National Testing Agency

Question Paper Name :   B Tech 25th July 2021 Shift1

Subject Name :   B TECH

Creation Date :   2021-07-25 15:16:43

Duration :   180

Total Marks :   300

Display Marks: Yes

B TECH

Group Number :   1

Group Id :   864351224

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 :   864351782

Section Number :   1

Section type :   Online

Mandatory or Optional :   Mandatory

Section Marks : 80

Enable Mark as Answered Mark for Review and Clear Response : Yes

Sub-Section Number : 1

Sub-Section Id : 8643511009

Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 86435118190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The half-life of ^{198}Au is 3 days. If atomic weight of ^{198}Au is 198 g/mol then the activity of 2 mg of ^{198}Au is [in disintegration/second] :

Options :

86435161151. 16.18×10^{12}

86435161152. 2.67×10^{12}

86435161153. 6.06×10^{18}

86435161154. 32.36×10^{12}

Question Number : 2 Question Id : 86435118191 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A parallel plate capacitor with plate area 'A' and distance of separation 'd' is filled with a dielectric. What is the capacity of the capacitor when permittivity of the dielectric varies as :

$$\varepsilon(x) = \varepsilon_0 + kx, \text{ for } \left(0 < x \le \frac{d}{2}\right)$$

$$\varepsilon(x) = \varepsilon_0 + k(d - x), \text{ for } \left(\frac{d}{2} \le x \le d\right)$$

Options :

86435161155. $\dfrac{kA}{2 \ln\left(\dfrac{2\varepsilon_0 + kd}{2\varepsilon_0}\right)}$

86435161156. $\dfrac{kA}{2} \ln\left(\dfrac{2\varepsilon_0}{2\varepsilon_0 - kd}\right)$

86435161157. $\left(\varepsilon_0 + \dfrac{kd}{2}\right)^{2/kA}$

86435161158. 0

Question Number : 3 Question Id : 86435118192 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Water droplets are coming from an open tap at a particular rate. The spacing between a droplet observed at 4th second after its fall to the next droplet is 34.3 m. At what rate the droplets are coming from the tap ? (Take g = 9.8 m/s²)

Options :

86435161159. 1 drop/second

86435161160. 2 drops/second

86435161161. 3 drops/2 seconds

86435161162. 1 drop/7 seconds

Question Number : 4 Question Id : 86435118193 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In Amplitude Modulation, the message signal

$$V_m(t) = 10 \sin(2\pi \times 10^5 t) \text{ volts and}$$

Carrier signal

$$V_c(t) = 20 \sin(2\pi \times 10^7 t) \text{ volts}$$

The modulated signal now contains the message signal with lower side band and upper side band frequency, therefore the bandwidth of modulated signal is α kHz.

The value of α is :

Options :

86435161163. 200 kHz

86435161164. 100 kHz

86435161165. 50 kHz

86435161166. 0

Question Number : 5 Question Id : 86435118194 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Some nuclei of a radioactive material are undergoing radioactive decay. The time gap between the instances when a quarter of the nuclei have decayed and when half of the nuclei have decayed is given as :

(where λ is the decay constant)

Options :

86435161167. $\dfrac{\ln \dfrac{3}{2}}{\lambda}$

86435161168. $\dfrac{1}{2} \dfrac{\ln 2}{\lambda}$

86435161169. $\dfrac{2\ln 2}{\lambda}$

86435161170. $\dfrac{\ln 2}{\lambda}$

Question Number : 6 Question Id : 86435118195 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

What should be the order of arrangement of de-Broglie wavelength of electron (λ_e), an α-particle (λ_α) and proton (λ_p) given that all have the same kinetic energy ?

Options :

86435161171. $\lambda_e < \lambda_p < \lambda_\alpha$

86435161172. $\lambda_e = \lambda_p = \lambda_\alpha$

86435161173.

$$\lambda_e > \lambda_p > \lambda_\alpha$$

86435161174. $\lambda_e = \lambda_p > \lambda_\alpha$

Question Number : 7 Question Id : 86435118196 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A particle of mass 4M at rest disintegrates into two particles of mass M and 3M respectively having non zero velocities. The ratio of de-Broglie wavelength of particle of mass M to that of mass 3M will be :

Options :

86435161175. $1 : 1$

86435161176. $1 : 3$

86435161177. $3 : 1$

86435161178. $1 : \sqrt{3}$

Question Number : 8 Question Id : 86435118197 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the Young's double slit experiment, the distance between the slits varies in time as $d(t) = d_0 + a_0 \sin \omega t$; where d_0, ω and a_0 are constants. The difference between the largest fringe width and the smallest fringe width obtained over time is given as :

Options :

86435161179. $\dfrac{\lambda D}{d_0^2}\, a_0$

86435161180. $\dfrac{2\lambda D\,(d_0)}{\left(d_0^2 - a_0^2\right)}$

86435161181. $\dfrac{\lambda D}{d_0 + a_0}$

86435161182. $\dfrac{2\lambda D a_0}{\left(d_0^2 - a_0^2\right)}$

Question Number : 9 Question Id : 86435118198 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A ray of laser of a wavelength 630 nm is incident at an angle of 30° at the diamond-air interface. It is going from diamond to air. The refractive index of diamond is 2.42 and that of air is 1. Choose the correct option.

Options :

86435161183. angle of refraction is 24.41°

86435161184. angle of refraction is 30°

86435161185. angle of refraction is 53.4°

86435161186. refraction is not possible

Question Number : 10 Question Id : 86435118199 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A linearly polarized electromagnetic wave in vacuum is

$$E = 3.1 \cos\left[(1.8)z - \left(5.4 \times 10^6\right)t\right]\hat{i} \ N/C$$

is incident normally on a perfectly reflecting wall at $z = a$. Choose the correct option

Options :

86435161187. The frequency of electromagnetic wave is 54×10^4 Hz.

86435161188. The reflected wave will be $3.1 \cos\left[(1.8)z + \left(5.4 \times 10^6\right)t\right]\hat{i} \ N/C$

86435161189. The transmitted wave will be $3.1 \cos\left[(1.8)z - \left(5.4 \times 10^6\right)t\right]\hat{i} \ N/C$
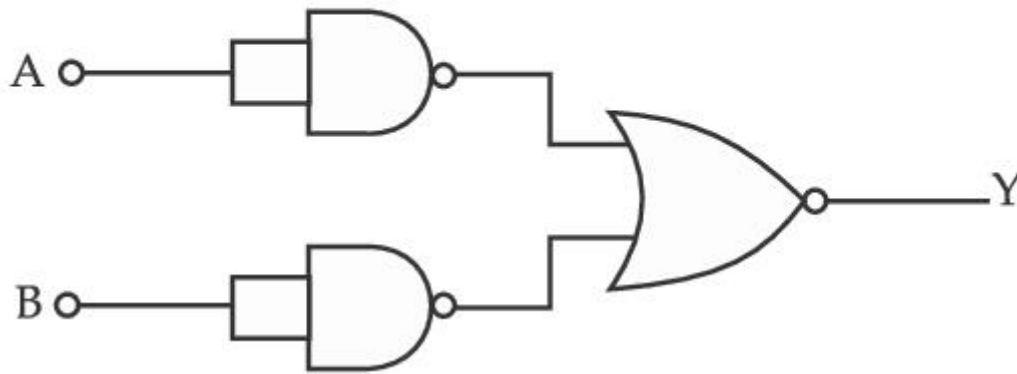
86435161190. The wavelength is 5.4 m

Question Number : 11 Question Id : 86435118200 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the given figure, there is a circuit of potentiometer of length AB = 10 m. The resistance per unit length is 0.1 Ω per cm. Across AB, a battery of emf E and internal resistance 'r' is connected. The maximum value of emf measured by this potentiometer is :

E r
+ |− ⎍ ⎍ww

Ⓖ

A ← 550 cm → J ← 450 cm → B

+ |− www ╱ K
6 V   20 Ω
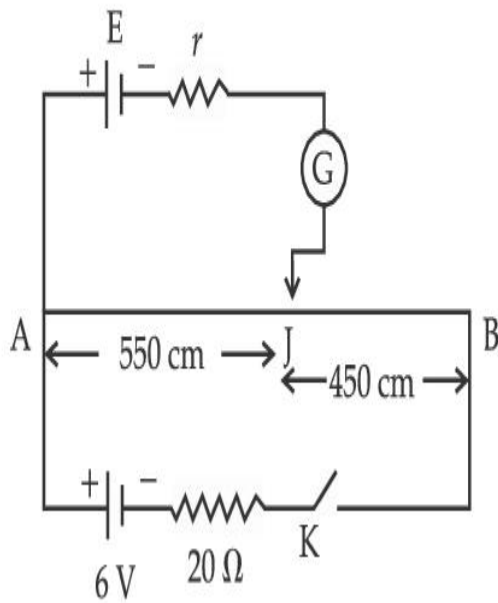
Options :

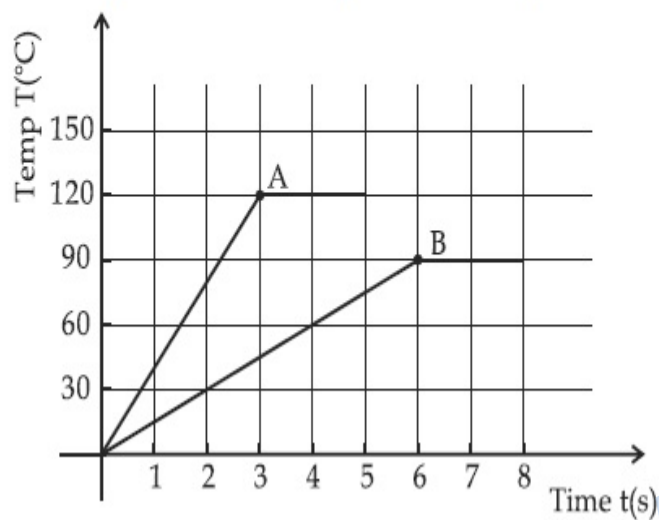86435161191. 2.25 V

86435161192. 2.75 V

86435161193. 5 V

86435161194. 6 V

Question Number : 12 Question Id : 86435118201 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Identify the logic operation carried out.

Options :

86435161195. AND

86435161196. NAND

86435161197. NOR

86435161198. OR

Question Number : 13 Question Id : 86435118202 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For a gas $C_p - C_V = R$ in a state P and $C_p - C_V = 1.10\ R$ in a state Q, T_P and T_Q are the temperatures in two different states P and Q respectively. Then

Options :

86435161199. $T_P > T_Q$

86435161200. $T_P < T_Q$

86435161201. $T_P = T_Q$

86435161202. $T_P = 0.9 \, T_Q$

Question Number : 14 Question Id : 86435118203 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two different metal bodies A and B of equal mass are heated at a uniform rate under similar conditions. The variation of temperature of the bodies is graphically represented as shown in the figure. The ratio of specific heat capacities is :

Options :

86435161203. $\dfrac{8}{3}$

86435161204. $\dfrac{4}{3}$

86435161205. $\dfrac{3}{4}$

86435161206. $\dfrac{3}{8}$

Question Number : 15 Question Id : 86435118204 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 : Moment of inertia of a circular disc of mass 'M' and radius 'R' about X, Y axes (passing through its plane) and Z-axis which is perpendicular to its plane were found to be I_x, I_y & I_z respectively. The respective radii of gyration about all the three axes will be the same.

Reason R : A rigid body making rotational motion has fixed mass and shape.

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

Options :

86435161207. Both **A** and **R** are correct and **R** is the correct explanation of **A**.

86435161208. Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**.

86435161209. **A** is correct but **R** is not correct.

86435161210. **A** is not correct but **R** is correct.

Question Number : 16 Question Id : 86435118205 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two billiard balls of equal mass 30 g strike a rigid wall with same speed of 108 kmph (as shown) but at different angles. If the balls get reflected with the same speed then the ratio of the magnitude of impulses imparted to ball 'a' and ball 'b' by the wall along 'X' direction is :

ball (a)   ball (b)
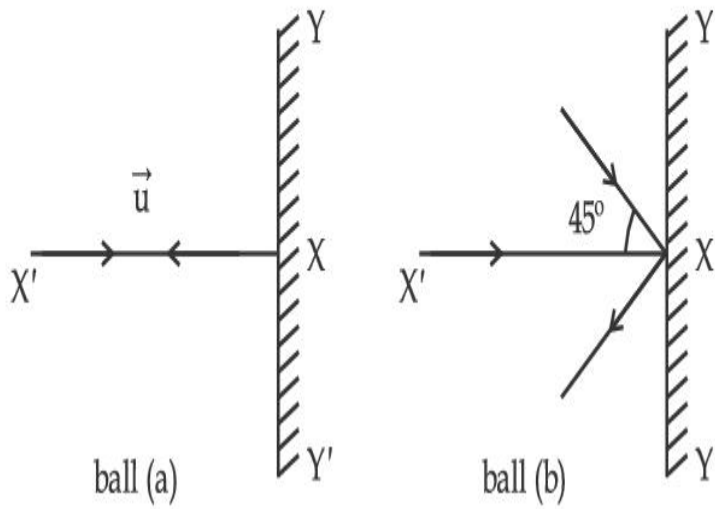
Options :

86435161211. $1 : \sqrt{2}$

86435161212. $1 : 1$

86435161213. $2 : 1$

86435161214. $\sqrt{2} : 1$

Question Number : 17 Question Id : 86435118206 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) $\vec{C} - \vec{A} - \vec{B} = 0$	(i)
(b) $\vec{A} - \vec{C} - \vec{B} = 0$	(ii)
(c) $\vec{B} - \vec{A} - \vec{C} = 0$	(iii)
(d) $\vec{A} + \vec{B} = -\vec{C}$	(iv)

Choose the correct answer from the options given below :

Options :

86435161215. (a) → (iv), (b) → (iii), (c) → (i), (d) → (ii)

86435161216. (a) → (iii), (b) → (ii), (c) → (iv), (d) → (i)

86435161217. (a) → (iv), (b) → (i), (c) → (iii), (d) → (ii)

86435161218. (a) → (i), (b) → (iv), (c) → (ii), (d) → (iii)

Question Number : 18 Question Id : 86435118207 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two wires of same length and radius are joined end to end and loaded. The Young's modulii of the materials of the two wires are Y_1 and Y_2. The combination behaves as a single wire then its Young's modulus is :

Options :

86435161219. $Y = \dfrac{Y_1 Y_2}{Y_1 + Y_2}$

86435161220. $Y = \dfrac{Y_1 Y_2}{2(Y_1 + Y_2)}$

86435161221. $Y = \dfrac{2Y_1 Y_2}{Y_1 + Y_2}$

86435161222. $Y = \dfrac{2Y_1 Y_2}{3(Y_1 + Y_2)}$

Question Number : 19 Question Id : 86435118208 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The minimum and maximum distances of a planet revolving around the Sun are x_1 and x_2. If the minimum speed of the planet on its trajectory is v_0 then its maximum speed will be :

Options :

86435161223. $\dfrac{v_0 x_2^2}{x_1^2}$

86435161224. $\dfrac{v_0\, x_1}{x_2}$

86435161225. $\dfrac{v_0\, x_2}{x_1}$

86435161226. $\dfrac{v_0\, x_1^2}{x_2^2}$

Question Number : 20 Question Id : 86435118209 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A monoatomic ideal gas, initially at temperature T_1 is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed to expand adiabatically to a temperature T_2 by releasing the piston suddenly. If l_1 and l_2 are the lengths of the gas column, before and after the expansion respectively, then the value of $\dfrac{T_1}{T_2}$ will be :

Options :

86435161227. $\dfrac{l_1}{l_2}$

86435161228. $\dfrac{l_2}{l_1}$

86435161229. $\left(\dfrac{l_1}{l_2}\right)^{\frac{2}{3}}$

86435161230. $\left(\dfrac{l_2}{l_1}\right)^{\frac{2}{3}}$

Physics Section B

Section Id :	864351783
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 :	8643511010
Question Shuffling Allowed :	Yes

Question Number : 21 Question Id : 86435118210 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A body of mass 2 kg moving with a speed of 4 m/s. makes an elastic collision with another body at rest and continues to move in the original direction but with one fourth of its initial speed. The speed of the two body centre of mass is $\dfrac{x}{10}$ m/s. Then the value of x is _____.

Response Type : Numeric

Evaluation Required For SA : Yes
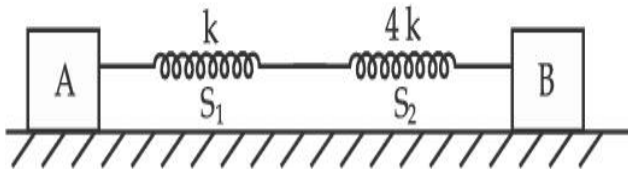
Question Number : 22 Question Id : 86435118211 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In the reported figure, two bodies A and B of masses 200 g and 800 g are attached with the system of springs. Springs are kept in a stretched position with some extension when the system is released. The horizontal surface is assumed to be frictionless. The angular frequency will be _____ rad/s when k=20 N/m.

Response Type : Numeric

Evaluation Required For SA : Yes

Question Number : 23 Question Id : 86435118212 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A pendulum bob has a speed of 3 m/s at its lowest position. The pendulum is 50 cm long. The speed of bob, when the length makes an angle of 60° to the vertical will be $(g=10 \text{ m/s}^2)$ _____ m/s.

Response Type : Numeric

Evaluation Required For SA : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 24 Question Id : 86435118213 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An inductor of 10 mH is connected to a 20 V battery through a resistor of 10 kΩ and a switch. After a long time, when maximum current is set up in the circuit, the current is switched off. The current in the circuit after 1 μs is $\frac{x}{100}$ mA. Then x is equal to _____.

(Take $e^{-1} = 0.37$)

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 : 86435118214 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A particle of mass 'm' is moving in time 't' on a trajectory given by

$$\vec{r} = 10\,\alpha t^2\,\hat{i} + 5\beta(t - 5)\,\hat{j}$$

Where α and β are dimensional constants.

The angular momentum of the particle becomes the same as it was for $t=0$ at time $t=$ _____ seconds.

Response Type : Numeric

Evaluation Required For SA : Yes

Question Number : 26 Question Id : 86435118215 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A circular conducting coil of radius 1 m is being heated by the change of magnetic field $\vec{B}$ passing perpendicular to the plane in which the coil is laid. The resistance of the coil is 2 μΩ. The magnetic field is slowly switched off such that its magnitude changes in time as

$$B = \frac{4}{\pi} \times 10^{-3} T \left(1 - \frac{t}{100}\right)$$

The energy dissipated by the coil before the magnetic field is switched off completely is E = _____ mJ.

Response Type : Numeric

Evaluation Required For SA : Yes

Question Number : 27 Question Id : 86435118216 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An electric bulb rated as 200 W at 100 V is used in a circuit having 200 V supply. The resistance 'R' that must be put in series with the bulb so that the bulb delivers the same power is _____ Ω.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 28 Question Id : 86435118217 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A particle of mass 1 mg and charge q is lying at the mid-point of two stationary particles kept at a distance '2 m' when each is carrying same charge 'q'. If the free charged particle is displaced from its equilibrium position through distance 'x' ($x \ll 1$ m). The particle executes SHM. Its angular frequency of oscillation will be _____ $\times 10^5$ rad/s if $q^2 = 10$ C^2.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText
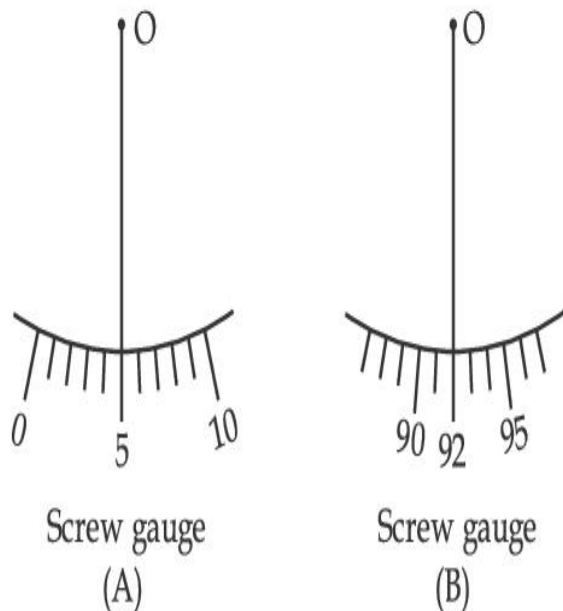
Possible Answers :

1

Question Number : 29 Question Id : 86435118218 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Student A and Student B used two screw gauges of equal pitch and 100 equal circular divisions to measure the radius of a given wire. The actual value of the radius of the wire is 0.322 cm. The absolute value of the difference between the final circular scale readings observed by the students A and B is _____.

[Figure shows position of reference 'O' when jaws of screw gauge are closed]

Given pitch = 0.1 cm.

Screw gauge   Screw gauge
     (A)   (B)

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 : 86435118219 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The value of aluminium susceptibility is 2.2×10^{-5}. The percentage increase in the magnetic field if space within a current carrying toroid is filled with Aluminium is $\dfrac{x}{10^4}$. Then the value of x is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Chemistry Section A

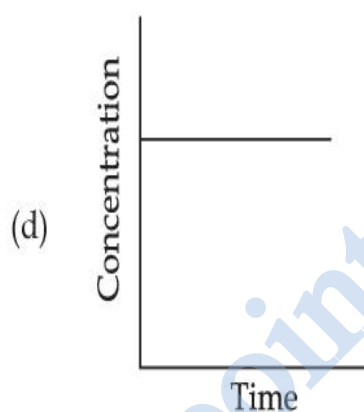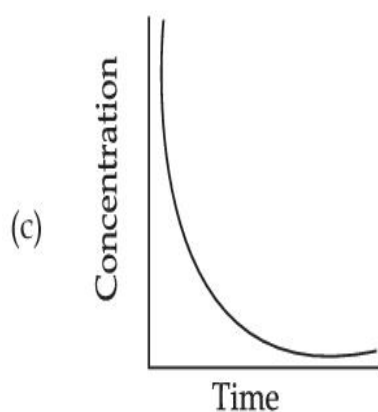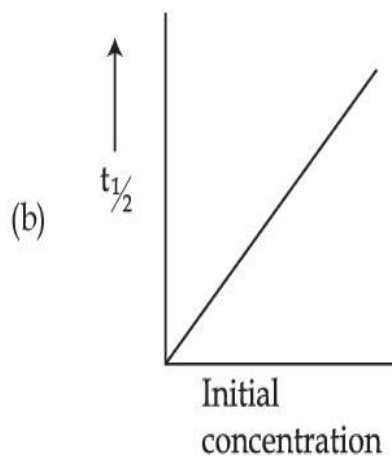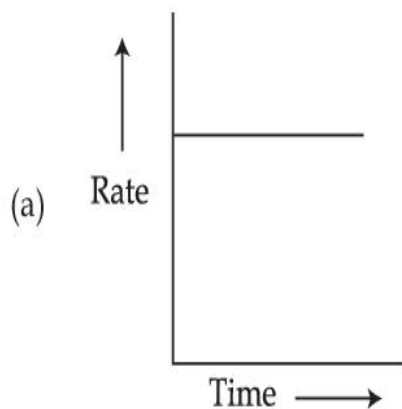|	
Section Id :	864351784
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511011
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 86435118220 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the following graphs,

(a) Rate vs Time →

(b) $t_{1/2}$ vs Initial concentration

(c) Concentration vs Time

(d) Concentration vs Time

(e) Rate vs Concentration
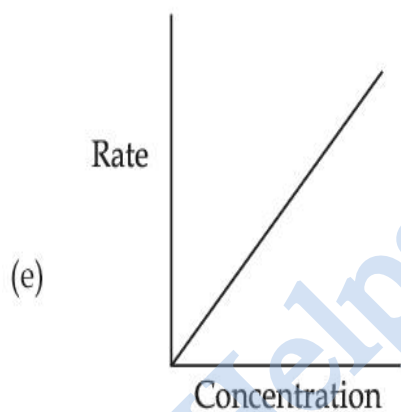
Choose from the options given below, the **correct** one regarding order of reaction is :

Options :

86435161241.
(a) and (b) Zero order
(c) and (e) First order

86435161242.
(a) and (b) Zero order
(e) First order

86435161243.
(b) Zero order
(c) and (e) First order

86435161244.
(b) and (d) Zero order
(e) First order

Question Number : 32 Question Id : 86435118221 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Sodium stearate $CH_3(CH_2)_{16}COO^-Na^+$ is an anionic surfactant which forms micelles in oil.
Choose the **correct** statement for it from the following :

Options :

86435161245.
It forms spherical micelles with $CH_3(CH_2)_{16}-$ group pointing outwards on the surface of sphere.

86435161246.
It forms non-spherical micelles with $-COO^\ominus$ group pointing outwards on the surface.

86435161247.
It forms spherical micelles with $CH_3(CH_2)_{16}-$ group pointing towards the centre of sphere.

86435161248.
It forms non-spherical micelles with $CH_3(CH_2)_{16}-$ group pointing towards the centre.

Question Number : 33 Question Id : 86435118222 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The ionic radii of K^+, Na^+, Al^{3+} and Mg^{2+} are in the order :

Options :

86435161249. $K^+ < Al^{3+} < Mg^{2+} < Na^+$

86435161250. $Na^+ < K^+ < Mg^{2+} < Al^{3+}$

86435161251. $Al^{3+} < Mg^{2+} < Na^+ < K^+$

86435161252. $Al^{3+} < Mg^{2+} < K^+ < Na^+$

Question Number : 34 Question Id : 86435118223 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the leaching of alumina from bauxite, the ore expected to leach out in the process by reacting with NaOH is :

Options :

86435161253. SiO_2

86435161254. TiO_2

86435161255. Fe_2O_3

86435161256. ZnO

Question Number : 35 Question Id : 86435118224 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

At 298.2 K the relationship between enthalpy of bond dissociation (in kJ mol^{-1}) for hydrogen (E_H) and its isotope, deuterium (E_D), is best described by :

Options :

86435161257. $E_H = E_D$

86435161258. $E_H \simeq E_D - 7.5$

86435161259. $E_H = 2E_D$

86435161260. $E_H = \dfrac{1}{2}E_D$

Question Number : 36 Question Id : 86435118225 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : None of the alkaline earth metal hydroxides dissolve in alkali.

Statement II : Solubility of alkaline earth metal hydroxides in water increases down the group.

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

Options :

86435161261. **Statement I** and **Statement II** both are correct.

86435161262. **Statement I** and **Statement II** both are incorrect.

86435161263. **Statement I** is correct but **Statement II** is incorrect.

86435161264. **Statement I** is incorrect but **Statement II** is correct.

Question Number : 37 Question Id : 86435118226 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following compounds of Group-14 elements is **not** known ?

Options :

86435161265. $[SiF_6]^{2-}$

86435161266. $[SiCl_6]^{2-}$

86435161267. $[GeCl_6]^{2-}$

86435161268. $[Sn(OH)_6]^{2-}$

Question Number : 38 Question Id : 86435118227 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The correct order of following 3d metal oxides, according to their oxidation numbers is :

(a) CrO_3
(b) Fe_2O_3
(c) MnO_2
(d) V_2O_5
(e) Cu_2O

Options :

86435161269. (a) > (c) > (d) > (b) > (e)

86435161270. $(a) > (d) > (c) > (b) > (e)$

86435161271. $(d) > (a) > (b) > (c) > (e)$

86435161272. $(c) > (a) > (d) > (e) > (b)$

Question Number : 39 Question Id : 86435118228 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following species responds to an external magnetic field ?

Options :

86435161273. $[Fe(H_2O)_6]^{3+}$

86435161274. $[Ni(CN)_4]^{2-}$

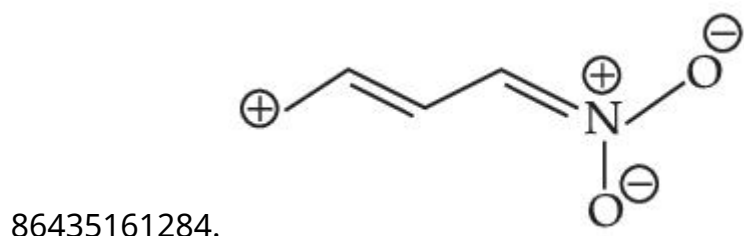86435161275. $[Co(CN)_6]^{3-}$

86435161276. $[Ni(CO)_4]$

Question Number : 40 Question Id : 86435118229 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following chemical agent is **not** being used for dry-cleaning of clothes ?

Options :

86435161277. CCl_4

86435161278. $Cl_2C = CCl_2$

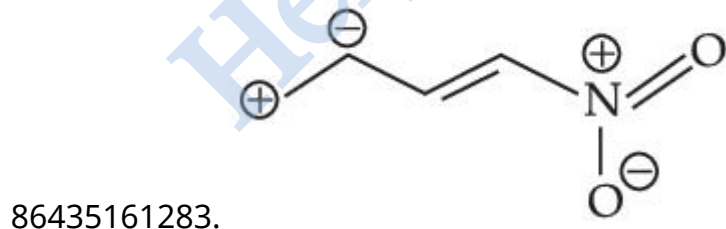86435161279. Liquid CO_2
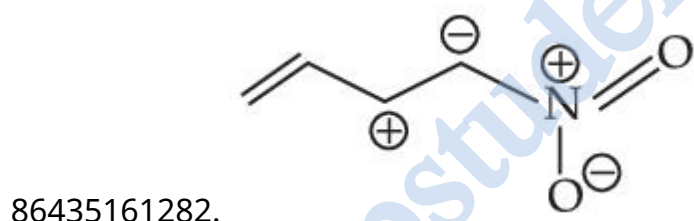
86435161280. H_2O_2

Question Number : 41 Question Id : 86435118230 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one among the following resonating structures is **not** correct ?

Options :

86435161281.

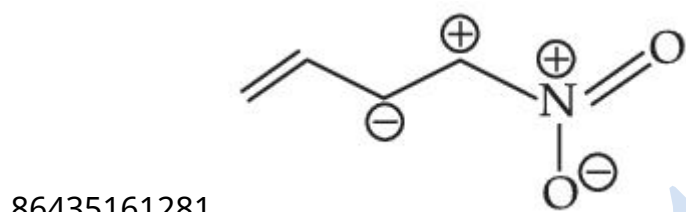86435161282.

86435161283.

86435161284.

Question Number : 42 Question Id : 86435118231 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An Organic compound 'A' C_4H_8 on treatment with $KMnO_4/H^+$ yields compound 'B' C_3H_6O. Compound 'A' also yields compound 'B' an ozonolysis. Compound 'A' is :

Options :

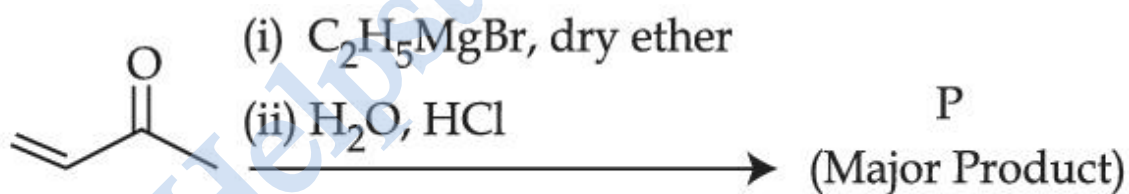86435161285. But-2-ene

86435161286. Cyclobutane

86435161287. 2-Methylpropene

86435161288. 1-Methylcyclopropane

Question Number : 43 Question Id : 86435118232 Question Type : MCQ Option Shuffling : Yes
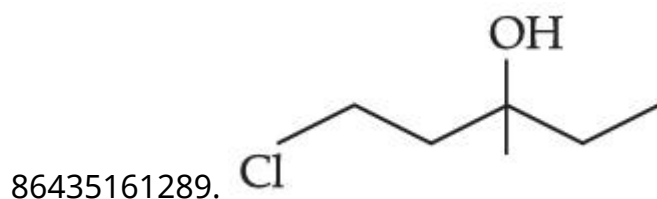
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the above reaction, the major product 'P' is :

Options :

86435161289.

86435161290.

OH

86435161291.

OH

86435161292.

OH
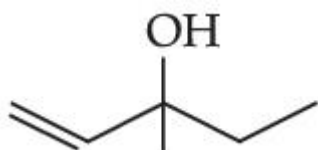
Question Number : 44 Question Id : 86435118233 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the given reaction, the product 'X' is :

Options :
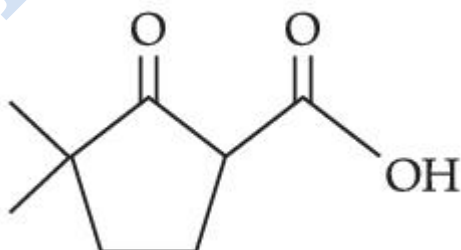
86435161293.

86435161294.

86435161295.
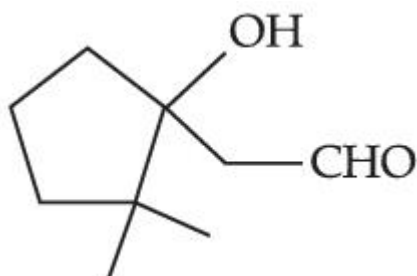
86435161296.

Question Number : 45 Question Id : 86435118234 Question Type : MCQ Option Shuffling : Yes

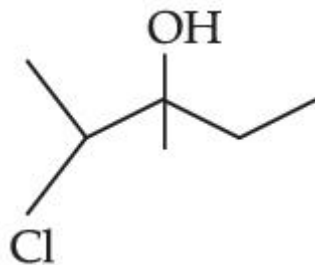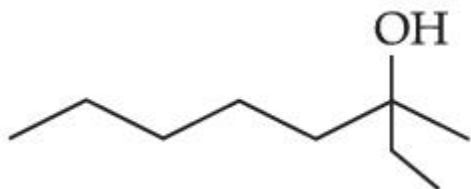**Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1
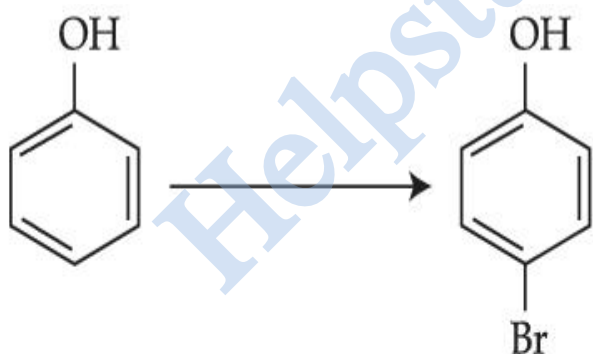
(Major Product)

The given reaction can occur in the presence of :

(a) Bromine water

(b) Br_2 in CS_2, 273 K

(c) $Br_2/FeBr_3$

(d) Br_2 in $CHCl_3$, 273 K

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

Options :

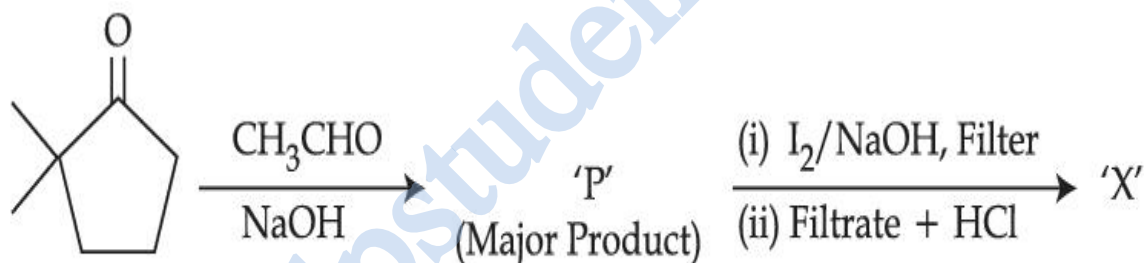**Question Number : 46 Question Id : 86435118235 Question Type : MCQ Option Shuffling : Yes**

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the products of the following reactions **does not** react with Hinsberg reagent to form sulphonamide ?

Options :

86435161301.

$$\text{(4-cyanobenzaldehyde)} + \text{LiAlH}_4 \xrightarrow{\text{H}_3\text{O}^{\oplus}}$$

86435161302.

$$\text{(benzonitrile)} + \text{SnCl}_2 + \text{HCl} \longrightarrow$$

86435161303.

$$+ \ H_2/Ni \longrightarrow$$

$$+ \ Na/Hg \ \xrightarrow{C_2H_5OH}$$

86435161304.

Question Number : 47 Question Id : 86435118236 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

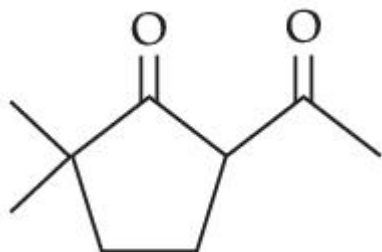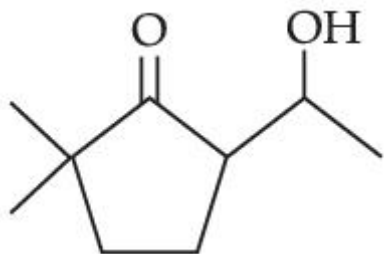**Correct Marks : 4 Wrong Marks : 1**

Given below are two statements, one is labelled as **Assertion (A)** and other is labelled as **Reason (R)**.

Assertion (A) : Gabriel phthalimide synthesis cannot be used to prepare aromatic primary amines.

Reason (R) : Aryl halides do not undergo nucleophilic substitution reaction.

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

Options :

86435161305. Both **(A)** and **(R)** are true and **(R)** is correct explanation of **(A)**.

86435161306. Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.

86435161307. **(A)** is true but **(R)** is false.

86435161308. **(A)** is false but **(R)** is true.

Question Number : 48 Question Id : 86435118237 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\left(-CH_2-\underset{\underset{\text{(OH)}}{|}}{\bigcirc}-CH_2-\underset{\underset{\text{(OH)}}{|}}{\bigcirc}-CH_2-\right)$$ is a repeating unit for :
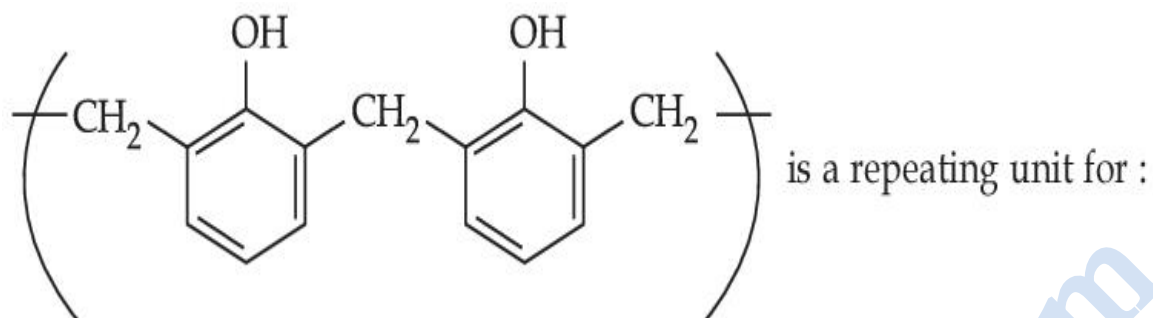
Options :

86435161309. Neoprene

86435161310. Buna-N

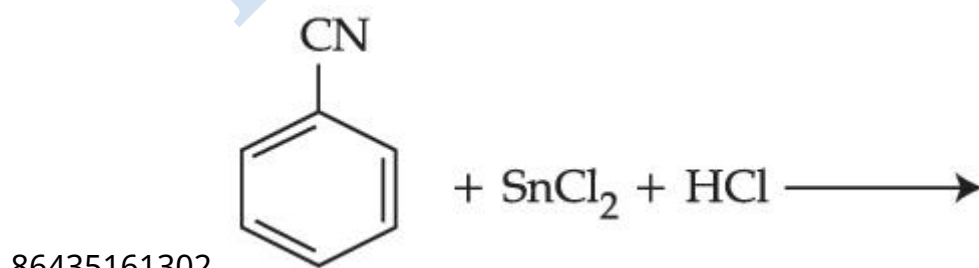86435161311. Novolac

86435161312. Acrilan

Question Number : 49 Question Id : 86435118238 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The water soluble protein is :

Options :

86435161313. Myosin

86435161314. Fibrin

86435161315. Collagen

86435161316. Albumin

Question Number : 50 Question Id : 86435118239 Question Type : MCQ Option Shuffling : Yes
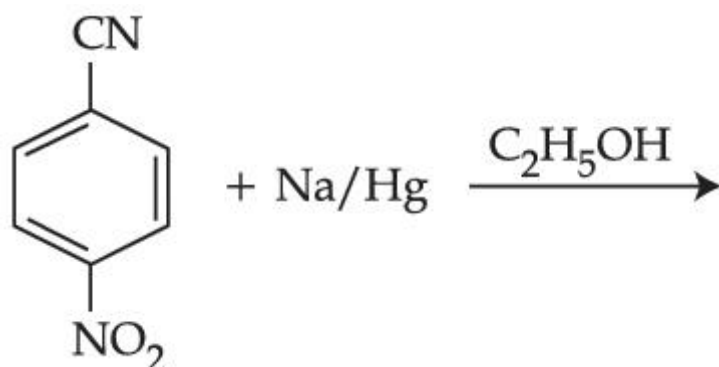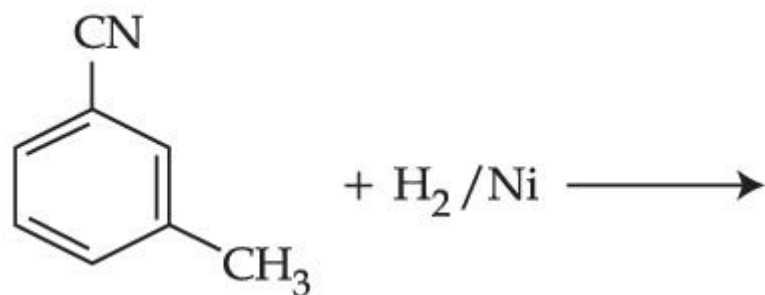
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following compounds will liberate CO_2, when treated with $NaHCO_3$?

Options :

86435161317.

$$CH_3-\overset{\overset{\displaystyle O}{\|}}{C}-NH_2$$

86435161318. CH_3NH_2

86435161319. $(CH_3)_4 \overset{\oplus}{N} \overset{\ominus}{O} H$

86435161320. $(CH_3)_3 \overset{\oplus}{N} H \overset{\ominus}{C} l$

Chemistry Section B

Section Id :	864351785
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory

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 :	8643511012
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 86435118240 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

When 10 mL of an aqueous solution of Fe^{2+} ions was titrated in the presence of dil H_2SO_4 using diphenylamine indicator, 15 mL of 0.02 M solution of $K_2Cr_2O_7$ was required to get the end point. The molarity of the solution containing Fe^{2+} ions is $x \times 10^{-2}$ M. The value of x 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 : 52 Question Id : 86435118241 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A home owner uses 4.00×10^3 m^3 of methane (CH_4) gas, (assume CH_4 is an ideal gas) in a year to heat his home. Under the pressure of 1.0 atm and 300 K, mass of gas used is $x \times 10^5$ g. The value of x is _____. (Nearest integer)

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

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 53 Question Id : 86435118242 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A source of monochromatic radiation of wavelength 400 nm provides 1000 J of energy in 10 seconds. When this radiation falls on the surface of sodium, $x \times 10^{20}$ electrons are ejected per second. Assume that wavelength 400 nm is sufficient for ejection of electron from the surface of sodium metal. The value of x is _____. (Nearest integer)

$(h = 6.626 \times 10^{-34} \text{ Js})$

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 : 86435118243 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of sigma bonds in

$$H_3C - \underset{\underset{H}{|}}{C} = CH - C \equiv C - H \text{ is } \underline{\hspace{2cm}}.$$

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 : 86435118244 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

At 298 K, the enthalpy of fusion of a solid (X) is 2.8 kJ mol^{-1} and the enthalpy of vaporisation of the liquid (X) is 98.2 kJ mol^{-1}. The enthalpy of sublimation of the substance (X) in kJ mol^{-1} is _____. (in 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 : 86435118245 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

CO_2 gas is bubbled through water during a soft drink manufacturing process at 298 K. If CO_2 exerts a partial pressure of 0.835 bar then x m mol of CO_2 would dissolve in 0.9 L of water. The value of x is _____. (Nearest integer)

(Henry's law constant for CO_2 at 298 K is 1.67×10^3 bar)

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 : 86435118246 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction

$$A + B \rightleftharpoons 2C$$

the value of equilibrium constant is 100 at 298 K. If the initial concentration of all the three species is 1 M each, then the equilibrium concentration of C is $x \times 10^{-1}$ M. The value of x is _____. (Nearest integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes
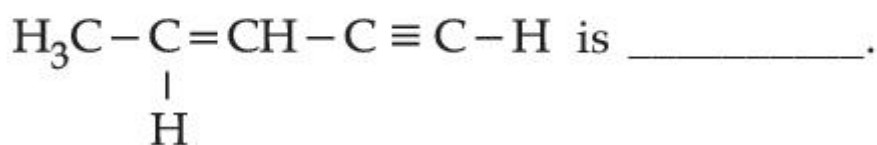
Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 58 Question Id : 86435118247 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the cell at 25℃

$$Zn \,|\, Zn^{2+}(aq),\ (1\ M) \,||\, Fe^{3+}(aq),\ Fe^{2+}(aq) \,|\, Pt(s)$$

The fraction of total iron present as Fe^{3+} ion at the cell potential of 1.500 V is $x \times 10^{-2}$. The value of x is _____. (Nearest integer)

(Given : $E^0_{Fe^{3+}/Fe^{2+}} = 0.77$ V, $E^0_{Zn^{2+}/Zn} = -0.76$ V)

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 : 86435118248 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the complete combustion of butane, the amount of butane utilized to produce 72.0 g of water is _____ $\times 10^{-1}$ g. (in nearest integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes
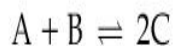
Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 60 Question Id : 86435118249 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Three moles of AgCl get precipitated when one mole of an octahedral co-ordination compound with empirical formula $CrCl_3.3NH_3.3H_2O$ reacts with excess of silver nitrate. The number of chloride ions satisfying the secondary valency of the metal ion is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes
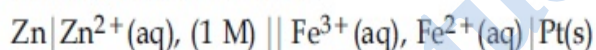
Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Mathematics Section A

Section Id :	864351786
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 :	8643511013
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 86435118250 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let an ellipse $E : \dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$, $a^2 > b^2$, passes through $\left(\sqrt{\dfrac{3}{2}}, 1\right)$ and has eccentricity $\dfrac{1}{\sqrt{3}}$. If a circle, centered at focus $F(\alpha, 0)$, $\alpha > 0$, of E and radius $\dfrac{2}{\sqrt{3}}$, intersects E at two points P and Q, then PQ^2 is equal to :

Options :

86435161331. $\dfrac{8}{3}$

86435161332. $\dfrac{4}{3}$

86435161333. $\dfrac{16}{3}$

86435161334. 3

Question Number : 62 Question Id : 86435118251 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $y = y(x)$ be the solution of the differential equation

$$\frac{dy}{dx} = 1 + x\, e^{y-x}, \quad -\sqrt{2} < x < \sqrt{2}, \quad y(0) = 0$$

then, the minimum value of $y(x)$, $x \in \left(-\sqrt{2}, \sqrt{2}\right)$ is equal to :

Options :

86435161335. $\left(1 - \sqrt{3}\right) - \log_e\left(\sqrt{3} - 1\right)$

86435161336. $\left(1 + \sqrt{3}\right) - \log_e\left(\sqrt{3} - 1\right)$

86435161337. $\left(2 - \sqrt{3}\right) - \log_e 2$

86435161338. $\left(2 + \sqrt{3}\right) + \log_e 2$

Question Number : 63 Question Id : 86435118252 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The area (in sq. units) of the region, given by the set
$\{(x, y) \in \mathbf{R} \times \mathbf{R} \mid x \geq 0,\ 2x^2 \leq y \leq 4 - 2x\}$ is :

Options :

86435161339. $\dfrac{7}{3}$

86435161340. $\dfrac{8}{3}$

86435161341. $\dfrac{13}{3}$

86435161342. $\dfrac{17}{3}$

Question Number : 64 Question Id : 86435118253 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f : [0, \infty) \to [0, \infty)$ be defined as

$$f(x) = \int_0^x [y]\, dy$$

where $[x]$ is the greatest integer less than or equal to x. Which of the following is true ?

Options :

86435161343. f is differentiable at every point in $[0, \infty)$.

86435161344. f is continuous at every point in $[0, \infty)$ and differentiable except at the integer points.

86435161345. f is continuous everywhere except at the integer points in $[0, \infty)$.

86435161346. f is both continuous and differentiable except at the integer points in $[0, \infty)$.

Question Number : 65 Question Id : 86435118254 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f : \mathbf{R} \to \mathbf{R}$ be defined as

$$f(x) = \begin{cases} \dfrac{\lambda |x^2 - 5x + 6|}{\mu(5x - x^2 - 6)} & , x < 2 \\[4mm] e^{\frac{\tan(x-2)}{x - [x]}} & , x > 2 \\[4mm] \mu & , x = 2 \end{cases}$$

where [x] is the greatest integer less than or equal to x. If f is continuous at x = 2, then $\lambda + \mu$ is equal to :

Options :

86435161347. 1

86435161348. $2e - 1$

86435161349. $e(e - 2)$

86435161350. $e(-e + 1)$

Question Number : 66 Question Id : 86435118255 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $g : \mathbf{N} \to \mathbf{N}$ be defined as

$g(3n + 1) = 3n + 2,$

$g(3n + 2) = 3n + 3,$

$g(3n + 3) = 3n + 1,$ for all $n \geqslant 0.$

Then which of the following statements is true ?

Options :

86435161351. $g \circ g \circ g = g$

86435161352. There exists a one-one function $f : \mathbf{N} \to \mathbf{N}$ such that $fog = f$

86435161353. There exists an onto function $f : \mathbf{N} \to \mathbf{N}$ such that $fog = f$

86435161354. There exists a function $f : \mathbf{N} \to \mathbf{N}$ such that $gof = f$

Question Number : 67 Question Id : 86435118256 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f(x) = 3\sin^4 x + 10\sin^3 x + 6\sin^2 x - 3$, $x \in \left[-\dfrac{\pi}{6}, \dfrac{\pi}{2} \right]$. Then, f is :

Options :

86435161355. increasing in $\left(-\dfrac{\pi}{6}, 0 \right)$

86435161356. decreasing in $\left(0, \dfrac{\pi}{2} \right)$

86435161357. increasing in $\left(-\dfrac{\pi}{6}, \dfrac{\pi}{2} \right)$

86435161358. decreasing in $\left(-\dfrac{\pi}{6}, 0 \right)$

Question Number : 68 Question Id : 86435118257 Question Type : MCQ Option Shuffling : Yes

Correct Marks : 4 Wrong Marks : 1

Let a parabola P be such that its vertex and focus lie on the positive x-axis at a distance 2 and 4 units from the origin, respectively. If tangents are drawn from O(0, 0) to the parabola P which meet P at S and R, then the area (in sq. units) of $\triangle$SOR is equal to :

Options :

86435161359. 16

86435161360. $16\sqrt{2}$

86435161361. $8\sqrt{2}$

86435161362. 32

Question Number : 69 Question Id : 86435118258 Question Type : MCQ Option Shuffling : Yes

Correct Marks : 4 Wrong Marks : 1

Let the foot of perpendicular from a point P(1, 2, −1) to the straight line $L : \dfrac{x}{1} = \dfrac{y}{0} = \dfrac{z}{-1}$ be N. Let a line be drawn from P parallel to the plane $x + y + 2z = 0$ which meets L at point Q. If α is the acute angle between the lines PN and PQ, then $\cos\alpha$ is equal to _____.

Options :

86435161363. $\dfrac{\sqrt{3}}{2}$

86435161364. $\dfrac{1}{\sqrt{3}}$

86435161365.

$$\frac{1}{\sqrt{5}}$$

86435161366. $$\frac{1}{2\sqrt{3}}$$

Question Number : 70 Question Id : 86435118259 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If b is very small as compared to the value of a, so that the cube and other higher powers of

$\dfrac{b}{a}$ can be neglected in the identity

$$\frac{1}{a-b} + \frac{1}{a-2b} + \frac{1}{a-3b} + \ldots + \frac{1}{a-nb} = \alpha n + \beta n^2 + \gamma n^3,$$

then the value of γ is :

Options :

86435161367. $$\frac{a+b}{3a^2}$$

86435161368. $$\frac{a+b^2}{3a^3}$$

86435161369. $$\frac{a^2+b}{3a^3}$$

86435161370. $$\frac{b^2}{3a^3}$$

Question Number : 71 Question Id : 86435118260 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let the vectors

$$(2 + a + b)\hat{i} + (a + 2b + c)\hat{j} - (b + c)\hat{k},$$

$$(1 + b)\hat{i} + 2b\hat{j} - b\hat{k} \text{ and } (2 + b)\hat{i} + 2b\hat{j} + (1 - b)\hat{k}, \text{ a, b, c} \in \mathbf{R}$$

be co-planar. Then which of the following is true ?

Options :

86435161371. $2b = a + c$

86435161372. $2a = b + c$

86435161373. $3c = a + b$

86435161374. $a = b + 2c$

Question Number : 72 Question Id : 86435118261 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of real roots of the equation
$e^{6x} - e^{4x} - 2e^{3x} - 12e^{2x} + e^x + 1 = 0$ is :

Options :

86435161375. 1

86435161376. 2

86435161377. 4

86435161378. 6

Question Number : 73 Question Id : 86435118262 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A spherical gas balloon of radius 16 meter subtends an angle 60° at the eye of the observer A while the angle of elevation of its center from the eye of A is 75°. Then the height (in meter) of the top most point of the balloon from the level of the observer's eye is :

Options :

86435161379. $8(2 + 2\sqrt{3} + \sqrt{2})$

86435161380. $8(\sqrt{6} + \sqrt{2} + 2)$

86435161381. $8(\sqrt{6} - \sqrt{2} + 2)$

86435161382. $8(\sqrt{2} + 2 + \sqrt{3})$

Question Number : 74 Question Id : 86435118263 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let 9 distinct balls be distributed among 4 boxes, B_1, B_2, B_3 and B_4. If the probability that B_3

contains exactly 3 balls is $k\left(\dfrac{3}{4}\right)^9$ then k lies in the set :

Options :

86435161383. $\{x \in \mathbf{R} : |x-1| < 1\}$

86435161384. $\{x \in \mathbf{R} : |x-2| \leq 1\}$

86435161385. $\{x \in \mathbf{R} : |x-3| < 1\}$

86435161386. $\{x \in \mathbf{R} : |x-5| \leq 1\}$

Question Number : 75 Question Id : 86435118264 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The locus of the centroid of the triangle formed by any point P on the hyperbola $16x^2 - 9y^2 + 32x + 36y - 164 = 0$, and its foci is :

Options :

86435161387. $9x^2 - 16y^2 + 36x + 32y - 36 = 0$

86435161388. $16x^2 - 9y^2 + 32x + 36y - 144 = 0$

86435161389. $9x^2 - 16y^2 + 36x + 32y - 144 = 0$

86435161390. $16x^2 - 9y^2 + 32x + 36y - 36 = 0$

Question Number : 76 Question Id : 86435118265 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let S_n be the sum of the first n terms of an arithmetic progression. If $S_{3n} = 3S_{2n}$, then the value of $\dfrac{S_{4n}}{S_{2n}}$ is :

Options :

86435161391. 2

86435161392. 4

86435161393. 6

86435161394. 8

Question Number : 77 Question Id : 86435118266 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The Boolean expression

$(p \Rightarrow q) \wedge (q \Rightarrow \sim p)$ is equivalent to :

Options :

86435161395. p

86435161396. q

86435161397. ~ p

86435161398. ~ q

Question Number : 78 Question Id : 86435118267 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of the definite integral

$$\int_{\pi/24}^{5\pi/24} \frac{dx}{1 + \sqrt[3]{\tan 2x}} \text{ is :}$$

Options :

86435161399. $\dfrac{\pi}{18}$

86435161400. $\dfrac{\pi}{3}$

86435161401. $\dfrac{\pi}{12}$

86435161402. $\dfrac{\pi}{6}$

Question Number : 79 Question Id : 86435118268 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The values of a and b, for which the system of equations

$$2x + 3y + 6z = 8$$
$$x + 2y + az = 5$$
$$3x + 5y + 9z = b$$

has no solution, are :

Options :

86435161403. $a \neq 3, b = 3$

86435161404. $a = 3,\ b \neq 13$

86435161405. $a = 3,\ b = 13$

86435161406. $a \neq 3,\ b \neq 13$

Question Number : 80 Question Id : 86435118269 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The sum of all values of x in $[0, 2\pi]$, for which $\sin x + \sin 2x + \sin 3x + \sin 4x = 0$, is equal to :

Options :

86435161407. 8π

86435161408. 9π

86435161409. 11π

86435161410. 12π

Mathematics Section B

Section Id :	864351787
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   Yes

Clear Response :

Sub-Section Number :   1

Sub-Section Id :   8643511014

Question Shuffling Allowed :   Yes

Question Number : 81 Question Id : 86435118270 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The term independent of 'x' in the expansion of $\left(\dfrac{x+1}{x^{2/3} - x^{1/3} + 1} - \dfrac{x-1}{x - x^{1/2}} \right)^{10}$, where $x \neq 0, 1$

is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 82 Question Id : 86435118271 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $\vec{p} = 2\hat{i} + 3\hat{j} + \hat{k}$ and $\vec{q} = \hat{i} + 2\hat{j} + \hat{k}$ be two vectors. If a vector $\vec{r} = \left(\alpha\hat{i} + \beta\hat{j} + \gamma\hat{k} \right)$

is perpendicular to each of the vectors $\left(\vec{p} + \vec{q} \right)$ and $\left(\vec{p} - \vec{q} \right)$, and $\left| \vec{r} \right| = \sqrt{3}$, then

$|\alpha| + |\beta| + |\gamma|$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Question Number : 83 Question Id : 86435118272 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The ratio of the coefficient of the middle term in the expansion of $(1+x)^{20}$ and the sum of the coefficients of two middle terms in expansion of $(1+x)^{19}$ is _____.

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 : 86435118273 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the value of $\left(1 + \dfrac{2}{3} + \dfrac{6}{3^2} + \dfrac{10}{3^3} + \ldots\ldots \text{ upto } \infty\right)^{\log_{(0.25)}\left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \ldots\ldots \text{ upto } \infty\right)}$

is l, then l^2 is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 85 Question Id : 86435118274 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $y = y(x)$ be solution of the following differential equation

$$e^y \frac{dy}{dx} - 2e^y \sin x + \sin x \cos^2 x = 0, \ y\left(\frac{\pi}{2}\right) = 0.$$

If $y(0) = \log_e(\alpha + \beta e^{-2})$, then $4(\alpha + \beta)$ 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 : 86435118275 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the following frequency distribution :

Class :	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency :	α	110	54	30	β

If the sum of all frequencies is 584 and median is 45, then $|\alpha - \beta|$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Question Number : 87 Question Id : 86435118276 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $S = \left\{ n \in \mathbf{N} \; \middle| \; \begin{pmatrix} 0 & i \\ 1 & 0 \end{pmatrix}^n \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \forall\, a, b, c, d \in \mathbf{R} \right\}$, where $i = \sqrt{-1}$. Then the

number of 2-digit numbers in the set S is _____.

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 : 86435118277 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $M = \left\{ A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} : a, b, c, d \in \{\pm 3, \pm 2, \pm 1, 0\} \right\}$. Define $f : M \to \mathbf{Z}$, as $f(A) = \det(A)$, for all

$A \in M$, where $\mathbf{Z}$ is set of all integers. Then the number of $A \in M$ such that $f(A) = 15$ is equal
to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 89 Question Id : 86435118278 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

There are 5 students in class 10, 6 students in class 11 and 8 students in class 12. If the number of ways, in which 10 students can be selected from them so as to include at least 2 students from each class and at most 5 students from the total 11 students of class 10 and 11 is 100 k, then 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

Question Number : 90 Question Id : 86435118279 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If α, β are roots of the equation $x^2 + 5(\sqrt{2})x + 10 = 0$, $\alpha > \beta$ and $P_n = \alpha^n - \beta^n$ for each positive integer n, then the value of $\left(\dfrac{P_{17}P_{20} + 5\sqrt{2}\ P_{17}P_{19}}{P_{18}P_{19} + 5\sqrt{2}\ P_{18}^2} \right)$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1