

# National Testing Agency

**Question Paper Name :** B TECH 4th Aug 2021 Shift 2  
**Subject Name :** B TECH  
**Creation Date :** 2021-08-04 19:14:50  
**Duration :** 180  
**Total Marks :** 300 **Display Marks:** Yes

## B TECH

**Group Number :** 1  
**Group Id :** 67603323  
**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 :** 676033133  
**Section Number :** 1  
**Section type :** 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>	676033133
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 1 Question Id : 6760331981 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A p-type semiconductor has acceptor levels 60 meV above the valence band.

What will be the maximum wavelength of em wave which can create a hole ?

(Plank's constant =  $4.14 \times 10^{-15}$  eV-s, Speed of light in vacuum =  $3 \times 10^8$  ms<sup>-1</sup>)

**Options :**

6760335941. 20.7  $\mu\text{m}$

6760335942. 30.8  $\mu\text{m}$

6760335943. 40.9  $\mu\text{m}$

6760335944. 50.0  $\mu\text{m}$

**Question Number : 2 Question Id : 6760331982 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

For an electron orbiting around the nucleus in a hydrogen like atom with atomic number  $Z$ ;  $T$ ,  $U$  and  $E$  denote the kinetic, potential and total energy respectively of the electron. Which of the following statements are valid in this context ?

- (A)  $T$ ,  $U$  is same for all orbits
- (B)  $T + U$  is same for all orbits
- (C)  $2T + U$  is same for all orbits
- (D)  $E + U$  is same for all orbits
- (E)  $E + T$  is same for all orbits

Choose the most appropriate answer from the options given below :

Options :

6760335945. (B) only

6760335946. (C) only

6760335947. (A) and (D) only

6760335948. (C) and (E) only

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Question Number : 3 Question Id : 6760331983 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Two wavelengths  $\lambda_1=496\text{nm}$  and  $\lambda_2=620\text{nm}$  fall on a metal surface. Calculate the work function if the ratio of max speed of photoelectron is  $v_1:v_2=\sqrt{2}:1$  for corresponding  $\lambda_1$  and  $\lambda_2$  respectively.

(Take  $hc=1240\text{eV}\cdot\text{nm}$ )

**Options :**

6760335949. 0.5 eV

6760335950. 1.5 eV

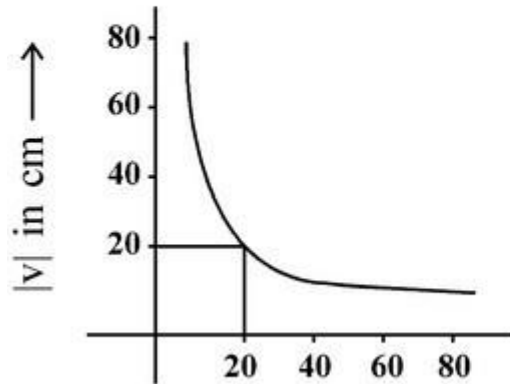
6760335951. 1.8 eV

6760335952. 2.5 eV

**Question Number : 4 Question Id : 6760331984 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

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The reported graph shows the variation of 'v' with 'u', where 'u' represents the distance of the object from the lens and v represent the distance of image from lens. This lens forms a real image of the object. The power of the lens is -



Options :

6760335953. -10 D

6760335954. 10 D

6760335955. -5 D

6760335956. 5 D

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Question Number : 5 Question Id : 6760331985 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A choke coil is needed to operate an arc lamp at 160 V (rms) and 50 Hz.

The arc lamp has an effective resistance of  $5\Omega$  when running at 10A (rms).

The inductance of the choke coil is -

**Options :**

6760335957.  $4.84 \times 10^{-2}$  H

6760335958.  $2.71 \times 10^{-2}$  H

6760335959.  $5.67 \times 10^{-2}$  H

6760335960.  $1.67 \times 10^{-2}$  H

**Question Number : 6 Question Id : 6760331986 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A given mass  $1\text{g}$  of copper is drawn into a wire and made into a circular loop. The circular loop is placed perpendicularly in a magnetic field which is varying at a rate of  $0.17 \text{ T/s}$ . The induced current in the loop approximately is \_\_\_\_\_.

(Resistivity and density of copper are  $1.7 \times 10^{-8} \text{ } \Omega\text{m}$  and  $9000 \text{ kg/m}^3$ )

**Options :**

6760335961.  $0.88 \text{ A}$

6760335962.  $0.088 \text{ A}$

6760335963.  $8.8 \text{ A}$

6760335964.  $0.088 \text{ mA}$

**Question Number : 7 Question Id : 6760331987 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

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The same current is passed through two identical conducting wires of the same length  $L$ . One of them,  $w_1$ , is bent in the form of a circular loop of  $N_1$  turns while the other wire,  $w_2$ , is bent in the form of a circular loop of  $N_2$  turns. The ratio of the magnetic fields at the centre of the coils  $w_1$  and  $w_2$  will be -

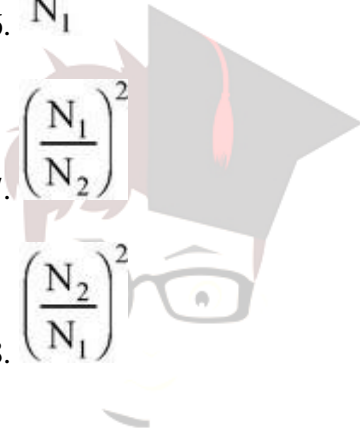
Options :

6760335965.  $\frac{N_1}{N_2}$

6760335966.  $\frac{N_2}{N_1}$

6760335967.  $\left(\frac{N_1}{N_2}\right)^2$

6760335968.  $\left(\frac{N_2}{N_1}\right)^2$



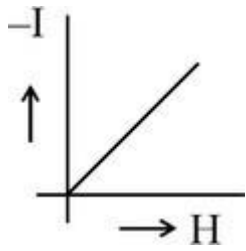
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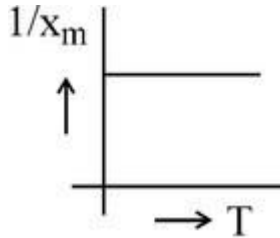
Question Number : 8 Question Id : 6760331988 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Which of the following curve represents properties similar to  $\text{CuCl}_2$  (Paramagnetic) ?

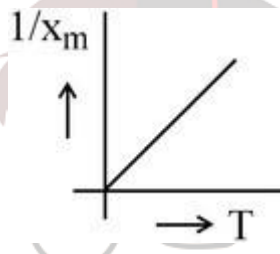
Options :



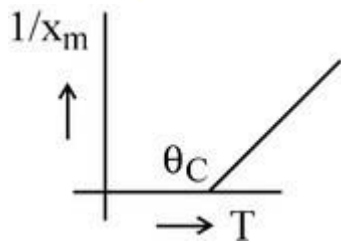
6760335969.



6760335970.



6760335971.



6760335972.

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Question Number : 9 Question Id : 6760331989 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1



The electric potential at any point P(x, y, z) is  $V=x^3z-x^2y-3$  volts.

The electric field  $\vec{E}_Q$  at point Q(2, 3, 1) will be (in V/m) -

Options :

6760335973.  $8\hat{i}-12\hat{j}-3\hat{k}$

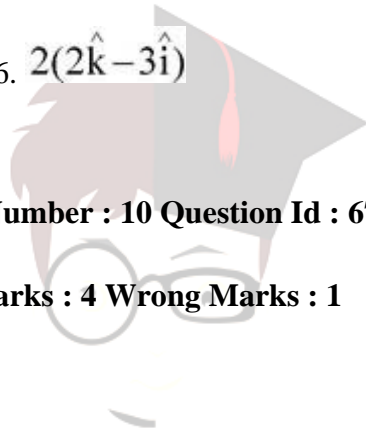
6760335974.  $4(2\hat{i}-3\hat{j})$

6760335975.  $4(\hat{j}-2\hat{k})$

6760335976.  $2(2\hat{k}-3\hat{i})$

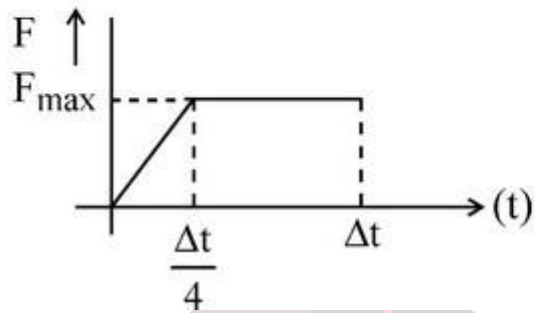
Question Number : 10 Question Id : 6760331990 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



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A body of mass 'M' is moving with a velocity 'v'. It makes a one dimensional head on elastic collision with a stationary body of same mass. They are in contact for a very small time ' $\Delta t$ '. The contact force between them varies as shown in the figure. Find the magnitude of  $\bar{F}_{\max}$ .



Options :

6760335977.  $\frac{mv}{7\Delta t}$

6760335978.  $\frac{8mv}{7\Delta t}$

6760335979.  $\frac{7mv}{8\Delta t}$

6760335980.  $\frac{mv}{8\Delta t}$

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Question Number : 11 Question Id : 6760331991 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The tension in a string is increased by 44%. If its frequency of vibration is to remain unchanged, its length must be increased by

**Options :**

6760335981. 12%

6760335982. 20%

6760335983. 24%

6760335984. 56%

**Question Number : 12 Question Id : 6760331992 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :**  
No

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

Consider two thermally insulated vessels filled with air, having volumes ( $V_1$ ), ( $V_2$ ), Pressure  $P_1$ ,  $P_2$  and temperature  $T_1$ ,  $T_2$  for vessels 1 and 2 respectively.

What is the temperature inside the vessel at equilibrium if

Joining valve of vessels 1 and 2 is opened ?

**Options :**

6760335985. 
$$\frac{T_1 T_2 (P_1 V_1 + P_2 V_2)}{P_1 V_1 T_2 + P_2 V_2 T_1}$$

6760335986. 
$$\frac{T_1 T_2 (P_1 V_1 - P_2 V_2)}{P_1 V_1 T_2 - P_2 V_2 T_1}$$

$$6760335987. \frac{T_1 T_2 (P_1 V_1 + P_2 V_2)}{P_1 V_1 T_1 + P_2 V_2 T_2}$$

$$6760335988. P_1 V_1 + P_2 V_2$$

**Question Number : 13 Question Id : 6760331993 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Given below are two statements :

Statement I : Second law of thermodynamics is derived from the fact that it is impossible to run an irreversible engine without aid of external agency.

Statement II : Second law of thermodynamics provides the concept of entropy.

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

**Options :**

6760335989. Both statement I and II are correct.

6760335990. Both statements I and II are incorrect.

6760335991. Statement I is correct but statement II is incorrect.

6760335992. Statement I is incorrect but statement II is correct.

Question Number : 14 Question Id : 6760331994 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A copper rod of length 1m is stretched by 30 mm within elastic limit. The energy stored in the stretched rod is converted into heat, then the rise in temperature of the rod is \_\_\_\_\_.

[Given Young's Modulus  $\gamma=1.05 \times 10^{11} \text{ N/m}^2$  Specific gravity of copper = 9 specific heat capacity  $S = 100 \text{ Cal/kg/}^\circ\text{C}$ ]

Options :

6760335993.  $1.25^\circ\text{C}$

6760335994.  $12.5^\circ\text{C}$

6760335995.  $15.0^\circ\text{C}$

6760335996.  $15.5^\circ\text{C}$



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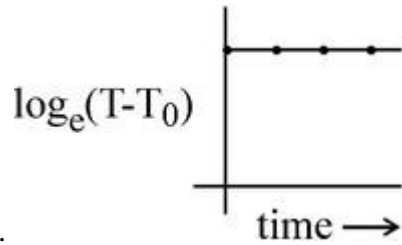
Question Number : 15 Question Id : 6760331995 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

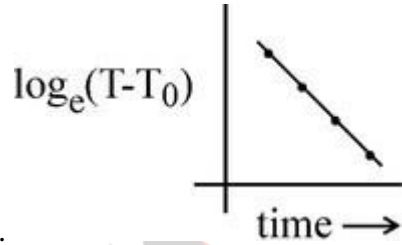
Which is the correct graph to explain the Newton's law of cooling.  $T$  and  $T_0$  are the temperatures of hot body and surrounding respectively.

Options :

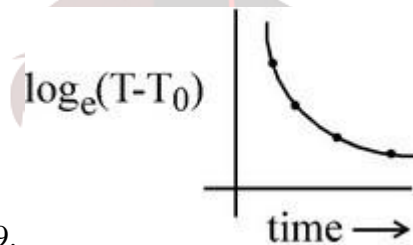
6760335997.



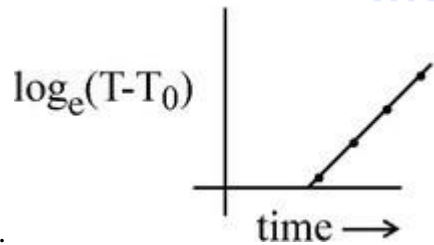
6760335998.



6760335999.



6760336000.



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Question Number : 16 Question Id : 6760331996 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

The distance of an equatorial satellite from the centre of Earth which is always above a certain place on the Earth's surface is -

Options :

6760336001.  $\left(\frac{GM}{\omega^2}\right)^{1/3}$

6760336002.  $\left(\frac{GM}{\omega^2}\right)^{1/2}$

6760336003.  $\left(\frac{GM}{\omega^2}\right)^{2/3}$

6760336004.  $\left(\frac{GM}{\omega^2}\right)$

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Question Number : 17 Question Id : 6760331997 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A neutron of mass  $m_n$  collides against a moderator nucleus of mass  $10 m_n$  at rest. Considering the collision to be one dimensional, the fractional kinetic energy lost by the neutron ( $f_1$ ) is [Given : The collision is elastic]

Options :

6760336005. 0.67

6760336006. 0.33

6760336007. 0.72

6760336008. 0.38

**Question Number : 18 Question Id : 6760331998 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The position time relation of a body of mass 0.02 kg is given by  
(one-dimensional motion)

$$x = 9 \text{ cm (for } t = 3, 9, 15, 21\text{s .....)}$$

$$x = 0 \text{ cm (for } t = 0, 6, 12, 18, 24\text{s .....)}$$

If the time between two consecutive impulse is '3s', find the magnitude of each impulse.

**Options :**

6760336009.  $1.2 \times 10^{-3} \text{ kg m/s}$

6760336010.  $1.2 \text{ kg m/s}$

6760336011.  $1.2 \times 10^{-1} \text{ kg m/s}$

6760336012.  $1200 \text{ g cms}^{-1}$

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**Question Number : 19 Question Id : 6760331999 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

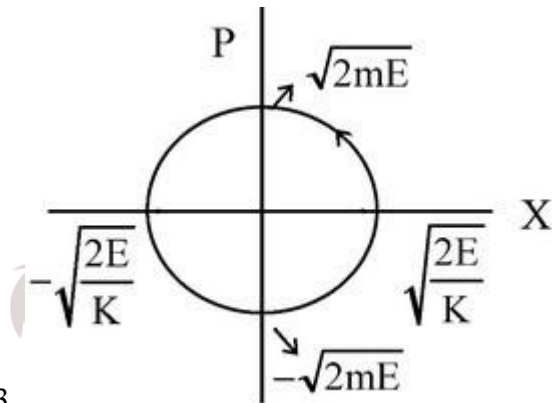


The potential energy function for a particle executing SHM is given by

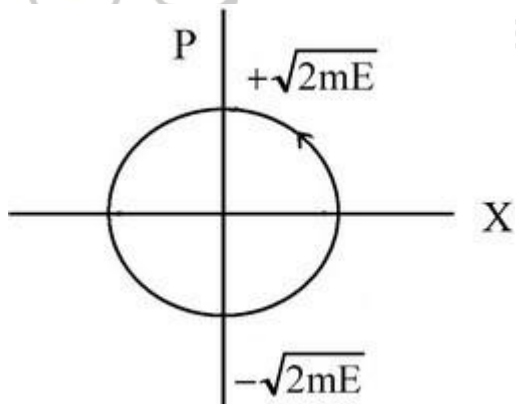
$$V(x) = \frac{1}{2}kx^2, \text{ where } k \text{ is the force constant of the oscillator. Which of the}$$

following diagram correctly shows the position - momentum curve for the motion.

Options :



6760336013.



6760336014.

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## Physics Section B

Section Id :	676033134
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 :	676033134
Question Shuffling Allowed :	Yes

Question Number : 21 Question Id : 6760332001 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An Amplitude Modulated (AM) wave is expressed as

$$C=5(1+0.3\cos 200\pi t)\cos(1\times 10^8\pi t) \text{ volts.}$$

Its percentage modulation is \_\_\_\_\_%.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 22 Question Id : 6760332002 Question Type : SA

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

Two heaters X and Y are connected in parallel across the supply of V volts. Heater X generates 500 kCal of heat in 20 minutes while Y generates 1000 kCal in 10 minutes. The resistance of heater X is  $10\Omega$ . If these heaters are connected in series across the same voltage, then the heat produced in 5 minutes will be \_\_\_\_\_ kCal.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 23 Question Id : 6760332003 Question Type : SA**

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

The magnitude of resultant of two forces acting at a point is 12N and the sum of their magnitude is 18N. If the resultant is at right angles with the smaller one, then the differences in the magnitude of the two forces will be \_\_\_\_\_ N.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

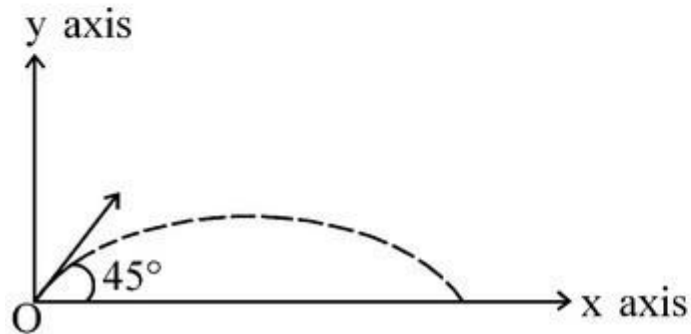
100

Question Number : 24 Question Id : 6760332004 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A particle of mass 1 kg is projected at  $t = 0$  from a point 'O' on the ground with a speed 'u' at an angle  $45^\circ$  to the horizontal. The magnitude of angular momentum of the particle about 'O' at time  $\frac{u}{g}$  is given by  $\frac{7u^3}{ag}$ . Then the

value of a is \_\_\_\_\_. (Take  $\frac{1}{\sqrt{2}} = 0.7$  and  $g = 10 \text{ m/s}^2$ )



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

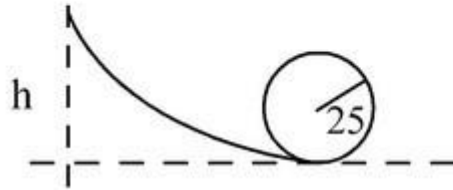
Possible Answers :

100

Question Number : 25 Question Id : 6760332005 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A small solid spherical marble of mass  $M$  and radius  $5$  cm rolls along loop track without slipping. The height above the base, from where it has to start rolling down incline such that the sphere just completes the vertical circular loop of radius  $25$  cm is \_\_\_\_\_ cm. ( $g = 10 \text{ m/s}^2$ )



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 26 **Question Id :** 6760332006 **Question Type :** SA

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

Employing a resistance of  $8\Omega$ , a capacitor is charged through a battery of  $12\text{V}$ .

In  $2\mu\text{s}$  time, the potential difference across the capacitor is found to be  $6\text{V}$ .

The storage capacity of the capacitor is  $\frac{x}{100}\mu\text{F}$ . Then the value of  $x$  is \_\_\_\_\_.

( $\ln 2 = 0.69$ )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

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Answers Type : Equal

Text Areas : PlainText

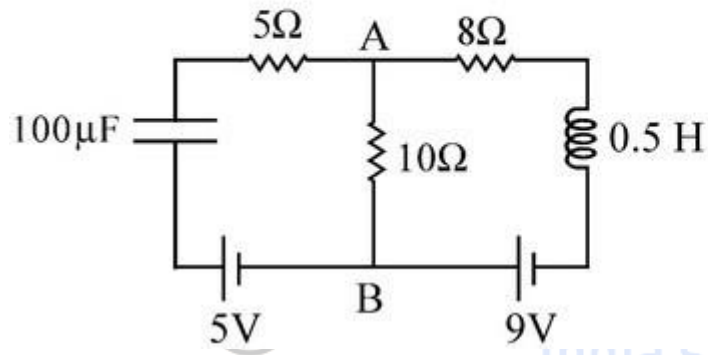
Possible Answers :

100

Question Number : 27 Question Id : 6760332007 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

As per the reported figure, the value of voltage across the terminals A B (i.e.  $V_{AB}$ ) is \_\_\_\_\_ V during the proper flow of current.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 28 Question Id : 6760332008 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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The voltage between the plates of a capacitor of capacitance  $5\mu\text{F}$  is changing at a rate of  $8 \times 10^2 \frac{\text{V}}{\text{s}}$ . The displacement current is \_\_\_\_\_ mA.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 29 **Question Id :** 6760332009 **Question Type :** SA

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

A light source of 25.1 mW emits  $2 \times 10^{16}$  photons per second. An unknown metal is brought in front of this light source from which electrons of speed upto  $10^6$  m/s are emitted upon the incidence of the photons from the light source. The work function of the unknown metal is \_\_\_\_\_ eV.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 30 **Question Id :** 6760332010 **Question Type :** SA

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



In the Bohr's atomic model, second energy state potential energy of hydrogen is  $(-E)$ . the kinetic energy of electron in the first energy state will be \_\_\_\_\_ E.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Section Id :**

676033135

**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 :**

676033135

**Question Shuffling Allowed :**

Yes

## Chemistry Section A

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Question Number : 31 Question Id : 6760332011 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List-I with List-II :

List-I : Examples of Colloids	List-II : Type of Colloid
A. Paints	I. Emulsion
B. Hair cream	II. Gel
C. Whipped cream	III. Sol
D. Cheese	IV. Foam

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

Options :

6760336031. A-III, B-I, C-IV, D-II

6760336032. A-II, B-I, C-IV, D-III

6760336033. A-IV, B-III, C-II, D-I

6760336034. A-I, B-IV, C-III, D-II

Question Number : 32 Question Id : 6760332012 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Identify the element with positive value of electron gain enthalpy

Options :

6760336035. At

6760336036. F

6760336037. Kr

6760336038. Te

**Question Number : 33 Question Id : 6760332013 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

During the isolation of copper from copper matte,  $\text{SiO}_2$  is added to

**Options :**

6760336039. remove FeS / FeO as  $\text{FeSiO}_3$ .

6760336040. reduce the melting point of the matte.

6760336041. reduce  $\text{Cu}_2\text{S}$  to metallic Cu.

6760336042. remove any C present.

**Question Number : 34 Question Id : 6760332014 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$\text{H}_2\text{O}_2$  reacts with  $\text{MnO}_4^-$  in basic medium to produce

**Options :**

6760336043.  $\text{Mn}_2\text{O}_3$

6760336044.  $\text{MnO}_2$

6760336045.  $\text{MnO}_4^{2-}$

6760336046.  $\text{Mn}_2\text{O}_7$

**Question Number : 35 Question Id : 6760332015 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

Statement-I : The chlorides of both beryllium and aluminium have structures in which chlorobridges are present in vapour phase.

Statement-II : Chlorides of both beryllium and aluminium are insoluble in organic solvents and are strong Lewis acids.

Choose the most appropriate answer :

**Options :**

6760336047. Both Statement-I and Statement-II are true.

6760336048. Both Statement-I and Statement-II are false.

6760336049. Statement-I is true but Statement-II is false.

6760336050. Statement-I is false but Statement-II is true.

**Question Number : 36 Question Id : 6760332016 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The number of  $\sigma$  (sigma) bond present in chloric acid, chlorous acid and perchloric acid are, respectively,

**Options :**

6760336051. 3, 4 and 5

6760336052. 4, 3 and 5

6760336053. 1, 2 and 3

6760336054. 3, 3 and 4

**Question Number : 37 Question Id : 6760332017 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Ruby and emerald are coloured due to the presence of

**Options :**

6760336055. Chromium(III) in both.

6760336056. Chromium(III) and Chromium(II) respectively.

6760336057. Chromium(III) and Copper(II) respectively.

6760336058. Chromium(II) and Copper(II) respectively.

**Question Number : 38 Question Id : 6760332018 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The oxidation states of Mn in  $\text{Mn}_2(\text{CO})_{10}$ ,  $[\text{Mn}(\text{CO})_5\text{Br}]$  and  $\text{K}[\text{Mn}(\text{CN})_6]$  are, respectively,

**Options :**

6760336059. 0, +6, +5

6760336060. +5, +6, +6

6760336061. 0, +1, +6

6760336062. 0, +1, +5

**Question Number : 39 Question Id : 6760332019 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The set in which both ligands generally behave in a bidentate chelating mode is

**Options :**

6760336063. CO,  $\text{SCN}^-$

6760336064. ethylenediamine, oxalate

6760336065.  $\text{CH}_3\text{NH}_2$ , oxalate

6760336066.  $\text{NCS}^-$ , ethylenediamine

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**Question Number : 40 Question Id : 6760332020 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The INCORRECT statement among those given below regarding smog is

**Options :**

6760336067. Photochemical smog occurs primarily in warm, dry and sunny climate.

6760336068. Classical smog is also called oxidizing smog.

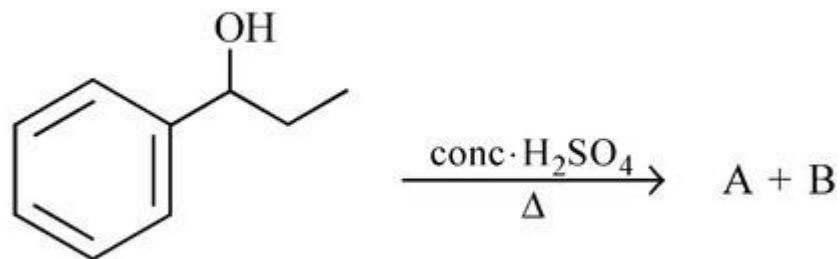
6760336069. Peroxyacetyl nitrate is a component of photochemical smog.

6760336070. Photochemical smog leads to cracking of rubber.

Question Number : 41 Question Id : 6760332021 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :

No Correct Marks : 4 Wrong Marks : 1

In the reaction given below,



the products A and B formed are

Options :

6760336071. Geometrical isomers

6760336072. Position isomers

6760336073. Chain isomers

6760336074. Metamers

Question Number : 42 Question Id : 6760332022 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :

No Correct Marks : 4 Wrong Marks : 1

Reaction of  $\text{CH}_3 - \text{CH} = \text{CH}_2$  with different reagents (List-I) yield different products (List-II).

Match List-I with List-II :

List-I : Reagents	List-II : Products on reaction with $\text{CH}_3 - \text{CH} = \text{CH}_2$
A. $\text{O}_3/\text{Zn}, \text{H}_2\text{O}$	I. Ethanoic acid
B. $\text{KMnO}_4/\text{H}_2\text{SO}_4$	II. Propan-2-ol
C. $\text{KMnO}_4/\text{NaOH}$	III. Ethanal
D. $\text{H}_3\text{O}^+$	IV. Propane-1, 2-diol

The correct match is :

Options :

6760336075. A-III, B-I, C-IV, D-II

6760336076. A-III, B-IV, C-I, D-II

6760336077. A-II, B-I, C-IV, D-III

6760336078. A-IV, B-I, C-II, D-III

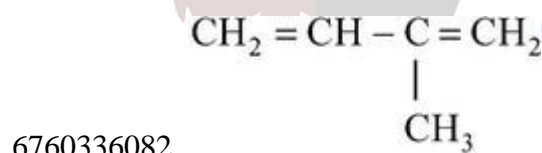
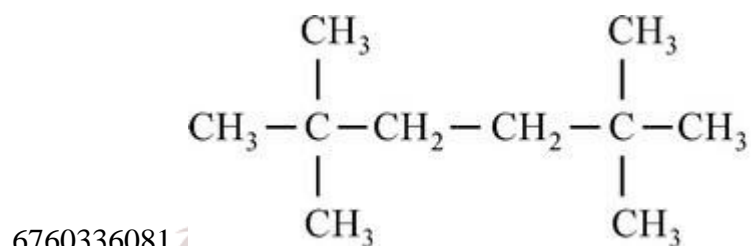
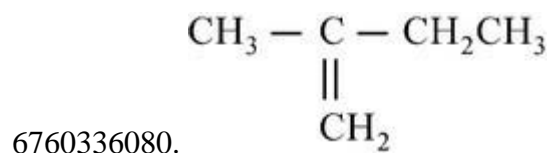
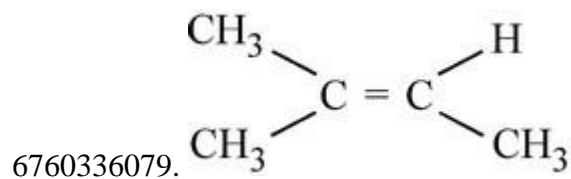
Question Number : 43 Question Id : 6760332023 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :

No Correct Marks : 4 Wrong Marks : 1

Neopentyl bromide on reaction with ethyl alcohol gives, as the major product,

Options :





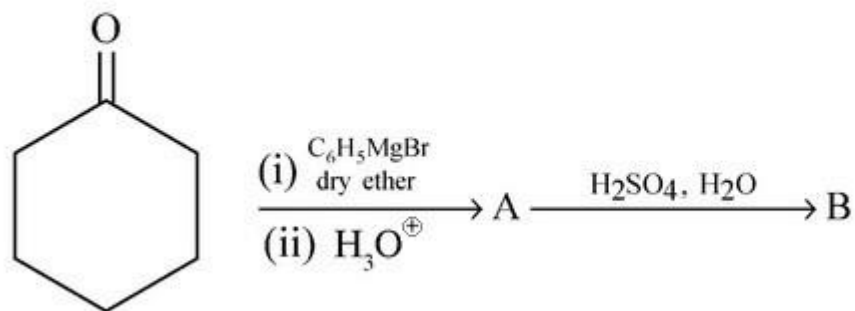
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Question Number : 44 Question Id : 6760332024 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

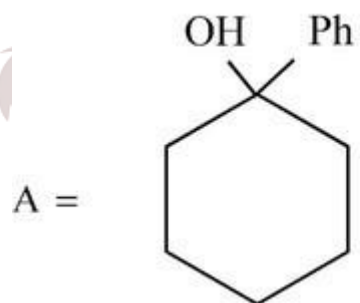
Correct Marks : 4 Wrong Marks : 1

The major products A and B in the following reaction sequence are

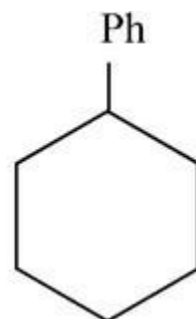


(Ph = -C<sub>6</sub>H<sub>5</sub>)

Options :

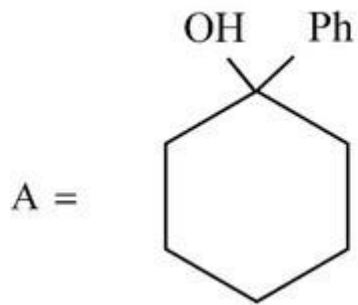


, B =

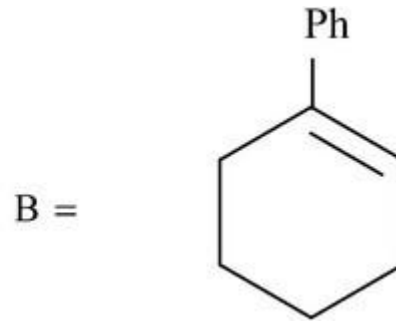


6760336083.

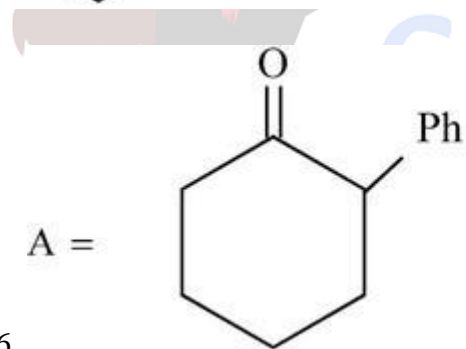
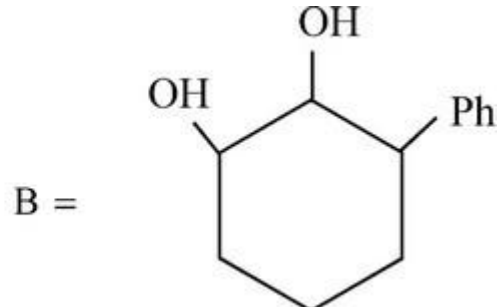
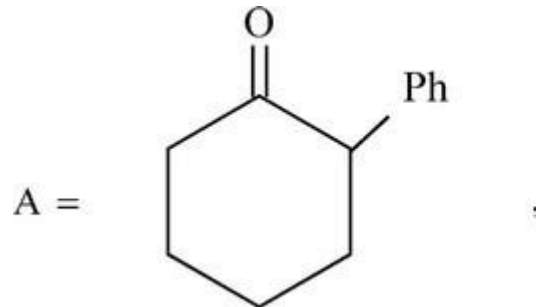
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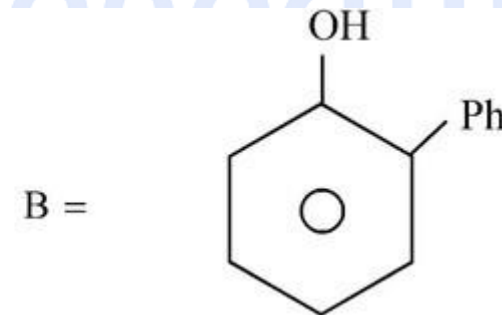
6760336084.



6760336085.



6760336086.

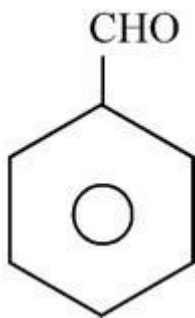


Question Number : 45 Question Id : 6760332025 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

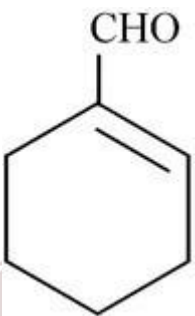
Cannizzaro reaction cannot be given by

Options :

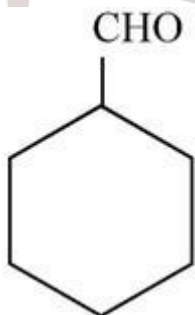
6760336087.  $\text{CCl}_3\text{CHO}$



6760336088.



6760336089.



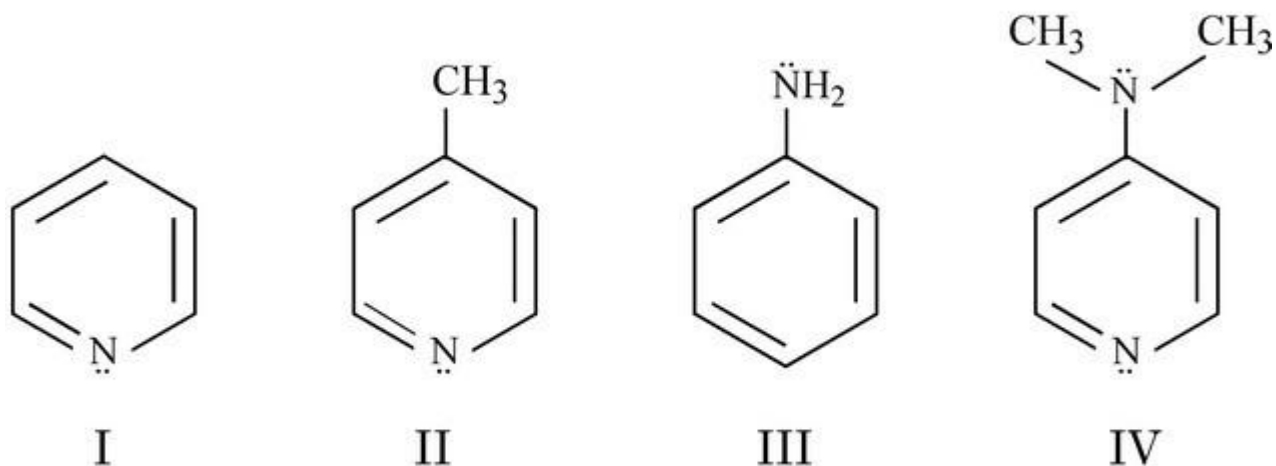
6760336090.

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Question Number : 46 Question Id : 6760332026 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the compounds below given



the correct order of basicity is

Options :

6760336091. III < I < II < IV

6760336092. I < II < IV < III

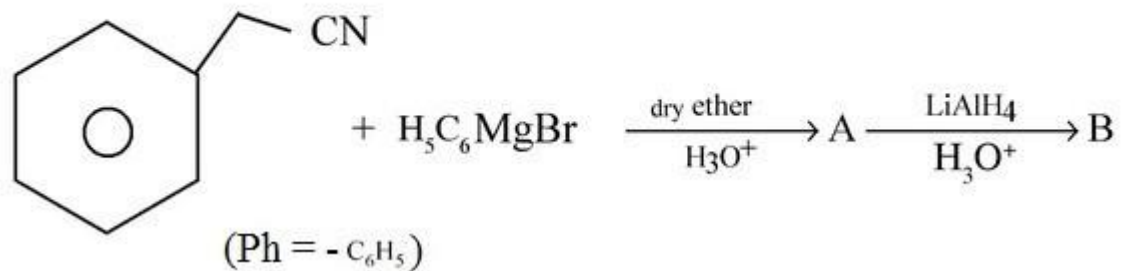
6760336093. I < II < III < IV

6760336094. III < IV < I < II

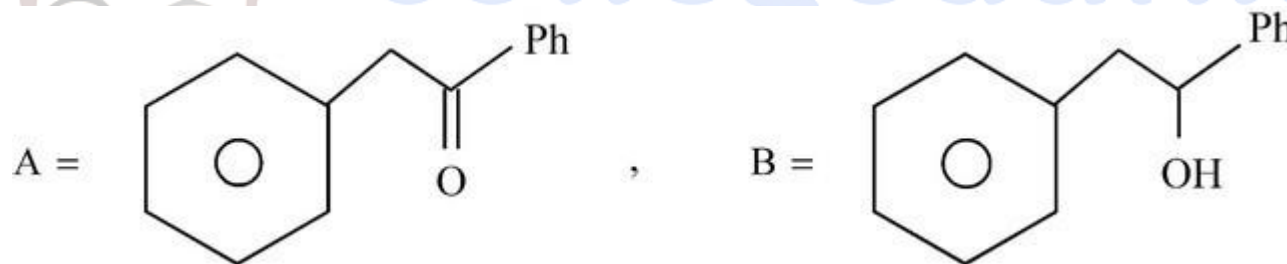
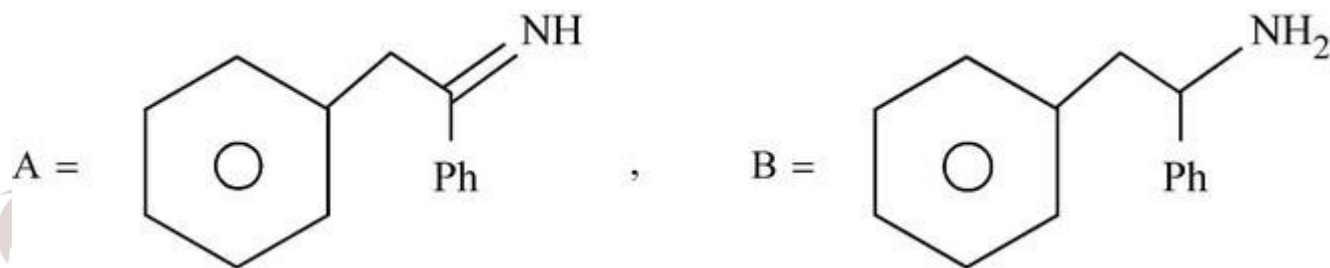
Question Number : 47 Question Id : 6760332027 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

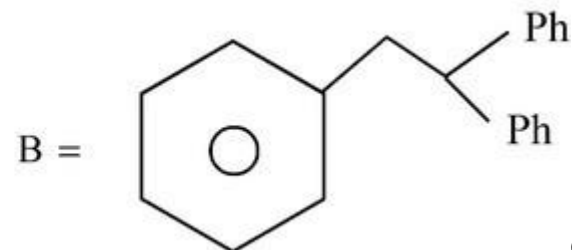
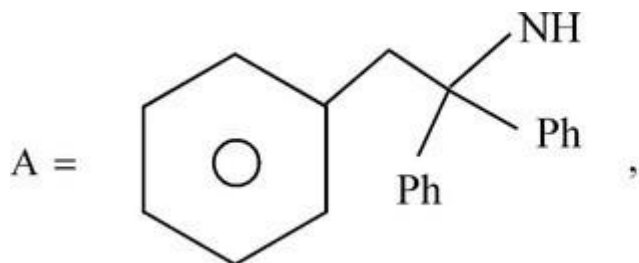
Correct Marks : 4 Wrong Marks : 1

The major products A and B in the following reaction sequence are



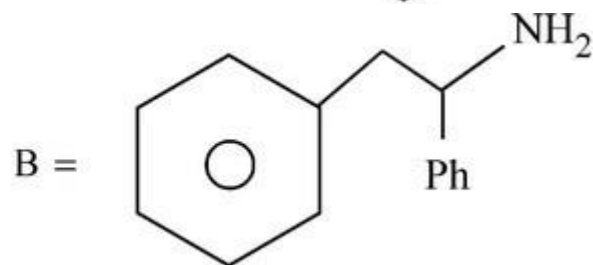
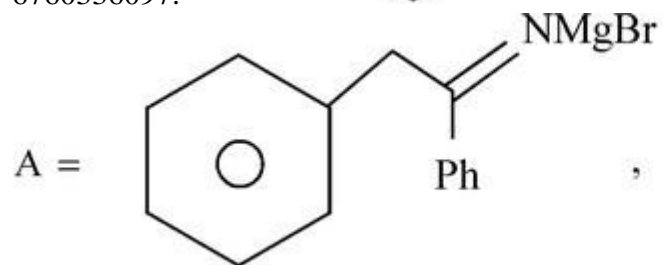
Options :





6760336097.

6760336098.



Question Number : 48 Question Id : 6760332028 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The drug that is used as an antacid is

Options :

6760336099. Cimetidine

6760336100. Veronal

6760336101. Codeine

6760336102. Iproniazid

Question Number : 49 Question Id : 6760332029 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The evidence about the cyclic structure of glucose appears from the fact that

**Options :**

6760336103. penta-acetate of glucose does not react with hydroxyl amine.
6760336104. glucose reacts with  $\text{NH}_2\text{OH}$  to form oxime.
6760336105. glucose does not form hexa-acetate.
6760336106. glucose produces gluconic acid with hydroxyl amine.

**Question Number : 50 Question Id : 6760332030 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The reagent that gives purple coloured complex with  $\text{S}^{2-}$  ion is

**Options :**

6760336107.  $\text{Na}_4 [\text{Fe}(\text{CN})_5 \text{NOS}]$
6760336108.  $\text{Na}_2 [\text{Fe}(\text{CN})_5 \text{NO}]$
6760336109.  $\text{Na}_2 [\text{Fe}(\text{CN})_5 \text{ONO}]$
6760336110.  $\text{Na}_4 [\text{Fe}(\text{CN})_5 \text{ONO}]$

## Chemistry Section B

**Section Id :**

676033136

**Section Number :**

4

**Section type :**

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
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	676033136
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 51 Question Id : 6760332031 Question Type : SA**

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

The amount of potassium chlorate ( $\text{KClO}_3$ ) that needs to be completely decomposed in order to liberate  $40 \text{ dm}^3$  of oxygen gas at STP is \_\_\_\_\_ g.

(Nearest integer)

[Atomic Masses :  $\text{K} = 39.0 \text{ u}$ ;  $\text{Cl} = 35.5 \text{ u}$ ;  $\text{O} = 16.0 \text{ u}$ ,  $R = 0.0831 \text{ L bar mol}^{-1} \text{ K}^{-1}$

Assume oxygen is an ideal gas at STP; at STP molar volume of an ideal gas is  $22.7 \text{ L mol}^{-1}$ ]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 52 Question Id : 6760332032 Question Type : SA**

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

A gaseous mixture of helium and oxygen contains 20% helium by weight. If the partial pressure of oxygen in the mixture is 5 atm, the partial pressure of helium is \_\_\_\_\_ atm.

(Nearest integer)

[Atomic Masses : He : 4.0 u; O : 16.0 u]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 53 **Question Id :** 6760332033 **Question Type :** SA

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

The number of photons emitted by a 800 nm lamp having an average power of 5 mW in 10 s is \_\_\_\_\_  $\times 10^{17}$ .

(Nearest integer)

[Given :  $h = 6.626 \times 10^{-34}$  Js;  $C = 3.0 \times 10^8$  ms<sup>-1</sup>]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

Question Number : 54 Question Id : 6760332034 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The bond order in  $\text{NO}^+$  is \_\_\_\_\_ .

(integer answer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 6760332035 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The standard reaction enthalpy for hydrogenation of propene is  $-124 \text{ kJ mol}^{-1}$ .

Additionally, standard heat of combustion  $\Delta_c H^\ominus$  (propane) =  $-2220 \text{ kJ mol}^{-1}$ .

and standard heat of formation  $\Delta_f H^\ominus$  (water) =  $-286 \text{ kJ mol}^{-1}$ .

If  $\Delta_c H^\ominus$  (propene) =  $-x \text{ kJ mol}^{-1}$ , 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 :

**Question Number : 56 Question Id : 6760332036 Question Type : SA**

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

0.7 cm<sup>3</sup> of compound A (molar mass = 70 g mol<sup>-1</sup>, density = 1.024 g cm<sup>-3</sup>) is dissolved in 1 dm<sup>3</sup> of water. If the depression in freezing point of water is 0.02 °C, the van't Hoff factor for the compound A is \_\_\_\_\_ × 10<sup>-2</sup>.

(Nearest integer)

[Given : K<sub>f</sub> for H<sub>2</sub>O = 1.86 K kg mol<sup>-1</sup>, Density of H<sub>2</sub>O = 1.0 g cm<sup>-3</sup>]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

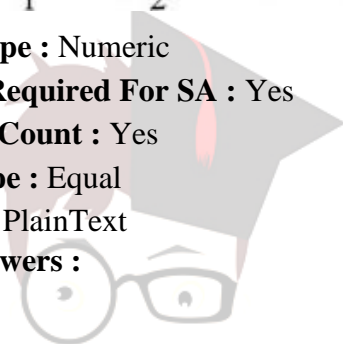
**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100



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**Question Number : 57 Question Id : 6760332037 Question Type : SA**

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

$x \times 10^{-5}$  g of Ca(OH)<sub>2</sub> are required to produce 200 cm<sup>3</sup> of an aqueous solution of pH 10.0.

The value of  $x$  is \_\_\_\_\_ .

(Nearest integer)

[Given : Atomic masses : Ca : 40.0 u; H : 1.0 u; O : 16.0 u]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

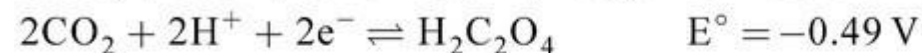
**Possible Answers :**

100

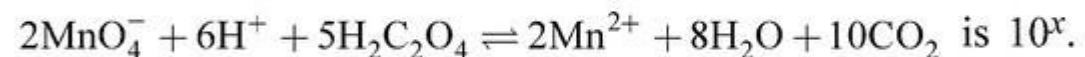
**Question Number : 58 Question Id : 6760332038 Question Type : SA**

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

The standard electrode potentials of the reactions are given below.



The equilibrium constant for the reaction



The value of  $x$  is \_\_\_\_\_ .

(Nearest integer)

$$\left[ \text{Given : } \frac{2.303 RT}{F} = 0.059 \text{ V} \right]$$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

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100

**Question Number : 59 Question Id : 6760332039 Question Type : SA**

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

$\text{N}_2\text{O}_5$  decomposes following first order kinetics according to the reaction



$\text{N}_2\text{O}_5$  is introduced in a closed vessel. After 46 minutes, the pressure in the vessel is 549.43 mm of Hg. After a very long time, the pressure saturated at 584.5 mm of Hg. The rate constant of the reaction in  $\text{hr}^{-1}$  is \_\_\_\_\_ .

(Nearest integer)

[Assume :  $\ln 10 = 2.3$ ,

Assume all gases behave as ideal gases]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

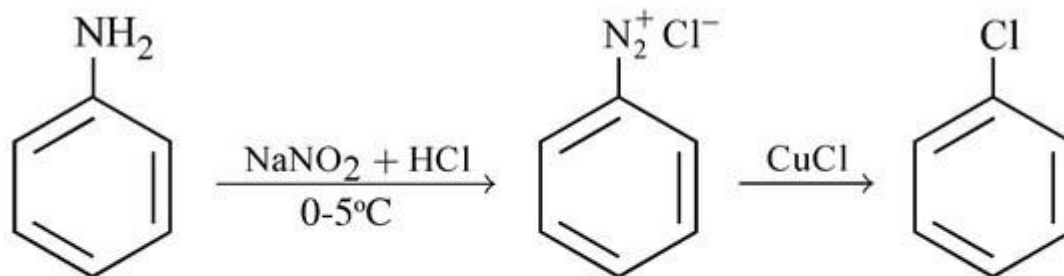
**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 60 Question Id : 6760332040 Question Type : SA**

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



In the reactions above, yield of the first step is 90% and that of the second step is 80%. The overall yield of the reaction is \_\_\_\_\_ %.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

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## Mathematics Section A

<b>Section Id :</b>	676033137
<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

**Enable Mark as Answered Mark for Review and Clear Response :** Yes  
**Sub-Section Number :** 1  
**Sub-Section Id :** 676033137  
**Question Shuffling Allowed :** Yes

**Question Number : 61 Question Id : 6760332041 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :**  
**No Correct Marks : 4 Wrong Marks : 1**

The domain of the function  $f(x) = \frac{\log_2(x+3)}{(x+1)(x+2)}$  is

**Options :**

6760336121.  $\mathbb{R} - \{-1, -2\}$

6760336122.  $(-2, \infty)$

6760336123.  $\mathbb{R} - \{-1, -2, -3\}$

6760336124.  $(-3, \infty) - \{-1, -2\}$

**Question Number : 62 Question Id : 6760332042 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :**  
**No Correct Marks : 4 Wrong Marks : 1**

If A is a  $3 \times 3$  matrix and  $|A| = \frac{1}{36}$ , then the value of  $|2 \cdot \text{adj}(3 \cdot \text{adj}(6A))|$  is

**Options :**

6760336125.  $2^7 \times 3^8$



6760336126.  $2^6 \times 3^{10}$

6760336127.  $2^6 \times 3^{12}$

6760336128.  $2^7 \times 3^{10}$

**Question Number : 63 Question Id : 6760332043 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The system of equations

$$x + 2y + pz = 4$$

$$x + qy + z = 5$$

$$2x + 4y + z = 8$$

has

**Options :**

6760336129. a unique solution for  $p = 1$  and  $q = 2$

6760336130. a unique solution for  $p = 2$  and  $q = 2$

6760336131. infinitely many solutions for  $p = \frac{1}{2}$  and  $q = 2$

6760336132. no solution for  $p = 2$  and  $q = 1$

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**Question Number : 64 Question Id : 6760332044 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :**

**No Correct Marks : 4 Wrong Marks : 1**

If  $C_r$  ( $r = 0, 1, 2, \dots, 11$ ) are the Binomial coefficients in the expansion of  $(1 + x)^{11}$ , then the value of

$C_0 + (C_0 + C_1) + (C_0 + C_1 + C_2) + \dots + (C_0 + C_1 + \dots + C_{11})$  is

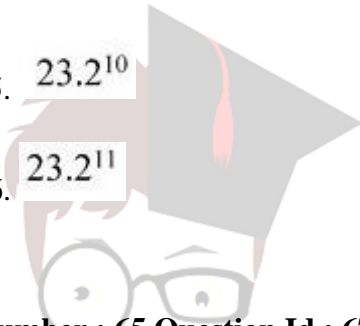
**Options :**

6760336133.  $13.2^{10}$

6760336134.  $13.2^{11}$

6760336135.  $23.2^{10}$

6760336136.  $23.2^{11}$



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**Question Number : 65 Question Id : 6760332045 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory :**

**No**

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

A fair coin is tossed  $n$  times. If the probability of getting 6 heads is equal to that of getting 8 tails, then the probability of getting 2 heads, is

**Options :**

6760336137.  $\frac{91}{2^{14}}$

6760336138.  $\frac{13}{2^{14}}$

6760336139.  $\frac{1}{7}$

6760336140.  $\frac{51}{2^{14}}$

**Question Number : 66 Question Id : 6760332046 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The value of  $\lim_{x \rightarrow 2} \left( 2 - \cos(2x^2 - 5x + 2) \right)^{\frac{1}{(x^2 - 4x + 4)}}$  is equal to

Options :

6760336141.  $e^{\frac{9}{4}}$

6760336142.  $e^{\frac{9}{2}}$

6760336143.  $e^{\frac{3}{4}}$

6760336144.  $e^{\frac{3}{2}}$



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**Question Number : 67 Question Id : 6760332047 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be twice differentiable and satisfy  $f(x + y) = f(x) + f(y)$ . If  $f'(0) = 1$ , then which of the following is true?

**Options :**

6760336145.  $f(0) = 1$

6760336146.  $f'(2) = 1$

6760336147.  $f''(0) = 1$

6760336148.  $f'(1) = 2$

**Question Number : 68 Question Id : 6760332048 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Equation of a tangent to the curve,  $y = 2 \int_0^x |t| dt$  which is parallel to the line,

$2x - y = 13$  is

**Options :**

6760336149.  $y = 2x + 13$

6760336150.  $y = 2x + 1$

6760336151.  $y = 2x - 7$

6760336152.  $y = 2x$

**Question Number : 69 Question Id : 6760332049 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $\int \sin^{-1}\left(\frac{2x+2}{\sqrt{4x^2+8x+13}}\right) dx = A \tan^{-1}\left(\frac{2x+2}{3}\right) + B \log_e(4x^2+8x+13) + C$  (C is a constant of integration), then the ordered pair (A, 4B) is equal to

**Options :**

6760336153.  $\left(\frac{3}{2}(x+1), -3\right)$

6760336154.  $\left(\frac{3}{2}(x+1), 3\right)$

6760336155.  $(x+1, -3)$

6760336156.  $(x+1, -6)$

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**Question Number : 70 Question Id : 6760332050 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The value of the integral  $\int_1^6 \frac{\log_e x \, dx}{\log_e x^2 + \log_e(x^2 - 14x + 49)}$  is

**Options :**

6760336157.  $\frac{5}{4}$

6760336158.  $\frac{5}{8}$

6760336159.  $\frac{7}{4}$

6760336160.  $\frac{5}{2}$

Question Number : 71 Question Id : 6760332051 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If  $u + v + w = 91$ , and  $2u = 3v = 4w$ , then the value of  $\int_{u-v+w}^{2u+v+4w} e^{(x-[x])} dx$ , where  $[x]$  denotes the greatest integer  $\leq x$ , is equal to

Options :

6760336161.  $160\left(1 - \frac{1}{e}\right)$

6760336162. 161

6760336163.  $161e$

6760336164.  $161(e - 1)$

**Question Number : 72 Question Id : 6760332052 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If two distinct chords, drawn from the point  $(\alpha, \beta)$  on the circle  $x^2 + y^2 = \alpha x + \beta y$  (where  $\alpha\beta \neq 0$ ) are bisected by the  $y$ -axis, then

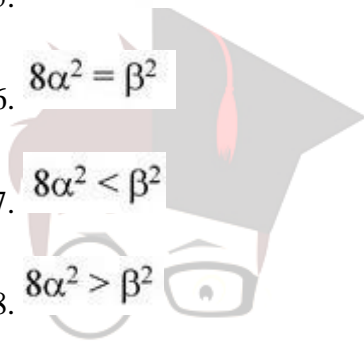
**Options :**

6760336165.  $\alpha^2 = 8\beta^2$

6760336166.  $8\alpha^2 = \beta^2$

6760336167.  $8\alpha^2 < \beta^2$

6760336168.  $8\alpha^2 > \beta^2$



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**Question Number : 73 Question Id : 6760332053 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If the area of the triangle formed by the tangent at a point in the first quadrant on the ellipse,  $4x^2 + 3y^2 = 12$  and its axes is 4 sq. units, then one such point is

**Options :**

6760336169.  $\left(1, \sqrt{\frac{8}{3}}\right)$

6760336170.  $\left(\frac{3}{2}, 1\right)$

6760336171.  $\left(\frac{1}{2}, \sqrt{\frac{11}{3}}\right)$

6760336172.  $\left(\sqrt{\frac{3}{2}}, \sqrt{2}\right)$

**Question Number : 74 Question Id : 6760332054 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let the normal at any point of hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  intersect the coordinate axes at points P and Q. Then the locus of the mid-point of PQ is :

**Options :**

6760336173.  $2(b^2x^2 + a^2y^2) = a^2 + b^2$

6760336174.  $2(b^2x^2 - a^2y^2) = a^2 + b^2$

6760336175.  $4(a^2x^2 + b^2y^2) = (a^2 + b^2)^2$



6760336176.  $4(a^2x^2 - b^2y^2) = (a^2 + b^2)$

**Question Number : 75 Question Id : 6760332055 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The equation of a line passing through the point (2, -1, 1) and the point of intersection of the lines  $2x - y - 4 = 0 = y + 2z$  and  $x + 3z = 0 = 2x + 5z - 1$ , is

**Options :**

6760336177.  $\frac{x-2}{1} = \frac{y+1}{-3} = \frac{z-1}{2}$

6760336178.  $\frac{x-2}{1} = \frac{y+1}{3} = \frac{z-1}{-2}$

6760336179.  $\frac{x-2}{1} = \frac{y+1}{3} = \frac{z-1}{2}$

6760336180.  $\frac{x-2}{-1} = \frac{y+1}{3} = \frac{z-1}{2}$

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**Question Number : 76 Question Id : 6760332056 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The distance of the point (5, 6, 9) from the plane, which passes through the line of intersection of the planes  $x + y - z = 1$  and  $2x + 3y + 4z = 5$ , and is perpendicular to the plane  $x - y + z = 0$  is

**Options :**

6760336181.  $\sqrt{31}$

6760336182.  $2\sqrt{31}$

6760336183.  $\sqrt{62}$

6760336184.  $2\sqrt{62}$

**Question Number : 77 Question Id : 6760332057 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The mean and the variance of seven observations are 8 and 16 respectively. If five of the observations are 2, 4, 10, 12 and 14, then the absolute difference of the remaining two observations is

**Options :**

6760336185. 2

6760336186. 3

6760336187. 4

6760336188. 6

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**Question Number : 78 Question Id : 6760332058 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A bag contains four bulbs. Some of these bulbs are defective. Two bulbs are drawn at random and it is found that both the bulbs are defective. What is the probability that the bag contains exactly 3 defective bulbs?

**Options :**

6760336189. 0.5

6760336190. 0.3

6760336191. 0.6

6760336192. 0.75

**Question Number : 79 Question Id : 6760332059 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The number of solutions of the equation  $|\cos x| = \cos x - 2 \sin x, -2\pi \leq x \leq 2\pi$ , is

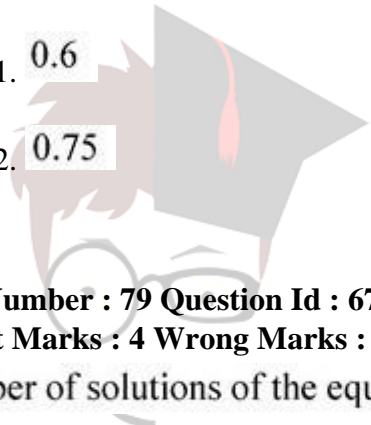
**Options :**

6760336193. 7

6760336194. 5

6760336195. 4

6760336196. 3



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Question Number : 80 Question Id : 6760332060 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the following statements :

$p$  : Amit plays cricket

$q$  : Amit is out of Delhi.

$r$  : It is Sunday

Then the statement “Amit plays cricket only if he is in Delhi and it is Sunday” can be expressed as :

Options :

6760336197.  $(q \wedge r) \Rightarrow p$

6760336198.  $(\sim q \wedge r) \Rightarrow p$

6760336199.  $p \Rightarrow (q \wedge r)$

6760336200.  $p \Rightarrow (\sim q \wedge r)$

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## Mathematics Section B

676033138

Section Id :

<b>Section Number :</b>	6
<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
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	676033138
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 81 Question Id : 6760332061 Question Type : SA**  
**Correct Marks : 4 Wrong Marks : 0**

If  $z = \frac{\sqrt{3}-i}{2}$  and  $(z^{95} + i^{95})^{94} = z^n$ , then the minimum positive integral value of 'n' is \_\_\_\_\_.

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

100

**Question Number : 82 Question Id : 6760332062 Question Type : SA**  
**Correct Marks : 4 Wrong Marks : 0**  
The integral value of  $a$ , for which the equation,

$$(x^2 + x + 2)^2 - (a - 3)(x^2 + x + 2)(x^2 + x + 1) + (a - 4)(x^2 + x + 1)^2 = 0$$

has real roots, is \_\_\_\_\_.

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

100

**Question Number :** 83 **Question Id :** 6760332063 **Question Type :** SA  
**Correct Marks :** 4 **Wrong Marks :** 0

If  $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ , the sum of the entries of  $A^{20}$  is \_\_\_\_\_.

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

100

**Question Number :** 84 **Question Id :** 6760332064 **Question Type :** SA  
**Correct Marks :** 4 **Wrong Marks :** 0  
The unit digit in the sum of  $1! + 2! + 3! + \dots + 2021!$  is \_\_\_\_\_.

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

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**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number : 85 Question Id : 6760332065 Question Type : SA**

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

Let  $\vec{a} = -\hat{i} + \hat{j}$  and  $\vec{b} = \hat{i} + \hat{j} - \hat{k}$  be two given vectors. If a vector  $\vec{c}$  satisfies  $(\vec{a} \times \vec{c}) + \vec{b} = \vec{0}$  and  $\vec{a} \cdot \vec{c} = 3$ , then  $10 |\vec{c}|^2$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number : 86 Question Id : 6760332066 Question Type : SA**

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

If 32,  $5x$  and  $y$  are in A.P., and 2,  $x$  and  $y$  are in G.P., then the positive common difference of the A.P. is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

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**Question Number : 87 Question Id : 6760332067 Question Type : SA**

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

If  $f$  be a twice differentiable function satisfying  $f(x) = x^4 + x^2 f''(1) + f''(2)$ , then the modulus of the minimum value of  $f(x)$  is equal to \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 88 Question Id : 6760332068 Question Type : SA**

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

If  $\frac{dw(t)}{dt} = t\sqrt{121-t^2}$  and  $w(0) = 0$ , then the value of  $3w(\sqrt{21})$  is \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 89 Question Id : 6760332069 Question Type : SA**

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



One side of a square lies along the line  $x - 3y + 1 = 0$  and its one vertex is  $(1, 4)$ . If  $(a, b)$  and  $(c, d)$  are its two vertices on the line  $x - 3y + 1 = 0$ , then

$$|a-2| + |c-2| + |b-1| + |d-1|$$

is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 90 **Question Id :** 6760332070 **Question Type :** SA

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

The number of real solutions of the equation

$$\left| \begin{array}{cc} x^2 + \sin x \cos x & x(1 + \sin x) \\ x + \cos x & x + 1 \end{array} \right| = 0$$

is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100