

# nta

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<b>Subject Name :</b>	B TECH
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<b>Display Marks:</b>	Yes

## B TECH

<b>Group Number :</b>	1
<b>Group Id :</b>	864351231
<b>Group Maximum Duration :</b>	0
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<b>Group Marks :</b>	300
<b>Is this Group for Examiner? :</b>	No

## Physics Section A

<b>Section Id :</b>	864351824
<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
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511051
<b>Question Shuffling Allowed :</b>	Yes

**Question Type : MCQ Is Question Mandatory : No**

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

If ' $f$ ' denotes the ratio of the number of nuclei decayed ( $N_d$ ) to the number of nuclei at  $t=0$  ( $N_0$ ) then for a collection of radioactive nuclei, the rate of change of ' $f$ ' with respect to time is given as :

[ $\lambda$  is the radioactive decay constant]

**Options :**

1.  $-\lambda e^{-\lambda t}$
2.  $\lambda e^{-\lambda t}$
3.  $\lambda(1 - e^{-\lambda t})$
4.  $-\lambda(1 - e^{-\lambda t})$

**Question Type : MCQ Is Question Mandatory : No**

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

যদি 'f' য়ে বিঘটিত হোৱা নিউক্লিয়াছৰ ( $N_d$ ) ৰ সংখ্যাৰ সৈতে  $t=0$  সময়ত নিউক্লিয়াছৰ সংখ্যাৰ ( $N_0$ ) অনুপাত দৰ্শাইছে, তেন্তে তেজস্ক্ৰিয় নিউক্লিয়াছৰ এক সংগ্ৰহৰ বাবে, সময় অনুযায়ী 'f' ৰ পৰিবৰ্তনৰ হাৰ দিয়া যায় :

[ $\lambda$  তেজস্ক্ৰিয় বিঘটন ধ্ৰুৱক]

**Options :**

1.  $-\lambda e^{-\lambda t}$
2.  $\lambda e^{-\lambda t}$
3.  $\lambda(1 - e^{-\lambda t})$
4.  $-\lambda(1 - e^{-\lambda t})$

**Question Type : MCQ Is Question Mandatory : No**

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

In Young's double slit experiment, if the source of light changes from orange to blue then :

**Options :**

1. the intensity of the minima will increase.
2. the distance between consecutive fringes will increase.
3. the distance between consecutive fringes will decrease.
4. the central bright fringe will become a dark fringe.

**Question Type : MCQ Is Question Mandatory : No**

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

ইয়ঙৰ দ্বি-ছিদ্র পৰীক্ষাত, যদি পোহৰৰ উৎস কমলাৰ পৰা নীলালৈ সলনি হয় তেন্তে :

**Options :**

1. অন্ধকাৰ পটিৰ তীব্ৰতা বাঢ়ি যাব।
2. ক্ৰমিক পটিৰ মাজৰ দূৰত্ব বাঢ়ি যাব।
3. ক্ৰমিক পটিৰ মাজৰ দূৰত্ব কমি যাব।
4. কেন্দ্ৰীয় উজ্জ্বল পটিটো এটা অন্ধকাৰ পটি হৈ যাব।

**Question Type : MCQ Is Question Mandatory : No**

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

The relative permittivity of distilled water is 81. The velocity of light in it will be :

(Given  $\mu_r = 1$ )

**Options :**

1.  $3.33 \times 10^7$  m/s
2.  $4.33 \times 10^7$  m/s
3.  $5.33 \times 10^7$  m/s
4.  $2.33 \times 10^7$  m/s

**Question Type : MCQ Is Question Mandatory : No**

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

পৰিশোধিত (distilled) পানীৰ আপেক্ষিক প্ৰৱেশ্যতা 81। ইয়াত পোহৰৰ বেগ হ'ব :

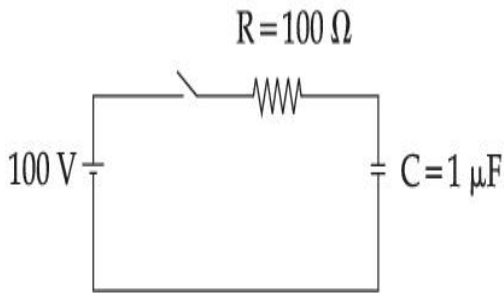
$$(\mu_r = 1)$$

**Options :**

1.  $3.33 \times 10^7$  m/s
2.  $4.33 \times 10^7$  m/s
3.  $5.33 \times 10^7$  m/s
4.  $2.33 \times 10^7$  m/s

**Question Type : MCQ Is Question Mandatory : No**

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



A capacitor of capacitance  $C = 1 \mu\text{F}$  is suddenly connected to a battery of 100 volt through a resistance  $R = 100 \Omega$ . The time taken for the capacitor to be charged to get 50 V is :

[Take  $\ln 2 = 0.69$ ]

**Options :**

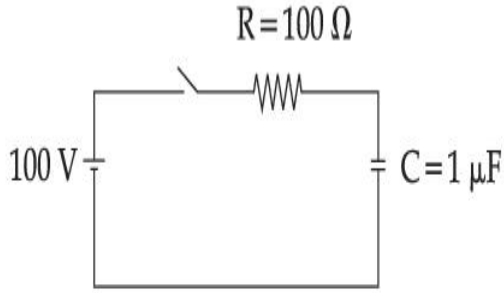
1.  $0.69 \times 10^{-4}$  s
2.  $0.30 \times 10^{-4}$  s

3.  $1.44 \times 10^{-4} \text{ s}$

4.  $3.33 \times 10^{-4} \text{ s}$

**Question Type : MCQ Is Question Mandatory : No**

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



$R = 100 \Omega$  ৰোধ এটাৰ মাজেদি 100 volt ৰ এটা বেটেৰীৰ সৈতে  $C = 1 \mu\text{F}$  ধাৰকত্বৰ ধাৰক এটা হঠাতে সংযোগ কৰা হ'ল। কিমান সময়ৰ পাছত ধাৰকটো 50 V লৈ আধানযুক্ত হ'ব :

[ $\ln 2 = 0.69$  লোৱা]

**Options :**

1.  $0.69 \times 10^{-4} \text{ s}$

2.  $0.30 \times 10^{-4} \text{ s}$

3.  $1.44 \times 10^{-4} \text{ s}$

4.  $3.33 \times 10^{-4} \text{ s}$

**Question Type : MCQ Is Question Mandatory : No**

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

A 0.07 H inductor and a 12  $\Omega$  resistor are connected in series to a 220 V, 50 Hz ac source. The approximate current in the circuit and the phase angle between current and source

voltage are respectively. [Take  $\pi$  as  $\frac{22}{7}$ ]

**Options :**

1. 8.8 A and  $\tan^{-1}\left(\frac{11}{6}\right)$

2. 0.88 A and  $\tan^{-1}\left(\frac{11}{6}\right)$

3. 88 A and  $\tan^{-1}\left(\frac{11}{6}\right)$

4. 8.8 A and  $\tan^{-1}\left(\frac{6}{11}\right)$

**Question Type : MCQ Is Question Mandatory : No**

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

এটা 220 V, 50 Hz ৰ পৰিবৰ্তী উৎসৰ সৈতে এটা 0.07 H ৰ আৱেশক আৰু 12  $\Omega$  ৰোধক শ্ৰেণীবদ্ধভাৱে সংযোগ কৰা হৈছে। বৰ্তনীটোত মোটামুটিভাৱে প্ৰবাহ আৰু প্ৰবাহ আৰু উৎসৰ বিভৱৰ মাজৰ দশা কোণ ক্ৰমান্বয়ে :

[ $\pi = \frac{22}{7}$  ৰূপে লোৱা]

**Options :**

1. 8.8 A আৰু  $\tan^{-1}\left(\frac{11}{6}\right)$

2.  $0.88 A$  আৰু  $\tan^{-1}\left(\frac{11}{6}\right)$

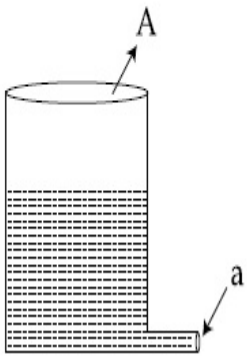
3.  $88 A$  আৰু  $\tan^{-1}\left(\frac{11}{6}\right)$

4.  $8.8 A$  আৰু  $\tan^{-1}\left(\frac{6}{11}\right)$

**Question Type : MCQ Is Question Mandatory : No**

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

A light cylindrical vessel is kept on a horizontal surface. Area of base is  $A$ . A hole of cross-sectional area ' $a$ ' is made just at its bottom side. The minimum coefficient of friction necessary to prevent sliding the vessel due to the impact force of the emerging liquid is ( $a \ll A$ ) :



**Options :**

1.  $\frac{a}{A}$

2.  $\frac{2a}{A}$

3.  $\frac{A}{2a}$

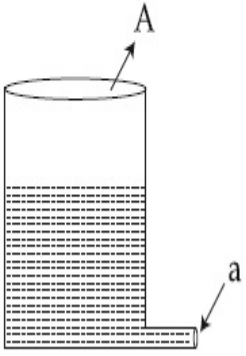


4. None of these

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এখন আনুভূমিক পৃষ্ঠত এটা পাতল চুঙাকৃতিৰ পাত্ৰ ৰখা আছে। ইয়াৰ ভূমিৰ কালি  $A$ । ইয়াৰ তলিৰ ফালে পৃষ্ঠছেদৰ কালি 'a' ৰ এটা ফুটা কৰা হ'ল। নিৰ্গত তৰলৰ প্ৰতিঘাতী বলৰ বাবে পাত্ৰটো পিছলিবৰ বাবে বাধা দিবৰ বাবে প্ৰয়োজনীয় নিন্মতম ঘৰ্ষণ গুণাংক হয়, ( $a \ll A$ ):



Options :

1.  $\frac{a}{A}$

2.  $\frac{2a}{A}$

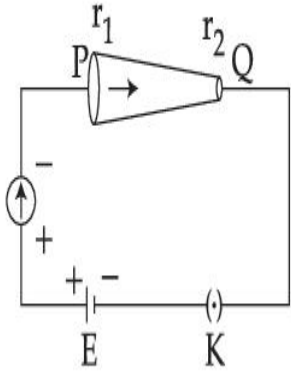
3.  $\frac{A}{2a}$

4. কোনটিই নহয়

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the given figure, a battery of emf  $E$  is connected across a conductor PQ of length ' $l$ ' and different area of cross-sections having radii  $r_1$  and  $r_2$  ( $r_2 < r_1$ ).



Choose the correct option as one moves from P to Q :

**Options :**

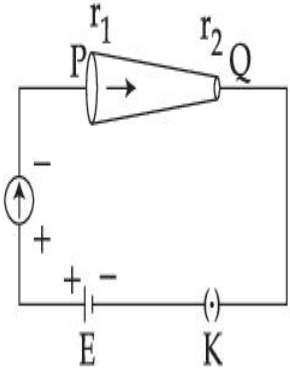
1. Drift velocity of electron increases.
2. Electron current decreases.
3. Electric field decreases.
4. All of these

**Question Type : MCQ Is Question Mandatory : No**

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

দিয়া চিত্ৰত, 'l' দৈৰ্ঘ্যৰ আৰু  $r_1$  আৰু  $r_2$  ( $r_2 < r_1$ ) ব্যাসাৰ্ধৰ ভিন্ন পৃষ্ঠচ্ছেদৰ কালিৰ এক পৰিবাহী PQ ৰ দুয়োপ্ৰান্তৰ মাজত

বিদ্যুৎ চালক বল E ৰ এক বেটেৰী সংযোগ কৰা হৈছে।



যেতিয়া এজনে P ৰ পৰা Q লৈ গতি কৰে শুদ্ধ বিকল্প চয়ন কৰা :

**Options :**

1. ইলেক্ট্ৰনৰ অপৰাহ বেগ বৃদ্ধি হয়।
2. ইলেক্ট্ৰন প্ৰবাহ কমি যায়।
3. বৈদ্যুতিক ক্ষেত্ৰ কমিব।
4. সকলোবোৰ।

**Question Type : MCQ Is Question Mandatory : No**

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

Two capacitors of capacities  $2C$  and  $C$  are joined in parallel and charged up to potential  $V$ . The battery is removed and the capacitor of capacity  $C$  is filled completely with a medium of dielectric constant  $K$ . The potential difference across the capacitors will now be :

**Options :**

1.  $\frac{V}{K}$

2.  $\frac{3V}{K}$

3.  $\frac{V}{K + 2}$

4.  $\frac{3V}{K + 2}$

**Question Type : MCQ Is Question Mandatory : No**

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

2C আৰু C ধাৰকত্বৰ দুটা ধাৰকক সমান্তৰালভাৱে সংযোগ কৰা হৈছে আৰু V বিভৱ পৰ্য্যন্ত আধানযুক্ত কৰা হৈছে।  
বেটেৰীটো আঁতৰোৱা হ'ল আৰু C ধাৰকত্বৰ ধাৰকটো সম্পূৰ্ণৰূপে পৰাবৈদ্যুতিক ধ্ৰুৱক K ৰ এক মাধ্যমেৰে পূৰ্ণ কৰা  
হ'ল। এতিয়া ধাৰকসমূহৰ দুয়োমূৰে বিভৱভেদ হ'ব :

**Options :**

1.  $\frac{V}{K}$

2.  $\frac{3V}{K}$

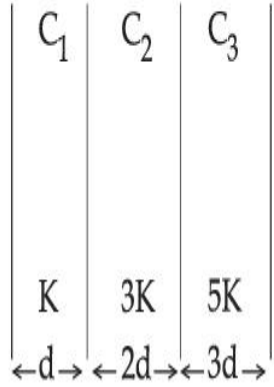
3.  $\frac{V}{K + 2}$

4.  $\frac{3V}{K + 2}$

**Question Type : MCQ Is Question Mandatory : No**

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

In the reported figure, a capacitor is formed by placing a compound dielectric between the plates of parallel plate capacitor. The expression for the capacity of the said capacitor will be : (Given area of plate = A)



**Options :**

1.  $\frac{25}{6} \frac{K\epsilon_0 A}{d}$

2.  $\frac{15}{34} \frac{K\epsilon_0 A}{d}$

3.  $\frac{9}{6} \frac{K\epsilon_0 A}{d}$

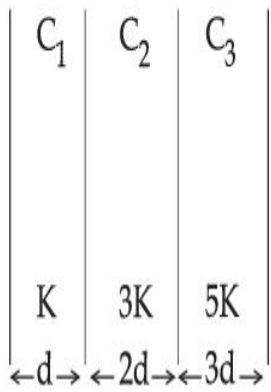
4.  $\frac{15}{6} \frac{K\epsilon_0 A}{d}$

**Question Type : MCQ Is Question Mandatory : No**

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

উল্লিখিত চিত্রটোত, এটা সমান্তৰাল পাত ধাৰকৰ পাতসমূহৰ মাজত এটা মিশ্ৰ/যৌগ পৰাবিদ্যুত ৰাখি এটা ধাৰক বনোৱা

হৈছে। উল্লিখিত ধাৰকটোৰ ধাৰকত্বৰ প্ৰকাশৰাশি হ'ব : (দিয়া আছে পাতৰ কালি = A)



**Options :**

1.  $\frac{25}{6} \frac{K\epsilon_0 A}{d}$

2.  $\frac{15}{34} \frac{K\epsilon_0 A}{d}$

3.  $\frac{9}{6} \frac{K\epsilon_0 A}{d}$

4.  $\frac{15}{6} \frac{K\epsilon_0 A}{d}$

**Question Type : MCQ Is Question Mandatory : No**

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

A particle starts executing simple harmonic motion (SHM) of amplitude 'a' and total energy

E. At any instant, its kinetic energy is  $\frac{3E}{4}$  then its displacement 'y' is given by :

**Options :**

1.

$$y = \frac{a}{\sqrt{2}}$$

2.  $y = \frac{a}{2}$

3.  $y = \frac{a\sqrt{3}}{2}$

4.  $y = a$

**Question Type : MCQ Is Question Mandatory : No**

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

এটা কণাই বিস্তার 'a' আৰু মুঠ শক্তি E ৰ সৰল পৰ্যাবৃত্ত গতি সম্পাদন কৰিবলৈ আৰম্ভ কৰে। যিকোনো ক্ষণত, ইয়াৰ গতি

শক্তি  $\frac{3E}{4}$ , তেন্তে ইয়াৰ সৰণ 'y' দিয়া যাব :

**Options :**

1.  $y = \frac{a}{\sqrt{2}}$

2.  $y = \frac{a}{2}$

3.  $y = \frac{a\sqrt{3}}{2}$

4.  $y = a$

**Question Type : MCQ Is Question Mandatory : No**

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

Two identical tennis balls each having mass 'm' and charge 'q' are suspended from a fixed point by threads of length 'l'. What is the equilibrium separation when each thread makes a small angle 'θ' with the vertical ?

**Options :**

1. 
$$x = \left( \frac{q^2 l^2}{2\pi\epsilon_0 m^2 g} \right)^{1/3}$$

2. 
$$x = \left( \frac{q^2 l}{2\pi\epsilon_0 m g} \right)^{1/3}$$

3. 
$$x = \left( \frac{q^2 l}{2\pi\epsilon_0 m g} \right)^{1/2}$$

4. 
$$x = \left( \frac{q^2 l^2}{2\pi\epsilon_0 m^2 g^2} \right)^{1/3}$$

**Question Type : MCQ Is Question Mandatory : No**

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

'l' দৈৰ্ঘ্যৰ সূতাৰ সহায়ত এটা দৃঢ় বিন্দুৰ পৰা প্ৰত্যেকৰে 'm' ভৰ আৰু 'q' আধান থকা দুটা সাইলাখ একেই টেনিছ বল ওলমাই ৰখা হৈছে। যেতিয়া প্ৰতিডাল সূতাই অভিলম্বৰ সৈতে এক সূক্ষ্মকোণ 'θ' কৰি থাকে সম্বলন ব্যৱধান কি হয় ?

**Options :**

1.



$$x = \left( \frac{q^2 l^2}{2\pi\epsilon_0 m^2 g} \right)^{1/3}$$

2.  $x = \left( \frac{q^2 l}{2\pi\epsilon_0 m g} \right)^{1/3}$

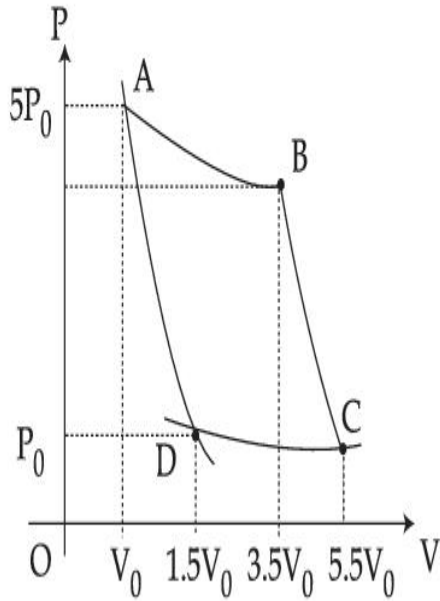
3.  $x = \left( \frac{q^2 l}{2\pi\epsilon_0 m g} \right)^{1/2}$

4.  $x = \left( \frac{q^2 l^2}{2\pi\epsilon_0 m^2 g^2} \right)^{1/3}$

**Question Type : MCQ Is Question Mandatory : No**

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

In the reported figure, there is a cyclic process ABCDA on a sample of 1 mol of a diatomic gas. The temperature of the gas during the process  $A \rightarrow B$  and  $C \rightarrow D$  are  $T_1$  and  $T_2$  ( $T_1 > T_2$ ) respectively.



Choose the correct option out of the following for work done if processes BC and DA are adiabatic.

**Options :**

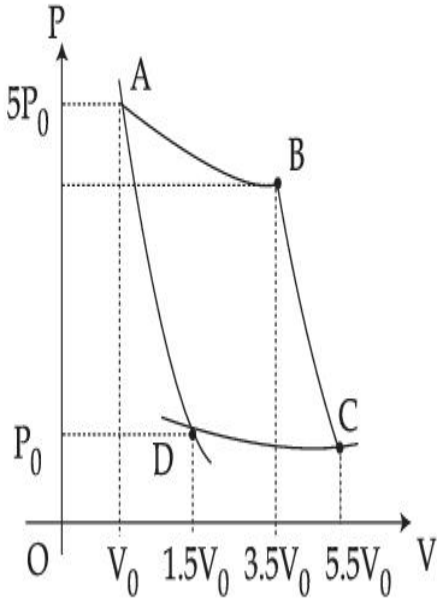
1.  $W_{BC} + W_{DA} > 0$
2.  $W_{AB} < W_{CD}$
3.  $W_{AB} = W_{DC}$
4.  $W_{AD} = W_{BC}$

**Question Type : MCQ Is Question Mandatory : No**

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

উল্লিখিত চিত্রত, এটা দ্বিপাৰমাণৱিক গেছৰ 1 ম'লৰ এক নমুনাৰ বাবে এক চক্ৰীয় প্ৰণালী ABCDA আছে। A → B

আৰু C → D প্ৰণালীৰ সময়ত গেছটোৰ উষ্ণতা ক্ৰমে  $T_1$  আৰু  $T_2$  ( $T_1 > T_2$ )।



যদি BC আৰু DA প্ৰণালীদুটা তাপৰোধী, তেন্তে সম্পাদিত কাৰ্য্যৰ বাবে তলৰ পৰা শুদ্ধ বিকল্পটো চয়ন কৰা।

**Options :**

1.  $W_{BC} + W_{DA} > 0$

2.  $W_{AB} < W_{CD}$

3.  $W_{AB} = W_{DC}$

4.  $W_{AD} = W_{BC}$

**Question Type : MCQ Is Question Mandatory : No**

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

A body takes 4 min. to cool from  $61^\circ\text{C}$  to  $59^\circ\text{C}$ . If the temperature of the surroundings is  $30^\circ\text{C}$ , the time taken by the body to cool from  $51^\circ\text{C}$  to  $49^\circ\text{C}$  is :

**Options :**

1. 3 min.

2. 4 min.
3. 6 min.
4. 8 min.

**Question Type : MCQ Is Question Mandatory : No**

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

এটা বস্তুর 61°C ৰ পৰা 59°C লৈ শীতল হ'বলৈ 4 min. লয়। যদিহে তেঁপাশৰ উষ্ণতা 30°C হয়, বস্তুটোৰ 51°C ৰ পৰা 49°C লৈ শীতল হ'বলৈ লোৱা সময় হ'ব :

**Options :**

1. 3 min.
2. 4 min.
3. 6 min.
4. 8 min.

**Question Type : MCQ Is Question Mandatory : No**

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

The number of molecules in one litre of an ideal gas at 300 K and 2 atmospheric pressure with mean kinetic energy  $2 \times 10^{-9}$  J per molecule is :

**Options :**

1.  $0.75 \times 10^{11}$

2.  $1.5 \times 10^{11}$

3.  $3 \times 10^{11}$

4.  $6 \times 10^{11}$

**Question Type : MCQ Is Question Mandatory : No**

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

অণুৰে প্ৰতি গড় গতি শক্তি  $2 \times 10^{-9}$  J ব সৈতে 2 বায়ুমণ্ডলীয় চাপ আৰু 300 K ত থকা এক লিটাৰ আদৰ্শ গেছত অণুৰ

সংখ্যা হয় :

**Options :**

1.  $0.75 \times 10^{11}$

2.  $1.5 \times 10^{11}$

3.  $3 \times 10^{11}$

4.  $6 \times 10^{11}$

**Question Type : MCQ Is Question Mandatory : No**

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

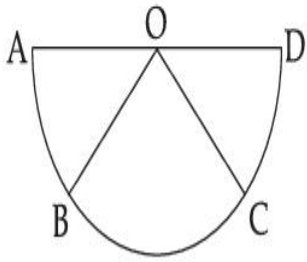
**Assertion A :** If A, B, C, D are four points on a semi-circular arc with centre at 'O' such

that  $|\vec{AB}| = |\vec{BC}| = |\vec{CD}|$ , then

$$\vec{AB} + \vec{AC} + \vec{AD} = 4\vec{AO} + \vec{OB} + \vec{OC}$$

**Reason R :** Polygon law of vector addition yields

$$\vec{AB} + \vec{BC} + \vec{CD} = \vec{AD} = 2\vec{AO}$$



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

**Options :**

1. Both **A** and **R** are correct and **R** is the correct explanation of **A**.
2. Both **A** and **R** are correct but **R** is not the correct explanation of **A**.
3. **A** is correct but **R** is not correct.
4. **A** is not correct but **R** is correct.

**Question Type : MCQ Is Question Mandatory : No**

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

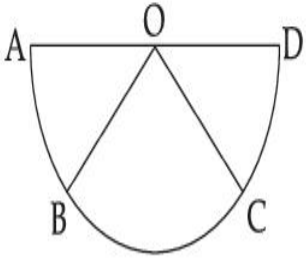
ঘোষণা A : যদিহে A, B, C, D এটা অর্ধ বৃত্তাকাৰ কেন্দ্ৰ 'O' চাপত থকা চাৰিটা বিন্দু হয় যাতে

$$|\vec{AB}| = |\vec{BC}| = |\vec{CD}|, \text{ তেন্তে}$$

$$\vec{AB} + \vec{AC} + \vec{AD} = 4\vec{AO} + \vec{OB} + \vec{OC}$$

কাৰণ R : ভেক্টৰ যোগৰ বহুভুজৰ সূত্র অনুসৰি

$$\vec{AB} + \vec{BC} + \vec{CD} = \vec{AD} = 2\vec{AO}$$



উপৰোক্ত উক্তিৰ প্ৰকাশত, তলৰ বিকল্পৰ পৰা সৰ্বোচ্চ যুক্তিযুক্ত উত্তৰ চয়ন কৰা :

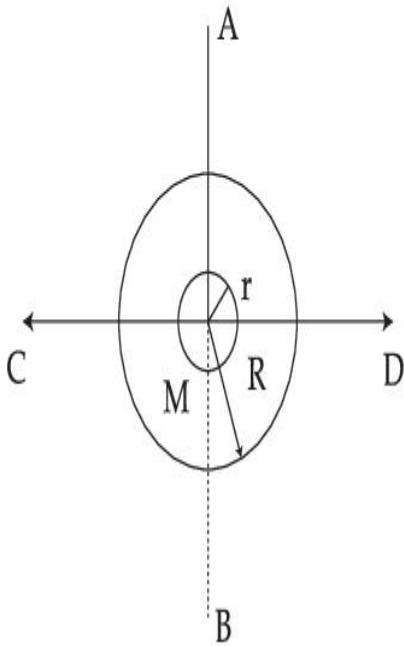
**Options :**

1. **A** আৰু **R** দুয়োটাই শুদ্ধ আৰু **R A** ৰ শুদ্ধ ব্যাখ্যা ।
2. **A** আৰু **R** দুয়োটাই শুদ্ধ কিন্তু **R A** ৰ শুদ্ধ ব্যাখ্যা নহয় ।
3. **A** শুদ্ধ কিন্তু **R** শুদ্ধ নহয় ।
4. **A** শুদ্ধ নহয় কিন্তু **R** শুদ্ধ ।

**Question Type : MCQ Is Question Mandatory : No**

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

The figure shows two solid discs with radius  $R$  and  $r$  respectively. If mass per unit area is same for both, what is the ratio of MI of bigger disc around axis  $AB$  (which is  $\perp$  to the plane of the disc and passing through its centre) to MI of smaller disc around one of its diameters lying on its plane? Given 'M' is the mass of the larger disc. (MI stands for moment of inertia)



**Options :**

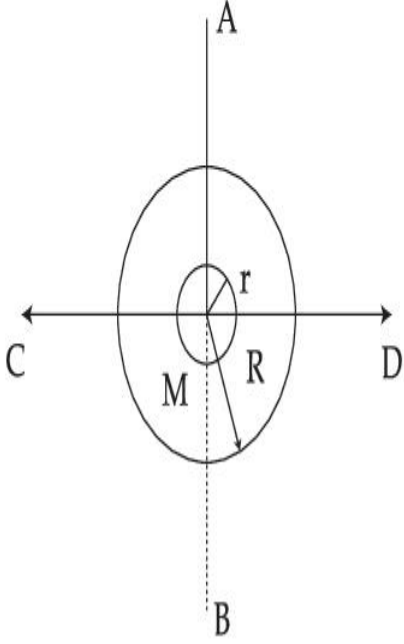
1.  $2R^2 : r^2$
2.  $R^2 : r^2$
3.  $2R^4 : r^4$
4.  $2r^4 : R^4$

**Question Type : MCQ Is Question Mandatory : No**

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



চিত্ৰত ক্ৰমে R আৰু r ব্যাসাৰ্ধৰ দুখন গোটা থাল দেখুওৱা হৈছে। যদি দুয়োৰে বাবে প্ৰতি একক কালিত ভৰ একেই হয়, AB অক্ষ সাপেক্ষে (যিয়ে থালখনৰ তলৰ (plane) লম্বভাৱে ( $\perp$ ) আছে আৰু ইয়াৰ কেন্দ্ৰৰ মাজেদি গৈছে) ডাঙৰ থালখনৰ জড় ভ্ৰামকৰ সৈতে, ইয়াৰ তলত (plane) থকা ইয়াৰ এডাল ব্যাস সাপেক্ষে সৰু থালখনৰ জড় ভ্ৰামকৰ অনুপাত কি হয় ? দিয়া আছে ডাঙৰ থালখনৰ ভৰ 'M'।



**Options :**

1.  $2R^2 : r^2$
2.  $R^2 : r^2$
3.  $2R^4 : r^4$
4.  $2r^4 : R^4$

**Question Type : MCQ Is Question Mandatory : No**

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

**List - I****List - II**

- |   |                 |
|---|-----------------|
| (a) MI of the rod (length L, Mass M, about an axis $\perp$ to the rod passing through the midpoint)     | (i) $8 ML^2/3$  |
| (b) MI of the rod (length L, Mass 2M, about an axis $\perp$ to the rod passing through one of its end)  | (ii) $ML^2/3$   |
| (c) MI of the rod (length 2L, Mass M, about an axis $\perp$ to the rod passing through its midpoint)    | (iii) $ML^2/12$ |
| (d) MI of the rod (length 2L, Mass 2M, about an axis $\perp$ to the rod passing through one of its end) | (iv) $2 ML^2/3$ |

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

**Options :**

1. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
2. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
3. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
4. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

**Question Type : MCQ Is Question Mandatory : No**

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

তালিকা - I

তালিকা - II

- |  |                 |
|--|-----------------|
| (a) দণ্ড এডালৰ জড় ভ্ৰামক (দৈৰ্ঘ্য L, ভৰ M, দণ্ডৰ লম্বভাৱে ( $\perp$ ),<br>মধ্যবিন্দুৱেদি যোৱা এডাল অক্ষ সাপেক্ষে)       | (i) $8 ML^2/3$  |
| (b) দণ্ড ডালৰ জড় ভ্ৰামক (দৈৰ্ঘ্য L, ভৰ 2M,<br>দণ্ডৰ এটা প্ৰান্তৰেদি ইয়াৰ লম্বভাৱে ( $\perp$ ) যোৱা এডাল অক্ষ সাপেক্ষে) | (ii) $ML^2/3$   |
| (c) দণ্ড ডালৰ জড় ভ্ৰামক (দৈৰ্ঘ্য 2L, ভৰ M,<br>ইয়াৰ মধ্যবিন্দুৱেদি লম্বভাৱে ( $\perp$ ) যোৱা এডাল অক্ষ সাপেক্ষে)        | (iii) $ML^2/12$ |
| (d) দণ্ড ডালৰ জড় ভ্ৰামক (দৈৰ্ঘ্য 2L, ভৰ 2M,<br>ইয়াৰ এটা প্ৰান্তৰেদি লম্বভাৱে ( $\perp$ ) যোৱা অক্ষ সাপেক্ষে)           | (iv) $2 ML^2/3$ |

তলৰ বিকল্পৰ পৰা শুদ্ধ উত্তৰ চয়ন কৰা :

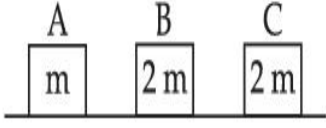
**Options :**

1. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
2. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
3. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
4. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

**Question Type : MCQ Is Question Mandatory : No**

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

Three objects A, B and C are kept in a straight line on a frictionless horizontal surface. The masses of A, B and C are  $m$ ,  $2m$  and  $2m$  respectively. A moves towards B with a speed of  $9\text{ m/s}$  and makes an elastic collision with it. Thereafter B makes a completely inelastic collision with C. All motions occur along same straight line. The final speed of C is :



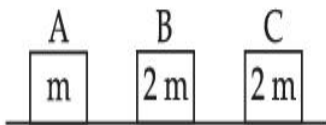
**Options :**

1.  $6\text{ m/s}$
2.  $3\text{ m/s}$
3.  $4\text{ m/s}$
4.  $9\text{ m/s}$

**Question Type : MCQ Is Question Mandatory : No**

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

এখন ঘর্ষণহীন আনুভূমিক তলত তিনিটা বস্তু A, B আৰু C ক এডাল সবলবেখাত বখা হৈছে। A, B আৰু C ৰ ভৰ ক্ৰমে  $m$ ,  $2m$  আৰু  $2m$ । A য়ে  $9\text{ m/s}$  দ্ৰুতিৰে B ৰ দিশত গতি কৰিছে আৰু ইয়াৰ সৈতে স্থিতিস্থাপক সংঘৰ্ষ কৰিছে। তাৰপাছত B য়ে C ৰ সৈতে এক সম্পূৰ্ণ অস্থিতিস্থাপক সংঘৰ্ষ কৰে। সকলো গতি একেডাল সবলবেখাৰ দিশতেই হৈছে। C ৰ শেষ দ্ৰুতি হয় :



**Options :**

1.  $6\text{ m/s}$

2.  $3 \text{ m/s}$

3.  $4 \text{ m/s}$

4.  $9 \text{ m/s}$

**Question Type : MCQ Is Question Mandatory : No**

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

A ball is thrown up with a certain velocity so that it reaches a height 'h'. Find the ratio of the

two different times of the ball reaching  $\frac{h}{3}$  in both the directions.

**Options :**

1.  $\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$

2.  $\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

3.  $\frac{1}{3}$

4.  $\frac{\sqrt{2} - 1}{\sqrt{2} + 1}$

**Question Type : MCQ Is Question Mandatory : No**

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

এটা বলক এক নির্দিষ্ট বেগেৰে ওপৰলৈ দলিওৱা হৈছে যাতে ই 'h' উচ্চতা পায়। বলটোৱে দুয়ো দিশত  $\frac{h}{3}$  উচ্চতা

পোৱাৰ দুয়োটা ভিন্ন সময়ৰ অনুপাত নিৰ্ণয় কৰা :

**Options :**

1.  $\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$

2.  $\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

3.  $\frac{1}{3}$

4.  $\frac{\sqrt{2} - 1}{\sqrt{2} + 1}$

**Question Type : MCQ Is Question Mandatory : No**

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

**Assertion A :** If in five complete rotations of the circular scale, the distance travelled on main scale of the screw gauge is 5 mm and there are 50 total divisions on circular scale, then least count is 0.001 cm.

**Reason R :** Least Count =  $\frac{\text{Pitch}}{\text{Total divisions on circular scale}}$

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

**Options :**

1. Both **A** and **R** are correct and **R** is the correct explanation of **A**.
2. Both **A** and **R** are correct and **R** is NOT the correct explanation of **A**.
3. **A** is correct but **R** is not correct.
4. **A** is not correct but **R** is correct.

**Question Type : MCQ Is Question Mandatory : No**

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

ঘোষণা **A** : যদি বৃত্তাকার স্কেলৰ পাঁচটা সম্পূৰ্ণ পৰিক্ৰমাত, স্ক্ৰু-গজটোৰ মূখ্য স্কেলত 5 mm দূৰত্ব যায় আৰু বৃত্তাকার স্কেলত মুঠ 50 বিভাজন থাকে, তেন্তে নিম্নতম গণনা 0.001 cm হয়।

কাৰণ **R** : 
$$\text{নিম্নতম গণনা} = \frac{\text{পিট্চ}}{\text{বৃত্তাকার স্কেলৰ মুঠ বিভাজন}}$$

উপৰোক্ত দুই উক্তিৰ প্ৰকাশত, তলৰ বিকল্পৰ পৰা সৰ্বোচ্চ যুক্তিযুক্ত উত্তৰ চয়ন কৰা :

**Options :**

1. **A** আৰু **R** দুয়োটাই শুদ্ধ আৰু **R** **A** ৰ শুদ্ধ ব্যাখ্যা।
2. **A** আৰু **R** দুয়োটাই শুদ্ধ আৰু **R** **A** ৰ শুদ্ধ ব্যাখ্যা নহয়।
3. **A** শুদ্ধ কিন্তু **R** অশুদ্ধ।
4. **A** অশুদ্ধ কিন্তু **R** শুদ্ধ।

## Physics Section B

<b>Section Id :</b>	864351825
<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
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511052
<b>Question Shuffling Allowed :</b>	Yes

**Question Type : SA**

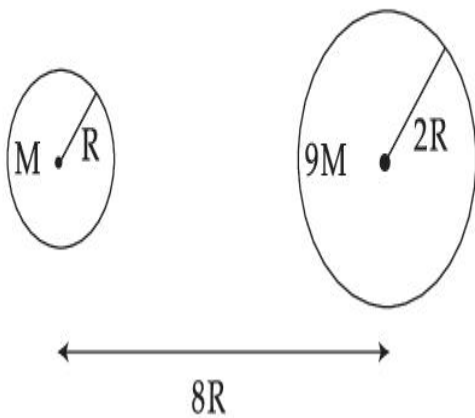
**Correct Marks : 4 Wrong Marks : 0**



Suppose two planets (spherical in shape) of radii  $R$  and  $2R$ , but mass  $M$  and  $9M$  respectively have a centre to centre separation  $8R$  as shown in the figure. A satellite of mass ' $m$ ' is projected from the surface of the planet of mass ' $M$ ' directly towards the centre of the second planet. The minimum speed ' $v$ ' required for the satellite to reach the surface of the second

planet is  $\sqrt{\frac{a}{7} \frac{GM}{R}}$  then the value of ' $a$ ' is \_\_\_\_\_.

[Given : The two planets are fixed in their position]



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

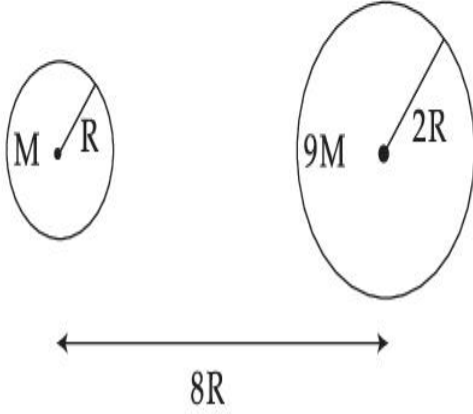
**Correct Marks :** 4 **Wrong Marks :** 0

চিত্রত দেখুওৱা ধৰণে ধৰি লোৱা  $R$  আৰু  $2R$  ব্যাসাৰ্ধৰ কিন্তু ক্ৰমে ভৰ  $M$  আৰু  $9M$  ভৰৰ দুটা গ্ৰহৰ (গোলাকাৰ আকৃতিৰ) কেন্দ্ৰৰ পৰা কেন্দ্ৰলৈ ব্যৱধান  $8R$ । ' $M$ ' ভৰৰ গ্ৰহটোৰ পৃষ্ঠৰ পৰা ' $m$ ' ভৰৰ এটা উপগ্ৰহক পোনপটীয়াকৈ দ্বিতীয়টো গ্ৰহৰ কেন্দ্ৰৰ দিশত প্ৰক্ষেপ কৰা হৈছে। দ্বিতীয়টো গ্ৰহৰ পৃষ্ঠ পাবৰ বাবে উপগ্ৰহটোক লগা নিম্নতম বেগ ' $v$ '

$$\sqrt{\frac{a}{7} \frac{GM}{R}}$$

। ' $a$ ' ৰ মান হয় \_\_\_\_\_।

[দিয়া আছে : দুয়োটা গ্ৰহ সিহঁতৰ অৱস্থানত দৃঢ়ভাৱে আছে]



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

In a uniform magnetic field, the magnetic needle has a magnetic moment  $9.85 \times 10^{-2} \text{ A/m}^2$  and moment of inertia  $5 \times 10^{-6} \text{ kg m}^2$ . If it performs 10 complete oscillations in 5 seconds then the magnitude of the magnetic field is \_\_\_\_\_ mT. [Take  $\pi^2$  as 9.85]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

এখন সুষম চুম্বক ক্ষেত্রত, এডাল চুম্বক শলাৰ চৌম্বিক ভ্ৰামক  $9.85 \times 10^{-2} \text{ A/m}^2$  আৰু জড় ভ্ৰামক  $5 \times 10^{-6} \text{ kg m}^2$ । যদিহে ই 5 seconds ত 10 টা সম্পূৰ্ণ দোলন সম্পাদন কৰে তেন্তে চৌম্বিক ক্ষেত্ৰৰ মান হয় \_\_\_\_\_ mT। [ $\pi^2 = 9.85$  ৰূপে লোৱা]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

A stone of mass 20 g is projected from a rubber catapult of length 0.1 m and area of cross section  $10^{-6} \text{ m}^2$  stretched by an amount 0.04 m. The velocity of the projected stone is \_\_\_\_\_ m/s.

(Young's modulus of rubber =  $0.5 \times 10^9 \text{ N/m}^2$ )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

0.1 m দৈৰ্ঘ্যৰ আৰু  $10^{-6} \text{ m}^2$  পৃষ্ঠক্ষেত্ৰৰ কালিৰ 0.04 m খৰি টনা এডাল ববৰৰ বাটুলৰ (catapult) পৰা 20 g ভৰৰ এটা শিলগুটি প্ৰক্ষেপ কৰা হৈছে। প্ৰক্ষেপ কৰা শিলগুটিটোৰ বেগ হয় \_\_\_\_\_ m/s।

(ববৰৰ ইয়ঙৰ গুণাংক =  $0.5 \times 10^9 \text{ N/m}^2$ )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

A transistor is connected in common emitter circuit configuration, the collector supply voltage is 10 V and the voltage drop across a resistor of  $1000 \Omega$  in the collector circuit is 0.6 V. If the current gain factor ( $\beta$ ) is 24, then the base current is \_\_\_\_\_  $\mu\text{A}$ . (Round off to the Nearest Integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

কমন এমিটাৰ বৰ্তনী বিন্যাসত এটা ট্ৰেঞ্জিষ্টৰ সংযোগ কৰা হৈছে, কালেক্টৰৰ বিভৱ যোগান 10 V আৰু কালেক্টৰ বৰ্তনীত থকা  $1000 \Omega$  বোধৰ দুয়োপ্ৰান্তত বিভৱ পাত 0.6 V । যদিহে প্ৰবাহ পৰিৱৰ্তন গুণাংক (current gain factor) ( $\beta$ ) 24, তেন্তে ভূমি প্ৰবাহ \_\_\_\_\_  $\mu A$ । (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

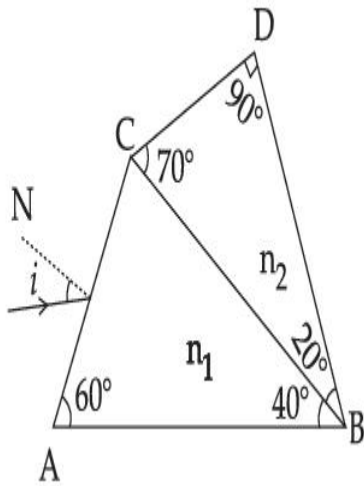
**Question Type : SA**

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

A prism of refractive index  $n_1$  and another prism of refractive index  $n_2$  are stuck together (as shown in the figure).  $n_1$  and  $n_2$  depend on  $\lambda$ , the wavelength of light, according to the relation

$$n_1 = 1.2 + \frac{10.8 \times 10^{-14}}{\lambda^2} \quad \text{and} \quad n_2 = 1.45 + \frac{1.8 \times 10^{-14}}{\lambda^2}$$

The wavelength for which rays incident at any angle on the interface BC pass through without bending at that interface will be \_\_\_\_\_ nm.



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

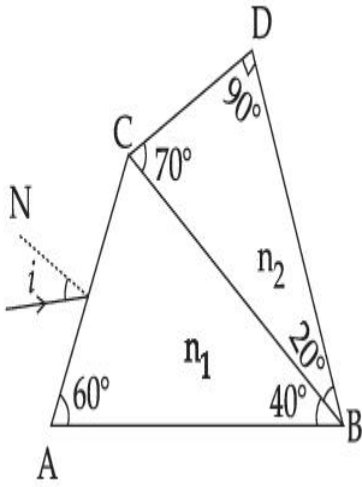
**Correct Marks :** 4 **Wrong Marks :** 0

(চিত্রত দেখুওৱা ধৰণে) প্ৰতিসৰাংক  $n_1$  ৰ এটা প্ৰিজম আৰু প্ৰতিসৰাংক  $n_2$  ৰ অন্য এটা প্ৰিজমক একেলগ কৰা হৈছে।

$n_1$  আৰু  $n_2$  পোহৰৰ তৰংগদৈৰ্ঘ্য  $\lambda$  ৰ ওপৰত তলৰ সম্বন্ধ অনুসৰি নিৰ্ভৰ কৰে,

$$n_1 = 1.2 + \frac{10.8 \times 10^{-14}}{\lambda^2} \text{ আৰু } n_2 = 1.45 + \frac{1.8 \times 10^{-14}}{\lambda^2}$$

যি তৰংগদৈৰ্ঘ্যৰ বাবে, সন্ধিপৃষ্ঠ BC ত যিকোনো কোণত আপতিত হোৱা বৰ্ণিসমূহ বেঁকা নোহোৱাকৈ পাৰ হৈ যাব সি হ'ব \_\_\_\_\_ nm।



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

A particle of mass  $9.1 \times 10^{-31}$  kg travels in a medium with a speed of  $10^6$  m/s and a photon of a radiation of linear momentum  $10^{-27}$  kg m/s travels in vacuum. The wavelength of photon is \_\_\_\_\_ times the wavelength of the particle.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

$9.1 \times 10^{-31}$  kg ভৰৰ এটা কণাই  $10^6$  m/s দ্ৰুতিৰে এটা মাধ্যমত গতি কৰিছে আৰু বৈখিক ভৰবেগ  $10^{-27}$  kg m/s ৰ বিকীৰণৰ এটা ফ'ট'নে শূন্যস্থানত গতি কৰিছে। ফ'ট'নৰ তৰংগদৈৰ্ঘ্য কণাটোৰ তৰংগদৈৰ্ঘ্যৰ \_\_\_\_\_ গুণ হয়।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

A radioactive sample has an average life of 30 ms and is decaying. A capacitor of capacitance  $200 \mu\text{F}$  is first charged and later connected with resistor 'R'. If the ratio of charge on capacitor to the activity of radioactive sample is fixed with respect to time then the value of 'R' should be \_\_\_\_\_  $\Omega$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes



**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

এটা তেজস্ক্রিয় নমুনাৰ গড় আয়ুস 30 ms আৰু ই বিঘটিত হৈ আছে। ধাৰকত্ব 200  $\mu\text{F}$  ৰ এটা ধাৰকক প্ৰথমে আধানযুক্ত কৰা হৈছে আৰু পাছত এটা ৰোধ 'R' ৰ সৈতে সংযোগ কৰা হৈছে। যদি সময় অনুযায়ী ধাৰকটোত থকা আধানৰ সৈতে তেজস্ক্রিয় নমুনাটোৰ সক্ৰিয়তাৰ অনুপাত হ্রিৰ থাকে তেন্তে 'R' ৰ মান হ'ব লাগিব \_\_\_\_\_  $\Omega$ ।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

In Bohr's atomic model, the electron is assumed to revolve in a circular orbit of radius 0.5 Å. If the speed of electron is  $2.2 \times 10^6$  m/s, then the current associated with the electron will be

\_\_\_\_\_  $\times 10^{-2}$  mA. [Take  $\pi$  as  $\frac{22}{7}$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

ব'ৰ পৰমাণু আৰ্হিত,  $0.5 \text{ \AA}$  ব্যাসাৰ্ধৰ বৃত্তাকাৰ কক্ষপথত ইলেক্ট্ৰনটো ঘূৰি থাকে বুলি ধৰা যায়। যদি ইলেক্ট্ৰনটোৰ দ্ৰুতি  $2.2 \times 10^6 \text{ m/s}$  হয়, তেন্তে ইলেক্ট্ৰনটোৰ সৈতে জড়িত প্ৰবাহ হ'ব \_\_\_\_\_  $\times 10^{-2} \text{ mA}$  ।

$[\pi \frac{22}{7}$  ৰূপে লোৱা]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

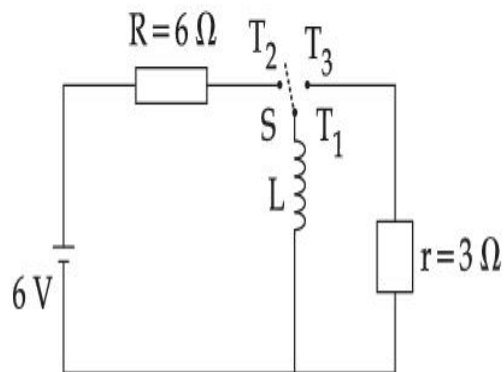
**Possible Answers :**

1

**Question Type : SA**

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

Consider an electrical circuit containing a two way switch 'S'. Initially S is open and then  $T_1$  is connected to  $T_2$ . As the current in  $R=6\ \Omega$  attains a maximum value of steady state level,  $T_1$  is disconnected from  $T_2$  and immediately connected to  $T_3$ . Potential drop across  $r=3\ \Omega$  resistor immediately after  $T_1$  is connected to  $T_3$  is \_\_\_\_\_ V. (Round off to the Nearest Integer)



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

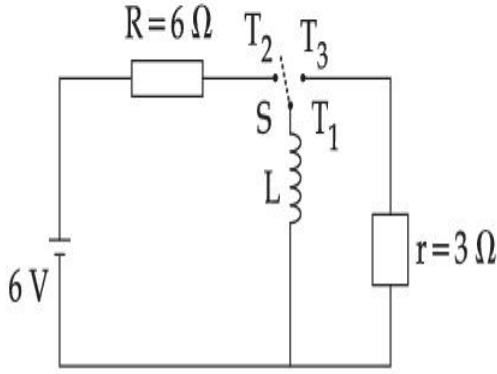
**Possible Answers :**

1

**Question Type :** SA

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

ধৰি লোৱা এটা বৈদ্যুতিক বৰ্তনীত এটা দ্বিপথ চুইচ 'S' আছে। আৰম্ভণিতে, 'S' খোলা আছে, আৰু  $T_1$  আৰু  $T_2$  ৰ লগত সংলগ্ন হৈ আছে।  $R=6\ \Omega$  ত যেতিয়াই প্ৰবাহে এক স্থিৰ অৱস্থাৰ স্তৰৰ সৰ্বোচ্চ মান লাভ কৰে, আৰু  $T_1$  ক আৰু  $T_2$  ৰ পৰা বিচ্ছিন্ন কৰি তৎক্ষণাত আৰু  $T_3$  ৰ লগত সংযোগ কৰা হয়। আৰু  $T_1$  ক  $T_3$  ৰ সৈতে সংযোগ কৰাৰ তৎক্ষণাত পাছত  $r=3\ \Omega$  ৰোধৰ দুয়োমূৰৰ মাজত বিভৱ পাত হয় \_\_\_\_\_ V। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

The amplitude of upper and lower side bands of A.M. wave where a carrier signal with frequency 11.21 MHz, peak voltage 15 V is amplitude modulated by a 7.7 kHz sine wave of

5 V amplitude are  $\frac{a}{10}$  V and  $\frac{b}{10}$  V respectively. Then the value of  $\frac{a}{b}$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

এটা বিস্তাৰ কলিত তৰংগৰ উৰ্দ্ধ আৰু নিম্ন পাৰ্শ্বপটিৰ বিস্তাৰ ক্ৰমে  $\frac{a}{10}$  V আৰু  $\frac{b}{10}$  V, য'ত 5 V ৰ 7.7 kHz চাইন

তৰংগ এটাৰ সহায়ত শীৰ্ষতম বিভৱ 15 V আৰু 11.21 MHz কম্পনাংকৰ বাহক সংকেত এটাক বিস্তাৰ কলন কৰা

হৈছে।  $\frac{a}{b}$  ৰ মান হয় \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

## Chemistry Section A

<b>Section Id :</b>	864351826
<b>Section Number :</b>	3
<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**

Yes

**Clear Response :**

**Sub-Section Number :**

1

**Sub-Section Id :**

8643511053

**Question Shuffling Allowed :**

Yes

**Question Type : MCQ Is Question Mandatory : No**

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

The parameters of the unit cell of a substance are  $a=2.5$ ,  $b=3.0$ ,  $c=4.0$ ,  $\alpha=90^\circ$ ,  $\beta=120^\circ$ ,  $\gamma=90^\circ$ . The crystal system of the substance is :

**Options :**

1. Triclinic
2. Hexagonal
3. Orthorhombic
4. Monoclinic

**Question Type : MCQ Is Question Mandatory : No**

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

এটা বস্তুৰ একক কোষৰ কাৰকবোৰ হ'ল  $a=2.5$ ,  $b=3.0$ ,  $c=4.0$ ,  $\alpha=90^\circ$ ,  $\beta=120^\circ$ ,  $\gamma=90^\circ$  । বস্তুটোৰ

ক্ৰিষ্টেল প্ৰথা হ'ল :

**Options :**

1. ট্ৰাইক্লিনিক
2. ষড়ভুজীয়

3. অর্থ'বন্দ্বিক

4. ম'ন'ক্লিনিক

**Question Type : MCQ Is Question Mandatory : No**

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

Given below are two statements :

**Statement I :** Rutherford's gold foil experiment cannot explain the line spectrum of hydrogen atom.

**Statement II :** Bohr's model of hydrogen atom contradicts Heisenberg's uncertainty principle.

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

**Options :**

1. Both **statement I** and **statement II** are true.
2. Both **statement I** and **statement II** are false.
3. **Statement I** is true but **statement II** is false.
4. **Statement I** is false but **statement II** is true.

**Question Type : MCQ Is Question Mandatory : No**

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

তলত দুটা উক্তি দিয়া হ'ল :

উক্তি I: বাডাৰফাৰ্ডৰ গ'ল্ড পাত পৰীক্ষাই হাইড্ৰ'জেনৰ বেখা বৰ্ণালী বৰ্ণনা কৰিব নোৱাৰে।

উক্তি II: ব'ৰ'ৰ হাইড্ৰ'জেন পৰমাণুৰ আৰ্হিয়ে হাইজেনবাৰ্গৰ অনিশ্চয়তা সূত্ৰৰ বিৰোধিতা কৰিছে।

ওপৰৰ উক্তিৰ আলমত নিম্নলিখিত বিকল্পৰ পৰা আটাইতকৈ উপযুক্ত উত্তৰটো বাছি উলিওৱা :

**Options :**

1. উক্তি I আৰু উক্তি II দুয়োটা সত্য।
2. উক্তি I আৰু উক্তি II দুয়োটা অসত্য।
3. উক্তি I সত্য কিন্তু উক্তি II অসত্য।
4. উক্তি I অসত্য কিন্তু উক্তি II সত্য।

**Question Type : MCQ Is Question Mandatory : No**

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

For a reaction of order n, the unit of the rate constant is :

**Options :**

1.  $\text{mol}^{1-n} \text{L}^{1-n} \text{s}^{-1}$
2.  $\text{mol}^{1-n} \text{L}^{1-n} \text{s}$
3.  $\text{mol}^{1-n} \text{L}^{2n} \text{s}^{-1}$
4.  $\text{mol}^{1-n} \text{L}^{n-1} \text{s}^{-1}$



**Question Type : MCQ Is Question Mandatory : No**

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

এটা  $n$  ক্রমৰ বিক্রিয়াৰ বাবে, গতি প্ৰৱৰ্তকৰ একক হ'ল :

**Options :**

1.  $\text{mol}^{1-n} \text{L}^{1-n} \text{s}^{-1}$

2.  $\text{mol}^{1-n} \text{L}^{1-n} \text{s}$

3.  $\text{mol}^{1-n} \text{L}^{2n} \text{s}^{-1}$

4.  $\text{mol}^{1-n} \text{L}^{n-1} \text{s}^{-1}$

**Question Type : MCQ Is Question Mandatory : No**

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

Match List - I with List - II :

**List - I**

**List - II**

- |                         |                  |
|-------------------------|------------------|
| (a) NaOH                | (i) Acidic       |
| (b) Be(OH) <sub>2</sub> | (ii) Basic       |
| (c) Ca(OH) <sub>2</sub> | (iii) Amphoteric |
| (d) B(OH) <sub>3</sub>  |                  |
| (e) Al(OH) <sub>3</sub> |                  |

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

**Options :**

1. (a)-(ii), (b)-(i), (c)-(ii), (d)-(iii), (e)-(iii)

2. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(i), (e)-(iii)

3. (a)-(ii), (b)-(iii), (c)-(ii), (d)-(i), (e)-(iii)

4. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(ii), (e)-(iii)

**Question Type : MCQ Is Question Mandatory : No**

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

তালিকা - I ক তালিকা - II ৰ সৈতে মিলন কৰা :

তালিকা - I

তালিকা - II

(a) NaOH

(i) অম্লীয়

(b) Be(OH)<sub>2</sub>

(ii) ক্ষাৰকীয়

(c) Ca(OH)<sub>2</sub>

(iii) উভয়ধৰ্মী

(d) B(OH)<sub>3</sub>

(e) Al(OH)<sub>3</sub>

নিম্নলিখিত বিকল্পৰ পৰা আটাইতকৈ উপযুক্ত উত্তৰটো বাছি উলিওৱা :

**Options :**

1. (a)-(ii), (b)-(i), (c)-(ii), (d)-(iii), (e)-(iii)

2. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(i), (e)-(iii)

3. (a)-(ii), (b)-(iii), (c)-(ii), (d)-(i), (e)-(iii)

4. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(ii), (e)-(iii)

**Question Type : MCQ Is Question Mandatory : No**

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

The statement that is INCORRECT about Ellingham diagram is :

**Options :**

1. provides idea about reduction of metal oxide.
2. provides idea about the reaction rate.
3. provides idea about free energy change.
4. provides idea about changes in the phases during the reaction.

**Question Type : MCQ Is Question Mandatory : No**

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

এলিংঘাম চিত্ৰৰ বিষয়ে অশুদ্ধ উক্তিটো হ'ল :

**Options :**

1. ধাতুৰ অক্সাইডৰ বিজাৰণৰ বিষয়ে ধাৰণা দিয়ে
2. বিক্ৰিয়াৰ গতিৰ বিষয়ে ধাৰণা দিয়ে
3. মুক্ত শক্তি পৰিবৰ্তনৰ বিষয়ে ধাৰণা দিয়ে
4. বিক্ৰিয়াৰ সময়ছোৱাত পৰিবৰ্তন হোৱা দশা (ফেজ) ৰ ধাৰণা দিয়ে

**Question Type : MCQ Is Question Mandatory : No**

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

The product obtained from the electrolytic oxidation of acidified sulphate solutions, is :

**Options :**

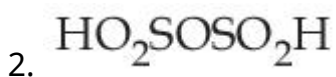
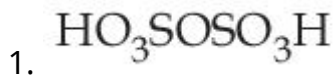


**Question Type : MCQ Is Question Mandatory : No**

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

এছিডযুক্ত ছালফেট দ্রৱৰ বিদ্যুৎবিশ্লেষ্য জাৰণৰ ফলত উৎপন্ন হোৱা জাতদ্রৱ্য :

**Options :**



**Question Type : MCQ 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 :** Lithium halides are somewhat covalent in nature.

**Reason R :** Lithium possess high polarisation capability.

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

**Options :**

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

**Question Type : MCQ Is Question Mandatory : No**

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

তলত দুটা উক্তি দিয়া হ'ল : এটাক নিশ্চয়োক্তি **A** আৰু আনটো কাৰণ **R** হিচাপে চিহ্নিত কৰা হৈছে।

নিশ্চয়োক্তি **A :** লিথিয়ামৰ হেলাইডবোৰ কিছু পৰিমাণে সহযোজী।

কাৰণ **R :** লিথিয়ামৰ প্ৰৱণতা ক্ষমতা বেছি।

ওপৰৰ উক্তিৰ আলমত, নিম্নলিখিত বিকল্পবোৰ আৰ্টাইতকৈ উপযুক্ত উত্তৰটো বাছি উলিওৱা :

**Options :**

1. **A** আৰু **R** দুয়োটাই সত্য আৰু **R** হ'ল **A** ৰ শুদ্ধ ব্যাখ্যা।
2. **A** আৰু **R** দুয়োটাই সত্য আৰু **R**, **A** ৰ শুদ্ধ ব্যাখ্যা নহয়।

3. A সত্য কিন্তু R অসত্য।

4. A অসত্য কিন্তু R সত্য।

**Question Type : MCQ Is Question Mandatory : No**

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

The oxidation states of 'P' in  $H_4P_2O_7$ ,  $H_4P_2O_5$  and  $H_4P_2O_6$ , respectively, are :

**Options :**

1. 6, 4 and 5

2. 5, 4 and 3

3. 5, 3 and 4

4. 7, 5 and 6

**Question Type : MCQ Is Question Mandatory : No**

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

'P' ৰ  $H_4P_2O_7$ ,  $H_4P_2O_5$  আৰু  $H_4P_2O_6$  ত জাৰণ অৱস্থা যথাক্ৰমে :

**Options :**

1. 6, 4 আৰু 5

2. 5, 4 আৰু 3

3. 5, 3 আৰু 4

4. 7, 5 আৰু 6

**Question Type : MCQ Is Question Mandatory : No**

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

The type of hybridisation and magnetic property of the complex  $[\text{MnCl}_6]^{3-}$ , respectively, are :

**Options :**

1.  $d^2sp^3$  and paramagnetic
2.  $sp^3d^2$  and diamagnetic
3.  $sp^3d^2$  and paramagnetic
4.  $d^2sp^3$  and diamagnetic

**Question Type : MCQ Is Question Mandatory : No**

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

জটিল  $[\text{MnCl}_6]^{3-}$  ৰ সংকৰণৰ প্ৰকাৰ আৰু চুম্বকীয় ধৰ্ম যথাক্ৰমে :

**Options :**

1.  $d^2sp^3$  আৰু অনুচুম্বকীয়
2.  $sp^3d^2$  আৰু অপচুম্বকীয়
3.  $sp^3d^2$  আৰু অনুচুম্বকীয়

4.  $d^2sp^3$  আৰু অপচুম্বকীয়

**Question Type : MCQ Is Question Mandatory : No**

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

The number of geometrical isomers found in the metal complexes  $[PtCl_2(NH_3)_2]$ ,  $[Ni(CO)_4]$ ,  $[Ru(H_2O)_3Cl_3]$  and  $[CoCl_2(NH_3)_4]^+$  respectively, are :

**Options :**

1. 1, 1, 1, 1
2. 2, 0, 2, 2
3. 2, 1, 2, 1
4. 2, 1, 2, 2

**Question Type : MCQ Is Question Mandatory : No**

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

ধাতুৰ জটিল  $[PtCl_2(NH_3)_2]$ ,  $[Ni(CO)_4]$ ,  $[Ru(H_2O)_3Cl_3]$  আৰু  $[CoCl_2(NH_3)_4]^+$  ত পোৱা জ্যামিতীয় সমযোগীৰ

সংখ্যা যথাক্ৰমে হ'ল :

**Options :**

1. 1, 1, 1, 1
2. 2, 0, 2, 2
3. 2, 1, 2, 1



4. 2, 1, 2, 2

**Question Type : MCQ Is Question Mandatory : No**

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

Which one of the following statements is **NOT** correct ?

**Options :**

1. The dissolved oxygen concentration below 6 ppm inhibits fish growth
2. Eutrophication indicates that water body is polluted
3. Eutrophication leads to increase in the oxygen level in water
4. Eutrophication leads to anaerobic conditions

**Question Type : MCQ Is Question Mandatory : No**

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

নিম্নলিখিত কোনটো উক্তি শুদ্ধ নহয় ?

**Options :**

1. পানীত দ্রবীভূত অক্সিজেনৰ পৰিমাণ 6 ppm তকৈ কম হলে মাছৰ বৃদ্ধি ব্যাহত হয়।
2. অতিপুষ্টি কৰণে পানী প্রদূষিত হোৱা সূচায়।
3. অতিপুষ্টি কৰণে পানীত অক্সিজেনৰ মাত্ৰা বেছি হোৱাত অৰিহণা যোগায়।
4. অতিপুষ্টি কৰণে অৱাতীয় পৰিস্থিতিৰ সৃষ্টি কৰে

**Question Type : MCQ Is Question Mandatory : No**

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

Which one among the following chemical tests is used to distinguish monosaccharide from disaccharide ?

**Options :**

1. Seliwanoff's test
2. Barfoed test
3. Tollen's test
4. Iodine test

**Question Type : MCQ Is Question Mandatory : No**

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

ম'ন'ছেকাৰাইডক ডাইছেকাৰাইডৰ পৰা বাছি উলিওৱাত নিম্নলিখিত কোনটো ৰাসায়নিক পৰীক্ষা ব্যৱহাৰ কৰা হয় ?

**Options :**

1. ছেলিৱান'ফৰ পৰীক্ষা
2. বাৰফ'য়েড পৰীক্ষা
3. টলেঞ্জ পৰীক্ষা
4. আয়'ডিন পৰীক্ষা

**Question Type : MCQ Is Question Mandatory : No**

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

Staggered and eclipsed conformers of ethane are :

**Options :**

1. Rotamers
2. Mirror images
3. Enantiomers
4. Polymers

**Question Type : MCQ Is Question Mandatory : No**

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

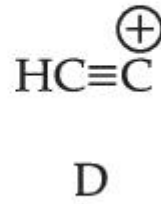
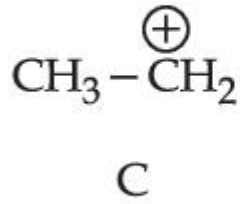
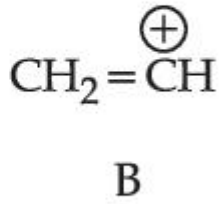
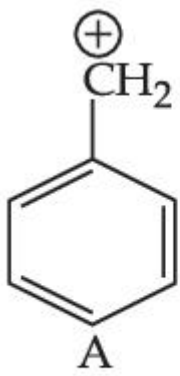
ইথেনৰ অনাগ্ৰস্ত আৰু গ্ৰস্ত অনুৰূপী হ'ল :

**Options :**

1. অনুৰূপী (ৰটাৰমাৰ)
2. দাপোণ (প্ৰতিবিস্ম) সমযোগী
3. দৰ্পণ প্ৰতিবিস্ম
4. বহুযোগী

**Question Type : MCQ Is Question Mandatory : No**

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



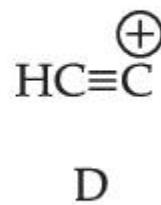
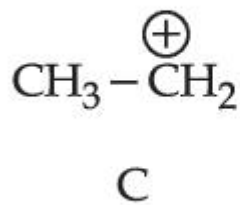
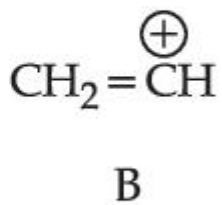
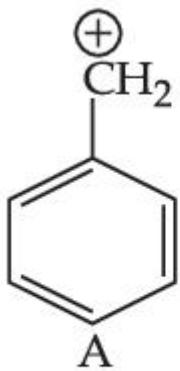
The correct order of stability of given carbocations is :

Options :

1.  $D > B > C > A$
2.  $A > C > B > D$
3.  $C > A > D > B$
4.  $D > B > A > C$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



প্রদত্ত কাৰ্ব'কেটায়নৰ স্থিৰতাৰ শুদ্ধ ক্ৰম হ'ল :

Options :

1.  $D > B > C > A$
2.  $A > C > B > D$

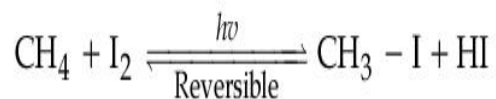
3.  $C > A > D > B$

4.  $D > B > A > C$

**Question Type : MCQ Is Question Mandatory : No**

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

Presence of which reagent will affect the reversibility of the following reaction, and change it to a irreversible reaction :



**Options :**

1. Concentrated  $\text{HIO}_3$

2.  $\text{HOCl}$

3. Liquid  $\text{NH}_3$

4. dilute  $\text{HNO}_2$

**Question Type : MCQ Is Question Mandatory : No**

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

নিম্নলিখিত বিক্রিয়াটোত কি বিকাৰকৰ উপস্থিতিয়ে প্ৰত্যাহতী হোৱাত প্ৰভাৱ পেলায়, আৰু ইয়াক অপ্ৰত্যাহতী বিক্রিয়ালৈ পৰিবৰ্তন কৰে।



Options :

1. গাড়  $\text{HIO}_3$

2.  $\text{HOCl}$

3. তবল  $\text{NH}_3$

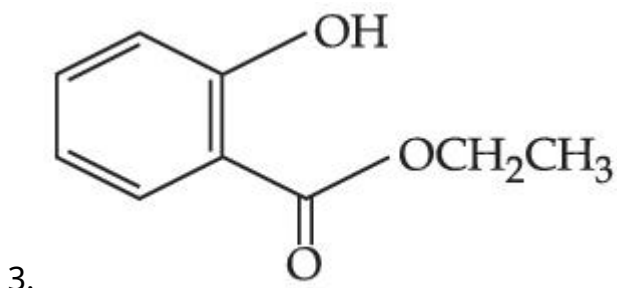
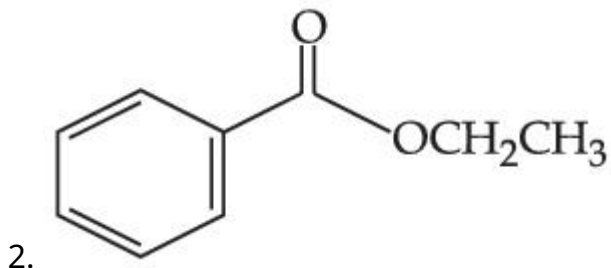
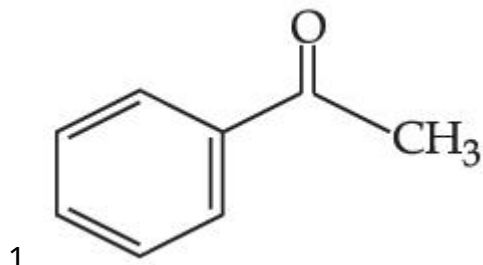
4. লঘু  $\text{HNO}_2$

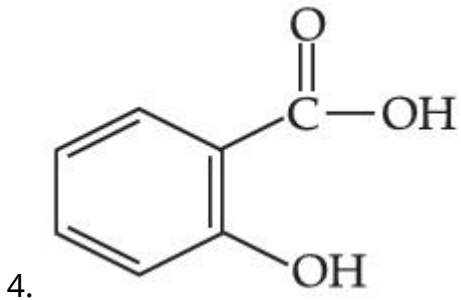
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following compounds will give orange precipitate when treated with 2,4-dinitrophenyl hydrazine ?

Options :



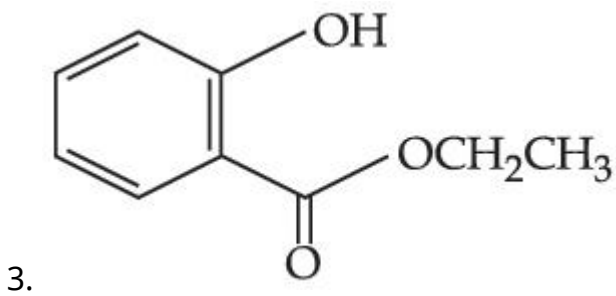
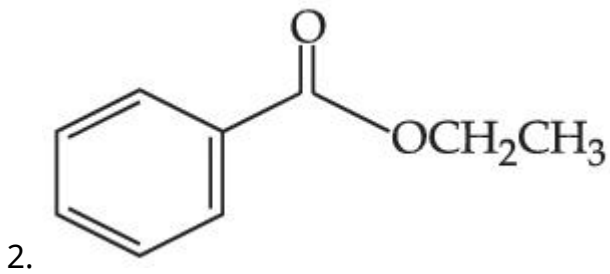
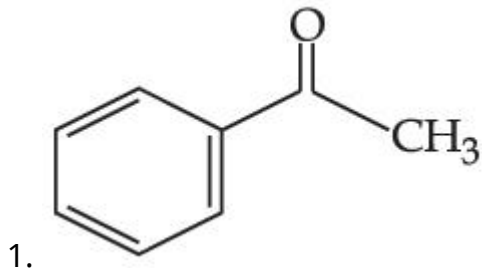


Question Type : MCQ Is Question Mandatory : No

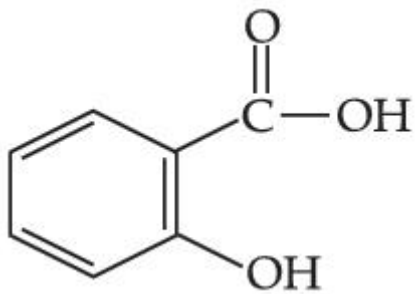
Correct Marks : 4 Wrong Marks : 1

নিম্নলিখিত কোনটো যৌগই 2,4-ডাইনাইট্রোফিনাইল হাইড্রাজিনৰ লগত বিক্ৰিয়া কৰিলে কমলা ৰঙৰ অধঃক্ষেপ দিয়ে ?

Options :

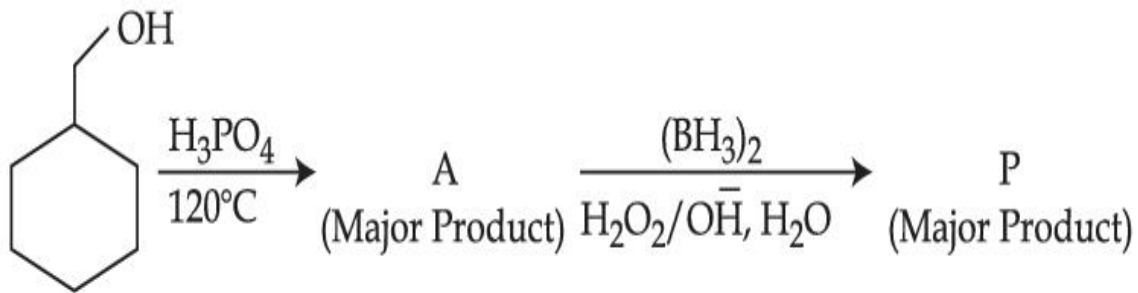


4.



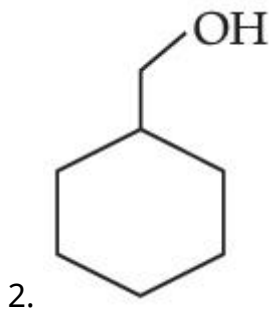
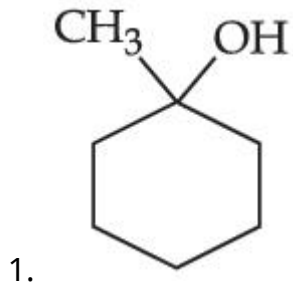
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

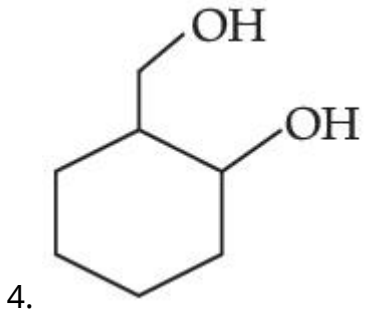
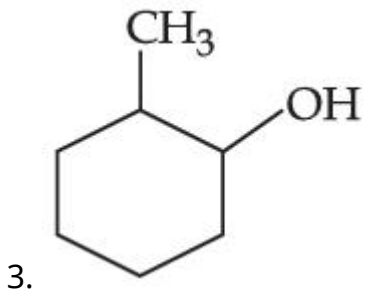


Consider the above reaction and identify the Product P :

Options :

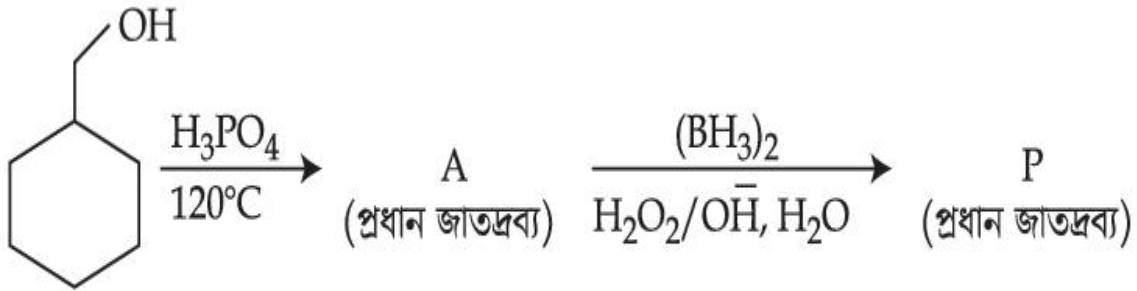






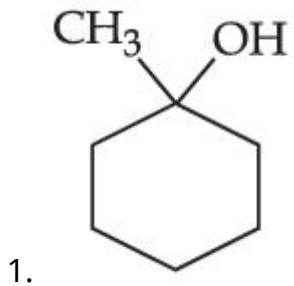
Question Type : MCQ Is Question Mandatory : No

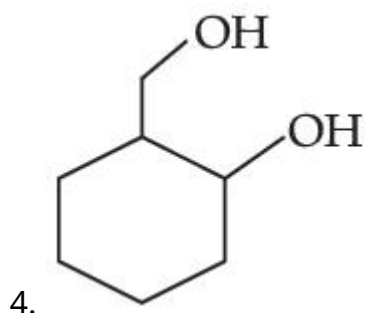
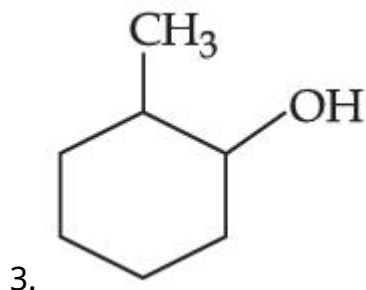
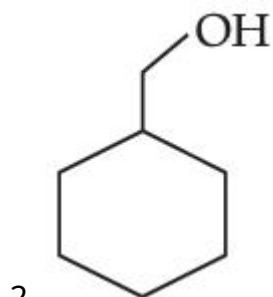
Correct Marks : 4 Wrong Marks : 1



ওপৰৰ বিক্ৰিয়াটো লোৱা আৰু জাতদ্রব্য P চিনাক্ত কৰা :

Options :





**Question Type : MCQ Is Question Mandatory : No**

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

Given below are two statements :

**Statement I :** Aniline is less basic than acetamide.

**Statement II :** In aniline, the lone pair of electrons on nitrogen atom is delocalised over benzene ring due to resonance and hence less available to a proton.

Choose the **most appropriate** option :

**Options :**

1. Both **statement I** and **statement II** are true.
2. Both **statement I** and **statement II** are false.

3. **Statement I is true but statement II is false.**
4. **Statement I is false but statement II is true.**

**Question Type : MCQ Is Question Mandatory : No**

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

তলত দুটা উক্তি দিয়া হ'ল :

উক্তি I: এনিলিন এছিটেমাইডতকৈ কম ক্ষাৰকীয়।

উক্তি II: এনিলিনত নাইট্ৰজেন পৰমাণুৰ ইলেক্ট্ৰনৰ একাকী যুগ্ময়ে সংস্পন্দনৰ কাৰণে বেনযিন চক্ৰৰ ওপৰত প্ৰসাৰিত হৈ থাকে আৰু সেই কাৰণে এটা প্ৰ'টনৰ বাবে কমকৈ উপলব্ধ হয়।

আটাইতকৈ উপযুক্ত বিকল্প বাছি উলিওৱা :

**Options :**

1. **উক্তি I আৰু উক্তি II দুয়োটা সত্য।**
2. **উক্তি I আৰু উক্তি II দুয়োটা অসত্য।**
3. **উক্তি I সত্য কিন্তু উক্তি II অসত্য।**
4. **উক্তি I অসত্য কিন্তু উক্তি II সত্য।**

**Question Type : MCQ Is Question Mandatory : No**

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

Match List - I with List - II :

List - I (Drug)	List - II (Class of Drug)
(a) Furacin	(i) Antibiotic
(b) Arsphenamine	(ii) Tranquilizers
(c) Dimetone	(iii) Antiseptic
(d) Valium	(iv) Synthetic antihistamines

Choose the **most appropriate** match :

**Options :**

1. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
2. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
3. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
4. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

**Question Type : MCQ Is Question Mandatory : No**

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

তালিকা - I ক তালিকা - II ৰ সৈতে মিলন কৰা :

তালিকা - I

তালিকা - II

(ঔষধ)

(ঔষধৰ শ্ৰেণী)

- |                  |                               |
|------------------|-------------------------------|
| (a) ফিউৰাছিন     | (i) প্ৰতিজৈৱিক                |
| (b) আৰস্ফেনামাইন | (ii) সুস্থিৰকাৰী              |
| (c) ডাইমেটোন     | (iii) বীজাণুবাৰক              |
| (d) ভেলিয়াম     | (iv) সাংশ্লেষিক হিষ্টামিনৰোধী |

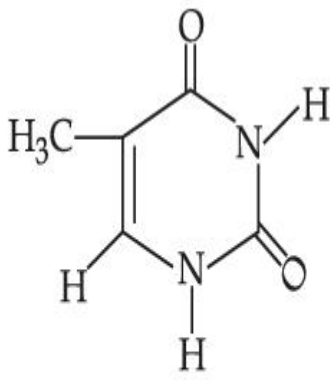
আটাইতকৈ উপযুক্ত মিলনটো বাছি উলিওৱা :

**Options :**

1. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
2. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
3. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
4. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

**Question Type : MCQ Is Question Mandatory : No**

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



(A)

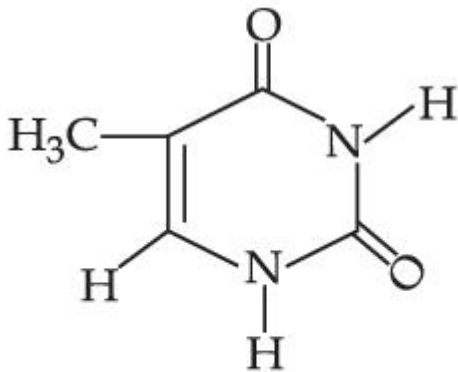
The compound 'A' is a complementary base of \_\_\_\_\_ in DNA strands.

**Options :**

1. Guanine
2. Adenine
3. Cytosine
4. Uracil

**Question Type : MCQ Is Question Mandatory : No**

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



(A)

যৌগ 'A' হ'ল এটা পৰিপূৰক ক্ষাৰ \_\_\_\_\_ ব, DNA তন্তুত।

**Options :**

1. গুরানিন
2. এডিনাইন
3. ছায়ট'ছিন
4. ইউৰাছিল

## Chemistry Section B

<b>Section Id :</b>	864351827
<b>Section Number :</b>	4
<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>	8643511054
<b>Question Shuffling Allowed :</b>	Yes
<b>Question Type :</b>	SA
<b>Correct Marks :</b>	4
<b>Wrong Marks :</b>	0

The density of NaOH solution is  $1.2 \text{ g cm}^{-3}$ . The molality of this solution is \_\_\_\_\_ m.

(Round off to the Nearest Integer)

[Use : Atomic masses : Na : 23.0 u O : 16.0 u H : 1.0 u

Density of  $\text{H}_2\text{O}$  :  $1.0 \text{ g cm}^{-3}$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

এটা NaOH দ্ৰৱৰ ঘনত্ব  $1.2 \text{ g cm}^{-3}$ । এই দ্ৰৱটোৰ ম'লালিটি হ'ল \_\_\_\_\_ m। (নিকটতম অখণ্ড সংখ্যাত)

[ব্যৱহাৰ কৰা : পৰমাণৱিক ভৰবোৰ : Na : 23.0 u O : 16.0 u H : 1.0 u

পানীৰ ঘনত্ব :  $1.0 \text{ g cm}^{-3}$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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



The difference between bond orders of CO and  $\text{NO}^{\oplus}$  is  $\frac{x}{2}$  where  $x = \underline{\hspace{2cm}}$ . (Round off to the Nearest Integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

CO আৰু  $\text{NO}^{\oplus}$  ৰ মাজৰ বান্ধনি ক্ৰমৰ পাৰ্থক্য হ'ল  $\frac{x}{2}$  য'ত  $x = \underline{\hspace{2cm}}$ । (নিকটতম অখণ্ড সংখ্যাত)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

For water at 100°C and 1 bar,

$$\Delta_{\text{vap}} H - \Delta_{\text{vap}} U = \text{_____} \times 10^2 \text{ J mol}^{-1}. \text{ (Round off to the Nearest Integer)}$$

[Use :  $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ ]

[Assume volume of  $\text{H}_2\text{O}(l)$  is much smaller than volume of  $\text{H}_2\text{O}(g)$ . Assume  $\text{H}_2\text{O}(g)$  can be treated as an ideal gas]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

100°C আৰু 1 bar ত পানীৰ বাবে,

$$\Delta_{\text{vap}} H - \Delta_{\text{vap}} U = \text{_____} \times 10^2 \text{ J mol}^{-1}. \text{ (নিকটতম অখণ্ড সংখ্যাত)}$$

[ব্যৱহাৰ কৰা :  $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ ]

[ধৰিলোৱা  $\text{H}_2\text{O}(g)$  ৰ আয়তনকৈ  $\text{H}_2\text{O}(l)$  ৰ আয়তন বহুত কম। ধৰিলোৱা  $\text{H}_2\text{O}(g)$  ক এটা আদৰ্শ গেছ হিচাবে ধৰিব পাৰি]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

1.46 g of a biopolymer dissolved in a 100 mL water at 300 K exerted an osmotic pressure of  $2.42 \times 10^{-3}$  bar.

The molar mass of the biopolymer is \_\_\_\_\_  $\times 10^4$  g mol<sup>-1</sup>. (Round off to the Nearest Integer)

[Use : R = 0.083 L bar mol<sup>-1</sup> K<sup>-1</sup>]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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

300 K ত 100 mL জলত 1.46 g ব এটা জৈৱবহুযোগী মিহলালে আশ্ৰবনী চাপ হয়  $2.42 \times 10^{-3}$  bar।

জৈৱবহুযোগীটোৰ ম'লাৰ ভৰ \_\_\_\_\_  $\times 10^4$  g mol<sup>-1</sup>। (নিকটতম অখণ্ড সংখ্যাত)

[ব্যৱহাৰ কৰা : R = 0.083 L bar mol<sup>-1</sup> K<sup>-1</sup>]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

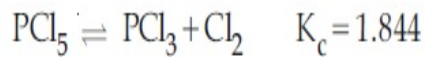
**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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



3.0 moles of  $\text{PCl}_5$  is introduced in a 1 L closed reaction vessel at 380 K. The number of moles of  $\text{PCl}_5$  at equilibrium is \_\_\_\_\_  $\times 10^{-3}$ . (Round off to the Nearest Integer)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

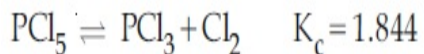
**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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



380 K ত এটা 1 L ৰ বন্ধ বিক্ৰিয়া পাত্ৰত 3.0 ম'ল  $\text{PCl}_5$  ভৰোৱা হ'ল। সাম্যত  $\text{PCl}_5$  ৰ ম'লৰ সংখ্যা \_\_\_\_\_  $\times 10^{-3}$ । (নিকটতম অখণ্ড সংখ্যাত)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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

The conductivity of a weak acid HA of concentration  $0.001 \text{ mol L}^{-1}$  is  $2.0 \times 10^{-5} \text{ S cm}^{-1}$ . If  $\Lambda_m^\circ(\text{HA}) = 190 \text{ S cm}^2 \text{ mol}^{-1}$ , the ionization constant ( $K_a$ ) of HA is equal to \_\_\_\_\_  $\times 10^{-6}$ . (Round off to the Nearest Integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

$0.001 \text{ mol L}^{-1}$  গাঢ়তাৰ এটা মৃদু অম্ল HA ৰ পৰিবহনতা  $2.0 \times 10^{-5} \text{ S cm}^{-1}$ । যদি  $\Lambda_m^\circ(\text{HA}) = 190 \text{ S cm}^2 \text{ mol}^{-1}$ , HA ৰ আয়নীয় প্ৰকৰ ( $K_a$ ) হ'ল \_\_\_\_\_  $\times 10^{-6}$ । (নিকটতম অখণ্ড সংখ্যাত)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

CO<sub>2</sub> gas adsorbs on charcoal following Freundlich adsorption isotherm. For a given amount of charcoal, the mass of CO<sub>2</sub> adsorbed becomes 64 times when the pressure of CO<sub>2</sub> is doubled. The value of n in the Freundlich isotherm equation is \_\_\_\_\_ × 10<sup>-2</sup>. (Round off to the Nearest Integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

CO<sub>2</sub> গেছ চাৰ্কোলত অধিশোষিত হয় ফ্ৰিউন্লিছ অধিশোষণ সমতাপক মতে। এটা নিৰ্দিষ্ট পৰিমাণৰ চাৰ্কোলৰ বাবে, যেতিয়া CO<sub>2</sub> ৰ চাপ দুগুণ কৰা হয় তেতিয়া CO<sub>2</sub> ৰ অধিশোষণৰ হাৰ 64 গুণ হয়। n ৰ মান ফ্ৰিউন্লিছ অধিশোষণ সমতাপক সমীকৰণত \_\_\_\_\_ × 10<sup>-2</sup>। (নিকটতম অখণ্ড সংখ্যাত)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

The number of geometrical isomers possible in triamminetrinitrocobalt (III) is X and in trioxalatochromate (III) is Y. Then the value of X+Y is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

ট্রাইএমিনট্রাইনাইট্র'ক'বাল্ট (III) ত সম্ভব জ্যামিতীয় সমযোজীৰ সংখ্যা X আৰু ট্রাইঅক্সালেট'ফ্রেমেট (III) ত Y। তেন্তে

X+Y ৰ মান \_\_\_\_\_ ।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

In gaseous triethyl amine the “-C-N-C-” bond angle is \_\_\_\_\_ degree.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

গেছীয় ট্রাইইথাইল এমাইনত “-C-N-C-” বান্ধনি কোণ হ'ল \_\_\_\_\_ ডিগ্রী।

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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

An organic compound is subjected to chlorination to get compound A using 5.0 g of chlorine. When 0.5 g of compound A is reacted with  $\text{AgNO}_3$  [Carius Method], the percentage of chlorine in compound A is \_\_\_\_\_ when it forms 0.3849 g of  $\text{AgCl}$ . (Round off to the Nearest Integer)

(Atomic masses of Ag and Cl are 107.87 and 35.5 respectively)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**



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

যৌগ A পাবলৈ 5.0 g ক্ল'বিন ব্যৱহাৰ কৰি এটা জৈব যৌগৰ ক্ল'বিনেছন কৰা হ'ল। যেতিয়া যৌগ A ৰ 0.5 g ৰ  $\text{AgNO}_3$  (কেৰিয়াছ পদ্ধতি)ৰ লগত বিক্ৰিয়া কৰোৱা হয়, যৌগ A ত ক্ল'বিনৰ শতকৰা পৰিমাণ \_\_\_\_\_ , যেতিয়া ই 0.3849 g  $\text{AgCl}$  উৎপন্ন কৰে। (নিকটতম অখণ্ড সংখ্যাত)

(পাৰমাণৱিক ভৰ Ag আৰু Cl ৰ 107.87 g/mol আৰু 35.5 g/mol যথাক্ৰমে)

**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>	864351828
<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>	8643511055
<b>Question Shuffling Allowed :</b>	Yes

**Question Type : MCQ Is Question Mandatory : No**

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

Let P and Q be two distinct points on a circle which has center at  $C(2, 3)$  and which passes through origin O. If OC is perpendicular to both the line segments CP and CQ, then the set  $\{P, Q\}$  is equal to :

**Options :**

1.  $\{(2 + 2\sqrt{2}, 3 + \sqrt{5}), (2 - 2\sqrt{2}, 3 - \sqrt{5})\}$

2.  $\{(2 + 2\sqrt{2}, 3 - \sqrt{5}), (2 - 2\sqrt{2}, 3 + \sqrt{5})\}$

3.  $\{(-1, 5), (5, 1)\}$

4.  $\{(4, 0), (0, 6)\}$

**Question Type : MCQ Is Question Mandatory : No**

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

$C(2, 3)$  বিন্দুত কেন্দ্র আৰু মূলবিন্দু O ৰে পাৰ হোৱা বৃত্ত এটাৰ ওপৰত P আৰু Q দুটা ভিন্ন বিন্দু। CP আৰু CQ দুয়ো ৰেখাখণ্ডৰ ওপৰত OC লম্ব। তেন্তে  $\{P, Q\}$  সংহতিটো সমান হ'ব :

**Options :**

1.  $\{(2 + 2\sqrt{2}, 3 + \sqrt{5}), (2 - 2\sqrt{2}, 3 - \sqrt{5})\}$

2.  $\{(2 + 2\sqrt{2}, 3 - \sqrt{5}), (2 - 2\sqrt{2}, 3 + \sqrt{5})\}$

3.  $\{(-1, 5), (5, 1)\}$

4.  $\{(4, 0), (0, 6)\}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$  and  $\vec{b} = -\hat{i} + 2\hat{j} + 3\hat{k}$ . Then the vector product

$(\vec{a} + \vec{b}) \times \left( \left( \vec{a} \times \left( (\vec{a} - \vec{b}) \times \vec{b} \right) \right) \times \vec{b} \right)$  is equal to :

Options :

1.  $5(30\hat{i} - 5\hat{j} + 7\hat{k})$

2.  $7(30\hat{i} - 5\hat{j} + 7\hat{k})$

3.  $5(34\hat{i} - 5\hat{j} + 3\hat{k})$

4.  $7(34\hat{i} - 5\hat{j} + 3\hat{k})$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$  আৰু  $\vec{b} = -\hat{i} + 2\hat{j} + 3\hat{k}$  তেন্তে

$(\vec{a} + \vec{b}) \times \left( \left( \vec{a} \times \left( (\vec{a} - \vec{b}) \times \vec{b} \right) \right) \times \vec{b} \right)$  ৰ ভেক্টৰ পূৰণফলটো সমান হ'ব :

Options :

1.  $5(30\hat{i} - 5\hat{j} + 7\hat{k})$

2.  $7(30\hat{i} - 5\hat{j} + 7\hat{k})$

3.  $5(34\hat{i} - 5\hat{j} + 3\hat{k})$

4.  $7(34\hat{i} - 5\hat{j} + 3\hat{k})$

**Question Type : MCQ Is Question Mandatory : No**

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

If the coefficients of  $x^7$  in  $\left(x^2 + \frac{1}{bx}\right)^{11}$  and  $x^{-7}$  in  $\left(x - \frac{1}{bx^2}\right)^{11}$ ,  $b \neq 0$ , are equal, then the

value of  $b$  is equal to :

**Options :**

1.  $-1$

2.  $2$

3.  $-2$

4.  $1$

**Question Type : MCQ Is Question Mandatory : No**

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

যদি  $\left(x^2 + \frac{1}{bx}\right)^{11}$  ব প্রসাৰণত  $x^7$  ব সহগ, আৰু  $\left(x - \frac{1}{bx^2}\right)^{11}$  ব প্রসাৰণত  $x^{-7}$  ব সহগ সমান,

$b \neq 0$ , তেন্তে  $b$  ব মান সমান হ'ব :

**Options :**

1.  $-1$
2.  $2$
3.  $-2$
4.  $1$

**Question Type : MCQ Is Question Mandatory : No**

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

If the area of the bounded region

$$R = \left\{ (x, y) : \max\{0, \log_e x\} \leq y \leq 2^x, \frac{1}{2} \leq x \leq 2 \right\}$$

is,  $\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$ , then the value of  $(\alpha + \beta - 2\gamma)^2$  is equal to :

**Options :**

1.  $1$
2.  $2$
3.  $4$
4.  $8$

**Question Type : MCQ Is Question Mandatory : No**

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

যদি  $R = \left\{ (x, y) : \max\{0, \log_e x\} \leq y \leq 2^x, \frac{1}{2} \leq x \leq 2 \right\}$  আবদ্ধ ক্ষেত্রের কালি

$\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$ , হয়, তেন্তে  $(\alpha + \beta - 2\gamma)^2$  ৰ মান সমান হ'ব :

**Options :**

1. 1

2. 2

3. 4

4. 8

**Question Type : MCQ Is Question Mandatory : No**

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

Let  $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ . If  $A^{-1} = \alpha I + \beta A$ ,  $\alpha, \beta \in \mathbf{R}$ ,  $I$  is a  $2 \times 2$  identity matrix, then  $4(\alpha - \beta)$  is

equal to :

**Options :**

1. 2

2. 4

3. 5

4.

**Question Type : MCQ Is Question Mandatory : No**

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

ধৰা হ'ল  $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ , যদি  $A^{-1} = \alpha I + \beta A$ ,  $\alpha, \beta \in \mathbf{R}$ ,  $I$  এটা  $2 \times 2$  আকাৰৰ অভেদ মৌল কক্ষ, তেন্তে

$4(\alpha - \beta)$  সমান হ'ব :

**Options :**

1. 2

2. 4

3. 5

4.  $\frac{8}{3}$

**Question Type : MCQ Is Question Mandatory : No**

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

Two tangents are drawn from the point  $P(-1, 1)$  to the circle  $x^2 + y^2 - 2x - 6y + 6 = 0$ . If these tangents touch the circle at points  $A$  and  $B$ , and if  $D$  is a point on the circle such that length of the segments  $AB$  and  $AD$  are equal, then the area of the triangle  $ABD$  is equal to :

**Options :**

1. 2

2. 4

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

4.  $3(\sqrt{2} - 1)$

**Question Type : MCQ Is Question Mandatory : No**

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

$x^2 + y^2 - 2x - 6y + 6 = 0$  বৃত্তৰ  $P(-1, 1)$  বিন্দুৰ পৰা দুডাল স্পৰ্শক টনা হ'ল। যদি এই স্পৰ্শকবোৰ বৃত্তৰ A আৰু B বিন্দুত স্পৰ্শ কৰে আৰু D বৃত্তৰ ওপৰৰ এনে এটা বিন্দু যাতে AB আৰু AD ৰেখাখণ্ড দুডালৰ দৈৰ্ঘ্য সমান, তেন্তে ABD ত্ৰিভুজটোৰ কালি সমান হ'ব :

**Options :**

1. 2

2. 4

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

4.  $3(\sqrt{2} - 1)$

**Question Type : MCQ Is Question Mandatory : No**

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



Let  $C$  be the set of all complex numbers. Let

$$S_1 = \{z \in C \mid |z - 3 - 2i|^2 = 8\},$$

$$S_2 = \{z \in C \mid \operatorname{Re}(z) \geq 5\} \text{ and}$$

$$S_3 = \{z \in C \mid |z - \bar{z}| \geq 8\}.$$

Then the number of elements in  $S_1 \cap S_2 \cap S_3$  is equal to :

**Options :**

1. 0
2. 1
3. 2
4. Infinite

**Question Type : MCQ Is Question Mandatory : No**

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

ধৰা হ'ল সকলো জটিল সংখ্যাৰ সংহতি  $C$ । ধৰা হ'ল

$$S_1 = \{z \in C \mid |z - 3 - 2i|^2 = 8\},$$

$$S_2 = \{z \in C \mid \operatorname{Re}(z) \geq 5\} \text{ আৰু}$$

$$S_3 = \{z \in C \mid |z - \bar{z}| \geq 8\},$$

তেন্তে  $S_1 \cap S_2 \cap S_3$  ত মৌলৰ সংখ্যা সমান হ'ব :

**Options :**

1. 0
2. 1
3. 2

4. অসীম

**Question Type : MCQ Is Question Mandatory : No**

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

Let the plane passing through the point  $(-1, 0, -2)$  and perpendicular to each of the planes  $2x + y - z = 2$  and  $x - y - z = 3$  be  $ax + by + cz + 8 = 0$ . Then the value of  $a + b + c$  is equal to :

**Options :**

1. 5

2. 3

3. 4

4. 8

**Question Type : MCQ Is Question Mandatory : No**

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

ধৰা হ'ল  $(-1, 0, -2)$  বিন্দুৰে যোৱা আৰু  $2x + y - z = 2$  আৰু  $x - y - z = 3$  প্ৰতিটো সমতলৰ ওপৰত লম্ব হোৱা সমতলবোৰ সমীকৰণ  $ax + by + cz + 8 = 0$ , তেন্তে  $a + b + c$  ৰ মান সমান হ'ব :

**Options :**

1. 5

2. 3

3. 4

4. 8

**Question Type : MCQ Is Question Mandatory : No**

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

Let  $\alpha, \beta$  be two roots of the equation  $x^2 + (20)^{\frac{1}{4}}x + (5)^{\frac{1}{2}} = 0$ . Then  $\alpha^8 + \beta^8$  is equal to :

**Options :**

1. 100

2. 10

3. 50

4. 160

**Question Type : MCQ Is Question Mandatory : No**

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

ধৰা হ'ল  $x^2 + (20)^{\frac{1}{4}}x + (5)^{\frac{1}{2}} = 0$  সমীকৰণৰ মূল দুটা  $\alpha$  আৰু  $\beta$ । তেন্তে  $\alpha^8 + \beta^8$  সমান হ'ব :

**Options :**

1. 100

2. 10

3. 50

4. 160

**Question Type : MCQ Is Question Mandatory : No**

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

Let  $f : \left(-\frac{\pi}{4}, \frac{\pi}{4}\right) \rightarrow \mathbf{R}$  be defined as

$$f(x) = \begin{cases} (1 + |\sin x|)^{\frac{3a}{|\sin x|}}, & -\frac{\pi}{4} < x < 0 \\ b, & x = 0 \\ e^{\cot 4x / \cot 2x}, & 0 < x < \frac{\pi}{4} \end{cases}$$

If  $f$  is continuous at  $x=0$ , then the value of  $6a + b^2$  is equal to :

**Options :**

1.  $1 + e$

2.  $1 - e$

3.  $e$

4.  $e - 1$

**Question Type : MCQ Is Question Mandatory : No**

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

ধরা হ'ল  $f: \left(-\frac{\pi}{4}, \frac{\pi}{4}\right) \rightarrow \mathbf{R}$  বর্ণিত যাতে,  $f(x) = \begin{cases} (1 + |\sin x|)^{\frac{3a}{|\sin x|}}, & -\frac{\pi}{4} < x < 0 \\ b, & x = 0 \\ e^{\cot 4x / \cot 2x}, & 0 < x < \frac{\pi}{4} \end{cases}$

যদি  $f$  ফলনটো  $x=0$  বিন্দুত অবিচ্ছিন্ন, তেন্তে  $6a + b^2$  ৰ মান সমান হ'ব :

**Options :**

1.  $1 + e$
2.  $1 - e$
3.  $e$
4.  $e - 1$

**Question Type : MCQ Is Question Mandatory : No**

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

Let

$$A = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 2x^2 + 2y^2 - 2x - 2y = 1\},$$

$$B = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 4x^2 + 4y^2 - 16y + 7 = 0\} \text{ and}$$

$$C = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid x^2 + y^2 - 4x - 2y + 5 \leq r^2\}.$$

Then the minimum value of  $|r|$  such that  $A \cup B \subseteq C$  is equal to :

**Options :**

1.  $\frac{3 + \sqrt{10}}{2}$
2.  $1 + \sqrt{5}$

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

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

**Question Type : MCQ Is Question Mandatory : No**

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

ধরা হ'ল  $A = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 2x^2 + 2y^2 - 2x - 2y = 1\}$ ,

$B = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 4x^2 + 4y^2 - 16y + 7 = 0\}$  আৰু

$C = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid x^2 + y^2 - 4x - 2y + 5 \leq r^2\}$

তেন্তে  $|r|$  ৰ সৰ্বনিম্ন মান যাতে  $A \cup B \subseteq C$  সমান হ'ব :

**Options :**

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

2.  $1 + \sqrt{5}$

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

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

**Question Type : MCQ Is Question Mandatory : No**

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

If the mean and variance of the following data :

6, 10, 7, 13, a, 12, b, 12

are 9 and  $\frac{37}{4}$  respectively, then  $(a - b)^2$  is equal to :

**Options :**

1. 16
2. 12
3. 24
4. 32

**Question Type : MCQ Is Question Mandatory : No**

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

যদি 6, 10, 7, 13, a, 12, b, 12 প্রদত্ত তথ্যটোৰ মাধ্যম আৰু প্ৰসৰণ ক্ৰমে 9 আৰু  $\frac{37}{4}$  হয়, তেন্তে  $(a - b)^2$  সমান

হ'ব :

**Options :**

1. 16
2. 12
3. 24
4. 32

**Question Type : MCQ Is Question Mandatory : No**

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

Let  $y=y(x)$  be solution of the differential equation  $\log_e\left(\frac{dy}{dx}\right) = 3x + 4y$ , with  $y(0)=0$ .

If  $y\left(-\frac{2}{3}\log_e 2\right) = \alpha \log_e 2$ , then the value of  $\alpha$  is equal to :

**Options :**

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

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

3. 2

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

**Question Type : MCQ Is Question Mandatory : No**

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

ধরা হ'ল  $\log_e\left(\frac{dy}{dx}\right) = 3x + 4y$ ,  $y(0)=0$  অৱকল সমীকৰণটোৰ সমাধান  $y=y(x)$  । যদি

$y\left(-\frac{2}{3}\log_e 2\right) = \alpha \log_e 2$ , তেন্তে  $\alpha$  ৰ মান সমান হ'ব :

**Options :**

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



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

3. 2

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

**Question Type : MCQ Is Question Mandatory : No**

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

If  $\sin\theta + \cos\theta = \frac{1}{2}$ , then  $16(\sin(2\theta) + \cos(4\theta) + \sin(6\theta))$  is equal to :

**Options :**

1. 23

2. -23

3. 27

4. -27

**Question Type : MCQ Is Question Mandatory : No**

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

যদি  $\sin\theta + \cos\theta = \frac{1}{2}$ , তেন্তে  $16(\sin(2\theta) + \cos(4\theta) + \sin(6\theta))$  সমান হ'ব :

**Options :**

1. 23

2.  $-23$

3.  $27$

4.  $-27$

**Question Type : MCQ Is Question Mandatory : No**

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

The probability that a randomly selected 2-digit number belongs to the set  $\{n \in \mathbb{N} : (2^n - 2) \text{ is a multiple of } 3\}$  is equal to :

**Options :**

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

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

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

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

**Question Type : MCQ Is Question Mandatory : No**

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

$\{n \in \mathbf{N} : (2^n - 2), 3 \text{ ব গুণিতক}\}$  সংহতিটোৰ অন্তৰ্ভুক্ত হোৱা যাদৃচ্ছিকভাৱে বাছনি কৰা দুই অংকীয়া সংখ্যাৰ সম্ভাৱিতা  
সমান হ'ব :

**Options :**

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

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

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

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

**Question Type : MCQ Is Question Mandatory : No**

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

A ray of light through  $(2, 1)$  is reflected at a point P on the  $y$ -axis and then passes through the

point  $(5, 3)$ . If this reflected ray is the directrix of an ellipse with eccentricity  $\frac{1}{3}$  and the

distance of the nearer focus from this directrix is  $\frac{8}{\sqrt{53}}$ , then the equation of the other directrix

can be :

**Options :**

1.  $2x - 7y - 39 = 0$  or  $2x - 7y - 7 = 0$

2.  $11x + 7y + 8 = 0$  or  $11x + 7y - 15 = 0$

3.  $2x - 7y + 29 = 0$  or  $2x - 7y - 7 = 0$

4.  $11x - 7y - 8 = 0$  or  $11x + 7y + 15 = 0$

**Question Type : MCQ Is Question Mandatory : No**

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

(2, 1) বিন্দুৰে যোৱা পোহৰৰ বশ্মি  $y$ -অক্ষৰ ওপৰত থকা P বিন্দুত প্রতিফলিত হৈছে আৰু (5, 3) বিন্দুৰে পাৰ হয়।

$\frac{1}{3}$  উৎকেন্দ্ৰতা থকা উপবৃত্তৰ যদি নিয়ামিকাটো এই প্রতিফলিত বশ্মিয়ে বুজায় আৰু নিয়ামিকাটোৰ পৰা নিকটতম নাভিৰ

দূৰত্ব  $\frac{8}{\sqrt{53}}$  হয়, তেন্তে আন এটা নিয়ামিকাৰ সমীকৰণ হ'ব পাৰে :

**Options :**

1.  $2x - 7y - 39 = 0$  নাইবা  $2x - 7y - 7 = 0$

2.  $11x + 7y + 8 = 0$  নাইবা  $11x + 7y - 15 = 0$

3.  $2x - 7y + 29 = 0$  নাইবা  $2x - 7y - 7 = 0$

4.  $11x - 7y - 8 = 0$  নাইবা  $11x + 7y + 15 = 0$

**Question Type : MCQ Is Question Mandatory : No**

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

The compound statement  $(P \vee Q) \wedge (\sim P) \Rightarrow Q$  is equivalent to :

**Options :**

1.  $\sim(P \Rightarrow Q)$

2.  $P \wedge \sim Q$

3.  $\sim(P \Rightarrow Q) \Leftrightarrow P \wedge \sim Q$

4.  $P \vee Q$

**Question Type : MCQ Is Question Mandatory : No**

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

$(P \vee Q) \wedge (\sim P) \Rightarrow Q$  যৌগিক উক্তিটো সমতুল্য হ'ব :

**Options :**

1.  $\sim(P \Rightarrow Q)$

2.  $P \wedge \sim Q$

3.  $\sim(P \Rightarrow Q) \Leftrightarrow P \wedge \sim Q$

4.  $P \vee Q$

**Question Type : MCQ Is Question Mandatory : No**

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

Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be a function such that  $f(2)=4$  and  $f'(2)=1$ . Then, the value of

$\lim_{x \rightarrow 2} \frac{x^2 f(2) - 4f(x)}{x - 2}$  is equal to :

**Options :**

1. 4
2. 8
3. 12
4. 16

**Question Type : MCQ Is Question Mandatory : No**

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

ধরা হ'ল  $f: \mathbb{R} \rightarrow \mathbb{R}$  এটা ফলন যাতে  $f(2)=4$  আৰু  $f'(2)=1$  তেন্তে  $\lim_{x \rightarrow 2} \frac{x^2 f(2) - 4f(x)}{x-2}$  ৰ মান সমান

হ'ব :

**Options :**

1. 4
2. 8
3. 12
4. 16

**Question Type : MCQ Is Question Mandatory : No**

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

The value of  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{j=1}^n \frac{(2j-1) + 8n}{(2j-1) + 4n}$  is equal to :

**Options :**

1.  $5 + \log_e \left( \frac{3}{2} \right)$

2.  $1 + 2 \log_e \left( \frac{3}{2} \right)$

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

4.  $3 + 2 \log_e \left( \frac{2}{3} \right)$

**Question Type : MCQ Is Question Mandatory : No**

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

$\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{j=1}^n \frac{(2j-1) + 8n}{(2j-1) + 4n}$  ৰ মান সমান হ'ব :

**Options :**

1.  $5 + \log_e \left( \frac{3}{2} \right)$

2.  $1 + 2 \log_e \left( \frac{3}{2} \right)$

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

4.

$$3 + 2 \log_e \left( \frac{2}{3} \right)$$

**Question Type : MCQ Is Question Mandatory : No**

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

The value of the definite integral

$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{(1 + e^{x \cos x}) (\sin^4 x + \cos^4 x)}$$

is equal to :

**Options :**

1.  $\frac{\pi}{2\sqrt{2}}$

2.  $-\frac{\pi}{4}$

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

4.  $\frac{\pi}{\sqrt{2}}$

**Question Type : MCQ Is Question Mandatory : No**

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



$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{(1 + e^{x \cos x})(\sin^4 x + \cos^4 x)}$$
 নিশ্চিত অনুকলনটোৰ মান সমান হ'ব :

Options :

1.  $\frac{\pi}{2\sqrt{2}}$

2.  $-\frac{\pi}{4}$

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

4.  $\frac{\pi}{\sqrt{2}}$

## Mathematics Section B

Section Id :	864351829
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 :

8643511056

Question Shuffling Allowed :

Yes

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let a plane P pass through the point  $(3, 7, -7)$  and contain the line,

$\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ . If distance of the plane P from the origin is d, then  $d^2$  is equal to

\_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল P সমতলটো  $(3, 7, -7)$  বিন্দুৰে যায় আৰু  $\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$  ৰেখাডালক ৰাখে। যদি মূলবিন্দুৰ

পৰা P সমতলৰ দূৰত্ব d হয়, তেন্তে  $d^2$  সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

**Question Type : SA**

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

$$\text{Let } f(x) = \begin{vmatrix} \sin^2 x & -2 + \cos^2 x & \cos 2x \\ 2 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & 1 + \cos 2x \end{vmatrix}, x \in [0, \pi].$$

Then the maximum 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 :**

1

**Question Type : SA**

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

$$\text{ধৰা হ'ল } f(x) = \begin{vmatrix} \sin^2 x & -2 + \cos^2 x & \cos 2x \\ 2 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & 1 + \cos 2x \end{vmatrix}, x \in [0, \pi]$$

তেন্তে  $f(x)$  ৰ গৰিষ্ঠ মান সমান হ'ব \_\_\_\_\_।

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**

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

Let  $F : [3, 5] \rightarrow \mathbf{R}$  be a twice differentiable function on  $(3, 5)$  such that

$$F(x) = e^{-x} \int_3^x (3t^2 + 2t + 4F'(t))dt.$$

If  $F'(4) = \frac{\alpha e^\beta - 224}{(e^\beta - 4)^2}$ , 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 Type : SA**

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

ধৰা হ'ল  $F : [3, 5] \rightarrow \mathbf{R}$  এটা দুইবাৰ অৱকলনীয় ফলন  $(3, 5)$  যাতে  $F(x) = e^{-x} \int_3^x (3t^2 + 2t + 4F'(t))dt$  ।

যদি  $F'(4) = \frac{\alpha e^\beta - 224}{(e^\beta - 4)^2}$ , তেন্তে  $\alpha + \beta$  সমান হ'ব \_\_\_\_\_ ।

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

Let  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ ,  $\vec{b}$  and  $\vec{c} = \hat{j} - \hat{k}$  be three vectors such that  $\vec{a} \times \vec{b} = \vec{c}$  and

$\vec{a} \cdot \vec{b} = 1$ . If the length of projection vector of the vector  $\vec{b}$  on the vector  $\vec{a} \times \vec{c}$  is  $l$ , then the value of  $3l^2$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

ধৰা হ'ল  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ ,  $\vec{b}$  আৰু  $\vec{c} = \hat{j} - \hat{k}$  তিনিটা ভেক্টৰ যাতে  $\vec{a} \times \vec{b} = \vec{c}$  আৰু  $\vec{a} \cdot \vec{b} = 1$ ।

যদি  $\vec{b}$  ভেক্টৰৰ অভিক্ষেপৰ দৈৰ্ঘ্য  $\vec{a} \times \vec{c}$  ভেক্টৰৰ ওপৰত  $l$  হলে,  $3l^2$  ৰ মান সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

**Question Type : SA**

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

Let the domain of the function

$$f(x) = \log_4 \left( \log_5 \left( \log_3 \left( 18x - x^2 - 77 \right) \right) \right) \text{ be } (a, b).$$

Then the value of the integral

$$\int_a^b \frac{\sin^3 x}{(\sin^3 x + \sin^3(a + b - x))} dx$$

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

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

**Question Type : SA**

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

ধৰা হ'ল  $f(x) = \log_4 \left( \log_5 \left( \log_3 \left( 18x - x^2 - 77 \right) \right) \right)$  ফলনটোৰ আদিক্ষেত্র  $(a, b)$ । তেন্তে

$$\int_a^b \frac{\sin^3 x}{(\sin^3 x + \sin^3(a + b - x))} dx \text{ অনুকলনটোৰ মান সমান হ'ব } \underline{\hspace{2cm}}।$$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

If  $\log_3 2, \log_3(2^x - 5), \log_3\left(2^x - \frac{7}{2}\right)$  are in an arithmetic progression, then the value of  $x$  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 Type :** SA

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

যদি  $\log_3 2, \log_3(2^x - 5), \log_3\left(2^x - \frac{7}{2}\right)$  সমান্তর প্রগতিত থাকে, তেন্তে  $x$  ৰ মান সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

For real numbers  $\alpha$  and  $\beta$ , consider the following system of linear equations :

$$x + y - z = 2, \quad x + 2y + \alpha z = 1, \quad 2x - y + z = \beta.$$

If the system has infinite solutions, 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 Type : SA**

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

বাস্তৱ সংখ্যা  $\alpha$  আৰু  $\beta$  ৰ বাবে, তলৰ বৈখিক সমীকৰণ প্ৰণালীটো বিবেচনা কৰা হ'ল -

$$x + y - z = 2, \quad x + 2y + \alpha z = 1, \quad 2x - y + z = \beta$$

যদি প্ৰণালীটোৰ অসীম সংখ্যক সমাধান থাকে, তেন্তে  $\alpha + \beta$  সমান হ'ব \_\_\_\_\_।

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Type : SA**



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

Let  $S = \{1, 2, 3, 4, 5, 6, 7\}$ . Then the number of possible functions  $f: S \rightarrow S$  such that  $f(m \cdot n) = f(m) \cdot f(n)$  for every  $m, n \in S$  and  $m \cdot n \in S$  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 Type : SA**

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

ধৰা হ'ল  $S = \{1, 2, 3, 4, 5, 6, 7\}$ , তেন্তে  $f: S \rightarrow S$  যাতে  $f(m \cdot n) = f(m) \cdot f(n)$ , গতিকে  $m, n \in S, m \cdot n \in S$  ৰ বাবে সম্ভাৰ্য ফলনৰ সংখ্যা সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type : SA**

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

If  $y = y(x)$ ,  $y \in \left[0, \frac{\pi}{2}\right)$  is the solution of the differential equation

$\sec y \frac{dy}{dx} - \sin(x + y) - \sin(x - y) = 0$ , with  $y(0) = 0$ , then  $5y' \left(\frac{\pi}{2}\right)$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

যদি  $\sec y \frac{dy}{dx} - \sin(x + y) - \sin(x - y) = 0$ ,  $y(0) = 0$  অৱকলন সমীকৰণৰ সমাধান  $y = y(x)$ ,  $y \in \left[0, \frac{\pi}{2}\right)$

হয়, তেন্তে  $5y'\left(\frac{\pi}{2}\right)$  সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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

Let  $f: [0, 3] \rightarrow \mathbf{R}$  be defined by

$$f(x) = \min\{x - [x], 1 + [x] - x\}$$

where  $[x]$  is the greatest integer less than or equal to  $x$ .

Let  $P$  denote the set containing all  $x \in [0, 3]$  where  $f$  is discontinuous, and  $Q$  denote the set containing all  $x \in (0, 3)$  where  $f$  is not differentiable. Then the sum of number of elements in  $P$  and  $Q$  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 Type :** SA

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

ধৰা হ'ল  $f: [0, 3] \rightarrow \mathbf{R}$  বৰ্ণিত যাতে  $f(x) = \min\{x - [x], 1 + [x] - x\}$ , য'ত  $[x]$ ,  $x$  ৰ সমান বা  $x$  তকৈ সৰু গৰিষ্ঠ অখণ্ড সংখ্যা বুজায়।

যদি  $x \in [0, 3]$  ৰ বাবে সংহতি  $P$  হয় আৰু য'ত  $f$  বিচ্ছিন্ন আৰু  $x \in (0, 3)$  ৰ বাবে সংহতি  $Q$  হয় য'ত  $f$  অৱকলনীয় নহয়। তেন্তে  $P$  আৰু  $Q$  ৰ মৌলৰ সংখ্যাৰ যোগফল সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1