National Testing Agency

Question Paper Name :	B Tech 26082021 Shift 2
Subject Name :	B TECH
Creation Date :	2021-08-26 23:27:38
Duration :	180
Total Marks :	300
Display Marks:	Yes

B TECH

Group Number :	1
Group Id :	864351246
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 :	864351914
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20

Section Marks : 80
Enable Mark as Answered Mark for Review and Clear Response : Yes
Sub-Section Number : 1
Sub-Section Id : 8643511141
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 86435120170 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)	Magnetic Induction	(i)	$ML^2T^{-2}A^{-1}$
(b)	Magnetic Flux	(ii)	$M^0L^{-1}A$
(c)	Magnetic Permeability	(iii)	$MT^{-2}A^{-1}$
(d)	Magnetization	(iv)	$MLT^{-2}A^{-2}$

Choose the **most appropriate** answer from the options given below :

Options :

86435167091. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

86435167092. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435167093. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

86435167094. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Question Number : 2 Question Id : 86435120171 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A transmitting antenna at top of a tower has a height of 50 m and the height of receiving antenna is 80 m. What is the range of communication for Line of Sight (LoS) mode ?
[use radius of earth = 6400 km]

Options :

86435167095. 45.5 km

86435167096. 80.2 km

86435167097. 144.1 km

86435167098. 57.28 km

Question Number : 3 Question Id : 86435120172 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

If the length of the pendulum in pendulum clock increases by 0.1%, then the error in time per day is :

Options :

86435167099. 86.4 s

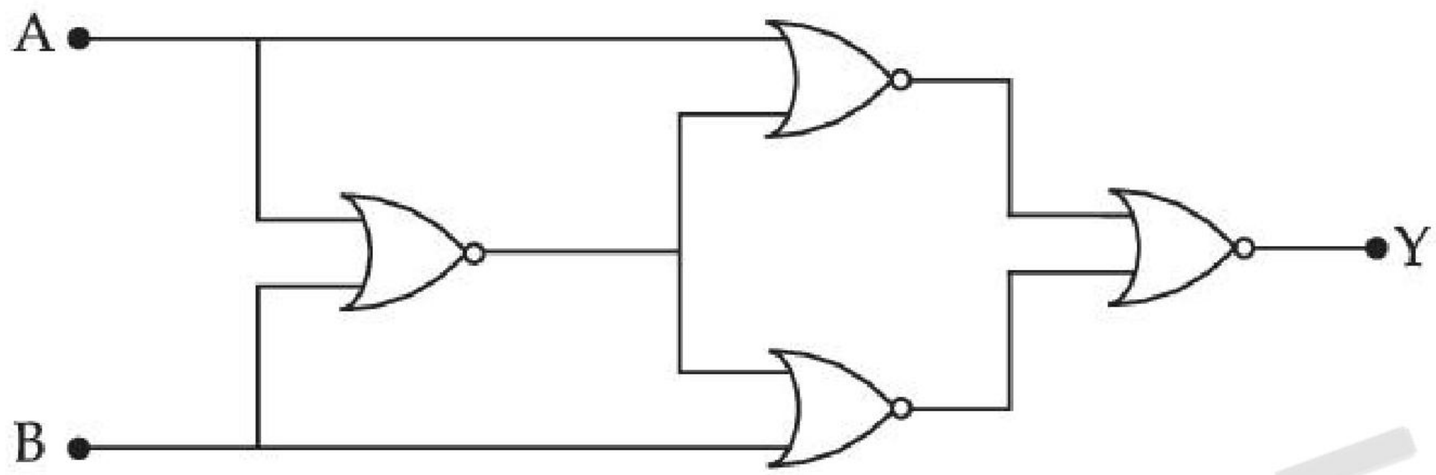
86435167100. 8.64 s

86435167101. 43.2 s

86435167102. 4.32 s

Question Number : 4 Question Id : 86435120173 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Four NOR gates are connected as shown in figure. The truth table for the given figure is :



Options :

86435167103.

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

86435167104.

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

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

86435167105.

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

86435167106.

Question Number : 5 Question Id : 86435120174 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A bomb is dropped by a fighter plane flying horizontally. To an observer sitting in the plane, the trajectory of the bomb is a :

Options :

86435167107. parabola in the direction of motion of plane

86435167108. straight line vertically down the plane

86435167109. parabola in a direction opposite to the motion of plane

86435167110. hyperbola

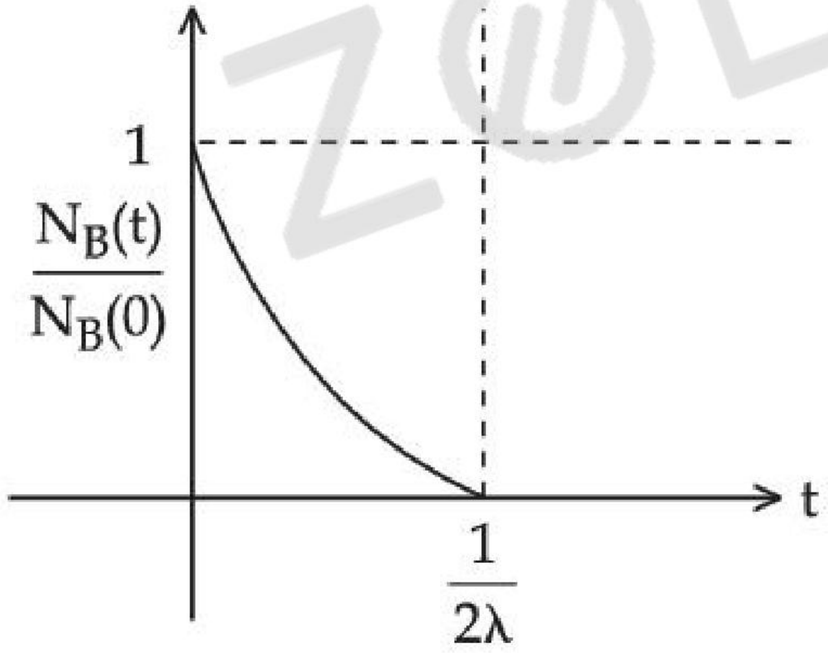
Question Number : 6 Question Id : 86435120175 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

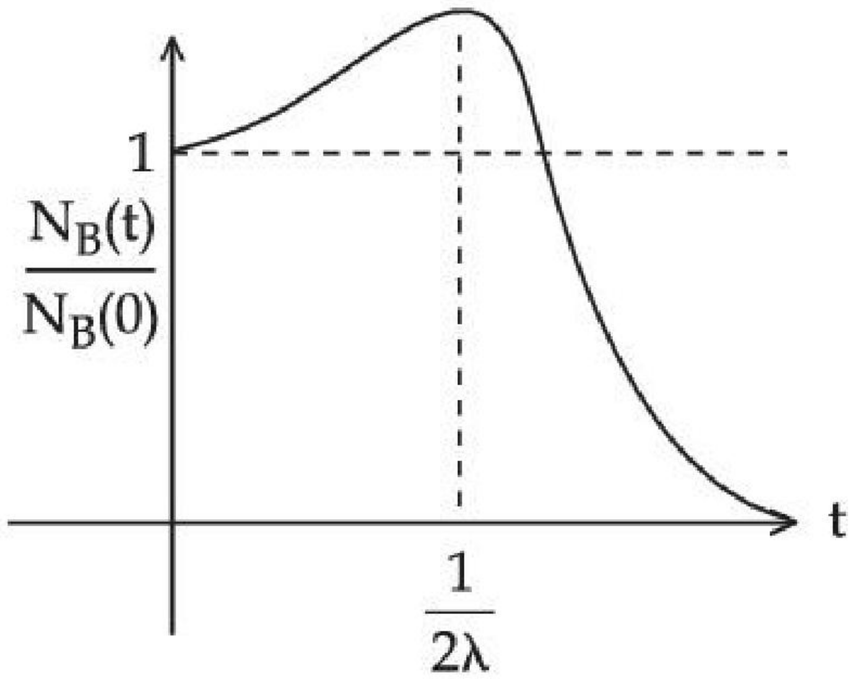
At time $t = 0$, a material is composed of two radioactive atoms A and B, where $N_A(0) = 2N_B(0)$. The decay constant of both kind of radioactive atoms is λ. However, A disintegrates to B and B disintegrates to C. Which of the following figures represents the evolution of $N_B(t)/N_B(0)$ with respect to time t ?

$$\begin{bmatrix} N_A(0) = \text{No. of A atoms at } t = 0 \\ N_B(0) = \text{No. of B atoms at } t = 0 \end{bmatrix}$$

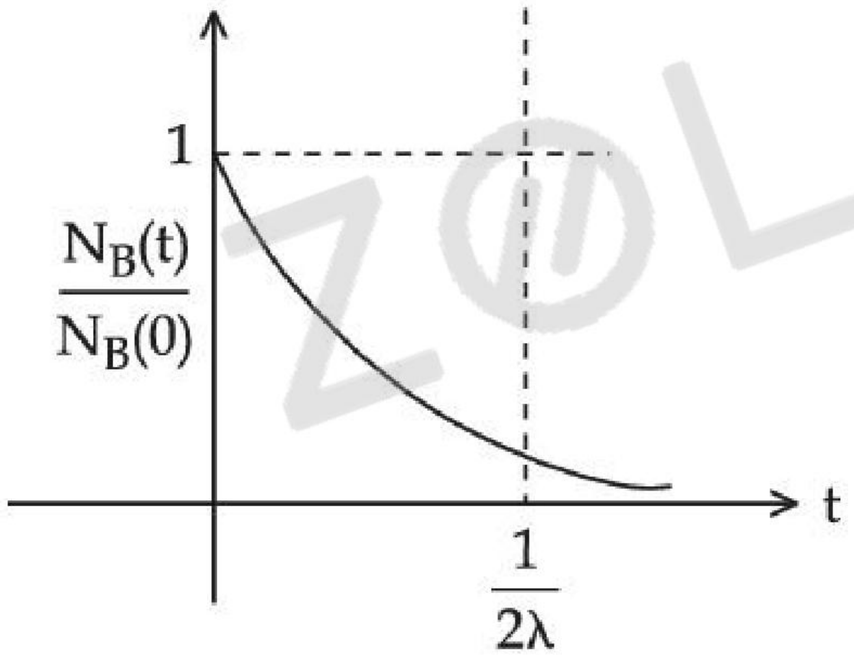
Options :

86435167111.

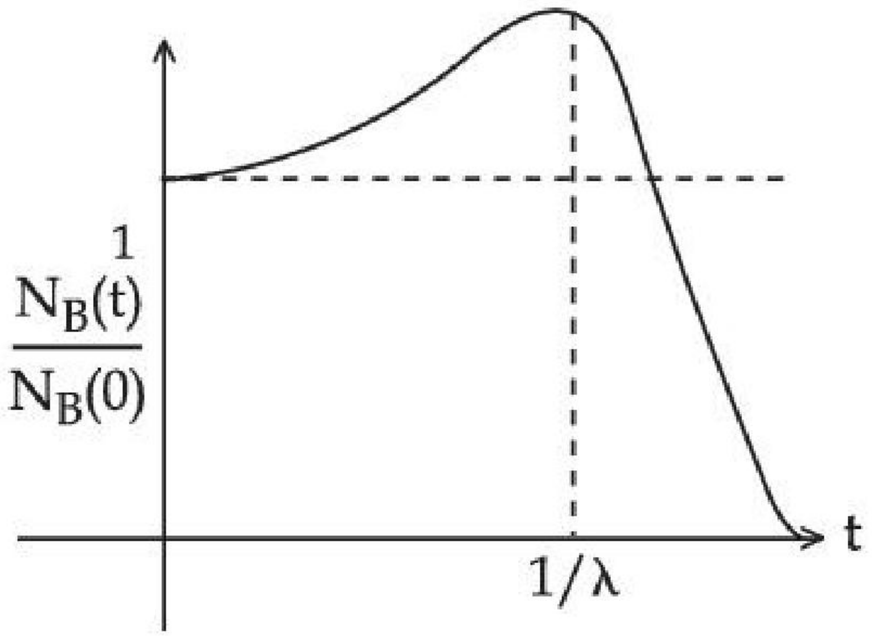




86435167112.



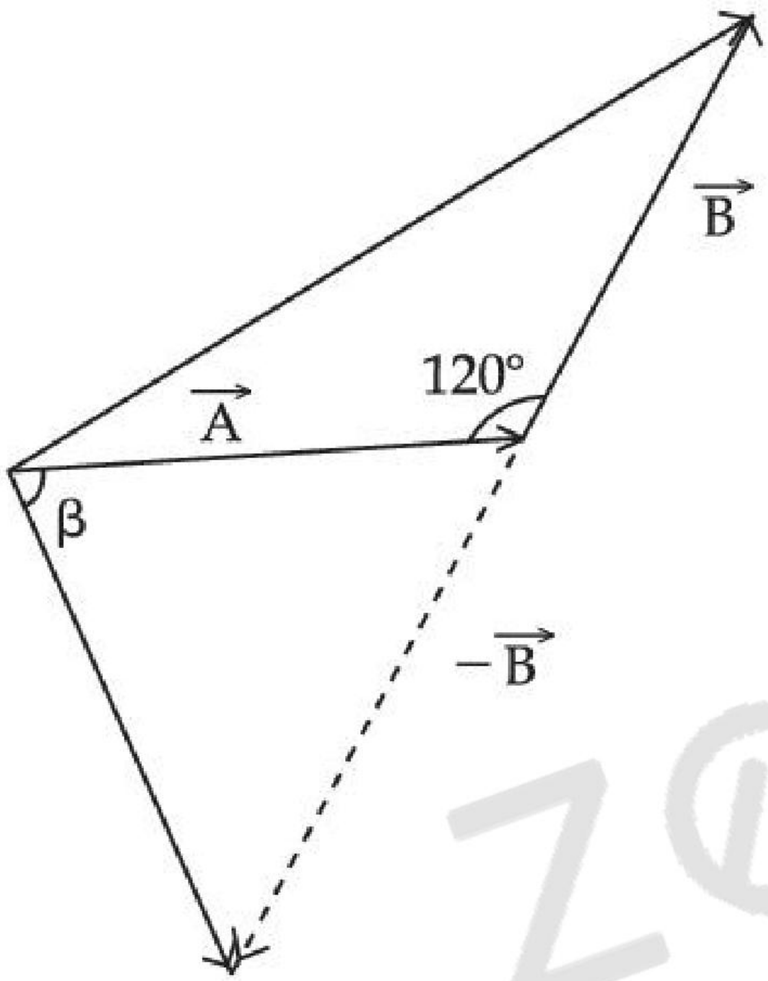
86435167113.



86435167114.

Question Number : 7 Question Id : 86435120176 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The angle between vector $\left(\vec{A}\right)$ and $\left(\vec{A} - \vec{B}\right)$ is :



Options :

86435167115. $\tan^{-1}\left(\frac{A}{0.7\ B}\right)$

86435167116. $\tan^{-1}\left(\frac{\sqrt{3}\ B}{2A - B}\right)$

86435167117. $\tan^{-1}\left(\frac{B\cos\theta}{A - B\sin\theta}\right)$

86435167118. $\tan^{-1}\left(\frac{-\frac{B}{2}}{A - B\frac{\sqrt{3}}{2}}\right)$

Question Number : 8 Question Id : 86435120177 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The de-Broglie wavelength of a particle having kinetic energy E is λ. How much extra energy must be given to this particle so that the de-Broglie wavelength reduces to 75% of the initial value ?

Options :

86435167119. E

86435167120. $\frac{1}{9}E$

86435167121. $\frac{7}{9}E$

86435167122. $\frac{16}{9}E$

Question Number : 9 Question Id : 86435120178 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A particle of mass m is suspended from a ceiling through a string of length L. The particle moves in a horizontal circle of radius r such that $r = \frac{L}{\sqrt{2}}$. The speed of particle will be :

Options :

86435167123. $\sqrt{rg}$

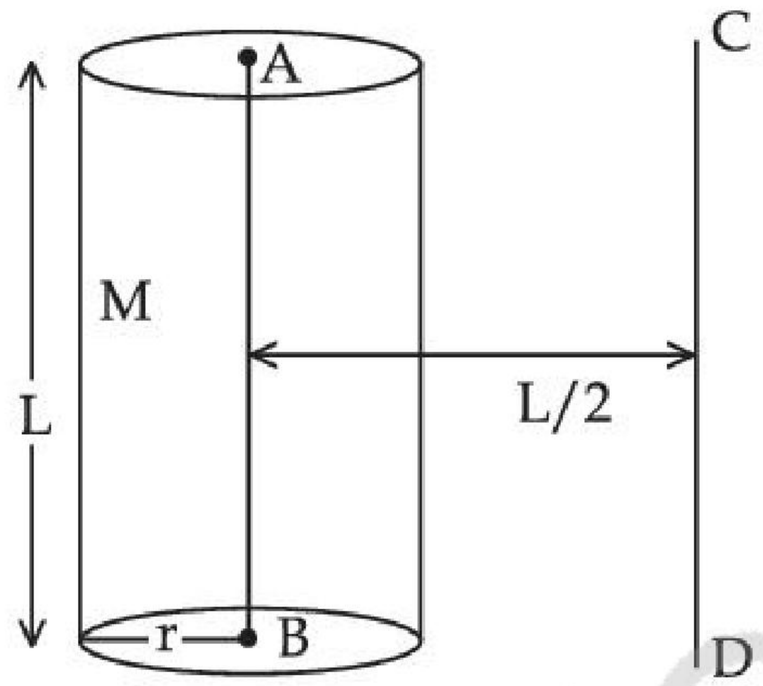
86435167124. $\sqrt{\frac{rg}{2}}$

86435167125. $\sqrt{2rg}$

86435167126. $2\sqrt{rg}$

Question Number : 10 Question Id : 86435120179 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The solid cylinder of length 80 cm and mass M has a radius of 20 cm. Calculate the density of the material used if the moment of inertia of the cylinder about an axis CD parallel to AB as shown in figure is 2.7 kg m^2.



Options :

86435167127. $14.9\ kg/m^3$

86435167128. $1.49\times10^2\ kg/m^3$

86435167129. $7.5\times10^1\ kg/m^3$

86435167130. $7.5\times10^2\ kg/m^3$

Question Number : 11 Question Id : 86435120180 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A light beam is described by $E = 800 \sin\omega\left(t - \frac{x}{c}\right)$. An electron is allowed to move normal to the propagation of light beam with a speed of 3×10^7 ms^{-1}. What is the maximum magnetic force exerted on the electron ?

Options :

86435167131. 1.28×10^{-18} N

86435167132. 12.8×10^{-18} N

86435167133. 12.8×10^{-17} N

86435167134. 1.28×10^{-21} N

Question Number : 12 Question Id : 86435120181 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The temperature of equal masses of three different liquids x, y and z are 10°C, 20°C and 30°C respectively. The temperature of mixture when x is mixed with y is 16°C and that when y is mixed with z is 26°C. The temperature of mixture when x and z are mixed will be :

Options :

86435167135. 20.28°C

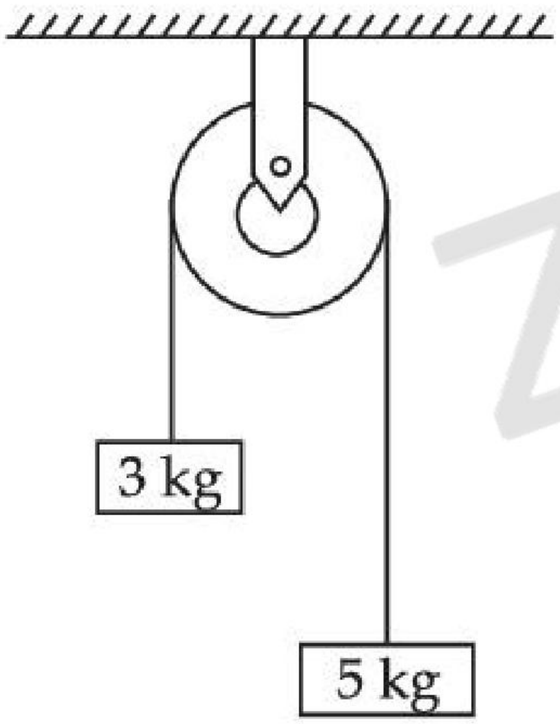
86435167136. 23.84°C

86435167137. 25.62°C

86435167138. $28.32^{\circ}C$

Question Number : 13 Question Id : 86435120182 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Two blocks of masses 3 kg and 5 kg are connected by a metal wire going over a smooth pulley. The breaking stress of the metal is $\frac{24}{\pi} \times 10^2 \text{ Nm}^{-2}$. What is the minimum radius of the wire ?
(take $g = 10 \text{ ms}^{-2}$)



Options :

86435167139. 12.5 cm

86435167140. 125 cm

86435167141. 1250 cm

86435167142. 1.25 cm

Question Number : 14 Question Id : 86435120183 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A refrigerator consumes an average 35 W power to operate between temperature $-10°C$ to $25°C$. If there is no loss of energy then how much average heat per second does it transfer ?

Options :

86435167143. 35 J/s

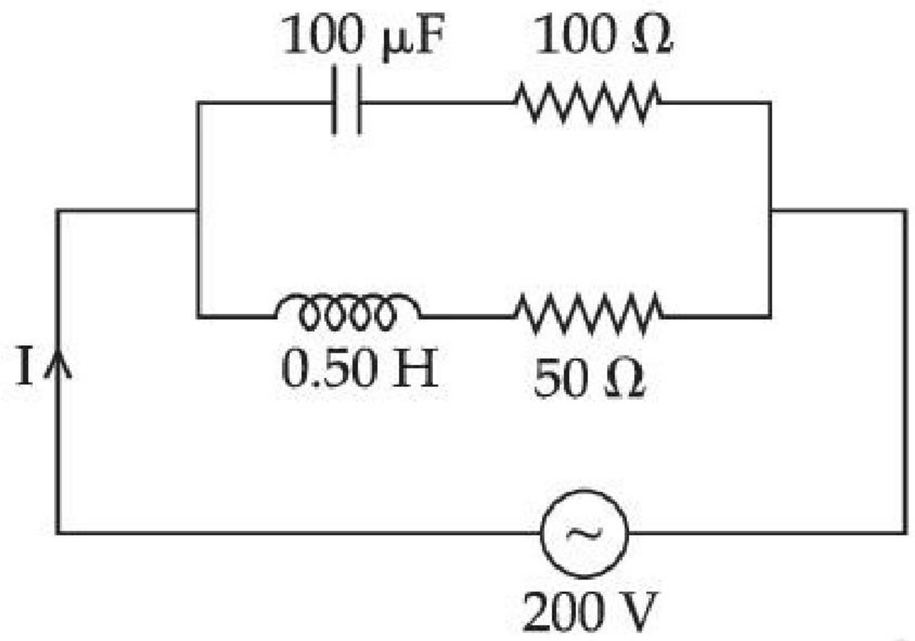
86435167144. 263 J/s

86435167145. 298 J/s

86435167146. 350 J/s

Question Number : 15 Question Id : 86435120184 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

In the given circuit the AC source has $\omega = 100$ rad s^{-1}. Considering the inductor and capacitor to be ideal, what will be the current I flowing through the circuit ?



Options :

86435167147. 6 A

86435167148. 4.24 A

86435167149. 0.94 A

86435167150. 5.9 A

Question Number : 16 Question Id : 86435120185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A cylindrical container of volume 4.0×10^{-3} m^3 contains one mole of hydrogen and two moles of carbon dioxide. Assume the temperature of the mixture is 400 K. The pressure of the mixture of gases is :

[Take gas constant as 8.3 J $mol^{-1} K^{-1}$]

Options :

86435167151. 24.9×10^5 Pa

86435167152. 24.9×10^3 Pa

86435167153. 24.9 Pa

86435167154. 249×10^1 Pa

Question Number : 17 Question Id : 86435120186 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

An electric bulb of 500 watt at 100 volt is used in a circuit having a 200 V supply. Calculate the resistance R to be connected in series with the bulb so that the power delivered by the bulb is 500 W.

Options :

86435167155. 20 Ω

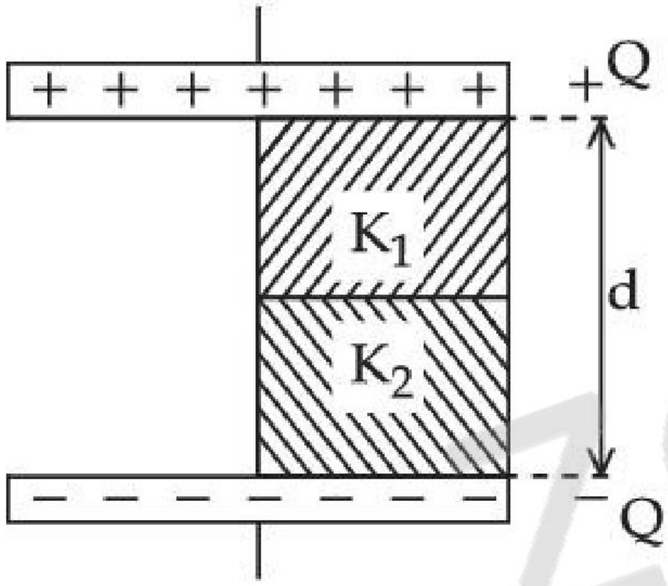
86435167156. 10 Ω

86435167157. 5 Ω

86435167158. 30 Ω

Question Number : 18 Question Id : 86435120187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A parallel-plate capacitor with plate area A has separation d between the plates. Two dielectric slabs of dielectric constant K_1 and K_2 of same area A/2 and thickness d/2 are inserted in the space between the plates. The capacitance of the capacitor will be given by :



Options :

86435167159. $\frac{\varepsilon_0 A}{d}\left(\frac{1}{2}+\frac{2(K_1+K_2)}{K_1 K_2}\right)$

86435167160. $\frac{\varepsilon_0 A}{d}\left(\frac{1}{2}+\frac{K_1 K_2}{2(K_1+K_2)}\right)$

86435167161. $\frac{\varepsilon_0 A}{d}\left(\frac{1}{2}+\frac{K_1+K_2}{K_1 K_2}\right)$

86435167162. $\frac{\varepsilon_0 A}{d}\left(\frac{1}{2}+\frac{K_1 K_2}{K_1+K_2}\right)$

Question Number : 19 Question Id : 86435120188 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If you are provided a set of resistances 2 Ω, 4 Ω, 6 Ω and 8 Ω. Connect these resistances so as to obtain an equivalent resistance of $\frac{46}{3}\Omega$.

Options :

86435167163. 6 Ω and 8 Ω are in parallel with 2 Ω and 4 Ω in series

86435167164. 2 Ω and 6 Ω are in parallel with 4 Ω and 8 Ω in series

86435167165. 2 Ω and 4 Ω are in parallel with 6 Ω and 8 Ω in series

86435167166. 4 Ω and 6 Ω are in parallel with 2 Ω and 8 Ω in series

Question Number : 20 Question Id : 86435120189 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The two thin coaxial rings, each of radius 'a' and having charges $+Q$ and $-Q$ respectively are separated by a distance of 's'. The potential difference between the centres of the two rings is :

Options :

86435167167. $\frac{Q}{4\pi\varepsilon_0}\left[\frac{1}{a}-\frac{1}{\sqrt{s^2+a^2}}\right]$

86435167168. $\frac{Q}{4\pi\varepsilon_0}\left[\frac{1}{a}+\frac{1}{\sqrt{s^2+a^2}}\right]$

86435167169. $\frac{Q}{2\pi\varepsilon_0}\left[\frac{1}{a}+\frac{1}{\sqrt{s^2+a^2}}\right]$

86435167170. $\frac{Q}{2\pi\varepsilon_0}\left[\frac{1}{a}-\frac{1}{\sqrt{s^2+a^2}}\right]$

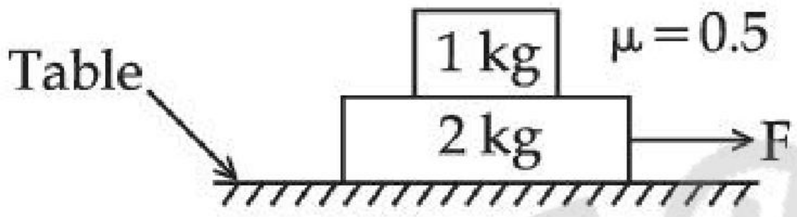
Physics Section B

Section Id :	864351915
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10

Number of Questions to be attempted : 5
Section Marks : 20
Enable Mark as Answered Mark for Review and Clear Response : Yes
Sub-Section Number : 1
Sub-Section Id : 8643511142
Question Shuffling Allowed : Yes

Question Number : 21 Question Id : 86435120190 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

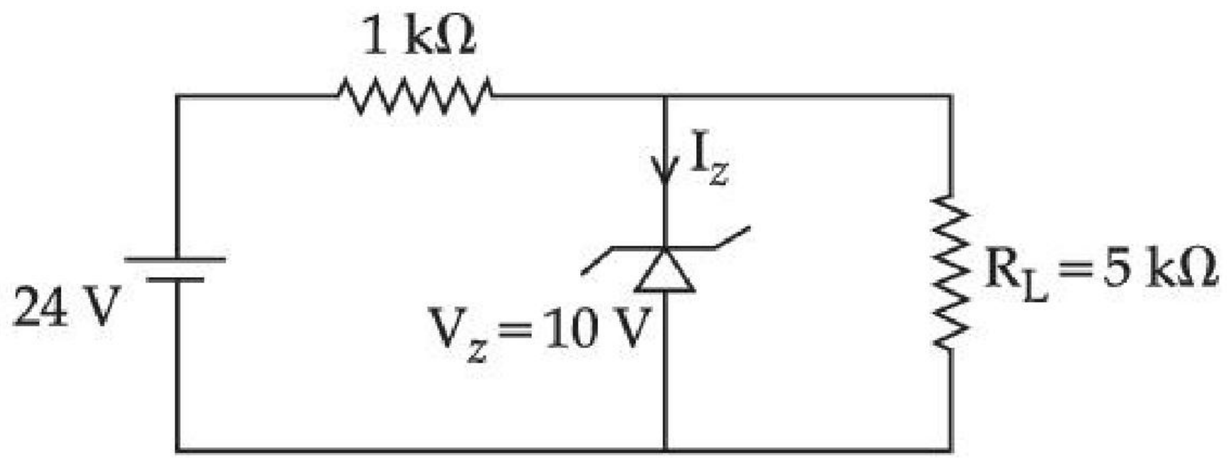
The coefficient of static friction between two blocks is 0.5 and the table is smooth. The maximum horizontal force that can be applied to move the blocks together is _____ N.
(take $g = 10\ ms^{-2}$)



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 : 86435120191 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

For the given circuit, the power across zener diode is _____ mW.



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 : 86435120192 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The acceleration due to gravity is found upto an accuracy of 4% on a planet. The energy supplied to a simple pendulum of known mass 'm' to undertake oscillations of time period T is being estimated. If time period is measured to an accuracy of 3%, the accuracy to which E is known as _____%.

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 : 86435120193 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Two simple harmonic motions are represented by the equations $x_1 = 5\sin\left(2\pi t + \frac{\pi}{4}\right)$ and $x_2 = 5\sqrt{2}(\sin 2\pi t + \cos 2\pi t)$. The amplitude of second motion is _____ times the amplitude in first motion.

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 : 86435120194 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If the maximum value of accelerating potential provided by a radio frequency oscillator is 12 kV. The number of revolution made by a proton in a cyclotron to achieve one sixth of the speed of light is _____.

$[m_p = 1.67 \times 10^{-27}\ \text{kg},\ e = 1.6 \times 10^{-19}\ \text{C},\ \text{Speed of light} = 3 \times 10^8\ \text{m/s}]$

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

1

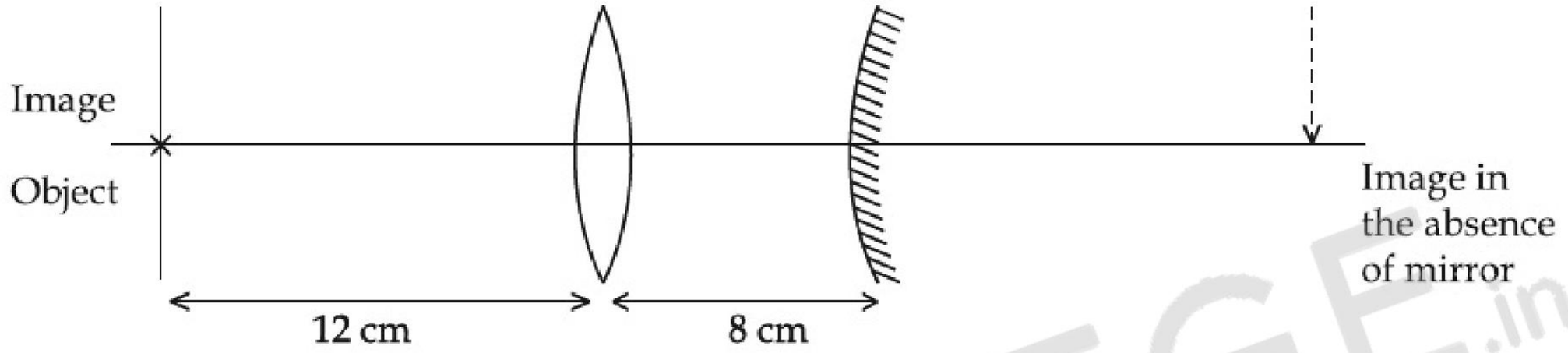
Question Number : 26 Question Id : 86435120195 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A source of light is placed in front of a screen. Intensity of light on the screen is I. Two Polaroids P_1 and P_2 are so placed in between the source of light and screen that the intensity of light on screen is I/2. P_2 should be rotated by an angle of _____(degrees) so that the intensity of light on the screen becomes $\frac{3I}{8}$.

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

Question Number : 27 Question Id : 86435120196 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

An object is placed at a distance of 12 cm from a convex lens. A convex mirror of focal length 15 cm is placed on other side of lens at 8 cm as shown in the figure. Image of object coincides with the object.



When the convex mirror is removed, a real and inverted image is formed at a position. The distance of the image from the object will be _____(cm).

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

Question Number : 28 Question Id : 86435120197 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A circular coil of radius 8.0 cm and 20 turns is rotated about its vertical diameter with an angular speed of 50 rad s^{-1} in a uniform horizontal magnetic field of 3.0×10^{-2} T. The maximum emf induced the coil will be _____ $\times 10^{-2}$ volt (rounded 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 :
1

Question Number : 29 Question Id : 86435120198 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A coil in the shape of an equilateral triangle of side 10 cm lies in a vertical plane between the pole pieces of permanent magnet producing a horizontal magnetic field 20 mT. The torque acting on the coil when a current of 0.2 A is passed through it and its plane becomes parallel to the magnetic field will be $\sqrt{x} \times 10^{-5}$ Nm. 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 : 30 Question Id : 86435120199 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Two waves are simultaneously passing through a string and their equations are : $y_1 = A_1 \sin k(x - vt)$, $y_2 = A_2 \sin k(x - vt + x_0)$. Given amplitudes $A_1 = 12$ mm and $A_2 = 5$ mm, $x_0 = 3.5$ cm and wave number $k = 6.28$ cm^{-1}. The amplitude of resulting wave will be _____ mm.

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 :	864351916
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511143
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 86435120200 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The interaction energy of London forces between two particles is proportional to r^x, where r is the distance between the particles. The value of x is :

Options :

86435167181. 3

86435167182. -3

86435167183. 6

86435167184. -6

Question Number : 32 Question Id : 86435120201 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The bond order and magnetic behaviour of O_2^- ion are, respectively :

Options :

86435167185. 1 and paramagnetic.

86435167186. 1.5 and paramagnetic.

86435167187. 2 and diamagnetic.

86435167188. 1.5 and diamagnetic.

Question Number : 33 Question Id : 86435120202 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The sol given below with negatively charged colloidal particles is :

Options :

86435167189. KI added to $AgNO_3$ solution

86435167190. $AgNO_3$ added to KI solution

86435167191. $FeCl_3$ added to hot water

86435167192. $Al_2O_3 \cdot xH_2O$ in water

Question Number : 34 Question Id : 86435120203 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Chalcogen group elements are :

Options :

86435167193. Se, Tb and Pu.

86435167194. S, Te and Pm.

86435167195. Se, Te and Po.

86435167196. O, Ti and Po.

Question Number : 35 Question Id : 86435120204 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : Sphalerite is a sulphide ore of zinc and copper glance is a sulphide ore of copper.

Statement II : It is possible to separate two sulphide ores by adjusting proportion of oil to water or by using 'depressants' in a froth flotation method.

Choose the **most appropriate** answer from the options given below :

Options :

86435167197. Both **Statement I** and **Statement II** are true.

86435167198. Both **Statement I** and **Statement II** are false.

86435167199. **Statement I** is true but **Statement II** is false.

86435167200. **Statement I** is false but **Statement II** is true.

Question Number : 36 Question Id : 86435120205 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) : Heavy water is used for the study of reaction mechanism.

Reason (R) : The rate of reaction for the cleavage of O – H bond is slower than that of O – D bond.

Choose the **most appropriate** answer from the options given below :

Options :

86435167201. Both **(A)** and **(R)** are true and **(R)** is the true explanation of **(A)**.

86435167202. Both **(A)** and **(R)** are true but **(R)** is not the true explanation of **(A)**.

86435167203. **(A)** is true but **(R)** is false.

86435167204. **(A)** is false but **(R)** is true.

Question Number : 37 Question Id : 86435120206 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) : Barium carbonate is insoluble in water and is highly stable.

Reason (R) : The thermal stability of the carbonates increases with increasing cationic size.

Choose the **most appropriate** answer from the options given below :

Options :

86435167205. Both **(A)** and **(R)** are true and **(R)** is the true explanation of **(A)**.

86435167206. Both **(A)** and **(R)** are true but **(R)** is not the true explanation of **(A)**.

86435167207. **(A)** is true but **(R)** is false.

86435167208. **(A)** is false but **(R)** is true.

Question Number : 38 Question Id : 86435120207 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The number of non-ionisable hydrogen atoms present in the final product obtained from the hydrolysis of PCl_5 is :

Options :

86435167209. 1

86435167210. 2

86435167211. 3

86435167212. 0

Question Number : 39 Question Id : 86435120208 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Arrange the following Cobalt complexes in the order of increasing Crystal Field Stabilization Energy (CFSE) value.

Complexes : $\underset{A}{[CoF_6]^{3-}}$, $\underset{B}{[Co(H_2O)_6]^{2+}}$, $\underset{C}{[Co(NH_3)_6]^{3+}}$ and $\underset{D}{[Co(en)_3]^{3+}}$

Choose the **correct** option :

Options :

86435167213. A < B < C < D

86435167214. $B < C < D < A$

86435167215. $C < D < B < A$

86435167216. $B < A < C < D$

Question Number : 40 Question Id : 86435120209 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Indicate the complex/complex ion which did not show any geometrical isomerism :

Options :

86435167217. $[CoCl_2(en)_2]$

86435167218. $[Co(CN)_5\ (NC)]^{3-}$

86435167219. $[Co(NH_3)_4\ Cl_2]^{+}$

86435167220. $[Co(NH_3)_3\ (NO_2)_3]$

Question Number : 41 Question Id : 86435120210 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) : Photochemical smog causes cracking of rubber.

Reason (R) : Presence of ozone, nitric oxide, acrolein, formaldehyde and peroxyacetyl nitrate in photochemical smog makes it oxidizing.

Choose the **most appropriate** answer from the options given below :

Options :

86435167221. Both **(A)** and **(R)** are true and **(R)** is the true explanation of **(A)**.

86435167222. Both **(A)** and **(R)** are true but **(R)** is not the true explanation of **(A)**.

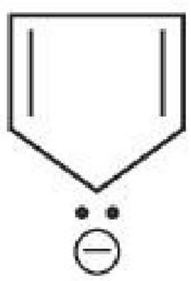
86435167223. **(A)** is true but **(R)** is false.

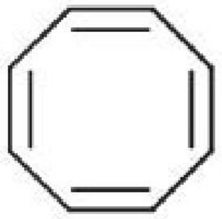
86435167224. **(A)** is false but **(R)** is true.

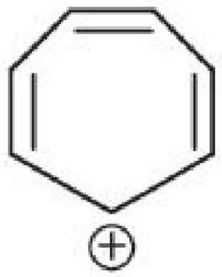
Question Number : 42 Question Id : 86435120211 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

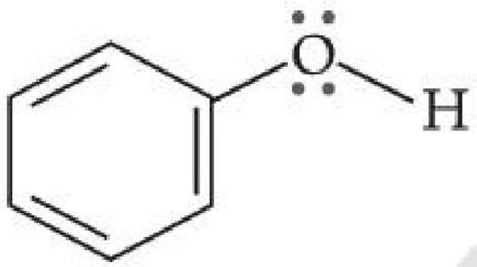
Which one of the following compounds is not aromatic ?

Options :

86435167225. 

86435167226. 

86435167227. 

86435167228. 

Question Number : 43 Question Id : 86435120212 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The number of stereoisomers possible for 1,2-dimethyl cyclopropane is :

Options :

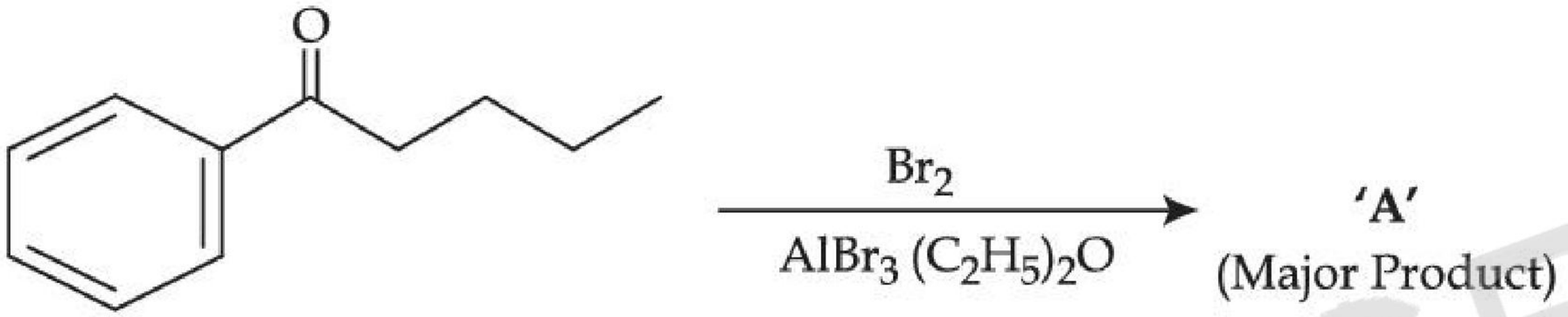
86435167229. One

86435167230. Two

86435167231. Three

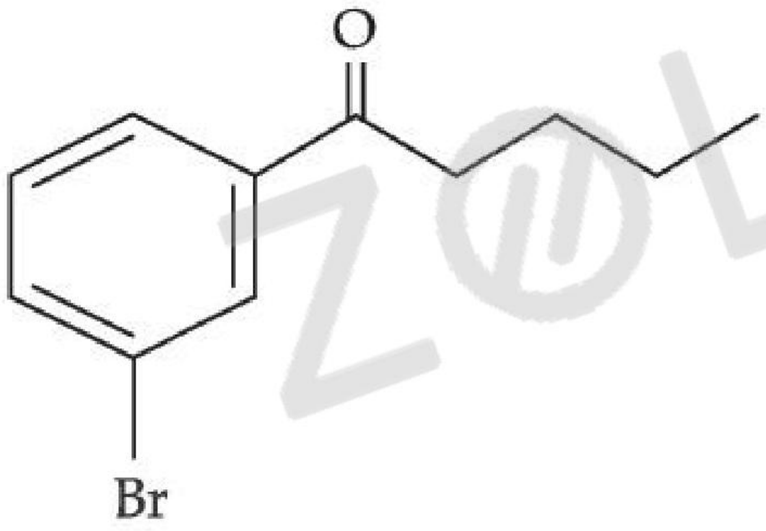
86435167232. Four

Question Number : 44 Question Id : 86435120213 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

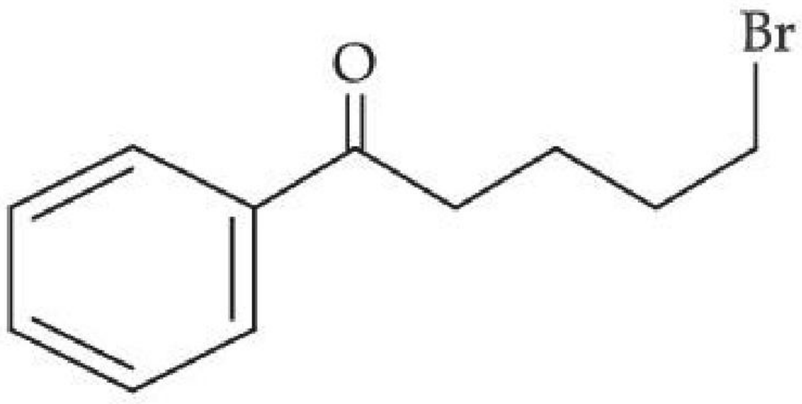


Consider the given reaction, the Product **A** is :

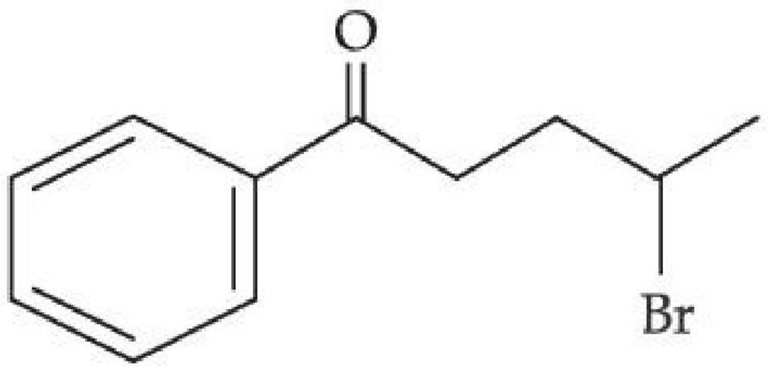
Options :

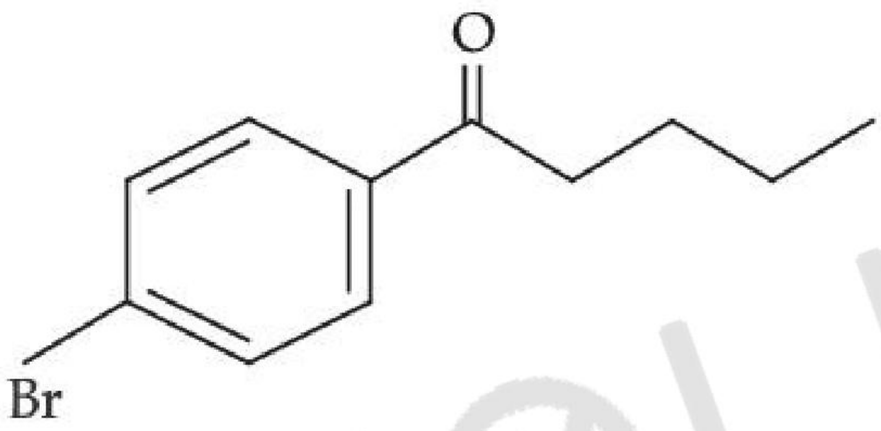


86435167233.



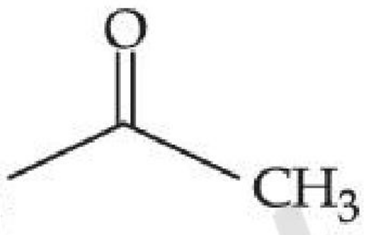
86435167234.

86435167235. 

86435167236. 

Question Number : 45 Question Id : 86435120214 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

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

List - I (Chemical Reaction)	**List - II (Reagent used)**
(a) $CH_3COOCH_2CH_3 \rightarrow CH_3CH_2OH$	(i) CH_3MgBr/H_3O^+ (1.equivalent)
(b) $CH_3COOCH_3 \rightarrow CH_3CHO$	(ii) H_2SO_4/H_2O
(c) $CH_3C \equiv N \rightarrow CH_3CHO$	(iii) DIBAL-H/H_2O
(d) $CH_3C \equiv N \rightarrow$ 	(iv) $SnCl_2$, HCl/H_2O

Choose the **most appropriate** match.

Options :

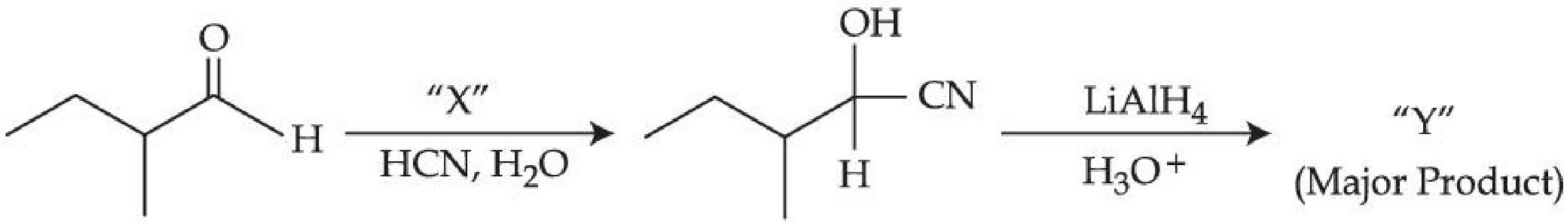
86435167237. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

86435167238. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

86435167239. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

86435167240. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

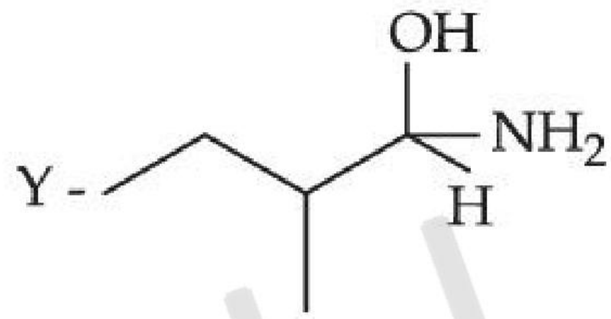
Question Number : 46 Question Id : 86435120215 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1



Consider the given reaction, Identify **'X'** and **'Y'** :

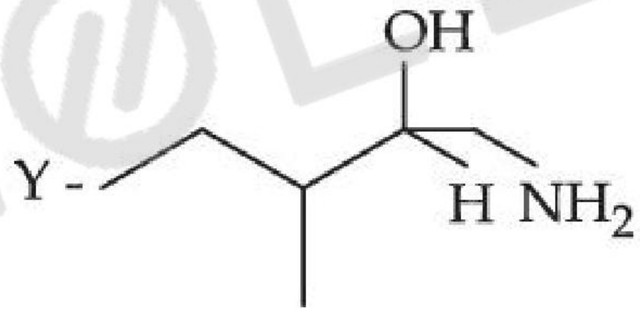
Options :

X - NaOH



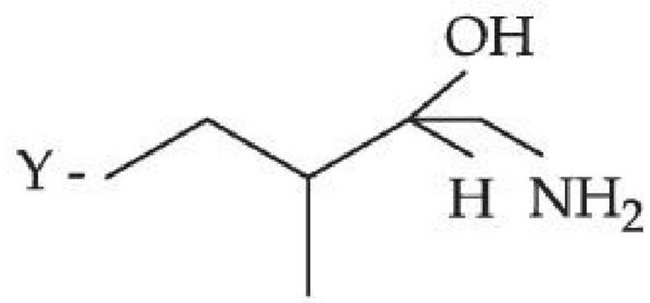
86435167241.

X - HNO_3



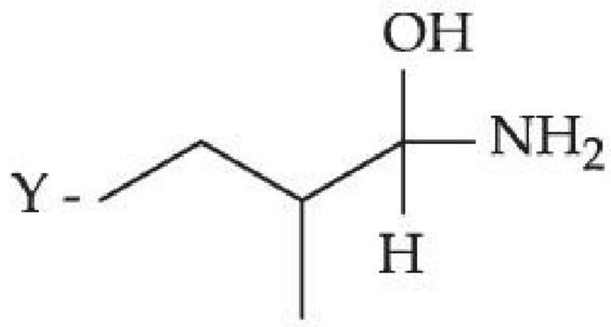
86435167242.

X - NaOH



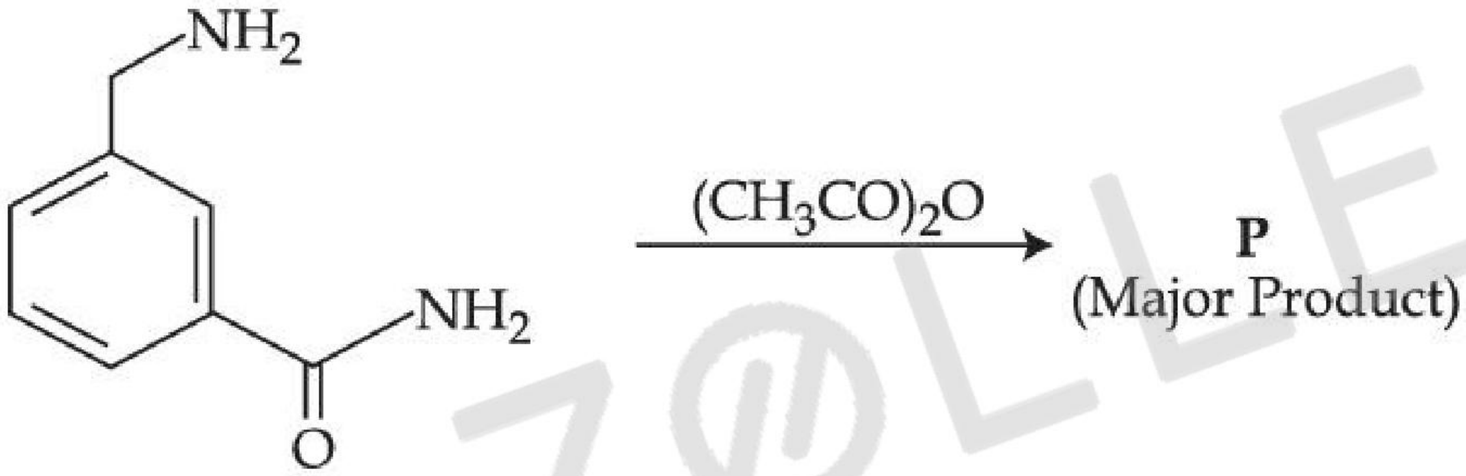
86435167243.

X - HNO_3



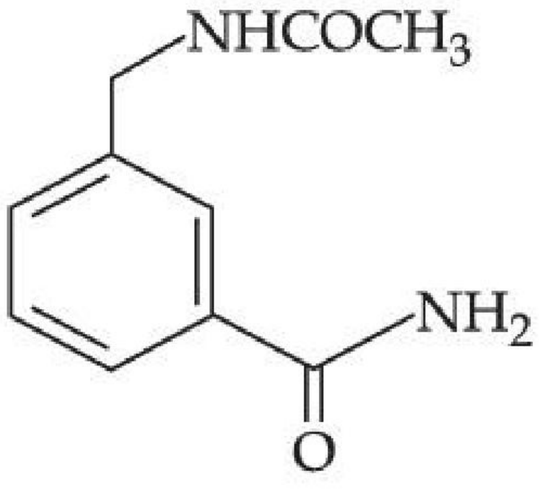
86435167244.

Question Number : 47 Question Id : 86435120216 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

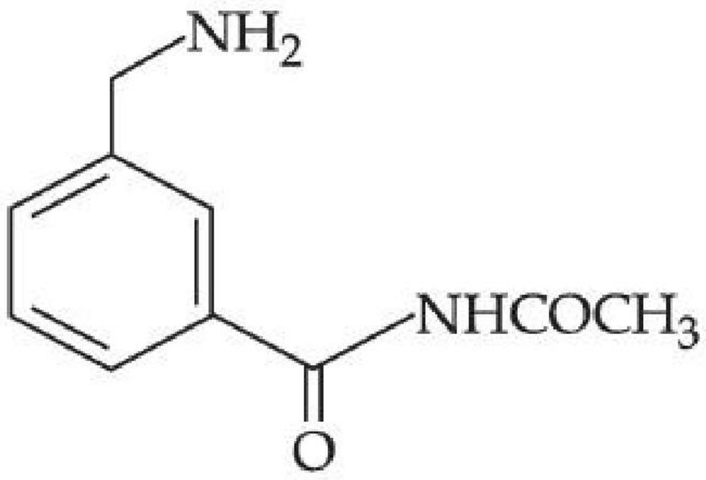


The Major Product in the above reaction is :

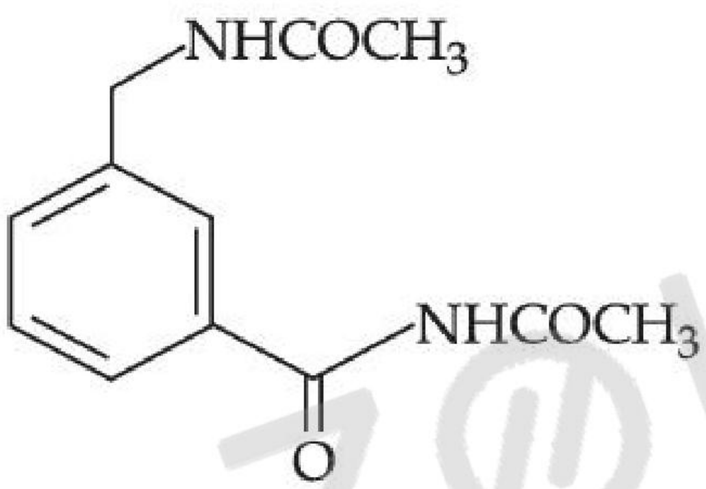
Options :



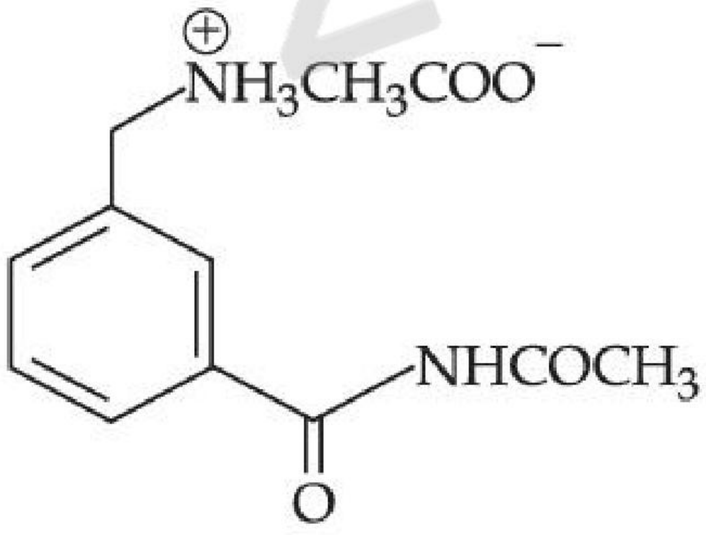
86435167245.



86435167246.

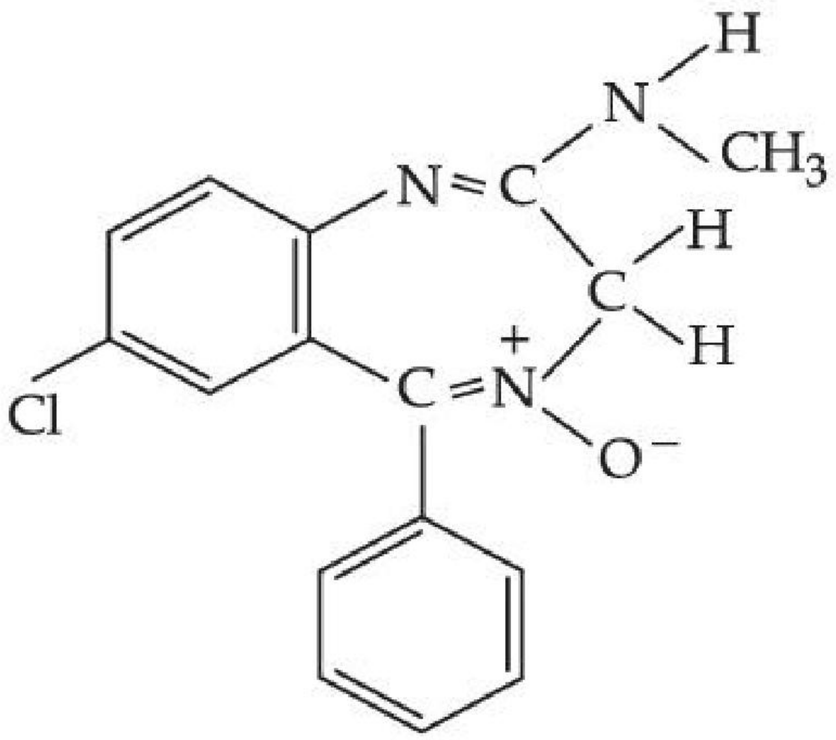


86435167247.



86435167248.

Question Number : 48 Question Id : 86435120217 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1



Chlordiazepoxide

The class of drug to which chlordiazepoxide with above structure belongs is :

Options :

86435167249. Tranquilizer

86435167250. Antibiotic

86435167251. Antacid

86435167252. Analgesic

Question Number : 49 Question Id : 86435120218 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) : Sucrose is a disaccharide and a non-reducing sugar.

Reason (R) : Sucrose involves glycosidic linkage between C_1 of β-glucose and C_2 of α-fructose.

Choose the **most appropriate** answer from the options given below :

Options :

86435167253. Both **(A)** and **(R)** are true and **(R)** is the true explanation of **(A)**.

86435167254. Both **(A)** and **(R)** are true but **(R)** is not the true explanation of **(A)**.

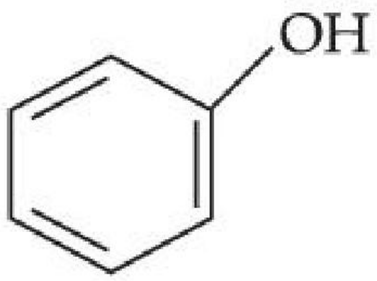
86435167255. **(A)** is true but **(R)** is false.

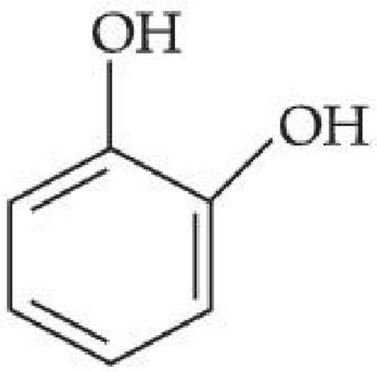
86435167256. **(A)** is false but **(R)** is true.

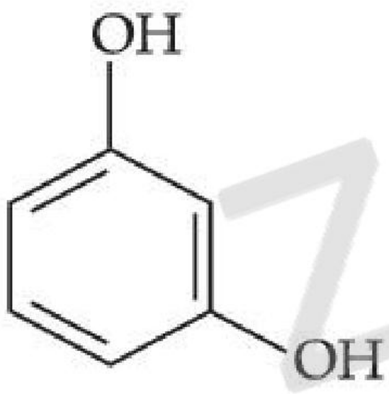
Question Number : 50 Question Id : 86435120219 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

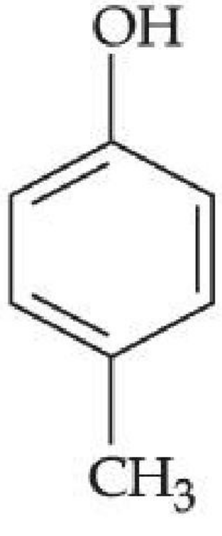
Which one of the following phenols does not give colour when condensed with phthalic anhydride in presence of conc. H_2SO_4 ?

Options :

86435167257. 

86435167258. 

86435167259. 

86435167260. 

Chemistry Section B

Section Id : 864351917
Section Number : 4
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 10
Number of Questions to be attempted : 5
Section Marks : 20
Enable Mark as Answered Mark for Review and Clear Response : Yes
Sub-Section Number : 1
Sub-Section Id : 8643511144
Question Shuffling Allowed : Yes

Question Number : 51 Question Id : 86435120220 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

100 mL of Na_3PO_4 solution contains 3.45 g of sodium. The molarity of the solution is _____ $\times 10^{-2}$ mol L^{-1}. (Nearest integer)

[Atomic Masses - Na : 23.0 u, O : 16.0 u, P : 31.0 u]

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

Question Number : 52 Question Id : 86435120221 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A metal surface is exposed to 500 nm radiation. The threshold frequency of the metal for photoelectric current is 4.3×10^{14} Hz. The velocity of ejected electron is _____ $\times 10^5$ ms^{-1}. (Nearest integer)

[Use : $h = 6.63 \times 10^{-34}$ Js, $m_e = 9.0 \times 10^{-31}$ kg]

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

Question Number : 53 Question Id : 86435120222 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

For water $\Delta_{vap}H = 41$ kJ mol^{-1} at 373 K and 1 bar pressure. Assuming that water vapour is an ideal gas that occupies a much larger volume than liquid water, the internal energy change during evaporation of water is _____ kJ mol^{-1}.

[Use : $R = 8.3$ J $mol^{-1}K^{-1}$]

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

Question Number : 54 Question Id : 86435120223 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

83 g of ethylene glycol dissolved in 625 g of water. The freezing point of the solution is _____ K. (Nearest integer)

[Use : Molal Freezing point depression constant of water = 1.86 K kg mol^{-1}

Freezing point of water = 273 K

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

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

Question Number : 55 Question Id : 86435120224 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The equilibrium constant K_c at 298 K for the reaction

$$A + B \rightleftharpoons C + D$$

is 100. Starting with an equimolar solution with concentrations of A, B, C and D all equal to 1 M, the equilibrium concentration of D is _____ $\times 10^{-2}$ M. (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 : 56 Question Id : 86435120225 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the galvanic cell,

$$Zn(s) + Cu^{2+}(0.02\ M) \rightarrow Zn^{2+}(0.04\ M) + Cu(s),$$

$$E_{cell} = \_\_\_\_\_ \times 10^{-2}\ V.\ \ (\text{Nearest integer})$$

$$[\text{Use : } E^0_{Cu/Cu^{2+}} = -0.34\ V,\ E^0_{Zn/Zn^{2+}} = +0.76\ V,\ \frac{2.303\,RT}{F} = 0.059V\ ]$$

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

Question Number : 57 Question Id : 86435120226 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The reaction rate for the reaction

$$[PtCl_4]^{2-} + H_2O \rightleftharpoons [Pt(H_2O)Cl_3]^- + Cl^-$$

was measured as a function of concentrations of different species. It was observed that

$$\frac{-d\left[[PtCl_4]^{2-}\right]}{dt} = 4.8\times10^{-5}\left[[PtCl_4]^{2-}\right] - 2.4\times10^{-3}\left[[Pt(H_2O)Cl_3]^-\right][Cl^-].$$

where square brackets are used to denote molar concentrations. The equilibrium constant

$K_c =$ _____. (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 : 58 Question Id : 86435120227 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The overall stability constant of the complex ion $[Cu(NH_3)_4]^{2+}$ is 2.1×10^{13}. The overall dissociation constant is $y\times10^{-14}$. Then y 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 : 59 Question Id : 86435120228 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

In the sulphur estimation, 0.471 g of an organic compound gave 1.44 g of barium sulfate. The percentage of sulphur in the compound is _____%. (Nearest integer)
(Atomic Mass of Ba = 137 u)

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

Question Number : 60 Question Id : 86435120229 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A chloro compound "**A**".
(i) forms aldehydes on ozonolysis followed by the hydrolysis.
(ii) when vaporized completely 1.53 g of A, gives 448 mL of vapour at STP.
The number of carbon atoms in a molecule of compound **A** is _____.

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

1

Mathematics Section A

Section Id :	864351918
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511145
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 86435120230 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The domain of the function $\text{cosec}^{-1}\left(\frac{1+x}{x}\right)$ is :

Options :

86435167271. $\left[-\frac{1}{2}, \infty\right) - \{0\}$

86435167272. $\left(-\frac{1}{2}, \infty\right) - \{0\}$

86435167273. $\left[-\frac{1}{2}, 0\right) \cup [1, \infty)$

86435167274. $\left(-1, -\frac{1}{2}\right] \cup (0, \infty)$

Question Number : 62 Question Id : 86435120231 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If $(\sqrt{3} + i)^{100} = 2^{99}(\mathrm{p} + i\mathrm{q})$, then p and q are roots of the equation :

Options :

86435167275. $x^2 + (\sqrt{3} - 1)x - \sqrt{3} = 0$

86435167276. $x^2 - (\sqrt{3} - 1)x - \sqrt{3} = 0$

86435167277. $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$

86435167278. $x^2 + (\sqrt{3} + 1)x + \sqrt{3} = 0$

Question Number : 63 Question Id : 86435120232 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Two fair dice are thrown. The numbers on them are taken as λ and μ, and a system of linear equations

$$x + y + z = 5$$
$$x + 2y + 3z = \mu$$
$$x + 3y + \lambda z = 1$$

is constructed. If p is the probability that the system has a unique solution and q is the probability that the system has no solution, then :

Options :

86435167279. $p = \frac{1}{6}$ and $q = \frac{1}{36}$

86435167280. $p = \frac{5}{6}$ and $q = \frac{1}{36}$

86435167281. $p = \frac{1}{6}$ and $q = \frac{5}{36}$

86435167282. $p = \frac{5}{6}$ and $q = \frac{5}{36}$

Question Number : 64 Question Id : 86435120233 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{pmatrix}$. Then $A^{2025} - A^{2020}$ is equal to :

Options :

86435167283. A^6

86435167284. $A^5 - A$

86435167285. $A^6 - A$

86435167286. A^5

Question Number : 65 Question Id : 86435120234 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

$\lim\limits_{x \to 2} \left(\sum\limits_{n=1}^{9} \dfrac{x}{n(n+1)x^2 + 2(2n+1)x + 4} \right)$ is equal to :

Options :

86435167287. $\dfrac{7}{36}$

86435167288. $\dfrac{1}{5}$

86435167289. $\frac{9}{44}$

86435167290. $\frac{5}{24}$

Question Number : 66 Question Id : 86435120235 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The local maximum value of the function

$$f(x) = \left(\frac{2}{x}\right)^{x^2}, x > 0, \text{ is :}$$

Options :

86435167291. $(2\sqrt{e})^{\frac{1}{e}}$

86435167292. $(e)^{\frac{2}{e}}$

86435167293. $\left(\frac{4}{\sqrt{e}}\right)^{\frac{e}{4}}$

86435167294. 1

Question Number : 67 Question Id : 86435120236 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{1+\sin^2 x}{1+\pi^{\sin x}}\right) dx$ is :

Options :

86435167295. $\frac{3\pi}{2}$

86435167296. $\frac{3\pi}{4}$

86435167297. $\frac{\pi}{2}$

86435167298. $\frac{5\pi}{4}$

Question Number : 68 Question Id : 86435120237 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let $y(x)$ be the solution of the differential equation $2x^2\,dy + (e^y - 2x)dx = 0$, $x > 0$. If $y(e) = 1$, then $y(1)$ is equal to :

Options :

86435167299. 2

86435167300. $\log_e(2e)$

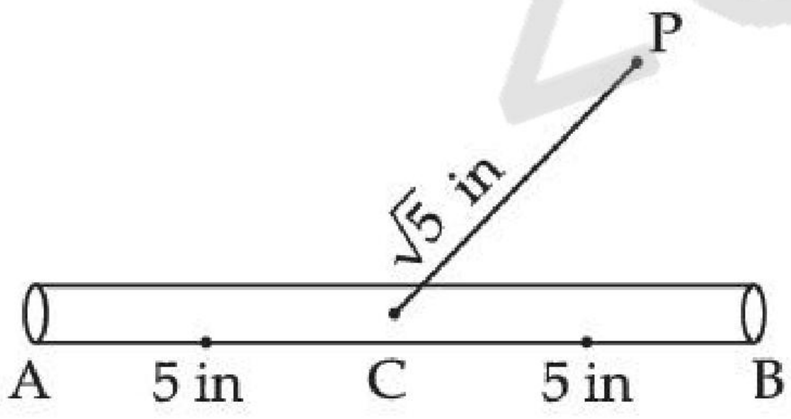
86435167301. $\log_e 2$

86435167302. 0

Question Number : 69 Question Id : 86435120238 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A 10 inches long pencil AB with mid point C and a small eraser P are placed on the horizontal top of a table such that $PC = \sqrt{5}$ inches and $\angle PCB = \tan^{-1}(2)$.

The acute angle through which the pencil must be rotated about C so that the perpendicular distance between eraser and pencil becomes exactly 1 inch is :



Options :

86435167303. $\tan^{-1}\left(\frac{4}{3}\right)$

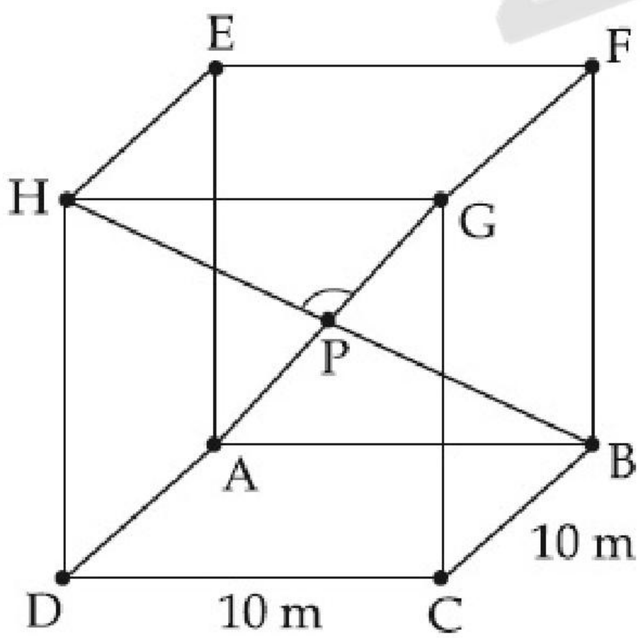
86435167304. $\tan^{-1}\left(\frac{3}{4}\right)$

86435167305. $\tan^{-1}(1)$

86435167306. $\tan^{-1}\left(\frac{1}{2}\right)$

Question Number : 70 Question Id : 86435120239 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A hall has a square floor of dimension 10 m × 10 m (see the figure) and vertical walls. If the angle GPH between the diagonals AG and BH is $\cos^{-1}\frac{1}{5}$, then the height of the hall (in meters) is :



Options :

86435167307. $5\sqrt{2}$

86435167308. $5\sqrt{3}$

86435167309. 5

86435167310. $2\sqrt{10}$

Question Number : 71 Question Id : 86435120240 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A circle C touches the line $x=2y$ at the point (2, 1) and intersects the circle $C_1 : x^2+y^2+2y-5=0$ at two points P and Q such that PQ is a diameter of C_1. Then the diameter of C is :

Options :

86435167311. 15

86435167312. $4\sqrt{15}$

86435167313. $\sqrt{285}$

86435167314. $7\sqrt{5}$

Question Number : 72 Question Id : 86435120241 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The point $P(-2\sqrt{6}, \sqrt{3})$ lies on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ having eccentricity $\frac{\sqrt{5}}{2}$. If the tangent and normal at P to the hyperbola intersect its conjugate axis at the points Q and R respectively, then QR is equal to :

Options :

86435167315. $4\sqrt{3}$

86435167316. $3\sqrt{6}$

86435167317. 6

86435167318. $6\sqrt{3}$

Question Number : 73 Question Id : 86435120242 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The locus of the mid points of the chords of the hyperbola $x^2 - y^2 = 4$, which touch the parabola $y^2 = 8x$, is :

Options :

86435167319. $x^3(x-2) = y^2$

86435167320. $x^2(x-2) = y^3$

86435167321. $y^2(x-2)=x^3$

86435167322. $y^3(x-2)=x^2$

Question Number : 74 Question Id : 86435120243 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

If the value of the integral $\int_0^5 \frac{x+[x]}{e^{x-[x]}}dx = \alpha e^{-1}+\beta$, where $\alpha, \beta \in \mathbf{R}$, $5\alpha+6\beta=0$, and $[x]$ denotes the greatest integer less than or equal to x; then the value of $(\alpha+\beta)^2$ is equal to :

Options :

86435167323. 25

86435167324. 36

86435167325. 100

86435167326. 16

Question Number : 75 Question Id : 86435120244 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Consider the two statements :

(S1) : $(p \rightarrow q) \vee (\sim q \rightarrow p)$ is a tautology.

(S2) : $(p \wedge \sim q) \wedge (\sim p \vee q)$ is a fallacy.

Then :

Options :

86435167327. only (S1) is true.

86435167328. only (S2) is true.

86435167329. both (S1) and (S2) are false.

86435167330. both (S1) and (S2) are true.

Question Number : 76 Question Id : 86435120245 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

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

Let $f(x) = x - [x]$, $g(x) = 1 - x + [x]$, and $h(x) = \min\{f(x), g(x)\}$, $x \in [-2, 2]$.

Then h is :

Options :

86435167331. not continuous at exactly four points in $[-2, 2]$

86435167332. not continuous at exactly three points in $[-2, 2]$

86435167333. continuous in $[-2, 2]$ but not differentiable at more than four points in $(-2, 2)$

86435167334. Continous in $[-2, 2]$ but not differentiable at exactly three poionts in $(-2, 2)$

Question Number : 77 Question Id : 86435120246 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If $\sum_{r=1}^{50} \tan^{-1} \frac{1}{2r^2} = p$, then the value of $\tan p$ is :

Options :

86435167335. $\frac{50}{51}$

86435167336. $\frac{51}{50}$

86435167337. $\frac{101}{102}$

86435167338. 100

Question Number : 78 Question Id : 86435120247 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A fair die is tossed until six is obtained on it. Let X be the number of required tosses, then the conditional probability $P(X \geq 5 \mid X > 2)$ is :

Options :

86435167339. $\frac{11}{36}$

86435167340. $\frac{25}{36}$

86435167341. $\frac{5}{6}$

86435167342. $\frac{125}{216}$

Question Number : 79 Question Id : 86435120248 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Let P be the plane passing through the point (1, 2, 3) and the line of intersection of the planes $\vec{r} \cdot \left(\hat{i} + \hat{j} + 4\hat{k}\right) = 16$ and $\vec{r} \cdot \left(-\hat{i} + \hat{j} + \hat{k}\right) = 6$.

Then which of the following points does **NOT** lie on P ?

Options :

86435167343. $(-8, 8, 6)$

86435167344. $(6, -6, 2)$

86435167345. $(4, 2, 2)$

86435167346. $(3, 3, 2)$

Question Number : 80 Question Id : 86435120249 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The value of

$$2\sin\left(\frac{\pi}{8}\right)\sin\left(\frac{2\pi}{8}\right)\sin\left(\frac{3\pi}{8}\right)\sin\left(\frac{5\pi}{8}\right)\sin\left(\frac{6\pi}{8}\right)\sin\left(\frac{7\pi}{8}\right) \text{ is :}$$

Options :

86435167347. $\frac{1}{8}$

86435167348. $\frac{1}{8\sqrt{2}}$

86435167349. $\frac{1}{4}$

86435167350. $\frac{1}{4\sqrt{2}}$

Mathematics Section B

Section Id :	864351919
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511146
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 86435120250 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let $\lambda \neq 0$ be in **R**. If α and β are the roots of the equation $x^2 - x + 2\lambda = 0$, and α and γ are the roots of the equation $3x^2 - 10x + 27\lambda = 0$, then $\frac{\beta\gamma}{\lambda}$ 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 : 82 Question Id : 86435120251 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let A be a 3×3 real matrix. If $\det(2\ \text{Adj}(2\ \text{Adj}(\text{Adj}\ (2A)))) = 2^{41}$, then the value of $\det(A^2)$ equals _____.

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

Question Number : 83 Question Id : 86435120252 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let $\binom{n}{k}$ denote ${}^nC_k$ and

$$\begin{bmatrix} n \\ k \end{bmatrix} = \begin{cases} \binom{n}{k}, & \text{if } 0 \le k \le n \\ 0, & \text{otherwise.} \end{cases}$$

If $A_k = \sum_{i=0}^{9} \binom{9}{i} \begin{bmatrix} 12 \\ 12-k+i \end{bmatrix} + \sum_{i=0}^{8} \binom{8}{i} \begin{bmatrix} 13 \\ 13-k+i \end{bmatrix}$ and $A_4 - A_3 = 190\ p$, then p 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 : 84 Question Id : 86435120253 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The sum of all 3-digit numbers less than or equal to 500, that are formed without using the digit "1" and they all are multiple of 11, is _____.

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

Question Number : 85 Question Id : 86435120254 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let a and b respectively be the points of local maximum and local minimum of the function

$$f(x) = 2x^3 - 3x^2 - 12x.$$

If A is the total area of the region bounded by $y = f(x)$, the x-axis and the lines $x = a$ and $x = b$, then 4 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 : 86 Question Id : 86435120255 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let the mean and variance of four numbers 3, 7, x and y $(x > y)$ be 5 and 10 respectively. Then the mean of four numbers $3+2x$, $7+2y$, $x+y$ and $x-y$ is _____.

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

1

Question Number : 87 Question Id : 86435120256 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the projection of the vector $\hat{i} + 2\hat{j} + \hat{k}$ on the sum of the two vectors $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $-\lambda\hat{i} + 2\hat{j} + 3\hat{k}$ is 1, then λ 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 : 88 Question Id : 86435120257 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The least positive integer n such that $\frac{(2i)^n}{(1-i)^{n-2}}$, $i = \sqrt{-1}$, is a positive integer, is _____.

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

Question Number : 89 Question Id : 86435120258 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let Q be the foot of the perpendicular from the point P(7, −2, 13) on the plane containing the lines $\frac{x+1}{6} = \frac{y-1}{7} = \frac{z-3}{8}$ and $\frac{x-1}{3} = \frac{y-2}{5} = \frac{z-3}{7}$.

Then $(PQ)^2$, 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 : 90 Question Id : 86435120259 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let $a_1, a_2, ..., a_{10}$ be an AP with common difference -3 and $b_1, b_2, ..., b_{10}$ be a GP with common ratio 2. Let $c_k = a_k + b_k$, $k = 1, 2, ..., 10$. If $c_2 = 12$ and $c_3 = 13$, then $\sum_{k=1}^{10} c_k$ is equal to _____.

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