

National Testing Agency

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| Question Paper Name : | B TECH 18th March 2021 Shift 1 |
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| Creation Date : | 2021-03-18 14:10:30 |
| Duration : | 180 |
| Number of Questions : | 90 |
| Total Marks : | 300 |
| Display Marks: | Yes |

B TECH

| | |
|--------------------------------------|----------|
| Group Number : | 1 |
| Group Id : | 86435153 |
| Group Maximum Duration : | 0 |
| Group Minimum Duration : | 180 |
| Show Attended Group? : | No |
| Edit Attended Group? : | No |
| Break time : | 0 |
| Group Marks : | 300 |
| Is this Group for Examiner? : | No |

Physics Section A

| | |
|--|-----------|
| Section Id : | 864351313 |
| Section Number : | 1 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 20 |
| Number of Questions to be attempted : | 20 |
| Section Marks : | 80 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 864351313 |
| Question Shuffling Allowed : | Yes |

Question Number : 1 Question Id : 8643514681 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

An oil drop of radius 2 mm with a density 3 g cm^{-3} is held stationary under a constant electric field $3.55 \times 10^5 \text{ V m}^{-1}$ in the Millikan's oil drop experiment. What is the number of excess electrons that the oil drop will possess ?

Consider $g = 9.81 \text{ m/s}^2$

Options :

86435114041. 17.3×10^{10}

86435114042. 1.73×10^{10}

86435114043. 1.73×10^{12}

86435114044. 48.8×10^{11}

Question Number : 2 Question Id : 8643514682 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A constant power delivering machine has towed a box, which was initially at rest, along a horizontal straight line. The distance moved by the box in time 't' is proportional to :

Options :

86435114045. $t^{3/2}$

86435114046. $t^{1/2}$

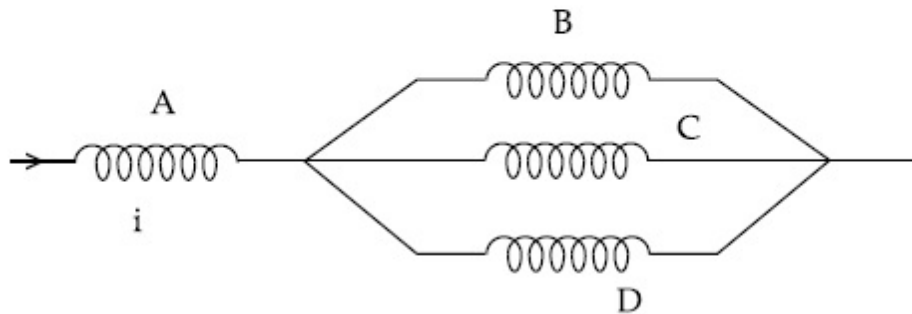
86435114047. $t^{2/3}$

86435114048. t

Question Number : 3 Question Id : 8643514683 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Four identical long solenoids A, B, C and D are connected to each other as shown in the figure. If the magnetic field at the center of A is 3 T, the field at the center of C would be : (Assume that the magnetic field is confined within the volume of respective solenoid).



Options :

86435114049. 1 T

86435114050. 9 T

86435114051. 6 T

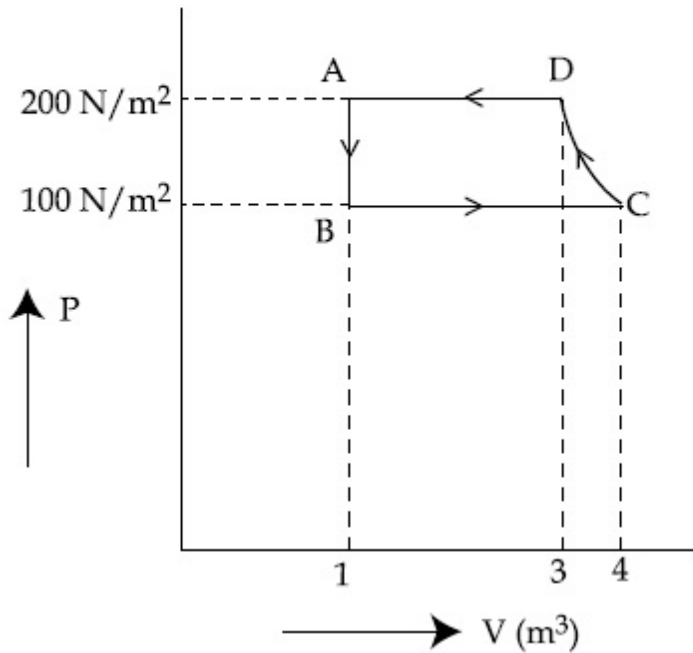
86435114052. 12 T

Question Number : 4 Question Id : 8643514684 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The P-V diagram of a diatomic ideal gas system going under cyclic process as shown in figure. The work done during an adiabatic process CD is (use $\gamma = 1.4$) :



Options :

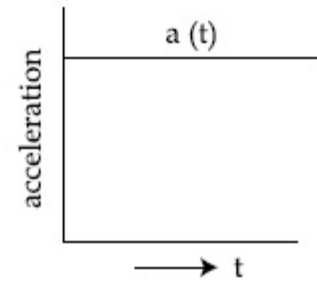
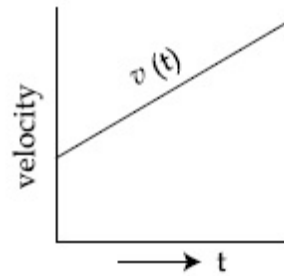
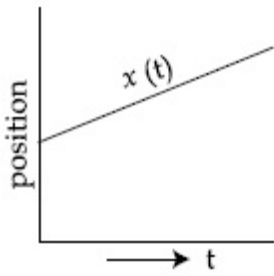
86435114053. 400 J
86435114054. -500 J
86435114055. 200 J
86435114056. -400 J

Question Number : 5 Question Id : 8643514685 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

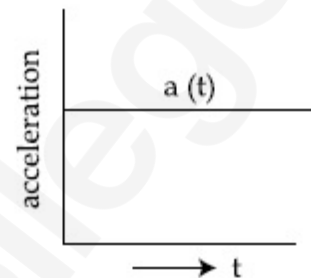
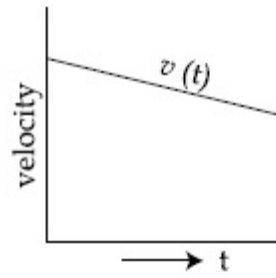
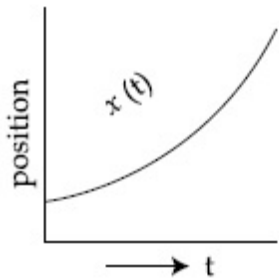
The position, velocity and acceleration of a particle moving with a constant acceleration can be represented by :

Options :

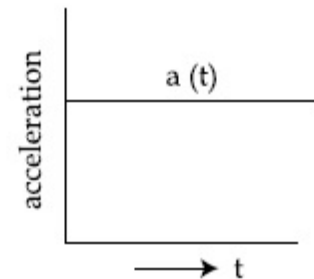
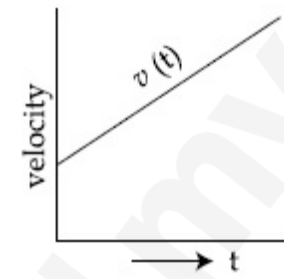
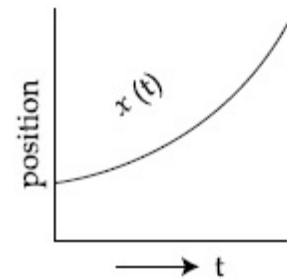
- 86435114057.



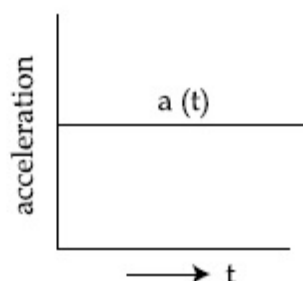
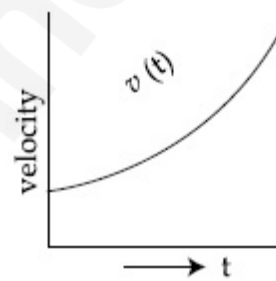
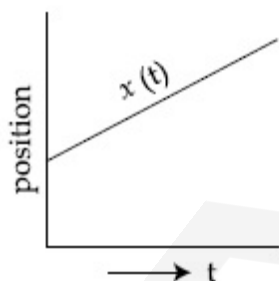
86435114058.



86435114059.



86435114060.



Question Number : 6 Question Id : 8643514686 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An AC source rated 220 V, 50 Hz is connected to a resistor. The time taken by the current to change from its maximum to the rms value is :

Options :

86435114061. 2.5 ms

86435114062. 25 ms

86435114063. 0.25 ms

86435114064. 2.5 s

Question Number : 7 Question Id : 8643514687 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In Young's double slit arrangement, slits are separated by a gap of 0.5 mm, and the screen is placed at a distance of 0.5 m from them. The distance between the first and the third bright fringe formed when the slits are illuminated by a monochromatic light of 5890 Å is :

Options :

86435114065. 1178×10^{-12} m86435114066. 5890×10^{-7} m86435114067. 1178×10^{-9} m86435114068. 1178×10^{-6} m

Question Number : 8 Question Id : 8643514688 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A particle is travelling 4 times as fast as an electron. Assuming the ratio of de-Broglie wavelength of a particle to that of electron is 2 : 1, the mass of the particle is :

Options :

86435114069. 8 times the mass of e^- 86435114070. $\frac{1}{16}$ times the mass of e^- 86435114071. 16 times the mass of e^-

86435114072. $\frac{1}{8}$ times the mass of e^-

Question Number : 9 Question Id : 8643514689 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The time period of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$. The measured value of the length of pendulum is 10 cm known to a 1 mm accuracy. The time for 200 oscillations of the pendulum is found to be 100 second using a clock of 1 s resolution. The percentage accuracy in the determination of 'g' using this pendulum is 'x'. The value of 'x' to the nearest integer is,

Options :

86435114073. 2%

86435114074. 3%

86435114075. 4%

86435114076. 5%

Question Number : 10 Question Id : 8643514690 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Imagine that the electron in a hydrogen atom is replaced by a muon (μ). The mass of muon particle is 207 times that of an electron and charge is equal to the charge of an electron. The ionization potential of this hydrogen atom will be :

Options :

86435114077. 13.6 eV

86435114078. 27.2 eV

86435114079. 331.2 eV

86435114080. 2815.2 eV

Question Number : 11 Question Id : 8643514691 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A radioactive sample disintegrates via two independent decay processes having half lives

$T_{1/2}^{(1)}$ and $T_{1/2}^{(2)}$ respectively. The effective half-life, $T_{1/2}$ of the nuclei is :

Options :

$$T_{1/2} = \frac{T_{1/2}^{(1)} T_{1/2}^{(2)}}{T_{1/2}^{(1)} + T_{1/2}^{(2)}}$$

86435114081.

$$T_{1/2} = T_{1/2}^{(1)} + T_{1/2}^{(2)}$$

86435114082.

$$T_{1/2} = \frac{T_{1/2}^{(1)} + T_{1/2}^{(2)}}{T_{1/2}^{(1)} - T_{1/2}^{(2)}}$$

86435114083.

86435114084. None of the above

Question Number : 12 Question Id : 8643514692 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A loop of flexible wire of irregular shape carrying current is placed in an external magnetic field. Identify the effect of the field on the wire.

Options :

86435114085. shape of the loop remains unchanged

86435114086. loop assumes circular shape with its plane normal to the field

86435114087. loop assumes circular shape with its plane parallel to the field

86435114088. wire gets stretched to become straight

Question Number : 13 Question Id : 8643514693 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the experiment of Ohm's law, a potential difference of 5.0 V is applied across the end of a conductor of length 10.0 cm and diameter of 5.00 mm. The measured current in the conductor is 2.00 A. The maximum permissible percentage error in the resistivity of the conductor is :

Options :

86435114089. 3.9

86435114090. 7.5

86435114091. 8.4

86435114092. 3.0

Question Number : 14 Question Id : 8643514694 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The time period of a satellite in a circular orbit of radius R is T. The period of another satellite in a circular orbit of radius 9R is :

Options :

86435114093. 3 T

86435114094. 9 T

86435114095. 27 T

86435114096. 12 T

Question Number : 15 Question Id : 8643514695 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a series LCR resonance circuit, if we change the resistance only, from a lower to higher value :

Options :

86435114097. The resonance frequency will increase
86435114098. The bandwidth of resonance circuit will increase
86435114099. The quality factor will increase
86435114100. The quality factor and the resonance frequency will remain constant

Question Number : 16 Question Id : 8643514696 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Your friend is having eye sight problem. She is not able to see clearly a distant uniform window mesh and it appears to her as non-uniform and distorted. The doctor diagnosed the problem as :

Options :

86435114101. Myopia and hypermetropia
86435114102. Presbyopia with Astigmatism
86435114103. Astigmatism
86435114104. Myopia with Astigmatism

Question Number : 17 Question Id : 8643514697 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

What will be the average value of energy along one degree of freedom for an ideal gas in thermal equilibrium at a temperature T ? (k_B is Boltzmann constant)

Options :

86435114105. $k_B T$
86435114106. $\frac{1}{2} k_B T$

$$\frac{3}{2} k_B T$$

86435114107.

$$\frac{2}{3} k_B T$$

86435114108.

Question Number : 18 Question Id : 8643514698 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II.

List - I

- (a) 10 km height over earth's surface
- (b) 70 km height over earth's surface
- (c) 180 km height over earth's surface
- (d) 270 km height over earth's surface

List - II

- (i) Thermosphere
- (ii) Mesosphere
- (iii) Stratosphere
- (iv) Troposphere

Options :

86435114109. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

86435114110. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

86435114111. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435114112. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

Question Number : 19 Question Id : 8643514699 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A plane electromagnetic wave of frequency 100 MHz is travelling in vacuum along the x-direction. At a particular point in space and time, $\vec{B} = 2.0 \times 10^{-8} \hat{k}$ T. (where, \hat{k} is unit vector along z-direction) What is \vec{E} at this point ?

(speed of light $c = 3 \times 10^8$ m/s)

Options :

86435114113. $0.6 \hat{j}$ V/m

86435114114. $6.0 \hat{j} \text{ V/m}$

86435114115. $6.0 \hat{k} \text{ V/m}$

86435114116. $0.6 \hat{k} \text{ V/m}$

Question Number : 20 Question Id : 8643514700 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A thin circular ring of mass M and radius r is rotating about its axis with an angular speed ω . Two particles having mass m each are now attached at diametrically opposite points. The angular speed of the ring will become :

Options :

86435114117. $\omega \frac{M}{M + m}$

86435114118. $\omega \frac{M}{M + 2m}$

86435114119. $\omega \frac{M - 2m}{M + 2m}$

86435114120. $\omega \frac{M + 2m}{M}$

Physics Section B

| | |
|--|-----------|
| Section Id : | 864351314 |
| Section Number : | 2 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 10 |
| Number of Questions to be attempted : | 5 |
| Section Marks : | 20 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |

Sub-Section Id :

864351314

Question Shuffling Allowed :

Yes

Question Number : 21 Question Id : 8643514701 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An npn transistor operates as a common emitter amplifier with a power gain of 10^6 . The input circuit resistance is $100\ \Omega$ and the output load resistance is $10\ \text{k}\Omega$. The common emitter current gain ' β ' will be _____. (Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 22 Question Id : 8643514702 Question Type : SA

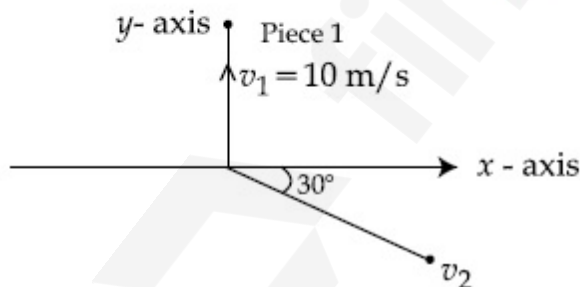
Correct Marks : 4 Wrong Marks : 0

A ball of mass $10\ \text{kg}$ moving with a velocity $10\sqrt{3}\ \text{m/s}$ along the x -axis, hits another ball of mass $20\ \text{kg}$ which is at rest. After the collision, first ball comes to rest while the second ball disintegrates into two equal pieces. One piece starts moving along y -axis with a speed of $10\ \text{m/s}$. The second piece starts moving at an angle of 30° with respect to the x -axis.

The velocity of the ball moving at 30° with x -axis is $x\ \text{m/s}$.

The configuration of pieces after collision is shown in the figure below.

The value of x to the nearest integer is _____.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

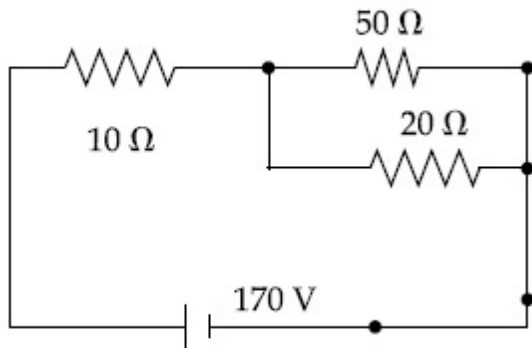
Possible Answers :

100

Question Number : 23 Question Id : 8643514703 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The voltage across the $10\ \Omega$ resistor in the given circuit is x volt.



The value of ' x ' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

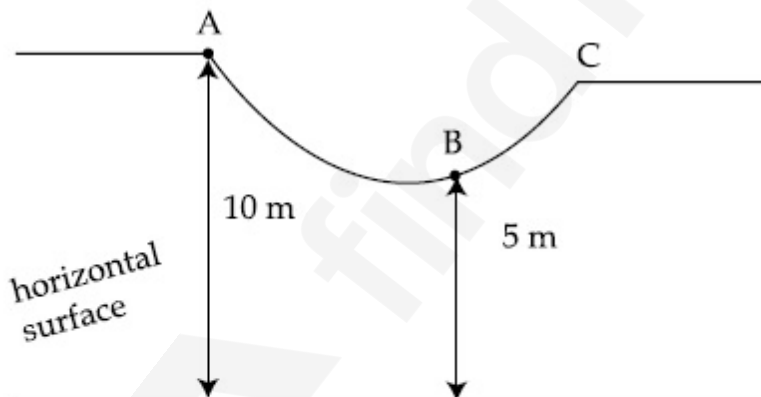
Text Areas : PlainText

Possible Answers :

100

Question Number : 24 Question Id : 8643514704 Question Type : SA

Correct Marks : 4 Wrong Marks : 0



As shown in the figure, a particle of mass $10\ \text{kg}$ is placed at a point A. When the particle is slightly displaced to its right, it starts moving and reaches the point B. The speed of the particle at B is $x\ \text{m/s}$.

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

The value of ' x ' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 25 Question Id : 8643514705 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A particle performs simple harmonic motion with a period of 2 second. The time taken by the particle to cover a displacement equal to half of its amplitude from the mean position is $\frac{1}{a}$ s.

The value of 'a' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

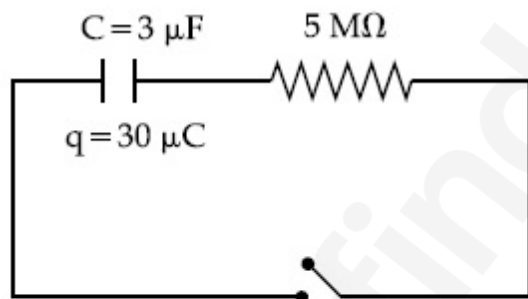
Text Areas : PlainText

Possible Answers :

100

Question Number : 26 Question Id : 8643514706 Question Type : SA

Correct Marks : 4 Wrong Marks : 0



The circuit shown in the figure consists of a charged capacitor of capacity $3 \mu\text{F}$ and a charge of $30 \mu\text{C}$. At time $t=0$, when the key is closed, the value of current flowing through the $5 \text{ M}\Omega$ resistor is ' x ' μA .

The value of 'x' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 27 Question Id : 8643514707 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A person is swimming with a speed of 10 m/s at an angle of 120° with the flow and reaches to a point directly opposite on the other side of the river. The speed of the flow is 'x' m/s.

The value of 'x' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 28 Question Id : 8643514708 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Two separate wires A and B are stretched by 2 mm and 4 mm respectively, when they are subjected to a force of 2 N. Assume that both the wires are made up of same material and the radius of wire B is 4 times that of the radius of wire A. The length of the wires A and B

are in the ratio of a : b. Then $\frac{a}{b}$ can be expressed as $\frac{1}{x}$ where x is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 29 Question Id : 8643514709 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A parallel plate capacitor has plate area 100 m^2 and plate separation of 10 m. The space between the plates is filled up to a thickness 5 m with a material of dielectric constant of 10. The resultant capacitance of the system is 'x' pF.

The value of $\epsilon_0 = 8.85 \times 10^{-12} \text{ F.m}^{-1}$

The value of 'x' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 30 Question Id : 8643514710 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A bullet of mass 0.1 kg is fired on a wooden block to pierce through it, but it stops after moving a distance of 50 cm into it. If the velocity of bullet before hitting the wood is 10 m/s and it slows down with uniform deceleration, then the magnitude of effective retarding force on the bullet is 'x' N.

The value of 'x' to the nearest integer is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Chemistry Section A

| | |
|---------------------------------------|-----------|
| Section Id : | 864351315 |
| Section Number : | 3 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 20 |
| Number of Questions to be attempted : | 20 |
| Section Marks : | 80 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 864351315 |
| Question Shuffling Allowed : | Yes |

Question Number : 31 Question Id : 8643514711 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a binary compound, atoms of element A form a hcp structure and those of element M occupy $\frac{2}{3}$ of the tetrahedral voids of the hcp structure. The formula of the binary compound is :

Options :

86435114131. M_2A_3 86435114132. M_4A_3 86435114133. MA_3 86435114134. M_4A

Question Number : 32 Question Id : 8643514712 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A certain orbital has no angular nodes and two radial nodes. The orbital is :

Options :

86435114135. $2s$ 86435114136. $2p$ 86435114137. $3s$ 86435114138. $3p$

Question Number : 33 Question Id : 8643514713 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

List - I

(Process)

(a) Deacon's process

(b) Contact process

(c) Cracking of hydrocarbons

(d) Hydrogenation of vegetable oils

List - II

(Catalyst)

(i) ZSM-5

(ii) $CuCl_2$

(iii) Particles 'Ni'

(iv) V_2O_5

Choose the most appropriate answer from the options given below :

Options :

86435114139. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

86435114140. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

86435114141. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

86435114142. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

Question Number : 34 Question Id : 8643514714 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The ionic radius of Na^+ ion is 1.02 \AA . The ionic radii (in \AA) of Mg^{2+} and Al^{3+} , respectively, are :

Options :

86435114143. 0.85 and 0.99

86435114144. 0.72 and 0.54

86435114145. 0.68 and 0.72

86435114146. 1.05 and 0.99

Question Number : 35 Question Id : 8643514715 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The chemical that is added to reduce the melting point of the reaction mixture during the extraction of aluminium is :

Options :

86435114147. Bauxite

86435114148. Kaolite

86435114149. Calamine

86435114150. Cryolite

Question Number : 36 Question Id : 8643514716 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

Assertion A : During the boiling of water having temporary hardness, $\text{Mg}(\text{HCO}_3)_2$ is converted to MgCO_3 .

Reason R : The solubility product of $\text{Mg}(\text{OH})_2$ is greater than that of MgCO_3 .

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

Options :

86435114151. Both A and R are true and R is the correct explanation of A
86435114152. Both A and R are true but R is NOT the correct explanation of A
86435114153. A is true but R is false
86435114154. A is false but R is true

Question Number : 37 Question Id : 8643514717 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

| List - I | List - II |
|---|-----------------------|
| (a) $\text{Ca}(\text{OCl})_2$ | (i) Antacid |
| (b) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ | (ii) Cement |
| (c) CaO | (iii) Bleach |
| (d) CaCO_3 | (iv) Plaster of Paris |

Choose the most appropriate answer from the options given below :

Options :

86435114155. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
86435114156. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
86435114157. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

86435114158. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

Question Number : 38 Question Id : 8643514718 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of ionisable hydrogens present in the product obtained from a reaction of phosphorus trichloride and phosphonic acid is :

Options :

86435114159. ¹

86435114160. ²

86435114161. ⁰

86435114162. ³

Question Number : 39 Question Id : 8643514719 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

| List - I | List - II |
|-------------------------------|----------------|
| (a) Chlorophyll | (i) Ruthenium |
| (b) Vitamin - B ₁₂ | (ii) Platinum |
| (c) Anticancer drug | (iii) Cobalt |
| (d) Grubbs catalyst | (iv) Magnesium |

Choose the most appropriate answer from the options given below :

Options :

86435114163. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

86435114164. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

86435114165. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

86435114166. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

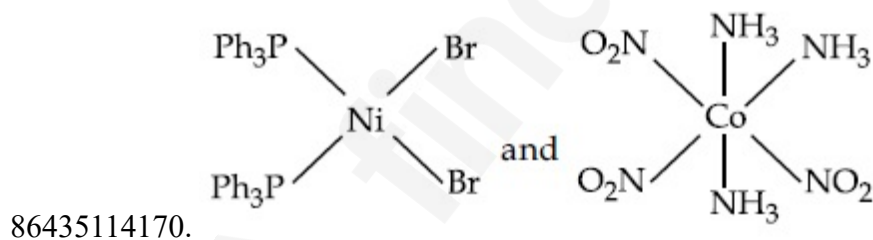
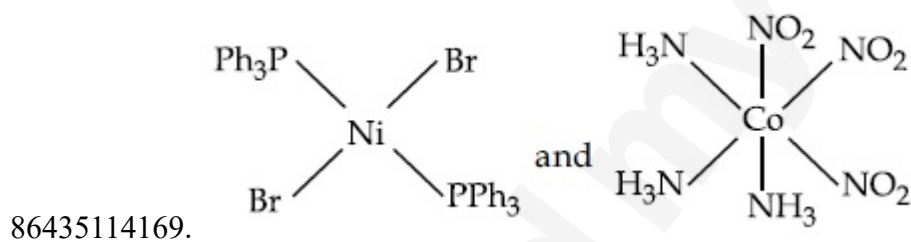
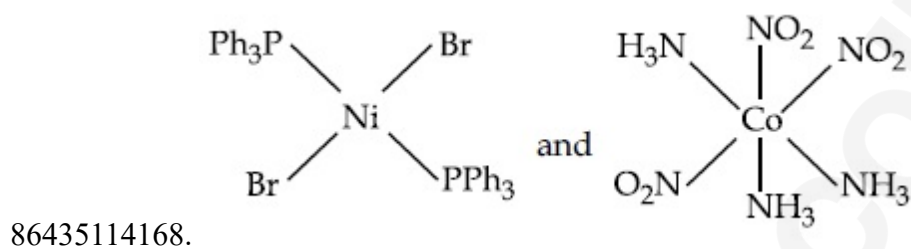
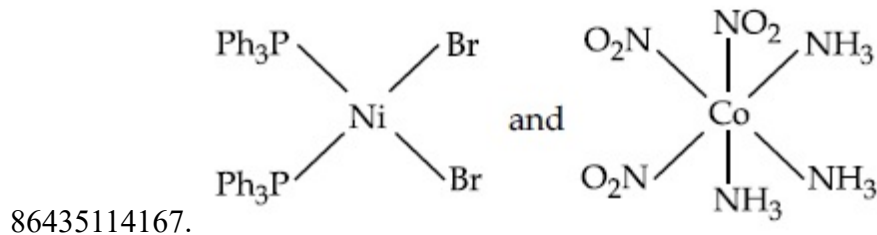
Question Number : 40 Question Id : 8643514720 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The correct structures of $\text{trans-[NiBr}_2(\text{PPh}_3)_2]$ and meridional- $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$, respectively, are :

Options :



Question Number : 41 Question Id : 8643514721 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The statements that are TRUE :

- (A) methane leads to both global warming and photochemical smog
- (B) methane is generated from paddy fields
- (C) methane is a stronger global warming gas than CO₂
- (D) methane is a part of reducing smog.

Choose the most appropriate answer from the options given below :

Options :

86435114171. (A) and (B) only

86435114172. (A), (B), (C) only

86435114173. (B), (C), (D) only

86435114174. (A), (B), (D) only

Question Number : 42 Question Id : 8643514722 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Compound with molecular formula C₃H₆O can show :

Options :

86435114175. Positional isomerism

86435114176. Functional group isomerism

86435114177. Metamerism

86435114178. Both positional isomerism and metamerism

Question Number : 43 Question Id : 8643514723 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

List - I

(Chemicals)

- (a) Alcoholic potassium hydroxide
- (b) Pd/BaSO₄
- (c) BHC (Benzene hexachloride)
- (d) Polyacetylene

List - II

(Use/Preparation/Constituent)

- (i) electrodes in batteries
- (ii) obtained by addition reaction
- (iii) used for β -elimination reaction
- (iv) Lindlar's Catalyst

Choose the most appropriate match :

Options :

86435114179. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435114180. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

86435114181. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

86435114182. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

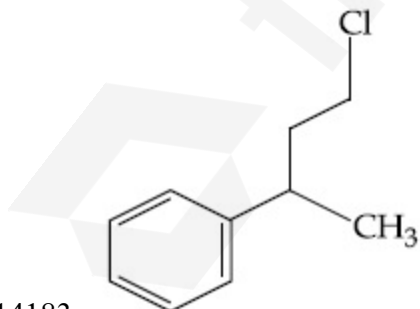
Question Number : 44 Question Id : 8643514724 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

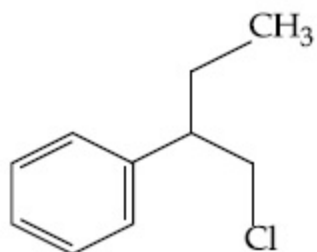
Reaction of Grignard reagent, C₂H₅MgBr with C₈H₈O followed by hydrolysis gives compound "A" which reacts instantly with Lucas reagent to give compound B, C₁₀H₁₃Cl.

The Compound B is :

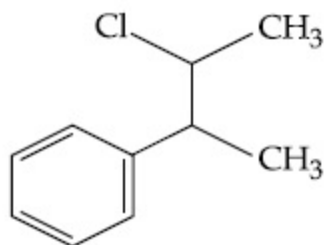
Options :



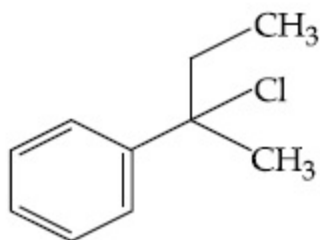
86435114183.



86435114184.



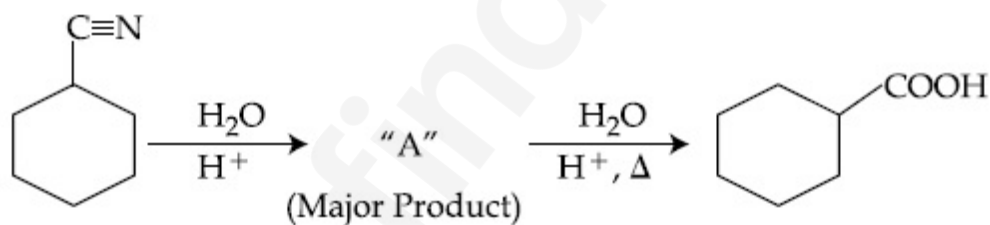
86435114185.



86435114186.

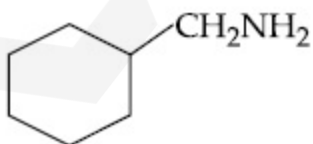
Question Number : 45 Question Id : 8643514725 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

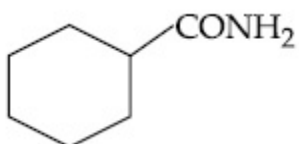


Consider the above chemical reaction and identify product "A" :

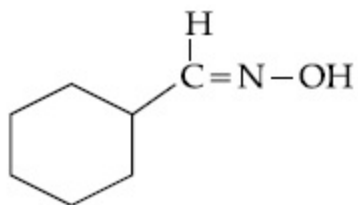
Options :



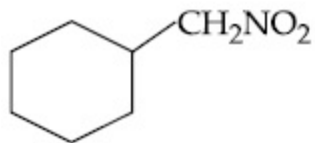
86435114187.



86435114188.



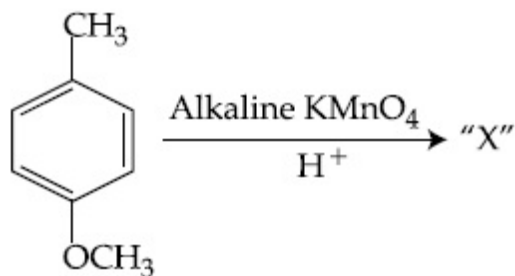
86435114189.



86435114190.

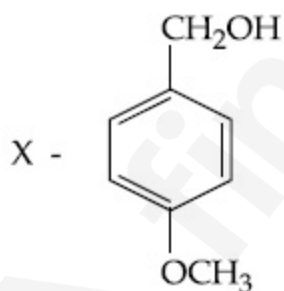
Question Number : 46 Question Id : 8643514726 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

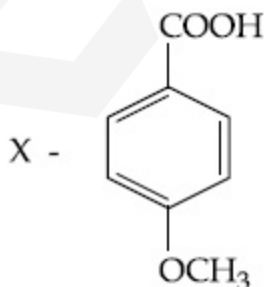


Considering the above chemical reaction, identify the product "X" :

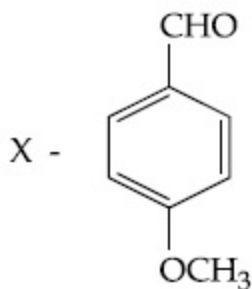
Options :



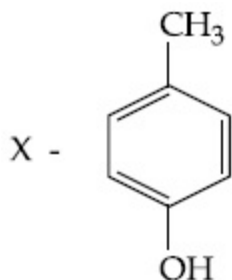
86435114191.



86435114192.

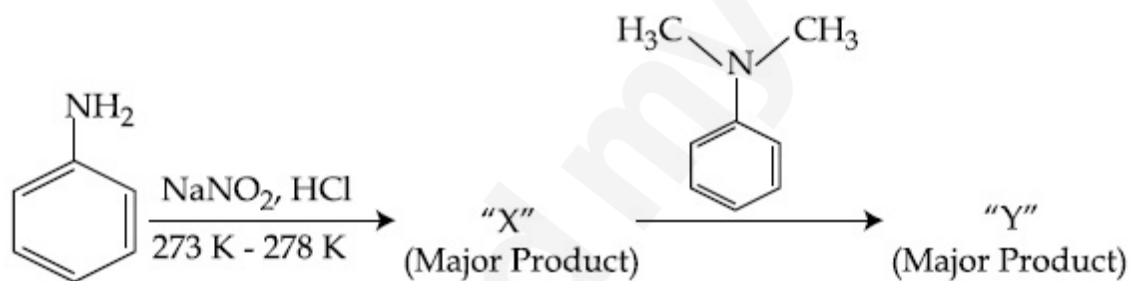


86435114193.



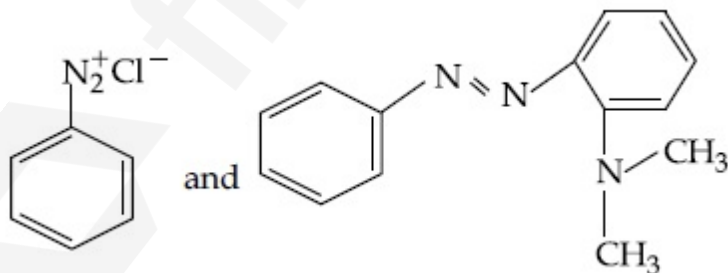
86435114194.

Question Number : 47 Question Id : 8643514727 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

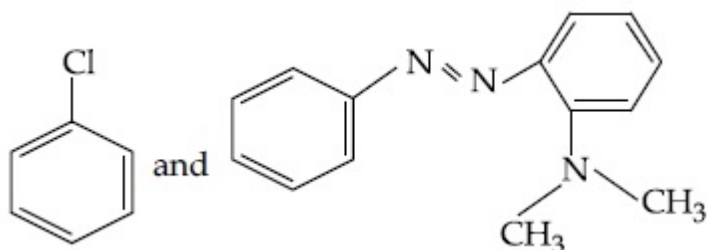


Considering the above reaction, X and Y respectively are :

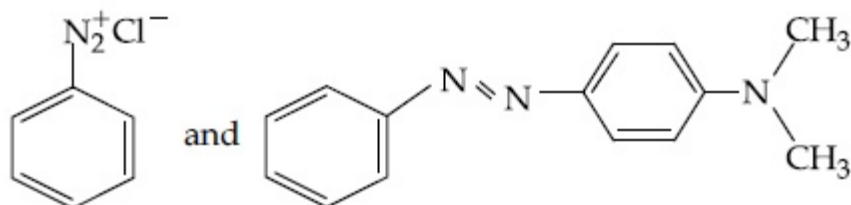
Options :



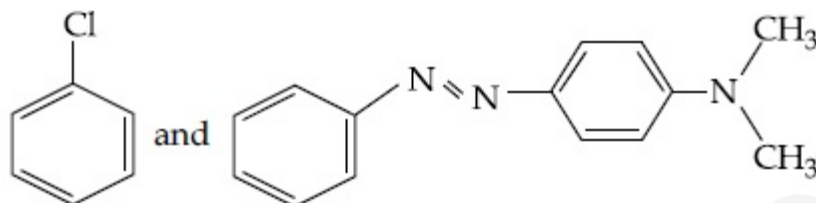
86435114195.



86435114196.



86435114197.



86435114198.

Question Number : 48 Question Id : 8643514728 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

| List - I (Class of Drug) | List - II (Example) |
|-----------------------------|------------------------|
| (a) Antacid | (i) Novestrol |
| (b) Artificial Sweetener | (ii) Cimetidine |
| (c) Antifertility | (iii) Valium |
| (d) Tranquilizers | (iv) Alitame |

Choose the most appropriate match :

Options :

86435114199. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

86435114200. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

86435114201. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

86435114202. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Question Number : 49 Question Id : 8643514729 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A non-reducing sugar "A" hydrolyses to give two reducing mono saccharides. Sugar A is :

Options :

86435114203. Glucose

86435114204. Fructose

86435114205. Galactose

86435114206. Sucrose

Question Number : 50 Question Id : 8643514730 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Reagent, 1-naphthylamine and sulphanilic acid in acetic acid is used for the detection of :

Options :

86435114207. NO_2^-

86435114208. NO_3^-

86435114209. NO

86435114210. N_2O

Chemistry Section B

| | |
|--|-----------|
| Section Id : | 864351316 |
| Section Number : | 4 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 10 |
| Number of Questions to be attempted : | 5 |
| Section Marks : | 20 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 864351316 |
| Question Shuffling Allowed : | Yes |

Question Number : 51 Question Id : 8643514731 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Complete combustion of 3 g of ethane gives $x \times 10^{22}$ molecules of water. The value of x is _____ . (Round off to the Nearest Integer).

[Use : $N_A = 6.023 \times 10^{23}$; Atomic masses in u : C : 12.0 ; O : 16.0 ; H : 1.0]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 52 Question Id : 8643514732 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

AX is a covalent diatomic molecule where A and X are second row elements of periodic table. Based on Molecular orbital theory, the bond order of AX is 2.5. The total number of electrons in AX is _____ . (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

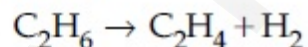
Possible Answers :

100

Question Number : 53 Question Id : 8643514733 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction



the reaction enthalpy $\Delta_r H =$ _____ kJ mol^{-1} . (Round off to the Nearest Integer).

[Given : Bond enthalpies in kJ mol^{-1} : C - C : 347, C = C : 611;

C - H : 414, H - H : 436]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 54 Question Id : 8643514734 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

2 molal solution of a weak acid HA has a freezing point of 3.885°C . The degree of dissociation of this acid is _____ $\times 10^{-3}$. (Round off to the Nearest Integer).

[Given : Molal depression constant of water = $1.85 \text{ K kg mol}^{-1}$

Freezing point of pure water = 0°C]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 8643514735 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In order to prepare a buffer solution of pH 5.74, sodium acetate is added to acetic acid. If the concentration of acetic acid in the buffer is 1.0 M, the concentration of sodium acetate in the buffer is _____ M. (Round off to the Nearest Integer).

[Given : pK_a (acetic acid) = 4.74]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

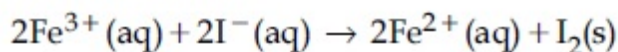
Possible Answers :

100

Question Number : 56 Question Id : 8643514736 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction



the magnitude of the standard molar free energy change,

$$\Delta_r G_m^\circ = - \text{_____ kJ (Round off to the Nearest Integer)}.$$

$$\left[\begin{array}{l} E^\circ_{\text{Fe}^{2+}/\text{Fe}(\text{s})} = -0.440 \text{ V}; E^\circ_{\text{Fe}^{3+}/\text{Fe}(\text{s})} = -0.036 \text{ V} \\ E^\circ_{\text{I}_2/2\text{I}^{-}} = 0.539 \text{ V}; \quad F = 96500 \text{ C} \end{array} \right]$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

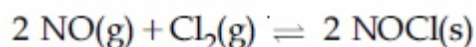
Text Areas : PlainText

Possible Answers :

100

Question Number : 57 **Question Id :** 8643514737 **Question Type :** SA

Correct Marks : 4 **Wrong Marks :** 0



This reaction was studied at -10°C and the following data was obtained

| run | $[\text{NO}]_0$ | $[\text{Cl}_2]_0$ | r_0 |
|-----|-----------------|-------------------|-------|
| 1 | 0.10 | 0.10 | 0.18 |
| 2 | 0.10 | 0.20 | 0.35 |
| 3 | 0.20 | 0.20 | 1.40 |

$[\text{NO}]_0$ and $[\text{Cl}_2]_0$ are the initial concentrations and r_0 is the initial reaction rate.

The overall order of the reaction is _____. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 58 **Question Id :** 8643514738 **Question Type :** SA

Correct Marks : 4 **Wrong Marks :** 0

The total number of unpaired electrons present in the complex $\text{K}_3[\text{Cr}(\text{oxalate})_3]$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 59 Question Id : 8643514739 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

_____ grams of 3-Hydroxy propanal (MW = 74) must be dehydrated to produce 7.8 g of acrolein (MW = 56) (C_3H_4O) if the percentage yield is 64. (Round off to the Nearest Integer).

[Given : Atomic masses : C : 12.0 u, H : 1.0 u, O : 16.0 u]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 60 Question Id : 8643514740 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A reaction of 0.1 mole of Benzylamine with bromomethane gave 23 g of Benzyl trimethyl ammonium bromide. The number of moles of bromomethane consumed in this reaction are $n \times 10^{-1}$, when $n =$ _____. (Round off to the Nearest Integer).

[Given : Atomic masses : C : 12.0 u, H : 1.0 u, N : 14.0 u, Br : 80.0 u]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Mathematics Section A

Section Id :

864351317

Section Number :

5

Section type :

Online

| | |
|--|-----------|
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 20 |
| Number of Questions to be attempted : | 20 |
| Section Marks : | 80 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 864351317 |
| Question Shuffling Allowed : | Yes |

Question Number : 61 Question Id : 8643514741 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the functions are defined as $f(x) = \sqrt{x}$ and $g(x) = \sqrt{1-x}$, then what is the common domain of the following functions : $f+g$, $f-g$, f/g , g/f , $g-f$ where

$$(f \pm g)(x) = f(x) \pm g(x), (f/g)(x) = \frac{f(x)}{g(x)}$$

Options :

86435114221. $0 \leq x < 1$

86435114222. $0 < x < 1$

86435114223. $0 \leq x \leq 1$

86435114224. $0 < x \leq 1$

Question Number : 62 Question Id : 8643514742 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the equation $a|z|^2 + \overline{\alpha}z + \alpha\overline{z} + d = 0$ represents a circle where a, d are real constants, then which of the following condition is correct ?

Options :

86435114225. $|\alpha|^2 - ad \geq 0$ and $a \in \mathbb{R}$

86435114226. $|\alpha|^2 - ad > 0$ and $a \in \mathbb{R} - \{0\}$

86435114227. $|\alpha|^2 - ad \neq 0$

86435114228. $\alpha=0, a, d \in \mathbb{R}^+$

Question Number : 63 Question Id : 8643514743 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $A + 2B = \begin{bmatrix} 1 & 2 & 0 \\ 6 & -3 & 3 \\ -5 & 3 & 1 \end{bmatrix}$ and $2A - B = \begin{bmatrix} 2 & -1 & 5 \\ 2 & -1 & 6 \\ 0 & 1 & 2 \end{bmatrix}$. If $\text{Tr}(A)$ denotes the sum of all

diagonal elements of the matrix A , then $\text{Tr}(A) - \text{Tr}(B)$ has value equal to :

Options :

86435114229. 1

86435114230. 2

86435114231. 3

86435114232. 0

Question Number : 64 Question Id : 8643514744 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let α, β, γ be the real roots of the equation, $x^3 + ax^2 + bx + c = 0$, ($a, b, c \in \mathbb{R}$ and $a, b \neq 0$). If the system of equations (in u, v, w) given by $\alpha u + \beta v + \gamma w = 0$; $\beta u + \gamma v + \alpha w = 0$;

$\gamma u + \alpha v + \beta w = 0$ has non-trivial solution, then the value of $\frac{a^2}{b}$ is :

Options :

86435114233. 0

86435114234. 1

86435114235. 3

86435114236. 5

Question Number : 65 Question Id : 8643514745 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The sum of all the 4-digit distinct numbers that can be formed with the digits 1, 2, 2 and 3 is :

Options :

86435114237. 22264

86435114238. 26664

86435114239. 122234

86435114240. 122664

Question Number : 66 Question Id : 8643514746 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $(1 + x + 2x^2)^{20} = a_0 + a_1x + a_2x^2 + \dots + a_{40}x^{40}$. Then, $a_1 + a_3 + a_5 + \dots + a_{37}$ is equal to :

Options :

86435114241. $2^{19}(2^{20} + 21)$

86435114242. $2^{20}(2^{20} + 21)$

86435114243. $2^{19}(2^{20} - 21)$

86435114244. $2^{20}(2^{20} - 21)$

Question Number : 67 Question Id : 8643514747 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $3 + \frac{1}{4 + \frac{1}{3 + \frac{1}{4 + \frac{1}{3 + \dots \infty}}}}$ is equal to :

Options :

86435114245. $1.5 + \sqrt{3}$

86435114246. $2 + \sqrt{3}$

86435114247. $3 + 2\sqrt{3}$

86435114248. $4 + \sqrt{3}$

Question Number : 68 Question Id : 8643514748 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\frac{1}{3^2 - 1} + \frac{1}{5^2 - 1} + \frac{1}{7^2 - 1} + \dots + \frac{1}{(201)^2 - 1} \text{ is equal to :}$$

Options :

86435114249. $\frac{25}{101}$

86435114250. $\frac{101}{408}$

86435114251. $\frac{99}{400}$

86435114252. $\frac{101}{404}$

Question Number : 69 Question Id : 8643514749 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If α, β are natural numbers such that $100^\alpha - 199\beta = (100)(100) + (99)(101) + (98)(102) + \dots + (1)(199)$, then the slope of the line passing through (α, β) and origin is :

Options :

86435114253. 510

86435114254. 530

86435114255. 540

86435114256. 550

Question Number : 70 Question Id : 8643514750 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $f(x) = \begin{cases} \frac{1}{|x|} & ; |x| \geq 1 \\ ax^2 + b & ; |x| < 1 \end{cases}$ is differentiable at every point of the domain, then the values of

a and b are respectively :

Options :

86435114257. $\frac{1}{2}, \frac{1}{2}$

86435114258. $-\frac{1}{2}, \frac{3}{2}$

86435114259. $\frac{5}{2}, -\frac{3}{2}$

86435114260. $\frac{1}{2}, -\frac{3}{2}$

Question Number : 71 Question Id : 8643514751 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The real valued function $f(x) = \frac{\operatorname{cosec}^{-1}x}{\sqrt{x - [x]}}$, where $[x]$ denotes the greatest integer less than or

equal to x , is defined for all x belonging to :

Options :

86435114261. all reals except integers

86435114262. all reals except the interval $[-1, 1]$

86435114263. all non-integers except the interval $[-1, 1]$

86435114264. all integers except 0, -1, 1

Question Number : 72 Question Id : 8643514752 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $\lim_{x \rightarrow 0} \frac{\sin^{-1} x - \tan^{-1} x}{3x^3}$ is equal to L, then the value of $(6L + 1)$ is :

Options :

86435114265. $\frac{1}{6}$

86435114266. 6

86435114267. 2

86435114268. $\frac{1}{2}$

Question Number : 73 Question Id : 8643514753 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The integral $\int \frac{(2x - 1) \cos \sqrt{(2x - 1)^2 + 5}}{\sqrt{4x^2 - 4x + 6}} dx$ is equal to :

(where c is a constant of integration)

Options :

86435114269. $\frac{1}{2} \sin \sqrt{(2x + 1)^2 + 5} + c$

86435114270. $\frac{1}{2} \sin \sqrt{(2x - 1)^2 + 5} + c$

86435114271. $\frac{1}{2} \cos \sqrt{(2x - 1)^2 + 5} + c$

86435114272. $\frac{1}{2} \cos \sqrt{(2x + 1)^2 + 5} + c$

Question Number : 74 Question Id : 8643514754 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The differential equation satisfied by the system of parabolas $y^2 = 4a(x + a)$ is :

Options :

86435114273. $y\left(\frac{dy}{dx}\right)^2 + 2x\left(\frac{dy}{dx}\right) - y = 0$

86435114274. $y\left(\frac{dy}{dx}\right) + 2x\left(\frac{dy}{dx}\right) - y = 0$

86435114275. $y\left(\frac{dy}{dx}\right)^2 - 2x\left(\frac{dy}{dx}\right) + y = 0$

86435114276. $y\left(\frac{dy}{dx}\right)^2 - 2x\left(\frac{dy}{dx}\right) - y = 0$

Question Number : 75 Question Id : 8643514755 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Choose the correct statement about two circles whose equations are given below :

$$x^2 + y^2 - 10x - 10y + 41 = 0$$

$$x^2 + y^2 - 22x - 10y + 137 = 0$$

Options :

86435114277. circles have two meeting points

86435114278. circles have no meeting point

86435114279. circles have only one meeting point

86435114280. circles have same centre

Question Number : 76 Question Id : 8643514756 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the four circles M, N, O and P, following four equations are given :

Circle M : $x^2 + y^2 = 1$

Circle N : $x^2 + y^2 - 2x = 0$

Circle O : $x^2 + y^2 - 2x - 2y + 1 = 0$

Circle P : $x^2 + y^2 - 2y = 0$

If the centre of circle M is joined with centre of the circle N, further centre of circle N is joined with centre of the circle O, centre of circle O is joined with the centre of circle P and lastly, centre of circle P is joined with centre of circle M, then these lines form the sides of a :

Options :

86435114281. Rectangle

86435114282. Rhombus

86435114283. Square

86435114284. Parallelogram

Question Number : 77 Question Id : 8643514757 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of integral values of m so that the abscissa of point of intersection of lines $3x + 4y = 9$ and $y = mx + 1$ is also an integer, is :

Options :

86435114285. 0

86435114286. 1

86435114287. 2

86435114288. 3

Question Number : 78 Question Id : 8643514758 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The equation of one of the straight lines which passes through the point (1, 3) and makes an angle $\tan^{-1}(\sqrt{2})$ with the straight line, $y + 1 = 3\sqrt{2}x$ is :

Options :

86435114289. $4\sqrt{2}x + 5y - (15 + 4\sqrt{2}) = 0$

86435114290. $4\sqrt{2}x - 5y - (5 + 4\sqrt{2}) = 0$

86435114291. $5\sqrt{2}x + 4y - (15 + 4\sqrt{2}) = 0$

86435114292. $4\sqrt{2}x + 5y - 4\sqrt{2} = 0$

Question Number : 79 Question Id : 8643514759 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The solutions of the equation

$$\begin{vmatrix} 1 + \sin^2 x & \sin^2 x & \sin^2 x \\ \cos^2 x & 1 + \cos^2 x & \cos^2 x \\ 4 \sin 2x & 4 \sin 2x & 1 + 4 \sin 2x \end{vmatrix} = 0, (0 < x < \pi), \text{ are :}$$

Options :

86435114293. $\frac{\pi}{6}, \frac{5\pi}{6}$

86435114294. $\frac{5\pi}{12}, \frac{7\pi}{12}$

86435114295. $\frac{7\pi}{12}, \frac{11\pi}{12}$

86435114296. $\frac{\pi}{12}, \frac{\pi}{6}$

Question Number : 80 Question Id : 8643514760 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A vector \vec{a} has components $3p$ and 1 with respect to a rectangular cartesian system. This system is rotated through a certain angle about the origin in the counter clockwise sense. If, with respect to new system, \vec{a} has components $p + 1$ and $\sqrt{10}$, then a value of p is equal to :

Options :

86435114297. 1

86435114298. -1

86435114299. $\frac{4}{5}$

86435114300. $-\frac{5}{4}$

Mathematics Section B

| | |
|--|-----------|
| Section Id : | 864351318 |
| Section Number : | 6 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 10 |
| Number of Questions to be attempted : | 5 |
| Section Marks : | 20 |
| Mark As Answered Required? : | Yes |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 864351318 |
| Question Shuffling Allowed : | Yes |

Question Number : 81 Question Id : 8643514761 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let z_1, z_2 be the roots of the equation $z^2 + az + 12 = 0$ and z_1, z_2 form an equilateral triangle with origin. Then, the value of $|a|$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643514762 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $f(x)$ and $g(x)$ be two functions satisfying $f(x^2) + g(4-x) = 4x^3$ and $g(4-x) + g(x) = 0$, then

the value of $\int_{-4}^4 f(x^2) dx$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643514763 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $f(x) = \int \frac{5x^8 + 7x^6}{(x^2 + 1 + 2x^7)^2} dx$, ($x \geq 0$), $f(0) = 0$ and $f(1) = \frac{1}{K}$, then the value of K is

_____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 84 Question Id : 8643514764 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A square ABCD has all its vertices on the curve $x^2y^2 = 1$. The midpoints of its sides also lie on the same curve. Then, the square of area of ABCD is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 85 Question Id : 8643514765 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let the plane $ax + by + cz + d = 0$ bisect the line joining the points $(4, -3, 1)$ and $(2, 3, -5)$ at the right angles. If a, b, c, d are integers, then the minimum value of $(a^2 + b^2 + c^2 + d^2)$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 86 Question Id : 8643514766 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The equation of the planes parallel to the plane $x - 2y + 2z - 3 = 0$ which are at unit distance from the point $(1, 2, 3)$ is $ax + by + cz + d = 0$. If $(b - d) = K(c - a)$, then the positive value of K is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 87 Question Id : 8643514767 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The mean age of 25 teachers in a school is 40 years. A teacher retires at the age of 60 years and a new teacher is appointed in his place. If the mean age of the teachers in this school now is 39 years, then the age (in years) of the newly appointed teacher is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 88 Question Id : 8643514768 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of times the digit 3 will be written when listing the integers from 1 to 1000 is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

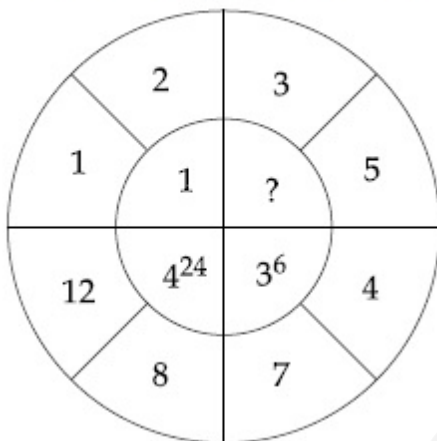
Possible Answers :

100

Question Number : 89 Question Id : 8643514769 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The missing value in the following figure is _____.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 90 Question Id : 8643514770 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of solutions of the equation $|\cot x| = \cot x + \frac{1}{\sin x}$ in the interval $[0, 2\pi]$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

