. Then the ratio of $\Delta Q : \Delta U : \Delta W$ is _____.

Options :

691121114. 2 : 3 : 5

691121115. 5 : 3 : 2

691121116. 2 : 5 : 7

691121117. 7 : 5 : 2

Question Number : 34 Question Id : 69112134 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two charged conducting spheres S_1 and S_2 of radii 8 cm and 18 cm are connected to each other by a wire. After equilibrium is established, the ratio of electric fields on S_1 and S_2 spheres are E_{S1} and E_{S2} respectively. The value of $\frac{E_{S1}}{E_{S2}}$ is _____.

Options :

691121118. $\frac{3}{2}$

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691121119. $\frac{2}{3}$

691121120. $\frac{4}{9}$

691121121. $\frac{9}{4}$

Question Number : 35 Question Id : 69112135 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The equation of a plane progressive wave is given by $y = 5\cos\pi\left(200\,t - \frac{x}{150}\right)$ where x and y are in cm and t is in second. The velocity of the wave is _____ m/s.

Options :

691121122. 120

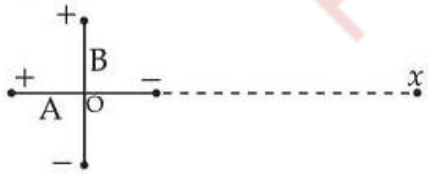
691121123. 150

691121124. 200

691121125. 300

Question Number : 36 Question Id : 69112136 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two short electric dipoles A and B having dipole moment p_1 and p_2 respectively are placed with their axis mutually perpendicular as shown in the figure. The resultant electric field at a point x is making an angle of 60° with the line joining points O and x. The ratio of the dipole moments p_2/p_1 is _____.



Options :

691121126. $\frac{\sqrt{3}}{2}$

691121127. $2\sqrt{3}$

691121128. $\frac{1}{\sqrt{3}}$

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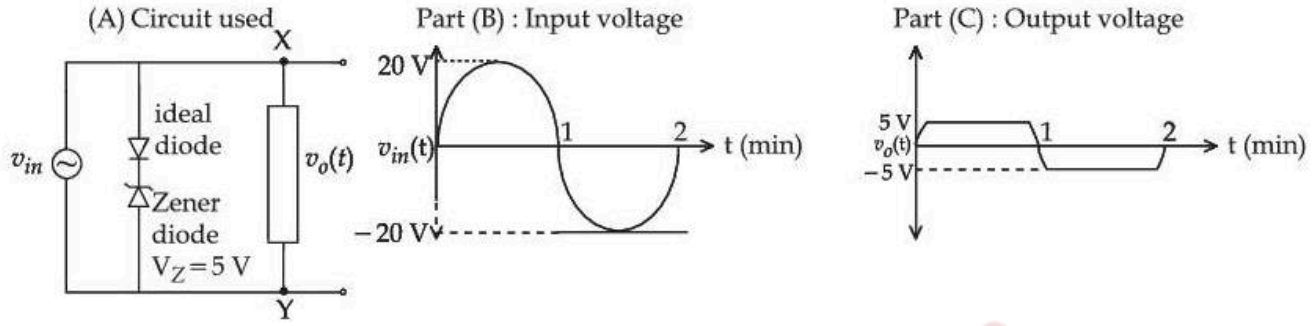
691121129. $\sqrt{3}$

Question Number : 37 Question Id : 69112137 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the given circuit (shown in part (A)) the time dependent input voltage $v_{in}(t)$ and corresponding output $v_o(t)$ are shown in part (B) and part (C), respectively. Identify the components that are used in the circuit between points X and Y.



Options :

691121130. 

691121131. 

691121132. 

691121133. 

Question Number : 38 Question Id : 69112138 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When a coil is placed in a time dependent magnetic field the power dissipated in it is P. The number of turns, area of the coil and radius of the coil wire are N, A and r respectively. For a second coils number of turns, area of the coil and radius of the coil wire are $2N$, $2A$ and $3r$ respectively. When the first coil is replaced with second coil the power dissipated in it is $\sqrt{2}\ \alpha P$. The value of α is _____.

Options :

691121134. 36

691121135. $128\sqrt{2}$

691121136. 16

691121137. 64

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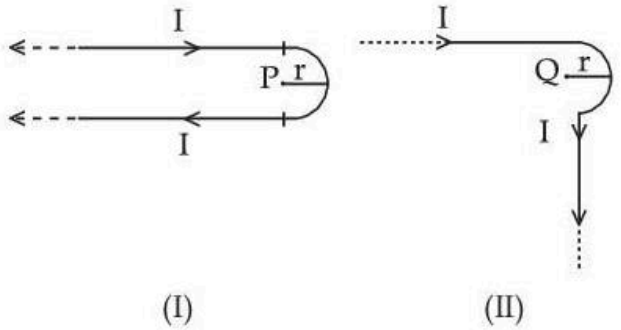
Question Number : 39 Question Id : 69112139 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two identical long current carrying wires are bent into the shapes shown in the following figures. If the magnitude of magnetic fields at the centres P and Q of a semicircular arc are B_1 and B_2 respectively, then the ratio $\frac{B_1}{B_2}$ is _____.



(I) (II)

Options :

691121138. $\frac{2+\pi}{1+\pi}$

691121139. $\frac{1+\pi}{1-\pi}$

691121140. $\frac{2+\pi}{1-\pi}$

691121141. $\frac{1+\pi}{2-\pi}$

Question Number : 40 Question Id : 69112140 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a thin symmetric prism made of glass (refractive index 1.5), the ratio of incident angle and minimum deviation will be _____.

Options :

691121142. 3 : 4

691121143. 3 : 2

691121144. 2 : 1

691121145. 1 : 2

Question Number : 41 Question Id : 69112141 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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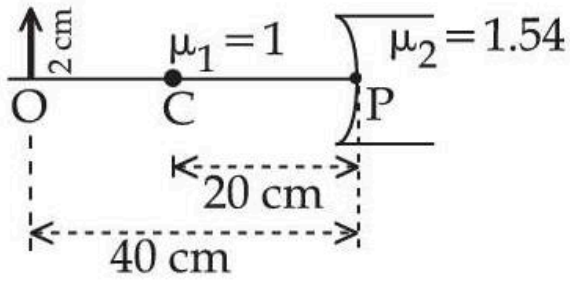
Refer the figure given below. μ_1 and μ_2 are refractive indices of air and lens material. The height of image will be _____ cm.



Options :

691121146. 1

691121147. 0.5

691121148. 1.2

691121149. 0.25

Question Number : 42 Question Id : 69112142 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a certain metal, when monochromatic light of wavelength λ is incident, the stopping potential for photoelectrons is $3V_o$. When the same metal is illuminated by light of wavelength 2λ, then the stopping potential becomes V_o. The threshold wavelength for photoelectric emission for the given metal is αλ. The value of α is _____.

Options :

691121150. 1

691121151. 4

691121152. 2

691121153. 3

Question Number : 43 Question Id : 69112143 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An electromagnetic wave travelling in x-direction is described by field equation $E_y = 300 \sin \omega \left(t - \frac{x}{c} \right)$. If the electron is restricted to move in y-direction only with speed of 1.5×10^6 m/s then ratio of maximum electric and magnetic forces acting on the electron is _____.

Options :

691121154. 200

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691121155. 150

691121156. 400

691121157. 300

Question Number : 44 Question Id : 69112144 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Angular momentum of an electron in a hydrogen atom is $\frac{3h}{\pi}$, then the energy of the electron is _____ eV.

Options :

691121158. -1.51

691121159. -0.85

691121160. -0.38

691121161. -0.28

Question Number : 45 Question Id : 69112145 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A liquid drop of diameter 2 mm breaks into 512 droplets. The change in surface energy is $\alpha \times 10^{-6}$ J. The value of α is _____. (Take surface tension of liquid = 0.08 N/m)

Options :

691121162. 10

691121163. 7

691121164. 8

691121165. 11

Physics Section B

Section Id :	6911214
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 :	6911214
Question Shuffling Allowed :	Yes

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Is Section Default? : No

Question Number : 46 Question Id : 69112146 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

In single slit diffraction pattern, the wavelength of light used is 628 nm and slit width is 0.2 mm, the angular width of central maximum is $\alpha \times 10^{-2}$ degrees. The value of α is _____.

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 : 69112147 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A vessel contains 0.15 m^3 of a gas at pressure 8 bar and temperature 140 °C with $c_p = 3R$ and $c_v = 2R$. It is expanded adiabatically till pressure falls to 1 bar. The work done during this process is _____ k J. (R is gas constant)

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 : 69112148 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

1 μC charge moving with velocity $\vec{v} = \left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ m/s in the region of magnetic field $\vec{B} = \left(2\hat{i} + 3\hat{j} - 5\hat{k}\right)$ T. The magnitude of force acting on it is $\sqrt{\alpha} \times 10^{-6}$ N. The value of α is _____.

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 : 69112149 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A uniform wire of length l of weight w is suspended from the roof with a weight of W at the other end. The stress in the wire at $\frac{l}{3}$ distance from the top is $\left(\frac{W}{A} + \frac{2}{\gamma}\frac{w}{A}\right)$, where, A is the cross sectional area of the wire. The value of γ is _____.

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

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1

Question Number : 50 Question Id : 69112150 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A tub is filled with water and a wooden cube 10 cm × 10 cm × 10 cm is placed in the water. The wooden cube is found to float on the water with a part of it submerged in water. When a metal coin is placed on the wooden cube, the submerged part is increased by 3.87 cm. The mass of the metal coin is _____ gram.

(Take water density as 1 g/cm^3 and density of wood as 0.4 g/cm^3)

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 :	6911215
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 :	6911215
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Id : 69112151 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The mass of iron converted into Fe_3O_4 by the action of 18 g of steam is :

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

Assume iron is present in excess :

Options :

691121171. 2.1 g

691121172. 4.2 g

691121173. 21 g

691121174. 42 g

Question Number : 52 Question Id : 69112152 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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What is the energy (in J atom^{-1}) required for the following process ?

$Li^{2+}(g) \rightarrow Li^{3+}(g) + e^-$

(Take the ionization energy for the H atom in the ground state as 2.18×10^{-18} J atom^{-1})

Options :

691121175. 8.72×10^{-18}

691121176. 1.962×10^{-18}

691121177. 1.962×10^{-17}

691121178. 6.54×10^{-17}

Question Number : 53 Question Id : 69112153 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 correct sequence of bond lengths in the following species is :

$O_2^+ < O_2 < O_2^- < O_2^{2-}$

Statement (II) : The correct sequence of number of unpaired electrons in the following species is :

$O_2 > O_2^+ > O_2^- > O_2^{2-}$

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

Options :

691121179. Both **Statement I** and **Statement II** are true

691121180. Both **Statement I** and **Statement II** are false

691121181. **Statement I** is true but **Statement II** is false

691121182. **Statement I** is false but **Statement II** is true

Question Number : 54 Question Id : 69112154 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.

(i) $2Al(s) + 6HCl(aq) \rightarrow Al_2Cl_6(aq) + 3H_2(g) + 1200$ kJ/mol

(ii) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g) + 164$ kJ/mol.

(iii) $HCl(g) + aq \rightarrow HCl(aq) + 83$ kJ/mol.

(iv) $Al_2Cl_6(s) + aq \rightarrow Al_2Cl_6(aq) + 663$ kJ/mol

The enthalpy of formation of anhydrous solid Al_2Cl_6 is :

Options :

691121183. -648 kJ mol^{-1}

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691121184. $-1350\ \text{kJ mol}^{-1}$

691121185. $-2002\ \text{kJ mol}^{-1}$

691121186. $-1527\ \text{kJ mol}^{-1}$

Question Number : 55 Question Id : 69112155 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

19.5 g of fluoro acetic acid (molar mass = 78 g mol^{-1}) is dissolved in 500 g of water at 298 K. The depression in the freezing point of water was 1°C. What is K_a of fluoro acetic acid ? (For water, $K_f = 1.86\ \text{K kg mol}^{-1}$). Assume molarity and molality to have same values.

Options :

691121187. 10^{-6}

691121188. 4×10^{-4}

691121189. 3×10^{-5}

691121190. 3×10^{-3}

Question Number : 56 Question Id : 69112156 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The solubility product constants of Ag_2CrO_4 and AgBr are $32x$ and $4y$ respectively at 298 K.

The value of $\left(\frac{\text{molarity of } Ag_2CrO_4}{\text{molarity of AgBr}}\right)$ can be expressed as :

Options :

691121191. $\frac{2\sqrt[3]{x}}{y}$

691121192. $2\sqrt{\frac{x}{y}}$

691121193. $\sqrt{\frac{x}{y}}$

691121194. $\frac{\sqrt[3]{x}}{\sqrt{y}}$

Question Number : 57 Question Id : 69112157 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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An electrochemical cell is constructed using half cells in the direction of spontaneous change

$Fe(OH)_2(s) + 2e^- \rightarrow Fe(s) + 2OH^-(aq)$ $\quad E^\theta = -0.88$ V

and $AgBr(s) + e^- \rightarrow Ag(s) + Br^-(aq)$ $\quad E^\theta = +0.07$ V

Which of the following option is **correct** ?

Options :

691121195. Overall reaction $Fe(s)+2OH^-(aq)+2AgBr(s) \rightleftharpoons Fe(OH)_2(s)+2Ag(s)+2Br^-(aq)$

691121196. $E^\theta_{cell} = -0.95$ V

691121197. Fe is reduced in the electrochemical cell

691121198. E^θ_{cell} is an extensive property

Question Number : 58 Question Id : 69112158 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$t_{100\%}$ is the time required for the 100% completion of the reaction while $t_{½}$ is the time required for 50% of the reaction to be completed. Which of the following option correctly represents the relation between $t_{100\%}$ and $t_{½}$ for zero and first order reactions respectively ?

Options :

691121199. $t_{100\%} = (t_{½})^2$ and $t_{100\%} = (t_{½})^{-\infty}$

691121200. $t_{100\%} = 2t_{½}$ and $t_{100\%} = (t_{½})^{\infty}$

691121201. $t_{100\%} = 2t_{½}$ and $t_{100\%} = (2t_{½})^2$

691121202. $t_{100\%} = (t_{½})^{\infty}$ and $t_{100\%} = 2t_{½}$

Question Number : 59 Question Id : 69112159 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 first ionisation enthalpy of the elements Na, Mg, Cl and Ar follows the order Na > Mg > Cl > Ar.

Statement (II) : Among Ca, Al, Fe and B, the third ionisation enthalpy is very high for Ca.

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

Options :

691121203. Both **Statement I** and **Statement II** are true

691121204. Both **Statement I** and **Statement II** are false

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691121205. **Statement I** is true but **Statement II** is false

691121206. **Statement I** is false but **Statement II** is true

Question Number : 60 Question Id : 69112160 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) : Oxidising power of halogens decreases in the order $F_2 > Cl_2 > Br_2 > I_2$, which is the basis of "Layer test".

Statement (II) : "Layer test" to identify Br_2 and I_2 in aqueous solution involves the oxidation of bromide or iodide into Br_2 or I_2 respectively with Cl_2, which is a type of displacement redox reaction.

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

Options :

691121207. Both **Statement I** and **Statement II** are true

691121208. Both **Statement I** and **Statement II** are false

691121209. **Statement I** is true but **Statement II** is false

691121210. **Statement I** is false but **Statement II** is true

Question Number : 61 Question Id : 69112161 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 sets includes all the species that will change the orange colour of $K_2Cr_2O_7$ in acidic medium ?

Options :

691121211. $Fe^{2+}, Sn^{2+}, I^-, S^{2-}$

691121212. $S^{2-}, Fe^{3+}, I^-, C_2O_4^{2-}$

691121213. $Fe^{2+}, NO_2^-, SO_2, Sn^{4+}$

691121214. $Fe^{3+}, SO_4^{2-}, S^{2-}, Sn^{4+}$

Question Number : 62 Question Id : 69112162 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Match **List - I** with **List - II**.

	List - I Chromium (III) Complexes (en = ethylene diamine)		**List - II** $\Delta_0(cm^{-1})$
A.	$[Cr(CN)_6]^{3-}$	I.	15,060
B.	$[CrF_6]^{3-}$	II.	17,400
C.	$[Cr(H_2O)_6]^{3+}$	III.	22,300
D.	$[Cr(en)_3]^{3+}$	IV.	26,600

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

Options :

691121215. A-I, B-II, C-III, D-IV

691121216. A-II, B-III, C-IV, D-I

691121217. A-III, B-IV, C-I, D-II

691121218. A-IV, B-I, C-II, D-III

Question Number : 63 Question Id : 69112163 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) : 1,2,3-Trihydroxypropane can be separated from water by simple distillation.

Statement (II) : An azeotropic mixture cannot be separated by fractional distillation.

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

Options :

691121219. Both **Statement I** and **Statement II** are true

691121220. Both **Statement I** and **Statement II** are false

691121221. **Statement I** is true but **Statement II** is false

691121222. **Statement I** is false but **Statement II** is true

Question Number : 64 Question Id : 69112164 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) : Benzyl chloride reacts faster in S_N1 mechanism than ethyl chloride.

Statement (II) : Ethyl carbocation intermediate is less stabilized by hyperconjugation than benzyl carbocation by resonance.

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

Options :

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691121223. Both **Statement I** and **Statement II** are true

691121224. Both **Statement I** and **Statement II** are false

691121225. **Statement I** is true but **Statement II** is false

691121226. **Statement I** is false but **Statement II** is true

Question Number : 65 Question Id : 69112165 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In IUPAC nomenclature, the **correct** order of decreasing priority of functional group is :

Options :

691121227. $-CONH_2, >C=O, -CHO, -NH_2, -C\equiv C-$

691121228. $-CONH_2, -COOCH_3, -CHO, -NH_2, -OH$

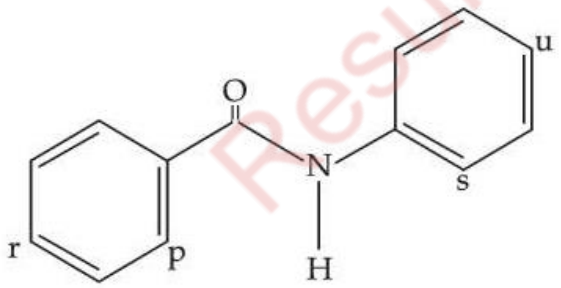
691121229. $-CONH_2, -CHO, >C=O, -NH_2, -C\equiv C-$

691121230. $-CONH_2, -CHO, -CN, -NH_2, -C\equiv C-$

Question Number : 66 Question Id : 69112166 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the given molecule, "*x*", the preferred site for the attack of the electrophile is :

x =



Options :

691121231. Predominantly at "r"

691121232. "r" and "u"

691121233. "p" and "s"

691121234. Predominantly at "u"

Question Number : 67 Question Id : 69112167 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

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Match **List - I** with **List - II**.

	List - I		**List - II**
	Mixture of Compounds		**Reagent used to distinguish**
A.	Diethyl amine + Ethyl amine	I.	Bromine water
B.	Acetaldehyde + Acetone	II.	$CHCl_3$ + KOH, Δ
C.	Ethanol + Phenol	III.	Neutral $FeCl_3$
D.	Benzoic acid + Cinnamic acid	IV.	Ammonical silver nitrate

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

Options :

691121235. A-IV, B-II, C-I, D-III

691121236. A-IV, B-II, C-III, D-I

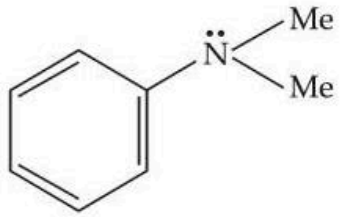
691121237. A-II, B-IV, C-I, D-III

691121238. A-II, B-IV, C-III, D-I

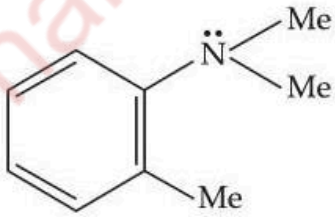
Question Number : 68 Question Id : 69112168 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the three aromatic molecules (P, Q and R) whose structures have been given below :

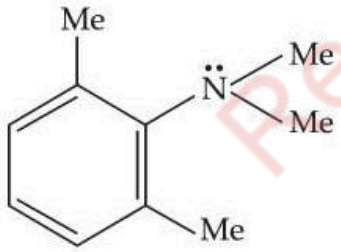
P.



Q.



R.



The **correct** order regarding the reactivity of these compounds with $Ph-\underset{(+)}{N}\equiv N\,Cl^{(-)}$ under optimum but slightly acidic medium is :

Options :

691121239. P > Q > R

691121240. R > P > Q

691121241. R > Q > P

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691121242. $P > R > Q$

Question Number : 69 Question Id : 69112169 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I **Vitamin**		**List - II** **Name**
A.	Vitamin B_1	I.	Pyridoxine
B.	Vitamin B_2	II.	Ascorbic acid
C.	Vitamin B_6	III.	Thiamine
D.	Vitamin C	IV.	Riboflavin

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

Options :

691121243. A-II, B-I, C-III, D-IV

691121244. A-IV, B-III, C-II, D-I

691121245. A-III, B-IV, C-I, D-II

691121246. A-I, B-III, C-II, D-IV

Question Number : 70 Question Id : 69112170 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A salt with few drops of conc. HCl gives apple green colour in flame test. The group precipitate of the salt is dissolved in acetic acid and treated with K_2CrO_4 to give yellow precipitate. When the sodium carbonate extract of the salt solution is heated with conc. HNO_3 and ammonium molybdate, it resulted a canary yellow precipitate. The cation and anion present in the salt are respectively,

Options :

691121247. Ca^{2+} and SO_4^{2-}

691121248. Ba^{2+} and PO_4^{3-}

691121249. Mn^{2+} and PO_4^{3-}

691121250. Ba^{2+} and SO_4^{2-}

Chemistry Section B

Section Id :	6911216
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory

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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 :	6911216
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 71 Question Id : 69112171 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

5.33 g of $CrCl_3 \cdot 6H_2O$, which is a 1 : 3 electrolyte, is dissolved in water and is passed through a cation exchanger. The chloride ions in the eluted solution, on treatment with $AgNO_3$ results in 8.61 g of AgCl. The ratio of moles of complex reacted and moles of AgCl formed is _____ $\times 10^{-2}$. (Nearest integer)

[Molar mass in g mol^{-1} Cr : 52, Ag : 108, Cl : 35.5, H : 1, 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 : 72 Question Id : 69112172 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Consider the isomers of hydrocarbon with molecular formula C_5H_{10}. These isomers do not decolourise $KMnO_4$ solution. These isomers are subjected to chlorination with chlorine in presence of light to give monochloro compounds. The total number of monochloro compounds (structural isomers only) formed is _____.

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 : 69112173 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

One mole of an alkane (x) requires 8 mole oxygen for complete combustion. Sum of number of carbon and hydrogen atoms in the alkane (x) is _____.

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 : 69112174 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For reaction A $\rightarrow$ P, rate constant $k = 1.5 \times 10^3\ s^{-1}$ at 27°C

If activation energy for the above reaction is 60 kJ mol^{-1}, then the temperature (in °C) at which rate constant, $k = 4.5 \times 10^3\ s^{-1}$ is _____. (Nearest integer)

Given : log 2 = 0.30, log 3 = 0.48, R = 8.3 J K^{-1} mol^{-1}, ln 10 = 2.3

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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 : 69112175 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

At the transition temperature T, $A \rightleftharpoons B$ and $\Delta G^0 = 105 - 35 \log T$ where A and B are two states of substance X. The transition temperature in °C when pressure is 1 atm is _____. (Nearest integer)

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

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