

# National Testing Agency

<b>Question Paper Name :</b>	B Tech 27th Aug2021 Shift 1
<b>Subject Name :</b>	B TECH
<b>Creation Date :</b>	2021-08-27 19:09:57
<b>Duration :</b>	180
<b>Total Marks :</b>	300
<b>Display Marks:</b>	Yes

## B TECH

<b>Group Number :</b>	1
<b>Group Id :</b>	864351250
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	180
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	300
<b>Is this Group for Examiner? :</b>	No

## Physics Section A

<b>Section Id :</b>	864351938
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80

Enable Mark as Answered Mark for Review and Clear Response : Yes  
Sub-Section Number : 1  
Sub-Section Id : 8643511165  
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 86435120530 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

In Millikan's oil drop experiment, what is viscous force acting on an uncharged drop of radius  $2.0 \times 10^{-5}$  m and density  $1.2 \times 10^3$   $\text{kgm}^{-3}$  ? Take viscosity of liquid =  $1.8 \times 10^{-5}$   $\text{Nsm}^{-2}$ . (Neglect buoyancy due to air).

Options :

86435168171.  $5.8 \times 10^{-10}$  N

86435168172.  $1.8 \times 10^{-10}$  N

86435168173.  $3.8 \times 10^{-11}$  N

86435168174.  $3.9 \times 10^{-10}$  N

Question Number : 2 Question Id : 86435120531 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Moment of inertia of a square plate of side  $l$  about the axis passing through one of the corner and perpendicular to the plane of square plate is given by :

Options :

86435168175.  $\frac{MI^2}{12}$

86435168176.  $\frac{2}{3} MI^2$

86435168177.  $\frac{MI^2}{6}$

86435168178.  $MI^2$

**Question Number : 3 Question Id : 86435120532 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A huge circular arc of length 4.4 ly subtends an angle '4s' at the centre of the circle. How long it would take for a body to complete 4 revolution if its speed is 8 AU per second ?

Given : 1 ly =  $9.46 \times 10^{15}$  m

1 AU =  $1.5 \times 10^{11}$  m

**Options :**

86435168179.  $4.5 \times 10^{10}$  s

86435168180.  $4.1 \times 10^8$  s

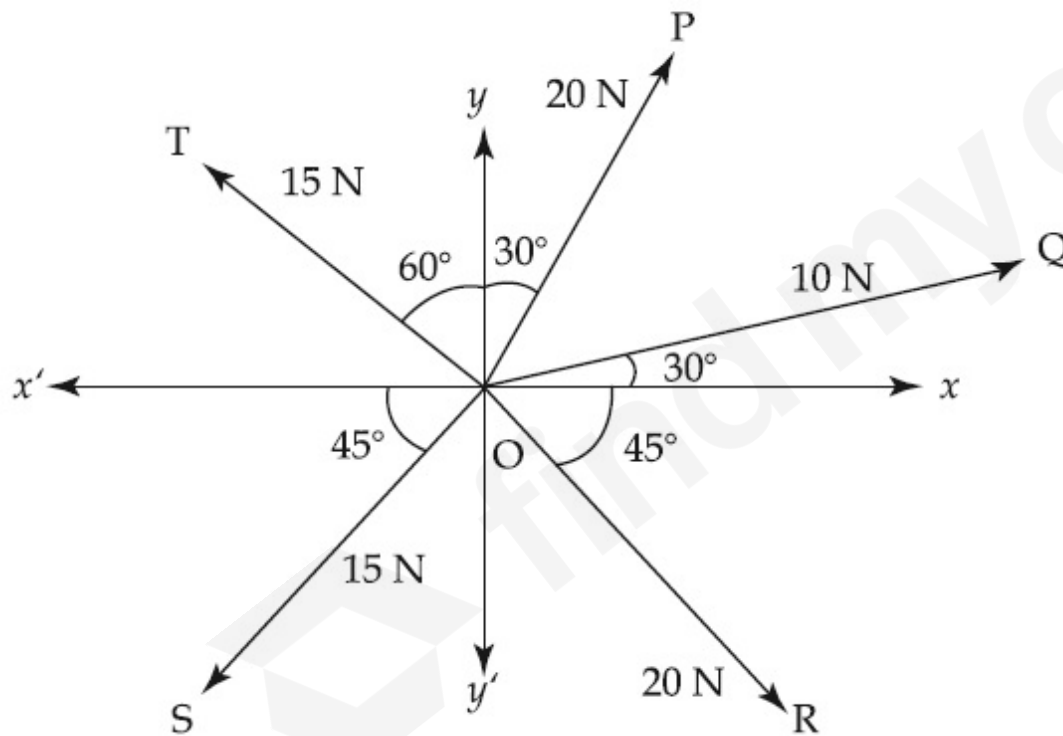
86435168181.  $3.5 \times 10^6$  s

86435168182.  $7.2 \times 10^8$  s

Question Number : 4 Question Id : 86435120533 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The resultant of these forces  $\vec{OP}$ ,  $\vec{OQ}$ ,  $\vec{OR}$ ,  $\vec{OS}$  and  $\vec{OT}$  is approximately \_\_\_\_\_ N.

[Take  $\sqrt{3} = 1.7$ ,  $\sqrt{2} = 1.4$  Given  $\hat{i}$  and  $\hat{j}$  unit vectors along  $x, y$  axis]



Options :

86435168183.  $3\hat{i} + 15\hat{j}$

86435168184.  $-1.5 \hat{i} - 15.5 \hat{j}$

86435168185.  $9.25 \hat{i} + 5 \hat{j}$

86435168186.  $2.5 \hat{i} - 14.5 \hat{j}$

**Question Number : 5 Question Id : 86435120534 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Which of the following is not a dimensionless quantity ?

**Options :**

86435168187. Quality factor

86435168188. Power factor

86435168189. Relative magnetic permeability ( $\mu_r$ )

86435168190. Permeability of free space ( $\mu_0$ )

**Question Number : 6 Question Id : 86435120535 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If E and H represents the intensity of electric field and magnetising field respectively, then the unit of E/H will be :

Options :

86435168191. mho

86435168192. ohm

86435168193. joule

86435168194. newton

Question Number : 7 Question Id : 86435120536 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

An ideal gas is expanding such that  $PT^3 = \text{constant}$ . The coefficient of volume expansion of the gas is :

Options :

86435168195.  $\frac{1}{T}$

86435168196.  $\frac{2}{T}$

86435168197.  $\frac{3}{T}$

86435168198.  $\frac{4}{T}$

**Question Number : 8 Question Id : 86435120537 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A balloon carries a total load of 185 kg at normal pressure and temperature of 27°C. What load will the balloon carry on rising to a height at which the barometric pressure is 45 cm of Hg and the temperature is  $-7^{\circ}\text{C}$ . Assuming the volume constant ?

**Options :**

86435168199. 123.54 kg

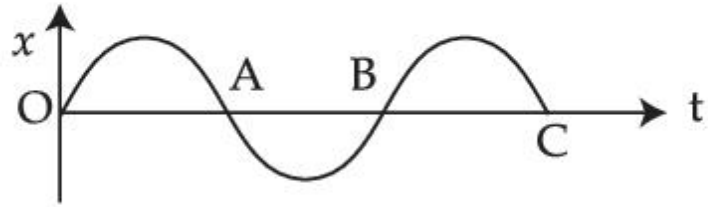
86435168200. 214.15 kg

86435168201. 219.07 kg

86435168202. 181.46 kg

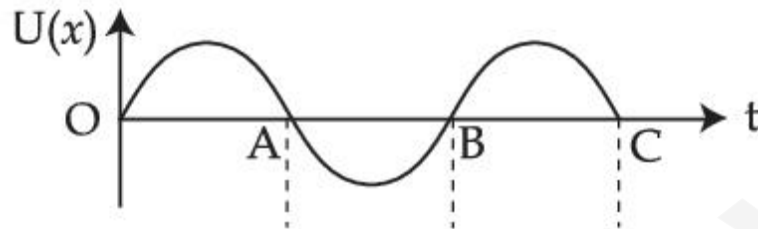
**Question Number : 9 Question Id : 86435120538 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The variation of displacement with time of a particle executing free simple harmonic motion is shown in the figure.

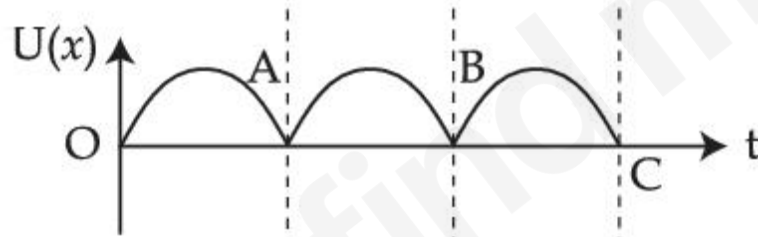


The potential energy  $U(x)$  versus time  $(t)$  plot of the particle is correctly shown in figure :

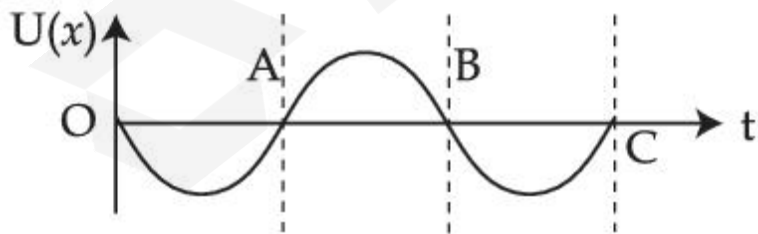
Options :



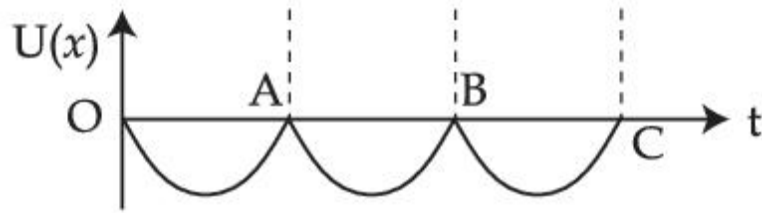
86435168203.



86435168204.



86435168205.

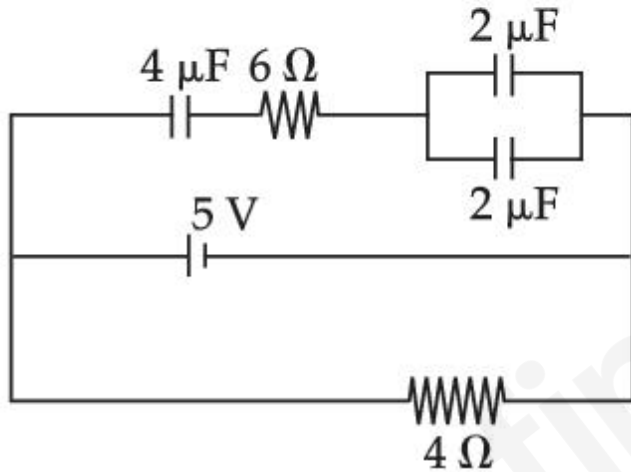


86435168206.

Question Number : 10 Question Id : 86435120539 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Calculate the amount of charge on capacitor of  $4 \mu\text{F}$ . The internal resistance of battery is  $1 \Omega$  :



Options :

86435168207. zero

86435168208.  $4 \mu\text{C}$

86435168209.  $8 \mu\text{C}$

86435168210.  $16 \mu\text{C}$

**Question Number : 11 Question Id : 86435120540 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A uniformly charged disc of radius  $R$  having surface charge density  $\sigma$  is placed in the  $xy$  plane with its center at the origin. Find the electric field intensity along the  $z$ -axis at a distance  $Z$  from origin :

**Options :**

86435168211. 
$$E = \frac{\sigma}{2\epsilon_0} \left( 1 + \frac{Z}{(Z^2 + R^2)^{1/2}} \right)$$

86435168212. 
$$E = \frac{\sigma}{2\epsilon_0} \left( 1 - \frac{Z}{(Z^2 + R^2)^{1/2}} \right)$$

86435168213. 
$$E = \frac{2\epsilon_0}{\sigma} \left( \frac{1}{(Z^2 + R^2)^{1/2}} + Z \right)$$

86435168214. 
$$E = \frac{\sigma}{2\epsilon_0} \left( \frac{1}{(Z^2 + R^2)} + \frac{1}{Z^2} \right)$$

**Question Number : 12 Question Id : 86435120541 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

Five identical cells each of internal resistance  $1 \Omega$  and emf  $5 \text{ V}$  are connected in series and in parallel with an external resistance ' $R$ '. For what value of ' $R$ ', current in series and parallel combination will remain the same ?

Options :

- 86435168215.  $1 \Omega$
- 86435168216.  $5 \Omega$
- 86435168217.  $10 \Omega$
- 86435168218.  $25 \Omega$

Question Number : 13 Question Id : 86435120542 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two ions of masses  $4 \text{ amu}$  and  $16 \text{ amu}$  have charges  $+2e$  and  $+3e$  respectively. These ions pass through the region of constant perpendicular magnetic field. The kinetic energy of both ions is same. Then :

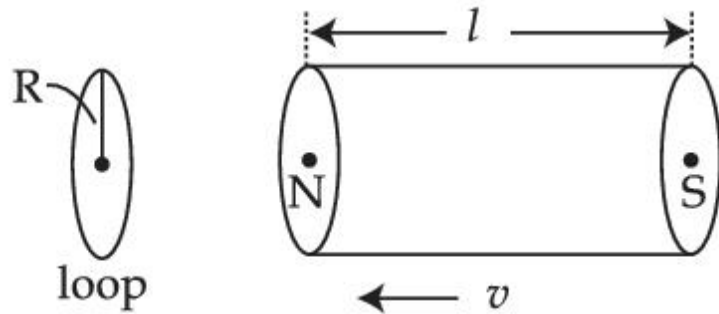
Options :

- 86435168219. lighter ion will be deflected more than heavier ion
- 86435168220. lighter ion will be deflected less than heavier ion
- 86435168221. both ions will be deflected equally
- 86435168222. no ion will be deflected

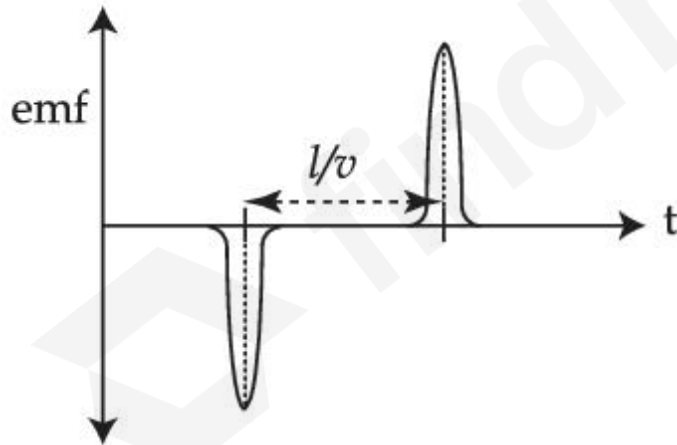
Question Number : 14 Question Id : 86435120543 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

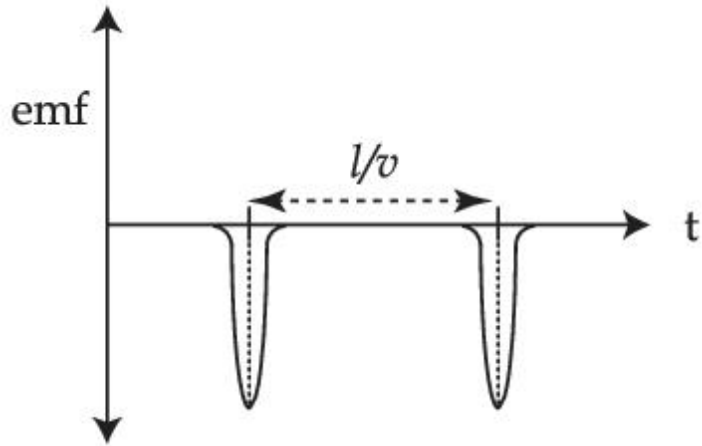
A bar magnet is passing through a conducting loop of radius  $R$  with velocity  $v$ . The radius of the bar magnet is such that it just passes through the loop. The induced e.m.f. in the loop can be represented by the approximate curve :



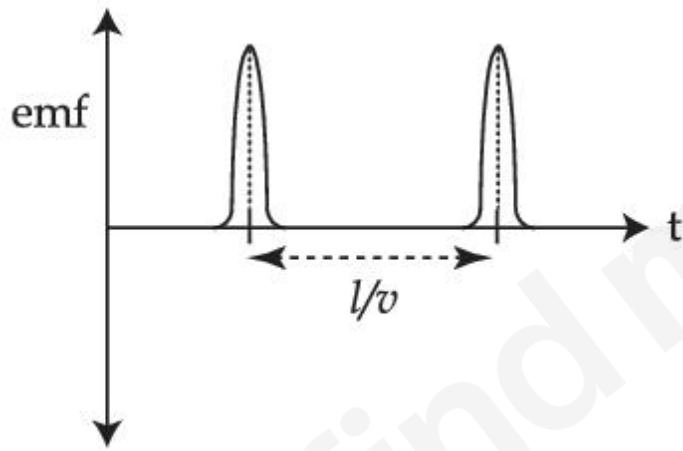
Options :



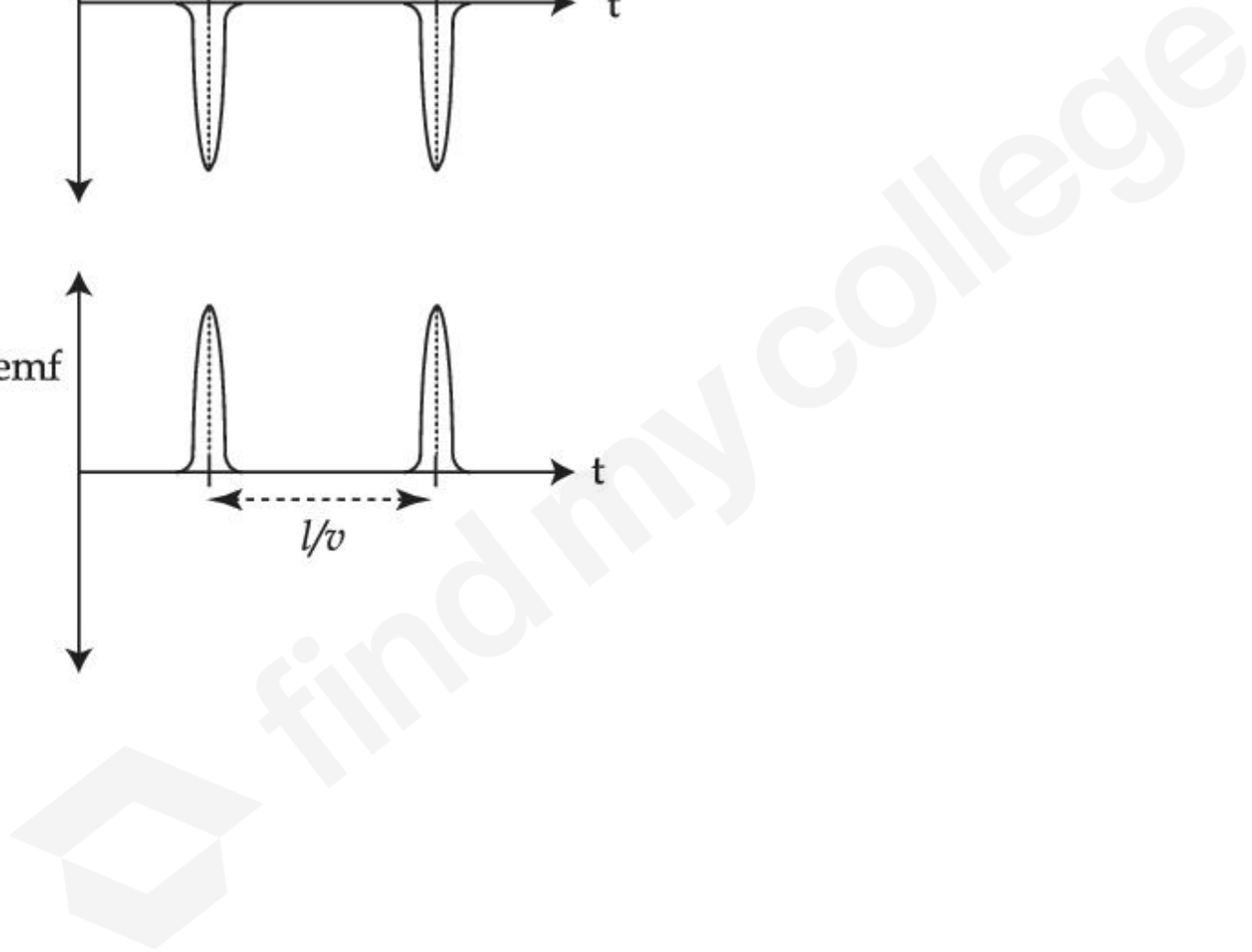
86435168223.

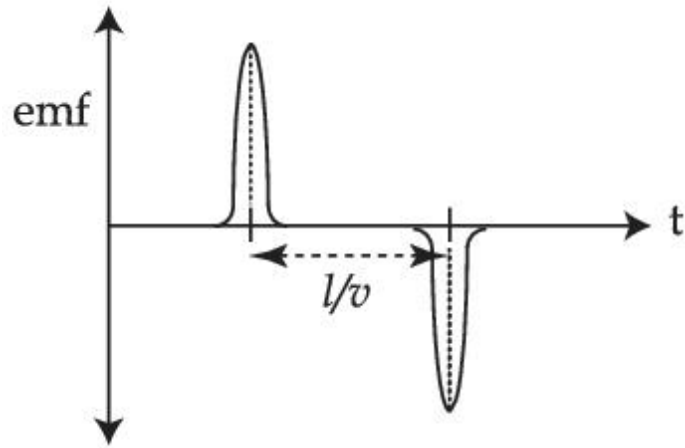


86435168224.



86435168225.





86435168226.

Question Number : 15 Question Id : 86435120544 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Electric field in a plane electromagnetic wave is given by

$$E = 50 \sin(500x - 10 \times 10^{10}t) \text{ V/m}$$

The velocity of electromagnetic wave in this medium is :

(Given  $C$  = speed of light in vacuum)

Options :

86435168227.  $\frac{2}{3} C$

86435168228.  $C$

86435168229.  $\frac{3}{2} C$

86435168230.  $\frac{C}{2}$

**Question Number : 16 Question Id : 86435120545 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

An object is placed beyond the centre of curvature  $C$  of the given concave mirror. If the distance of the object is  $d_1$  from  $C$  and the distance of the image formed is  $d_2$  from  $C$ , the radius of curvature of this mirror is :

**Options :**

86435168231.  $\frac{d_1 d_2}{d_1 - d_2}$

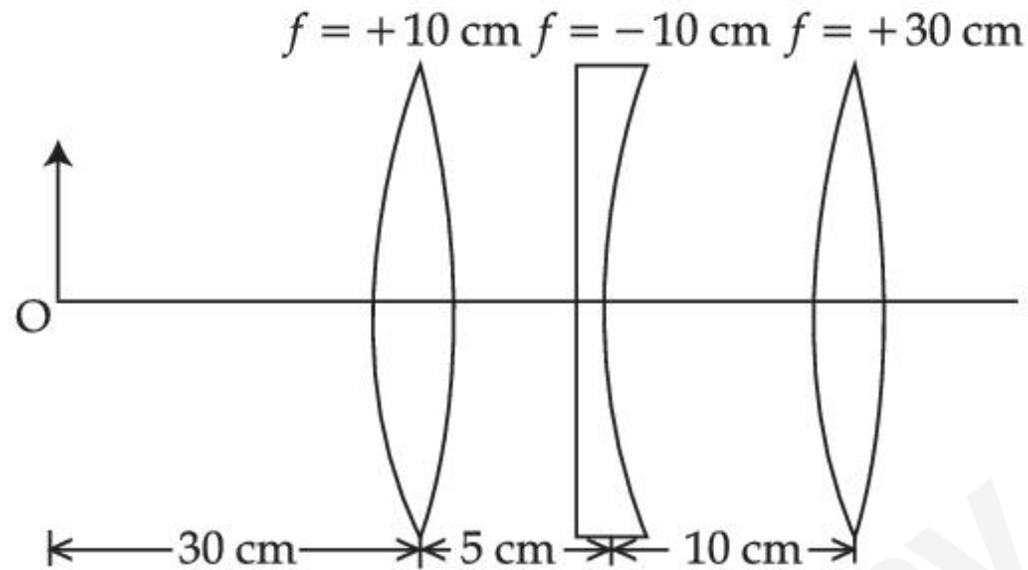
86435168232.  $\frac{d_1 d_2}{d_1 + d_2}$

86435168233.  $\frac{2d_1 d_2}{d_1 - d_2}$

86435168234.  $\frac{2d_1 d_2}{d_1 + d_2}$

**Question Number : 17 Question Id : 86435120546 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Find the distance of the image from object O, formed by the combination of lenses in the figure :



Options :

86435168235. 10 cm

86435168236. 20 cm

86435168237. 75 cm

86435168238. infinity

Question Number : 18 Question Id : 86435120547 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a photoelectric experiment, increasing the intensity of incident light :

**Options :**

86435168239.

increases the number of photons incident and also increases the K.E. of the ejected electrons.

86435168240.

increases the number of photons incident and the K.E. of the ejected electrons remains unchanged.

86435168241.

increases the frequency of photons incident and increases the K.E. of the ejected electrons.

86435168242.

increases the frequency of photons incident and the K.E. of the ejected electrons remains unchanged.

**Question Number : 19 Question Id : 86435120548 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

There are  $10^{10}$  radioactive nuclei in a given radioactive element. Its half-life time is 1 minute. How many nuclei will remain after 30 seconds ?

$$(\sqrt{2} = 1.414)$$

**Options :**

86435168243.  $10^5$

86435168244.  $2 \times 10^{10}$

86435168245.  $7 \times 10^9$

86435168246.  $4 \times 10^{10}$

**Question Number : 20 Question Id : 86435120549 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

For a transistor in CE mode to be used as an amplifier, it must be operated in :

**Options :**

86435168247. Cut-off region only

86435168248. Saturation region only

86435168249. Both cut-off and Saturation

86435168250. The active region only

## Physics Section B

<b>Section Id :</b>	864351939
<b>Section Number :</b>	2
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	20
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes

Sub-Section Number :

1

Sub-Section Id :

8643511166

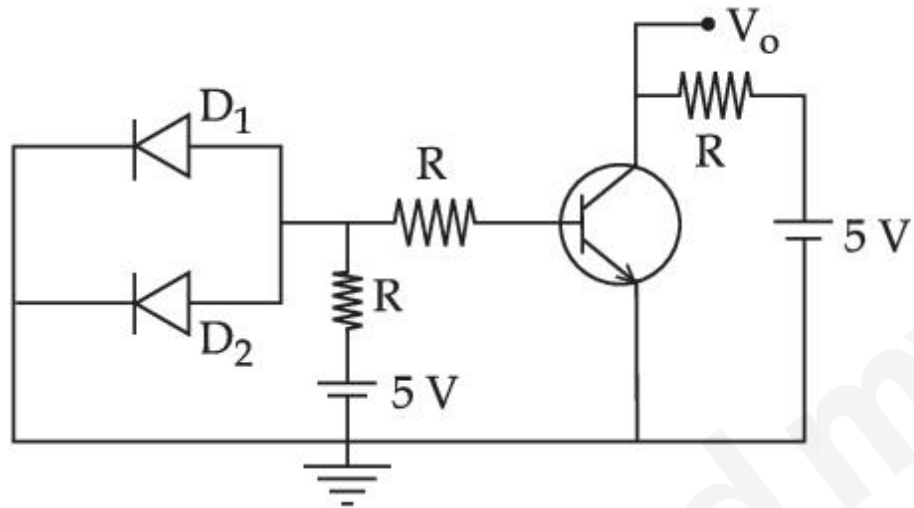
Question Shuffling Allowed :

Yes

Question Number : 21 Question Id : 86435120550 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A circuit is arranged as shown in figure. The output voltage  $V_o$  is equal to \_\_\_\_\_ V.



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 : 86435120551 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Two persons A and B perform same amount of work in moving a body through a certain distance  $d$  with application of forces acting at angles  $45^\circ$  and  $60^\circ$  with the direction of displacement respectively. The ratio of force applied by person A to the force applied by

person B is  $\frac{1}{\sqrt{x}}$ . 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 :** 23 **Question Id :** 86435120552 **Question Type :** SA

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

If the velocity of a body related to displacement  $x$  is given by  $v = \sqrt{5000 + 24x}$  m/s, then the acceleration of the body is \_\_\_\_\_ m/s<sup>2</sup>.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

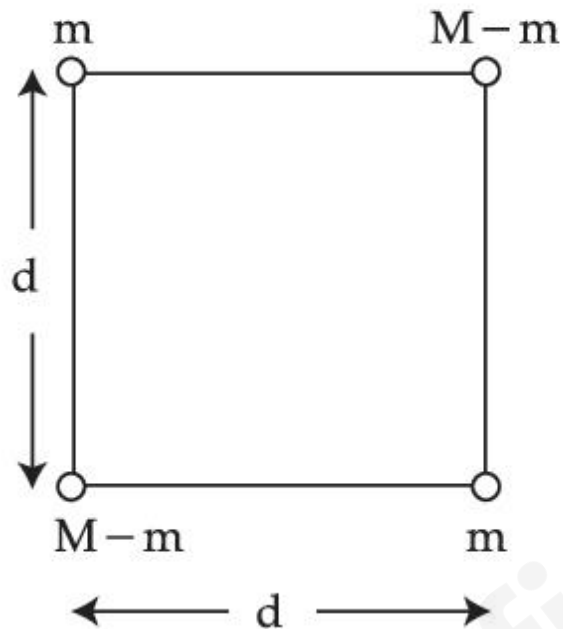
**Possible Answers :**

1

**Question Number :** 24 **Question Id :** 86435120553 **Question Type :** SA

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

A body of mass  $(2M)$  splits into four masses  $\{m, M - m, m, M - m\}$ , which are rearranged to form a square as shown in the figure. The ratio of  $\frac{M}{m}$  for which, the gravitational potential energy of the system becomes maximum is  $x : 1$ . 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 :** 25 **Question Id :** 86435120554 **Question Type :** SA

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

Two cars X and Y are approaching each other with velocities 36 km/h and 72 km/h respectively. The frequency of a whistle sound as emitted by a passenger in car X, heard by the passenger in car Y is 1320 Hz. If the velocity of sound in air is 340 m/s, the actual frequency of the whistle sound produced is \_\_\_\_\_ Hz.

**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 :** 86435120555 **Question Type :** SA

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

First, a set of  $n$  equal resistors of  $10\ \Omega$  each are connected in series to a battery of emf 20 V and internal resistance  $10\ \Omega$ . A current  $I$  is observed to flow. Then, the  $n$  resistors are connected in parallel to the same battery. It is observed that the current is increased 20 times, then the value of  $n$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number :** 27 **Question Id :** 86435120556 **Question Type :** SA

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

A uniform conducting wire of length is  $24a$ , and resistance  $R$  is wound up as a current carrying coil in the shape of an equilateral triangle of side ' $a$ ' and then in the form of a square of side ' $a$ '. The coil is connected to a voltage source  $V_0$ . The ratio of magnetic moment of the coils in case of equilateral triangle to that for square is  $1 : \sqrt{y}$  where  $y$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number :** 28 **Question Id :** 86435120557 **Question Type :** SA

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

The alternating current is given by

$$i = \left\{ \sqrt{42} \sin\left(\frac{2\pi}{T} t\right) + 10 \right\} \text{A}$$

The r.m.s. value of this current is \_\_\_\_\_ A.

**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 :** 86435120558 **Question Type :** SA

Correct Marks : 4 Wrong Marks : 0

A transmitting antenna has a height of 320 m and that of receiving antenna is 2000 m. The maximum distance between them for satisfactory communication in line of sight mode is 'd'. The value of 'd' is \_\_\_\_\_ km.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

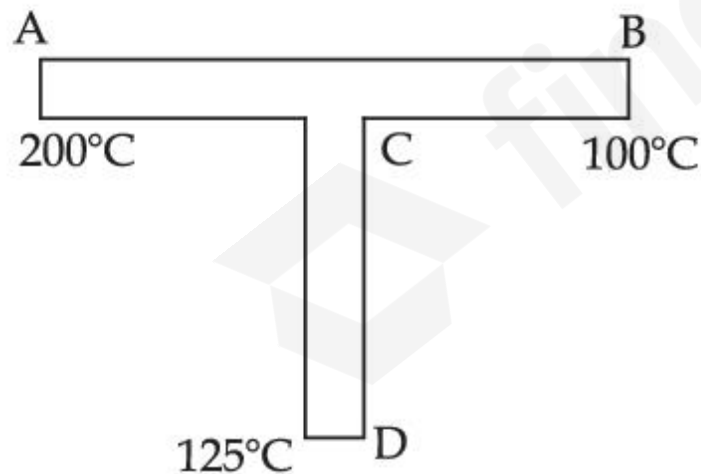
Possible Answers :

1

Question Number : 30 Question Id : 86435120559 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A rod CD of thermal resistance  $10.0 \text{ KW}^{-1}$  is joined at the middle of an identical rod AB as shown in figure. The ends A, B and D are maintained at  $200^\circ\text{C}$ ,  $100^\circ\text{C}$  and  $125^\circ\text{C}$  respectively. The heat current in CD is P watt. The value of P 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 :	864351940
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 :	8643511167
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 86435120560 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

The unit of the van der Waals gas equation parameter 'a' in

$$\left( P + \frac{an^2}{V^2} \right) (V - nb) = nRT \text{ is :}$$

Options :

86435168261.  $\text{kg m s}^{-2}$

86435168262.  $\text{atm dm}^6 \text{ mol}^{-2}$

86435168263.  $\text{dm}^3 \text{mol}^{-1}$

86435168264.  $\text{kg m s}^{-1}$

**Question Number : 32 Question Id : 86435120561 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Match items of **List - I** with those of **List - II** :

<b>List - I</b> <b>(Property)</b>	<b>List - II</b> <b>(Example)</b>
(a) Diamagnetism	(i) MnO
(b) Ferrimagnetism	(ii) $\text{O}_2$
(c) Paramagnetism	(iii) NaCl
(d) Antiferromagnetism	(iv) $\text{Fe}_3\text{O}_4$

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

**Options :**

86435168265. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

86435168266. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

86435168267. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

86435168268. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

Question Number : 33 Question Id : 86435120562 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

List - I (Species)	List - II (No. of lone pairs of electrons on the central atom)
(a) $\text{XeF}_2$	(i) 0
(b) $\text{XeO}_2\text{F}_2$	(ii) 1
(c) $\text{XeO}_3\text{F}_2$	(iii) 2
(d) $\text{XeF}_4$	(iv) 3

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

Options :

86435168269. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

86435168270. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

86435168271. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

86435168272. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Question Number : 34 Question Id : 86435120563 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Tyndall effect is more effectively shown by :

Options :

86435168273. true solution

86435168274. lyophilic colloid

86435168275. lyophobic colloid

86435168276. suspension

Question Number : 35 Question Id : 86435120564 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In which one of the following molecules strongest back donation of an electron pair from halide to boron is expected ?

Options :

86435168277.  $\text{BI}_3$

86435168278.  $\text{BBr}_3$

86435168279.  $\text{BCl}_3$

86435168280.  $\text{BF}_3$

Question Number : 36 Question Id : 86435120565 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which refining process is generally used in the purification of low melting metals ?

Options :

86435168281. Electrolysis

86435168282. Liquation

86435168283. Zone refining

86435168284. Chromatographic method

Question Number : 37 Question Id : 86435120566 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Deuterium resembles hydrogen in properties but :

Options :

86435168285. reacts vigorously than hydrogen

86435168286. emits  $\beta^+$  particles

86435168287. reacts slower than hydrogen

86435168288. reacts just as hydrogen

Question Number : 38 Question Id : 86435120567 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of water molecules in gypsum, dead burnt plaster and plaster of Paris, respectively are :

Options :

86435168289. 2, 0 and 1

86435168290. 0.5, 0 and 2

86435168291. 5, 0 and 0.5

86435168292. 2, 0 and 0.5

Question Number : 39 Question Id : 86435120568 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In polythionic acid,  $H_2S_xO_6$  ( $x = 3$  to  $5$ ) the oxidation state(s) of sulphur is/are :

Options :

86435168293. +5 only

86435168294. +3 and +5 only

86435168295. 0 and +5 only

86435168296. +6 only

Question Number : 40 Question Id : 86435120569 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1

The nature of oxides  $V_2O_3$  and  $CrO$  is indexed as 'X' and 'Y' type respectively. The correct set of X and Y is :

Options :

86435168297. X = amphoteric Y = basic

86435168298. X = basic Y = basic

86435168299. X = basic Y = amphoteric

86435168300. X = acidic Y = acidic

Question Number : 41 Question Id : 86435120570 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1

The gas 'A' is having very low reactivity reaches to stratosphere. It is non-toxic and non-flammable but dissociated by UV-radiations in stratosphere. The intermediates formed initially from the gas 'A' are :

Options :

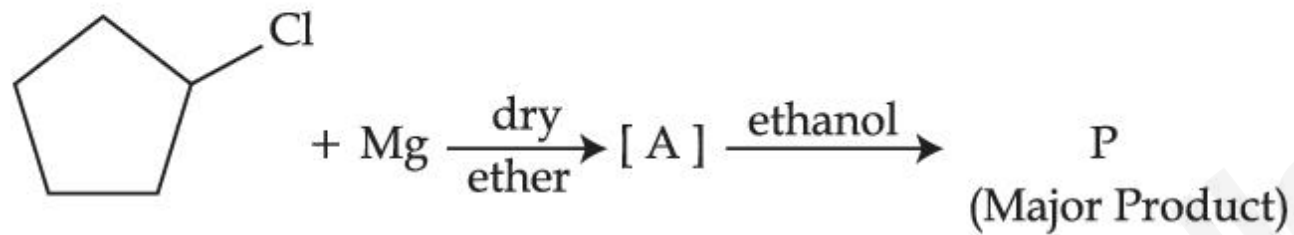
86435168301.  $\overset{\cdot}{C}H_3 + \overset{\cdot}{C}F_2Cl$

86435168302.  $Cl\overset{\cdot}{O} + \overset{\cdot}{C}H_3$

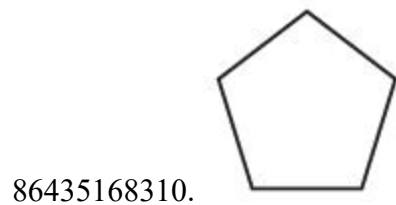
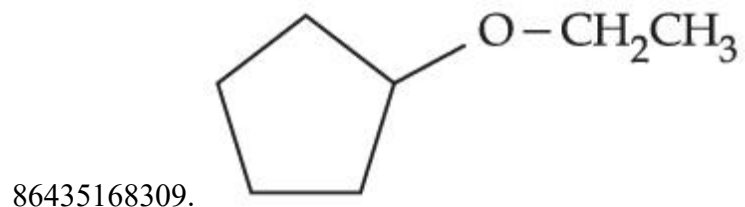


Question Number : 43 Question Id : 86435120572 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1

In the following sequence of reactions the P is :



Options :

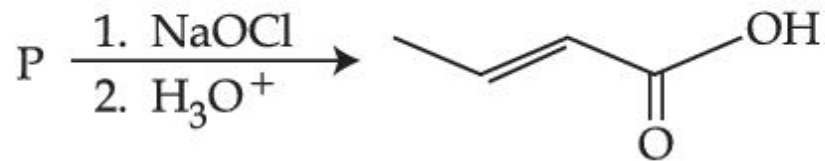




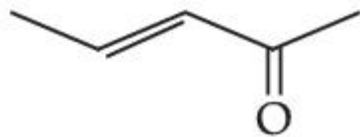
86435168312.

Question Number : 44 Question Id : 86435120573 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

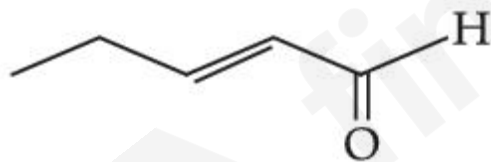
The structure of the starting compound P used in the reaction given below is :



Options :



86435168313.



86435168314.



86435168315.



86435168316.

Question Number : 45 Question Id : 86435120574 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)** : Synthesis of ethyl phenyl ether may be achieved by Williamson synthesis.

**Reason (R)** : Reaction of bromobenzene with sodium ethoxide yields ethyl phenyl ether.

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

Options :

86435168317. Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

86435168318. Both **(A)** and **(R)** are correct but **(R)** is NOT the correct explanation of **(A)**

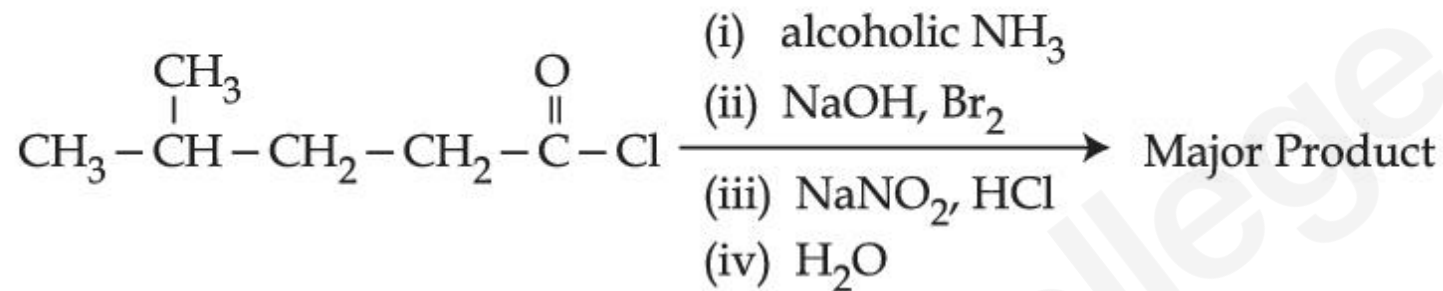
86435168319. **(A)** is correct but **(R)** is not correct

86435168320. **(A)** is not correct but **(R)** is correct

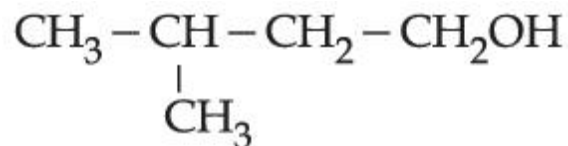
Question Number : 46 Question Id : 86435120575 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

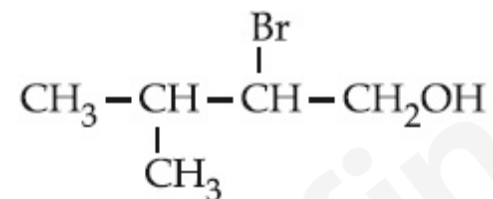
The major product of the following reaction is :



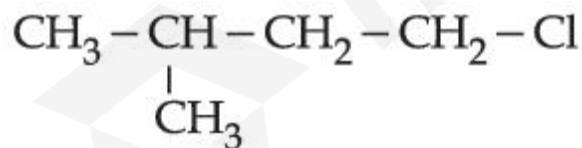
Options :



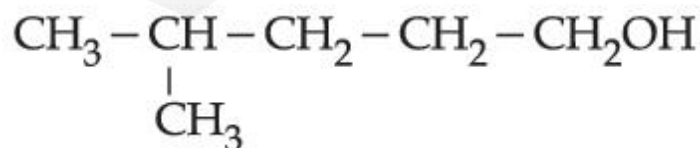
86435168321.



86435168322.



86435168323.



86435168324.

Question Number : 47 Question Id : 86435120576 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Which of the following is **not** a correct statement for primary aliphatic amines ?

Options :

86435168325. Primary amines can be prepared by the Gabriel phthalimide synthesis.

86435168326. Primary amines are less basic than the secondary amines.

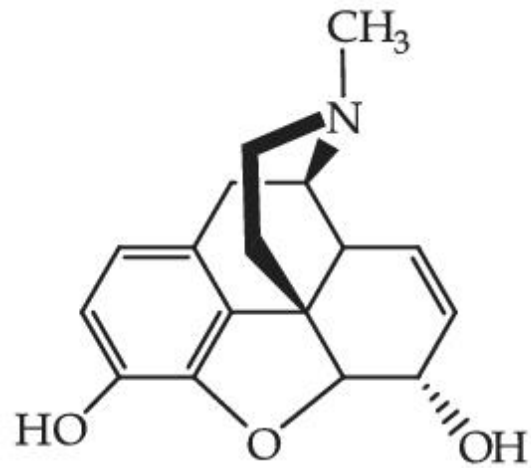
86435168327.

The intermolecular association in primary amines is less than the intermolecular association in secondary amines.

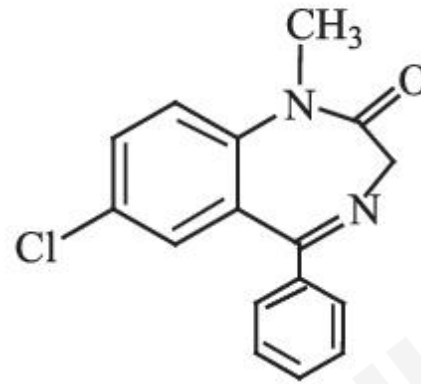
86435168328.

Primary amines on treating with nitrous acid solution form corresponding alcohols except methyl amine.

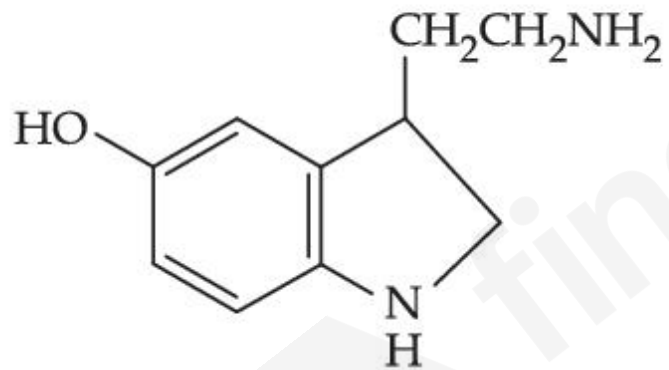
Question Number : 48 Question Id : 86435120577 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1



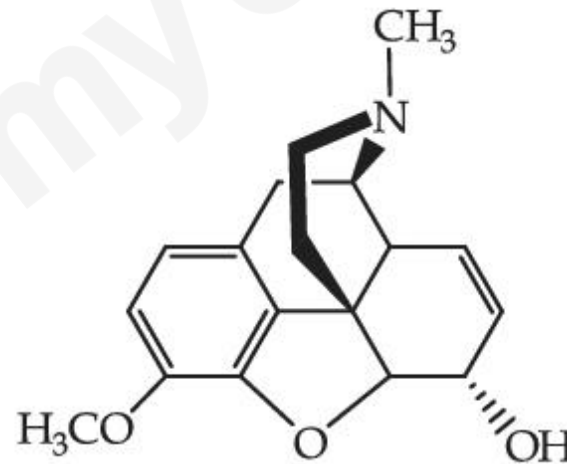
(A)



(B)



(C)



(D)

The correct statement about (A), (B), (C) and (D) is :

Options :

86435168329. (A), (B) and (C) are narcotic analgesics

86435168330. (B), (C) and (D) are tranquillizers

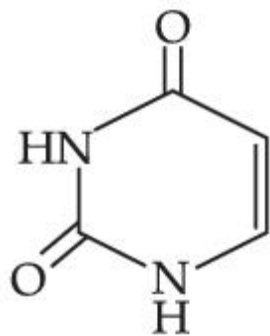
86435168331. (A) and (D) are tranquillizers

86435168332. (B) and (C) are tranquillizers

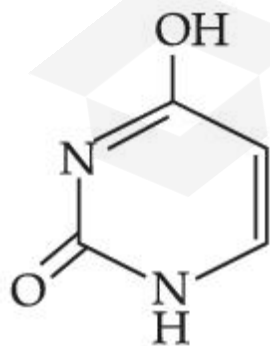
**Question Number : 49 Question Id : 86435120578 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Out of following isomeric forms of uracil, which one is present in RNA ?

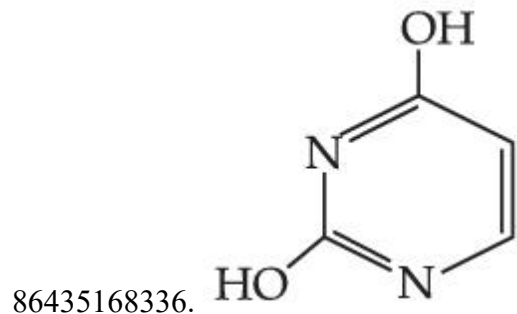
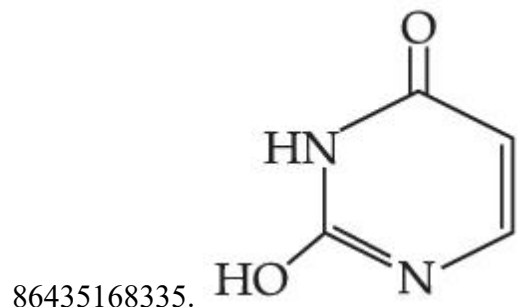
Options :



86435168333.



86435168334.



Question Number : 50 Question Id : 86435120579 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1

Acidic ferric chloride solution on treatment with excess of potassium ferrocyanide gives a Prussian blue coloured colloidal species. It is :

Options :



86435168340.  $K_5Fe[Fe(CN)_6]_2$

## Chemistry Section B

Section Id :	864351941
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 :	8643511168
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 86435120580 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is equal to

$\frac{h^2}{x m a_0^2}$ . The value of  $10 x$  is \_\_\_\_\_. ( $a_0$  is radius of Bohr's orbit)

(Nearest integer)

[ Given :  $\pi = 3.14$  ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 52 Question Id : 86435120581 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

200 mL of 0.2 M HCl is mixed with 300 mL of 0.1 M NaOH. The molar heat of neutralization of this reaction is  $-57.1$  kJ. The increase in temperature in  $^{\circ}\text{C}$  of the system on mixing is  $x \times 10^{-2}$ . The value of  $x$  is \_\_\_\_\_. (Nearest integer)

[Given : Specific heat of water =  $4.18 \text{ J g}^{-1} \text{ K}^{-1}$

Density of water =  $1.00 \text{ g cm}^{-3}$ ]

(Assume no volume change on mixing)

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 : 86435120582 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

1 kg of 0.75 molal aqueous solution of sucrose can be cooled up to  $-4^{\circ}\text{C}$  before freezing. The amount of ice (in g) that will be separated out is \_\_\_\_\_. (Nearest integer)

[Given :  $K_f(\text{H}_2\text{O}) = 1.86 \text{ K kg mol}^{-1}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 54 Question Id : 86435120583 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of moles of  $\text{NH}_3$ , that must be added to 2 L of 0.80 M  $\text{AgNO}_3$  in order to reduce the concentration of  $\text{Ag}^+$  ions to  $5.0 \times 10^{-8}$  M ( $K_{\text{formation}}$  for  $[\text{Ag}(\text{NH}_3)_2]^+ = 1.0 \times 10^8$ ) is \_\_\_\_\_. (Nearest integer)

[Assume no volume change on adding  $\text{NH}_3$  ]

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 : 86435120584 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

When 10 mL of an aqueous solution of  $\text{KMnO}_4$  was titrated in acidic medium, equal volume of 0.1 M of an aqueous solution of ferrous sulphate was required for complete discharge of colour. The strength of  $\text{KMnO}_4$  in grams per litre is \_\_\_\_\_  $\times 10^{-2}$ . (Nearest integer)

[Atomic mass of K = 39, Mn = 55, O = 16]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

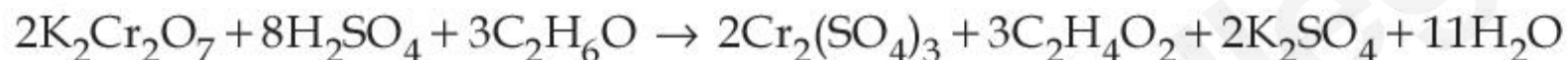
Possible Answers :

1

Question Number : 56 Question Id : 86435120585 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The reaction that occurs in a breath analyser, a device used to determine the alcohol level in a person's blood stream is



If the rate of appearance of  $\text{Cr}_2(\text{SO}_4)_3$  is  $2.67 \text{ mol min}^{-1}$  at a particular time, the rate of disappearance of  $\text{C}_2\text{H}_6\text{O}$  at the same time is \_\_\_\_\_  $\text{mol min}^{-1}$ . (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 : 57 Question Id : 86435120586 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of  $f$  electrons in the ground state electronic configuration of Np ( $Z = 93$ ) is \_\_\_\_\_. (Integer answer)

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 : 86435120587 Question Type : SA**

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

1 mol of an octahedral metal complex with formula  $MCl_3 \cdot 2L$  on reaction with excess of  $AgNO_3$  gives 1 mol of  $AgCl$ . The denticity of Ligand L is \_\_\_\_\_. (Integer answer)

**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 : 86435120588 Question Type : SA**

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

In Carius method for estimation of halogens, 0.2 g of an organic compound gave 0.188 g of  $AgBr$ . The percentage of bromine in the compound is \_\_\_\_\_. (Nearest integer)

[Atomic mass :  $Ag = 108$ ,  $Br = 80$ ]

**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 : 86435120589 Question Type : SA**

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

The number of moles of CuO, that will be utilized in Dumas method for estimating nitrogen in a sample of 57.5 g of N,N-dimethylaminopentane is \_\_\_\_\_  $\times 10^{-2}$ . (Nearest integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

## Mathematics Section A

<b>Section Id :</b>	864351942
<b>Section Number :</b>	5
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511169
<b>Question Shuffling Allowed :</b>	Yes

**Question Number :** 61 **Question Id :** 86435120590 **Question Type :** MCQ **Option Shuffling :** Yes **Is Question Mandatory :** No

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

If  $x^2 + 9y^2 - 4x + 3 = 0$ ,  $x, y \in \mathbb{R}$ , then  $x$  and  $y$  respectively lie in the intervals :

**Options :**

86435168351. [1, 3] and [1, 3]

86435168352.  $[1, 3]$  and  $\left[-\frac{1}{3}, \frac{1}{3}\right]$

86435168353.  $\left[-\frac{1}{3}, \frac{1}{3}\right]$  and  $[1, 3]$

86435168354.  $\left[-\frac{1}{3}, \frac{1}{3}\right]$  and  $\left[-\frac{1}{3}, \frac{1}{3}\right]$

**Question Number : 62 Question Id : 86435120591 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $S = \left\{z \in \mathbb{C} : \frac{z-i}{z+2i} \in \mathbb{R}\right\}$ , then :

**Options :**

86435168355. S contains only one element

86435168356. S contains exactly two elements

86435168357. S is a straight line in the complex plane

86435168358. S is a circle in the complex plane

Question Number : 63 Question Id : 86435120592 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the matrix  $A = \begin{pmatrix} 0 & 2 \\ K & -1 \end{pmatrix}$  satisfies  $A(A^3 + 3I) = 2I$ , then the value of K is :

Options :

86435168359.  $-\frac{1}{2}$

86435168360.  $-1$

86435168361.  $\frac{1}{2}$

86435168362.  $1$

Question Number : 64 Question Id : 86435120593 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If for  $x, y \in \mathbf{R}$ ,  $x > 0$ ,  $y = \log_{10}x + \log_{10}x^{1/3} + \log_{10}x^{1/9} + \dots$  upto  $\infty$  terms and

$$\frac{2 + 4 + 6 + \dots + 2y}{3 + 6 + 9 + \dots + 3y} = \frac{4}{\log_{10}x},$$

then the ordered pair  $(x, y)$  is equal to :

Options :

86435168363.  $(10^6, 6)$

86435168364.  $(10^2, 3)$

86435168365.  $(10^4, 6)$

86435168366.  $(10^6, 9)$

**Question Number : 65 Question Id : 86435120594 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $\alpha, \beta$  are the distinct roots of  $x^2 + bx + c = 0$ , then  $\lim_{x \rightarrow \beta} \frac{e^{2(x^2 + bx + c)} - 1 - 2(x^2 + bx + c)}{(x - \beta)^2}$  is equal

to :

**Options :**

86435168367.  $b^2 - 4c$

86435168368.  $b^2 + 4c$

86435168369.  $2(b^2 + 4c)$

86435168370.  $2(b^2 - 4c)$

**Question Number : 66 Question Id : 86435120595 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A wire of length 20 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a regular hexagon. Then the length of the side (in meters) of the hexagon, so that the combined area of the square and the hexagon is minimum, is :

Options :

86435168371.  $\frac{5}{2 + \sqrt{3}}$

86435168372.  $\frac{5}{3 + \sqrt{3}}$

86435168373.  $\frac{10}{3 + 2\sqrt{3}}$

86435168374.  $\frac{10}{2 + 3\sqrt{3}}$

Question Number : 67 Question Id : 86435120596 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let A be a fixed point (0, 6) and B be a moving point (2t, 0). Let M be the mid-point of AB and the perpendicular bisector of AB meets the y-axis at C. The locus of the mid-point P of MC is :

Options :

86435168375.  $2x^2 - 3y + 9 = 0$

86435168376.  $2x^2 + 3y - 9 = 0$

86435168377.  $3x^2 - 2y - 6 = 0$

86435168378.  $3x^2 + 2y - 6 = 0$

**Question Number : 68 Question Id : 86435120597 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $U_n = \left(1 + \frac{1}{n^2}\right) \left(1 + \frac{2^2}{n^2}\right)^2 \dots \left(1 + \frac{n^2}{n^2}\right)^n$ , then  $\lim_{n \rightarrow \infty} (U_n)^{\frac{-4}{n^2}}$  is equal to :

**Options :**

86435168379.  $\frac{4}{e}$

86435168380.  $\frac{4}{e^2}$

86435168381.  $\frac{16}{e^2}$

86435168382.  $\frac{e^2}{16}$

Question Number : 69 Question Id : 86435120598 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  $\frac{dy}{dx} = 2(y + 2\sin x - 5) x - 2\cos x$  such that  $y(0) = 7$ . Then  $y(\pi)$  is equal to :

Options :

86435168383.  $e^{\pi^2} + 5$

86435168384.  $2e^{\pi^2} + 5$

86435168385.  $7e^{\pi^2} + 5$

86435168386.  $3e^{\pi^2} + 5$

Question Number : 70 Question Id : 86435120599 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

A tangent and a normal are drawn at the point  $P(2, -4)$  on the parabola  $y^2 = 8x$ , which meet the directrix of the parabola at the points A and B respectively. If  $Q(a, b)$  is a point such that AQBP is a square, then  $2a + b$  is equal to :

Options :

86435168387.  $-12$

86435168388.  $-16$

86435168389.  $-18$

86435168390.  $-20$

**Question Number : 71 Question Id : 86435120600 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let us consider a curve,  $y=f(x)$  passing through the point  $(-2, 2)$  and the slope of the tangent to the curve at any point  $(x, f(x))$  is given by  $f(x) + xf'(x) = x^2$ . Then :

**Options :**

86435168391.  $x^3 - 3xf(x) - 4 = 0$

86435168392.  $x^2 + 2xf(x) - 12 = 0$

86435168393.  $x^3 + xf(x) + 12 = 0$

86435168394.  $x^2 + 2xf(x) + 4 = 0$

**Question Number : 72 Question Id : 86435120601 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Equation of a plane at a distance  $\sqrt{\frac{2}{21}}$  from the origin, which contains the line of intersection of the planes  $x - y - z - 1 = 0$  and  $2x + y - 3z + 4 = 0$ , is :

Options :

86435168395.  $3x - 4z + 3 = 0$

86435168396.  $-x + 2y + 2z - 3 = 0$

86435168397.  $3x - y - 5z + 2 = 0$

86435168398.  $4x - y - 5z + 2 = 0$

Question Number : 73 Question Id : 86435120602 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The distance of the point  $(1, -2, 3)$  from the plane  $x - y + z = 5$  measured parallel to a line, whose direction ratios are  $2, 3, -6$  is :

Options :

86435168399. 2

86435168400. 3

86435168401. 1

86435168402. 5

Question Number : 74 Question Id : 86435120603 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Let  $\frac{\sin A}{\sin B} = \frac{\sin (A - C)}{\sin (C - B)}$ , where A, B, C are angles of a triangle ABC. If the lengths of the sides opposite these angles are a, b, c respectively, then :

Options :

86435168403.  $a^2, b^2, c^2$  are in A.P.

86435168404.  $b^2, c^2, a^2$  are in A.P.

86435168405.  $c^2, a^2, b^2$  are in A.P.

86435168406.  $b^2 - a^2 = a^2 + c^2$

Question Number : 75 Question Id : 86435120604 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

When a certain biased die is rolled, a particular face occurs with probability  $\frac{1}{6} - x$  and its opposite face occurs with probability  $\frac{1}{6} + x$ . All other faces occur with probability  $\frac{1}{6}$ .

Note that opposite faces sum to 7 in any die. If  $0 < x < \frac{1}{6}$ , and the probability of obtaining total sum = 7, when such a die is rolled twice, is  $\frac{13}{96}$ , then the value of  $x$  is :

Options :

86435168407.  $\frac{1}{9}$

86435168408.  $\frac{1}{16}$

86435168409.  $\frac{1}{12}$

86435168410.  $\frac{1}{8}$

Question Number : 76 Question Id : 86435120605 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If  $(\sin^{-1}x)^2 - (\cos^{-1}x)^2 = a$ ;  $0 < x < 1$ ,  $a \neq 0$ , then the value of  $2x^2 - 1$  is :

Options :

86435168411.  $\cos\left(\frac{2a}{\pi}\right)$

86435168412.  $\sin\left(\frac{2a}{\pi}\right)$

86435168413.  $\sin\left(\frac{4a}{\pi}\right)$

86435168414.  $\cos\left(\frac{4a}{\pi}\right)$

Question Number : 77 Question Id : 86435120606 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

$$\int_6^{16} \frac{\log_e x^2}{\log_e x^2 + \log_e (x^2 - 44x + 484)} dx \text{ is equal to :}$$

Options :

86435168415. 10

86435168416. 8

86435168417. 6

86435168418. 5

**Question Number : 78 Question Id : 86435120607 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $0 < x < 1$ , then  $\frac{3}{2}x^2 + \frac{5}{3}x^3 + \frac{7}{4}x^4 + \dots$ , is equal to :

**Options :**

86435168419.  $x \left( \frac{1+x}{1-x} \right) + \log_e(1-x)$

86435168420.  $\frac{1+x}{1-x} + \log_e(1-x)$

86435168421.  $x \left( \frac{1-x}{1+x} \right) + \log_e(1-x)$

86435168422.  $\frac{1-x}{1+x} + \log_e(1-x)$

**Question Number : 79 Question Id : 86435120608 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The statement  $(p \wedge (p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow r$  is :

Options :

86435168423. a tautology

86435168424. a fallacy

86435168425. equivalent to  $p \rightarrow \sim r$

86435168426. equivalent to  $q \rightarrow \sim r$

Question Number : 80 Question Id : 86435120609 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\sum_{k=0}^{20} \binom{20}{k}^2$  is equal to :

Options :

86435168427.  ${}^{41}C_{20}$

86435168428.  ${}^{40}C_{19}$

86435168429.  ${}^{40}C_{20}$

86435168430.  ${}^{40}C_{21}$

## Mathematics Section B

Section Id :	864351943
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 :	8643511170
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 86435120610 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

If  $A = \{x \in \mathbf{R} : |x - 2| > 1\}$ ,  $B = \{x \in \mathbf{R} : \sqrt{x^2 - 3} > 1\}$ ,  $C = \{x \in \mathbf{R} : |x - 4| \geq 2\}$  and  $\mathbf{Z}$  is the set of all integers, then the number of subsets of the set  $(A \cap B \cap C)^c \cap \mathbf{Z}$  is \_\_\_\_\_.

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

1

Question Number : 82 Question Id : 86435120611 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

If the system of linear equations

$$2x + y - z = 3$$

$$x - y - z = \alpha$$

$$3x + 3y + \beta z = 3$$

has infinitely many solution, then  $\alpha + \beta - \alpha\beta$  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 :** 83 **Question Id :** 86435120612 **Question Type :** SA

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

A number is called a palindrome if it reads the same backward as well as forward. For example 285582 is a six digit palindrome. The number of six digit palindromes, which are divisible by 55, 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 :** 86435120613 **Question Type :** SA

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

If  $y^{1/4} + y^{-1/4} = 2x$ , and  $(x^2 - 1)\frac{d^2y}{dx^2} + \alpha x \frac{dy}{dx} + \beta y = 0$ , then  $|\alpha - \beta|$  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 :** 85 **Question Id :** 86435120614 **Question Type :** SA

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

The number of distinct real roots of the equation  $3x^4 + 4x^3 - 12x^2 + 4 = 0$  is \_\_\_\_\_.

**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 :** 86435120615 **Question Type :** SA

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

Let the equation  $x^2 + y^2 + px + (1 - p)y + 5 = 0$  represent circles of varying radius  $r \in (0, 5]$ . Then the number of elements in the set  $S = \{q : q = p^2 \text{ and } q \text{ is an integer}\}$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 87 Question Id : 86435120616 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the minimum area of the triangle formed by a tangent to the ellipse  $\frac{x^2}{b^2} + \frac{y^2}{4a^2} = 1$  and the co-ordinate axis is  $kab$ , 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 : 88 Question Id : 86435120617 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $n$  be an odd natural number such that the variance of  $1, 2, 3, 4, \dots, n$  is 14. Then  $n$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 89 Question Id : 86435120618 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $\vec{a} = \hat{i} + 5\hat{j} + \alpha\hat{k}$ ,  $\vec{b} = \hat{i} + 3\hat{j} + \beta\hat{k}$  and  $\vec{c} = -\hat{i} + 2\hat{j} - 3\hat{k}$  be three vectors such that,

$|\vec{b} \times \vec{c}| = 5\sqrt{3}$  and  $\vec{a}$  is perpendicular to  $\vec{b}$ . Then the greatest amongst the values of  $|\vec{a}|^2$  is \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 90 Question Id : 86435120619 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If  $\int \frac{dx}{(x^2 + x + 1)^2} = a \tan^{-1}\left(\frac{2x + 1}{\sqrt{3}}\right) + b \left(\frac{2x + 1}{x^2 + x + 1}\right) + C$ ,  $x > 0$  where  $C$  is the

constant of integration, then the value of  $9(\sqrt{3}a + b)$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1