

nta

**Question Paper Name :** B Tech 27July2021 Shift S1  
**Subject Name :** B TECH  
**Creation Date :** 2021-07-24 17:19:13  
**Duration :** 180  
**Total Marks :** 300  
**Display Marks:** Yes

## **B TECH**

**Group Number :** 1  
**Group Id :** 864351231  
**Group Maximum Duration :** 0  
**Group Minimum Duration :** 180  
**Show Attended Group? :** No  
**Edit Attended Group? :** No  
**Break time :** 0  
**Group Marks :** 300  
**Is this Group for Examiner? :** No

## **Physics Section A**

**Section Id :** 864351824  
**Section Number :** 1  
**Section type :** Online  
**Mandatory or Optional :** 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**

ଯଦି କ୍ଷୟ ହୋଇଥିବା ନ୍ୟୁକ୍ଲିୟସ୍ ସଂଖ୍ୟା ( $N_t$ ) ଏବଂ  $t=0$  ସମୟରେ ଥିବା ନ୍ୟୁକ୍ଲିୟସ୍ ସଂଖ୍ୟା ( $N_0$ ) ର ଅନୁପାତକୁ ' $f$ ' ସୂଚିତ କରିଥାଏ, ତେବେ ଏକ ତେଜସ୍ବିୟ ନ୍ୟୁକ୍ଲିୟସ୍ ସଂଗୃହିତ ନମୁନା ପାଇଁ, ସମୟ ସହ ' $f$ ' ର ପରିବର୍ତ୍ତନ ହାରକୁ ଲେଖା ଯାଇପାରିବ ।

(ତେଜସ୍ବିୟ କ୍ଷୟ ସ୍ଥିରାଙ୍କ ହେଉଛି  $\lambda$ )

**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**

ଗୋଟିଏ ଯଙ୍ଗଳ ଦ୍ଵି-ଚ୍ଛିଦ୍ର ପରୀକ୍ଷାରେ, ଯଦି ଆଲୋକ ଉତ୍ସଟି ନୀରଙ୍ଗୀରୁ ନୀଳକୁ ପରିବର୍ତ୍ତନ କରାଯାଏ ତେବେ :

**Options :**

1. ମିନିମାଲ ଡିଫ୍ରାକ୍ଟନ୍ ଚଳାଣରେ ବୃଦ୍ଧି ହେବ ।
2. ପାଖାପାଖି ଫ୍ରିଞ୍ଜ ଦୁଇଟି ମଧ୍ୟରେ ଦୂରତା ବୃଦ୍ଧି ଘଟିବ ।
3. ପାଖାପାଖି ଫ୍ରିଞ୍ଜ ଦୁଇଟି ମଧ୍ୟରେ ଦୂରତା କମିଯିବ ।
4. କେନ୍ଦ୍ରୀୟ ଉଜ୍ଜ୍ଵଳ ଫ୍ରିଞ୍ଜଟି ଅନ୍ଧକାର ଫ୍ରିଞ୍ଜ ହୋଇଯିବ ।

**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**

ପାତିତ ଜଳର ଆପେକ୍ଷିକ ପରାବୈଦ୍ୟତାଙ୍କ 81 ଅଟେ । ଏହା ମଧ୍ୟରେ ଆଲୋକର ବେଗ ହେବ :

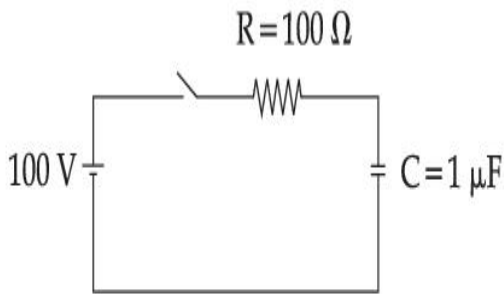
(ନିଅ  $\mu_r = 1$ )

**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 :**

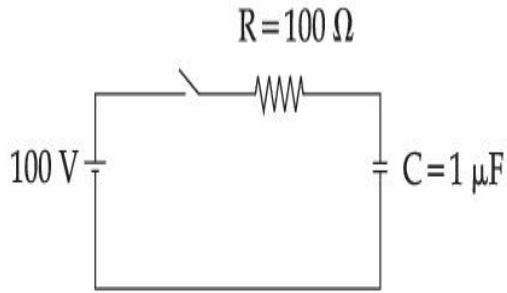
1.  $0.69 \times 10^{-4}$  s
2.  $0.30 \times 10^{-4}$  s
- 3.

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

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

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

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



$C = 1 \mu\text{F}$  ର ଏକ ଧାରିତ୍ରକୁ ବିଦ୍ୟୁତ୍ ପ୍ରତିରୋଧ  $R = 100 \Omega$  ମଧ୍ୟବେଳ ହଠାତ୍ 100 ଭୋଲଟ୍ ବ୍ୟାଟେରୀ ସହ ସଂଯୋଗ କରାଗଲା । ଧାରିତ୍ରଟି 50 V କୁ ଚାର୍ଜିତ ହେବା ପାଇଁ ଲାଗୁଥିବା ସମୟ ଅଟେ :

[ନିଅ  $\ln 2 = 0.69$ ]

**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**

ଗୋଟିଏ 0.07 H ର ପ୍ରଶୋଦକ ଏବଂ 12  $\Omega$  ର ପ୍ରତିରୋଧୀକୁ 220 V, 50 Hz ର ଏକ ପ୍ରତ୍ୟାବର୍ତ୍ତୀ ବିଦ୍ୟୁତ୍ ଉତ୍ସ ସହ ଶ୍ରେଣୀରେ ସଂଯୋଗ କରାଗଲା । ପରିପଥଟିରେ ଆନୁମାନିକ ବିଦ୍ୟୁତ୍ ସ୍ରୋତ ଓ ଉତ୍ସ ବିଭବ ମଧ୍ୟରେ କଳାକୋଣ (ଫେଜ୍ ଆଙ୍ଗଲ୍)

ନିଆକ୍ରମେ ହେବ : [ $\pi = \frac{22}{7}$  ନିଅ]

**Options :**

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

2.

$$0.88 A \text{ @ } \tan^{-1}\left(\frac{11}{6}\right)$$

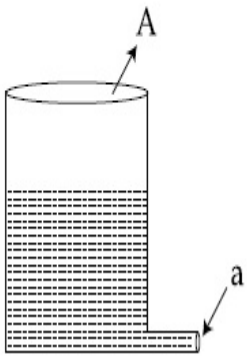
3.  $88 A \text{ @ } \tan^{-1}\left(\frac{11}{6}\right)$

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

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

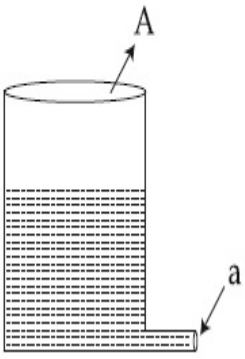


4. None of these

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ଏକ ହାଲୁକା ସିଲିଣ୍ଡର ଆକାରର ପାତ୍ରକୁ ଭୂସମାନ୍ତର ପୃଷ୍ଠ ଉପରେ ରଖାଯାଇଛି । ଏହାର ନିମ୍ନଭାଗର କ୍ଷେତ୍ରଫଳ  $A$  ଅଟେ । ଠିକ୍ ଏହାର ନିମ୍ନଭାଗରେ ପ୍ରସ୍ଥଚ୍ଛେଦ କ୍ଷେତ୍ରଫଳ ' $a$ ' ବିଶିଷ୍ଟ ଏକ ଛିଦ୍ର କରାଗଲା । ଛିଦ୍ର ଦେଇ ନିର୍ଗତ ତରଳ ପଦାର୍ଥ ଯୋଗୁଁ ପତ୍ତୁଥିବା ବଳର ପ୍ରୟୋଗ ହେତୁ ନ ଘୁଞ୍ଚାଇବା ପାଇଁ ଆବଶ୍ୟକ ପତ୍ତୁଥିବା ସର୍ବନିମ୍ନ ଘର୍ଷଣ ଧୁବାଙ୍କ ହେଉଛି ( $a \ll A$ ) :



Options :

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

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

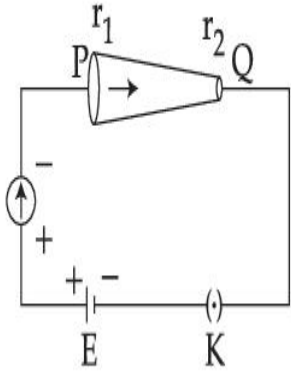
3.  $\frac{A}{2a}$

4. ଏଗୁଡ଼ିକ ମଧ୍ୟରୁ କେଉଁଟି ନୁହେଁ

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 :

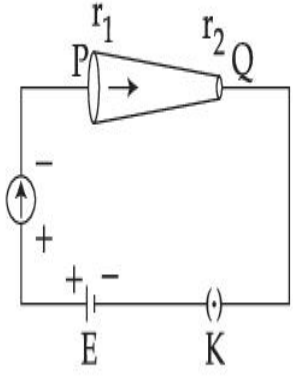
**Options :**

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**

ଦତ୍ତ ଚିତ୍ରରେ, ବିଦ୍ୟୁତ୍ ବାହକ ବଳ (ଇ.ଏମ.ଏଫ୍)  $E$  ଥିବା ଏକ ବ୍ୟାଚେରୀକୁ 'l' ଦୈର୍ଘ୍ୟ ଏବଂ ପ୍ରସ୍ତୁତ ବ୍ୟାସାର୍ଦ୍ଧ  $r_1$  ଏବଂ  $r_2$  ( $r_2 < r_1$ ) ରହିଥିବା ଗୋଟିଏ ବିଦ୍ୟୁତ୍ ପରିବାହୀ PQ ର ଦୁଇମୁଣ୍ଡରେ ସଂଯୋଗ କରାଯାଇଛି ।



ଯଦି ଜଣେ P ଠାରୁ Q ଅଭିମୁଖେ ଗତିକରେ ତେବେ ଠିକ୍ ବିକଳ୍ପଟି ବାଛି ।

**Options :**

1. ଇଲେକ୍ଟ୍ରନ୍ ଅବବାହ ବେଗ (ଡ୍ରିଫ୍ଟ୍, ଭେଲୋସିଟି) ବଢ଼ିଥାଏ ।
2. ଇଲେକ୍ଟ୍ରନ୍ ବିଦ୍ୟୁତ୍ ସ୍ରୋତ କମିଯାଏ ।
3. ବୈଦ୍ୟୁତିକ କ୍ଷେତ୍ର କମିଥାଏ ।
4. ବିଦ୍ୟୁତ୍ ସ୍ରୋତ ସାନ୍ଦ୍ରତା କମିଯାଏ ।

**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 ଓ C ଧାରିତା ଥିବା ଦୁଇଟି ଧାରିତ୍ରକୁ ସମାନ୍ତରରେ ସଂଯୋଗ କରାଗଲା ଏବଂ V ବିଭବ ପର୍ଯ୍ୟନ୍ତ ଚାର୍ଜିତ କରାଗଲା । ବ୍ୟାଟେରୀକୁ ଅପସାରଣ କରାଗଲା ଏବଂ ଧାରିତା C କୁ ପରାବୈଦ୍ୟୁତାଙ୍କ K ବିଶିଷ୍ଟ ଏକ ମାଧ୍ୟମ ଦ୍ୱାରା ସଂପୂର୍ଣ୍ଣ ପୂର୍ଣ୍ଣ କରାଗଲା । ଏବେ ଧାରିତାଗୁଡ଼ିକର ଦୁଇମୁଣ୍ଡ ମଧ୍ୟରେ ବିଭବ ପାର୍ଥକ୍ୟ ହେବ :

**Options :**

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

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

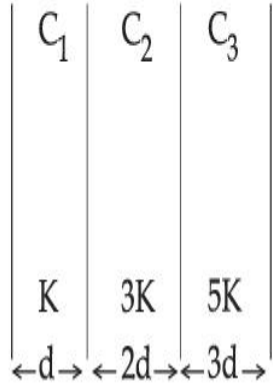
3.  $\frac{V}{K+2}$

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

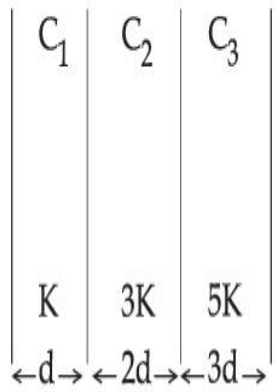
4.  $\frac{15}{6} \frac{K\epsilon_0 A}{d}$

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

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

ବର୍ଣ୍ଣିତ ଚିତ୍ରରେ, ସମାନ୍ତରାଳ ପ୍ଲେଟ୍ ଧାରିତ୍ରର ପ୍ଲେଟ୍ ଦୁଇଟି ମଧ୍ୟରେ ଗୋଟିଏ ଯୌଗିକ ପରାବୈଦ୍ୟୁତିକ ରଖାଯାଇ ଧାରିତ୍ରଟିଏ ତିଆରି କରାଗଲା । ତିଆରି ହୋଇଥିବା ଧାରିତ୍ରର ଧାରିତାର ବ୍ୟଞ୍ଜକ ହେବ :

(ଦତ୍ତ: ପ୍ଲେଟ୍ କ୍ଷେତ୍ରଫଳ = 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**

କଣିକାଟିଏ 'a' ଆୟାମର ସରଳ ହାରମୋନିକ ଗତି (ଏସ୍.ଏଚ୍.ଏମ୍) ସଂପାଦନ କରିବା ଆରମ୍ଭ କଲା ଏବଂ ମୋଟ ଶକ୍ତି E

ଗତିକ ଶକ୍ତି  $\frac{3E}{4}$  ଥିବା ସମୟରେ ଏହାର ବିସ୍ଥାପନ 'y' ଦର୍ଶାଯାଇପାରିବ :

**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**

ଦୁଇଟି 'm' ଏବଂ ଚାର୍ଜ 'q' ଥିବା ଦୁଇଟି ଏକା ପ୍ରକାରର ଚେନିସ୍ ବଲକୁ 'l' ଦୈର୍ଘ୍ୟ ବିଶିଷ୍ଟ ଦୁଇଟି ସୂତା ଦ୍ୱାରା ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ ବିନ୍ଦୁରେ ଝୁଲାଇ ଦିଆଯାଇଛି । ଯେତେବେଳେ ସୂତା ଦୁଇଟି ଭୂଲମ୍ବ ସହ ଏକ କ୍ଷୁଦ୍ର କୋଣ 'θ' କରିଥାନ୍ତି ସେମାନଙ୍କ ମଧ୍ୟରେ ଥିବା ସଂତୁଳନ ବ୍ୟବଧାନ କେତେ ହେବ ?

**Options :**



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

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

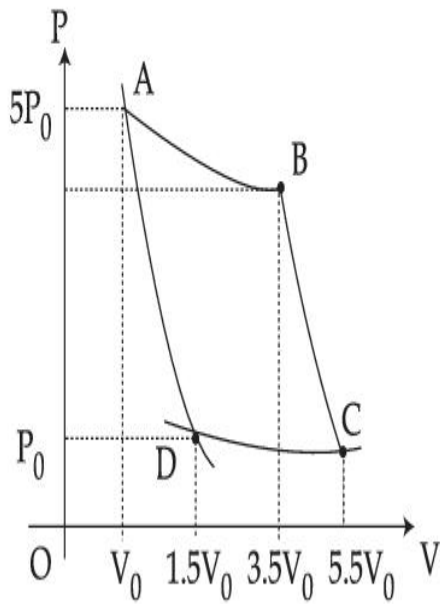
3. 
$$x = \left( \frac{q^2 l}{2\pi\epsilon_0 m g} \right)^{1/2}$$

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.

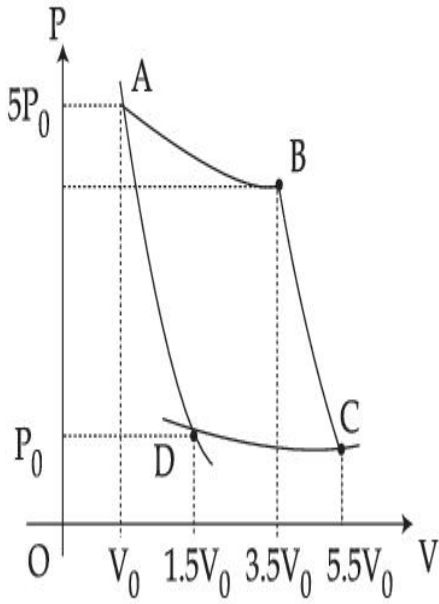
**Options :**

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**

ବର୍ଣ୍ଣିତ ଚିତ୍ରରେ, 1 ମୋଲର ଏକ ଦ୍ଵିପରମାଣୁ ବିଶିଷ୍ଟ ଗ୍ୟାସ୍ ନମୁନା ଉପରେ ଗୋଟିଏ ଚକ୍ରିୟ ପ୍ରକ୍ରିୟା ABCDA ରହିଛି । ପ୍ରକ୍ରିୟା  $A \rightarrow B$  ଏବଂ ପ୍ରକ୍ରିୟା  $C \rightarrow D$  ସମୟରେ ଗ୍ୟାସ୍‌ର ତାପମାତ୍ରା ଯଥାକ୍ରମେ  $T_1$  ଏବଂ  $T_2$  ( $T_1 > T_2$ ) ଅଟେ ।



ଯଦି BC ଏବଂ DA ପ୍ରକ୍ରିୟା ଦୁଇଟି ରୁଦ୍ଧତାପୀୟ ହୁଏ କାର୍ଯ୍ୟ ସଂପାଦନ ପାଇଁ ନିମ୍ନରେ ଦତ୍ତ ବିକଳଗୁଡ଼ିକରୁ ଠିକ୍ ଉତ୍ତରଟି ବାଛି :

**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**

61°C ରୁ 59°C କୁ ଥଣ୍ଡା ହେବା ପାଇଁ ଗୋଟିଏ ବସ୍ତୁ 4 ମିନିଟ୍ ସମୟ ନିଏ । ଯଦି ପାରିପାର୍ଶ୍ଵିକ ତାପମାତ୍ରା 30°C ହୁଏ, ତେବେ ଉକ୍ତ ବସ୍ତୁଟି 51°C ରୁ 49°C କୁ ଥଣ୍ଡା ହେବା ପାଇଁ ନେଉଥିବା ସମୟ ଅଟେ :

**Options :**

1. 3 ମିନିଟ୍
2. 4 ମିନିଟ୍
3. 6 ମିନିଟ୍
4. 8 ମିନିଟ୍

**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**

ଅଶୁଦ୍ଧି ହାରାହାରି ଗତିଜ ଶକ୍ତି  $2 \times 10^{-9}$  J ସହ 300 K ତାପମାତ୍ରା ଏବଂ ଦୁଇ ବାୟୁମଣ୍ଡଳୀୟ ତାପରେ ଥିବା ଏକ ଲିଟର ଆଦର୍ଶ ଗ୍ୟାସର ଅଣୁମାନଙ୍କର ସଂଖ୍ୟା ଅଟେ :

**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**

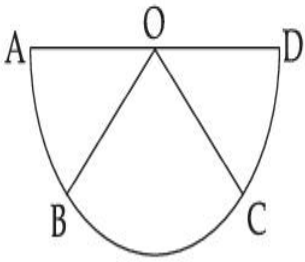
**Assertion A :** If A, B, C, D are four points on a semi-circular arc with centre at 'O' such

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**

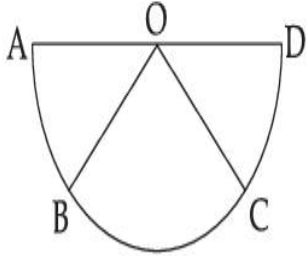
**Correct Marks : 4 Wrong Marks : 1**

ଯୋଗଣା A : ଯଦି ଏକ ଅର୍ଧ ବୃତ୍ତାକାର କେନ୍ଦ୍ର 'O' ଚିତ୍ତ ଉପରେ A, B, C ଏବଂ D ଚାରିଟି ବିନ୍ଦୁ ଏପରି ଅଙ୍କିତ ଯେମିତି

$$|\vec{AB}| = |\vec{BC}| = |\vec{CD}| \text{ ତେବେ } \vec{AB} + \vec{BC} + \vec{CD} = 4\vec{AO} + \vec{OB} + \vec{OC} \text{ ।}$$

କାରଣ R : ସଦିଶ ଯୋଗକ୍ରିୟାର ବହୁଭୁଜ ନିୟମ ପ୍ରଦାନ କରିଥାଏ

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



ଉପରୋକ୍ତ କଥନ ଅନୁଯାୟୀ, ନିମ୍ନରେ ଦିଆଯାଇଥିବା ସର୍ବୋତ୍ତମ ଉତ୍ତରଟି ଚୟନ କର :

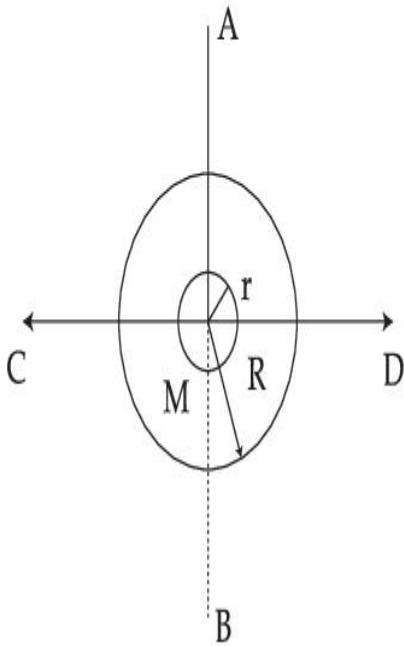
**Options :**

1. ଉଭୟ A ଏବଂ R ଠିକ୍ ଏବଂ A ର R ସଠିକ୍ ବ୍ୟାଖ୍ୟା ।
2. ଉଭୟ A ଏବଂ R ଠିକ୍ କିନ୍ତୁ A ର R ସଠିକ୍ ବ୍ୟାଖ୍ୟା ନୁହେଁ ।
3. A ଠିକ୍ କିନ୍ତୁ R ଠିକ୍ ନୁହେଁ ।
4. A ଠିକ୍ ନୁହେଁ କିନ୍ତୁ R ଠିକ୍ ଅଟେ ।

**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 :**

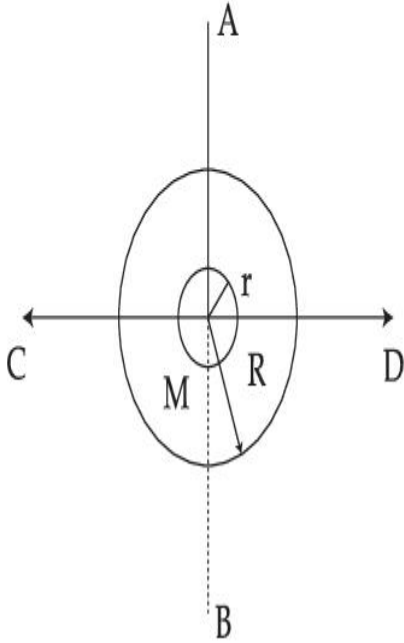
1.  $2R^2 : r^2$
2.  $R^2 : r^2$
3.  $2R^4 : r^4$
4.  $2r^4 : R^4$

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

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



ଚିତ୍ରଟି ଯଥାକ୍ରମେ R ଏବଂ r ବ୍ୟାସାର୍ଦ୍ଧ ଥିବା ଦୁଇଟି ନିଦା ଡିସ୍କକୁ ଦର୍ଶାଉଛି । ଯଦି ଉଭୟଙ୍କ ପାଇଁ ବସ୍ତୁତ୍ୱ ପ୍ରତି ଏକକ କ୍ଷେତ୍ରଫଳ ସମାନ ହୁଏ, ତେବେ AB ଅକ୍ଷ (ଯିଏକି ଡିସ୍କର ସମତଳକୁ ଲମ୍ବ ହୋଇ ଏହାର କେନ୍ଦ୍ର ଦେଇ ଯାଉଛି) ଚାରିପଟେ ବୃହତ୍ତର ଡିସ୍କର ଆୟତ୍ସ ଜଡ଼ତ୍ୱ (MI) ସହ ସାନ ଡିସ୍କର ଏହାର ସମତଳରେ ଥିବା ଏକ ବ୍ୟାସ ଚାରିପଟେ ଆୟତ୍ସ ଜଡ଼ତ୍ୱ (MI) ର ଅନୁପାତ ହେବ : (MI ହେଉଛି ଆୟତ୍ସ ଜଡ଼ତ୍ୱ)



**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**

- (a) MI of the rod (length  $L$ , Mass  $M$ , about an axis  $\perp$  to the rod passing through the midpoint)
- (b) MI of the rod (length  $L$ , Mass  $2M$ , about an axis  $\perp$  to the rod passing through one of its end)
- (c) MI of the rod (length  $2L$ , Mass  $M$ , about an axis  $\perp$  to the rod passing through its midpoint)
- (d) MI of the rod (length  $2L$ , Mass  $2M$ , about an axis  $\perp$  to the rod passing through one of its end)

**List - II**

(i)  $8 ML^2/3$

(ii)  $ML^2/3$

(iii)  $ML^2/12$

(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**

**ତାଲିକା - I****ତାଲିକା - II**

- |  |                 |
|--|-----------------|
| (a) ଦଣ୍ଡର ଆୟତ୍ତ ଜଡ଼ତ୍ତ (ଦୈର୍ଘ୍ୟ L, ବସ୍ତୁତ୍ତ M, ଦଣ୍ଡର ମଝିଦେଇ ଏହାକୁ ଲମ୍ବ ଭାବେ ଯାଇଥିବା ଅକ୍ଷ ଚାରିପଟେ)              | (i) $8 ML^2/3$  |
| (b) ଦଣ୍ଡର ଆୟତ୍ତ ଜଡ଼ତ୍ତ (ଦୈର୍ଘ୍ୟ L, ବସ୍ତୁତ୍ତ 2M, ଦଣ୍ଡର ଗୋଟିଏ ମୁଣ୍ଡ ଦେଇ ଏହାକୁ ଲମ୍ବ ଭାବେ ଯାଇଥିବା ଅକ୍ଷ ଚାରିପଟେ)    | (ii) $ML^2/3$   |
| (c) ଦଣ୍ଡର ଆୟତ୍ତ ଜଡ଼ତ୍ତ (ଦୈର୍ଘ୍ୟ 2L, ବସ୍ତୁତ୍ତ M ଏହାର ମଝି ଦେଇ ଏହାକୁ ଲମ୍ବ ଭାବେ ଯାଇଥିବା)                           | (iii) $ML^2/12$ |
| (d) ଦଣ୍ଡର ଆୟତ୍ତ ଜଡ଼ତ୍ତ (ଦୈର୍ଘ୍ୟ 2L, ବସ୍ତୁତ୍ତ 2M, ଏହାର ଗୋଟିଏ ମୁଣ୍ଡ ଦେଇ ଏହାକୁ ଲମ୍ବ ଭାବେ ଯାଇଥିବା ଏକ ଅକ୍ଷ ଚାରିପଟେ) | (iv) $2 ML^2/3$ |

ନିମ୍ନରେ ଦିଆଯାଇଥିବା ବିକଳ୍ପଗୁଡ଼ିକରୁ ଠିକ୍ ଉତ୍ତରଟି ଚୟନ କର :

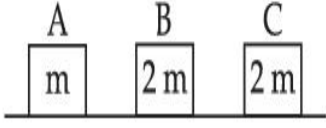
**Options :**

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 :



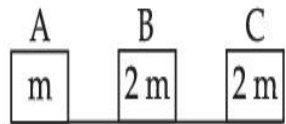
**Options :**

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**

ତିନୋଟି ବସ୍ତୁ A, B ଏବଂ C କୁ ସରଳରେଖାରେ ଘର୍ଷଣବିହୀନ ଭୂସମାନ୍ତର ପୃଷ୍ଠ ଉପରେ ରଖାଗଲା । A, B ଏବଂ C ର ବସ୍ତୁତ୍ୱ ଯଥାକ୍ରମେ  $m$ ,  $2m$  ଏବଂ  $2m$  ଅଟେ । B, A ଆଡ଼କୁ  $9\text{ m/s}$  ଗତିରେ ଆସି ଛିଡ଼ିସ୍ଥାପକ ସଂଘାତ କରୁଛି । ତେଣୁ B ସମ୍ପୂର୍ଣ୍ଣ ଭାବେ ଏକ ଅଣଛିଡ଼ିସ୍ଥାପକ ସଂଘାତ C ସହିତ କରୁଛି । ସମସ୍ତ ଗତି ଏକ ସମାନ ସରଳରେଖାରେ ଘଟୁଛି । C ର ଅନ୍ତିମ (ଫାଇନାଲ) ଗତି ବାହାର କର ।



**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**

ଗୋଟିଏ ବଲ୍‌କୁ ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ ବେଗରେ ଉପରକୁ ନିକ୍ଷେପ କରାଗଲା ଯେପରିକି ଏହା 'h' ଉଚ୍ଚତାରେ ପହଞ୍ଚିଲା । ବଲ୍‌ଟି ଉଭୟ

ଦିଗରୁ  $\frac{h}{3}$  ଉଚ୍ଚତାରେ ପହଞ୍ଚିବା ବେଳେ ଏହାର ଦୁଇଟି ଭିନ୍ନ ସମୟର ଅନୁପାତ ବାହାର କର ।

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

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**

ଘୋଷଣା **A** : ଯଦି ଗୋଟିଏ ସ୍କୃ-ଗେଜର ଗୋଲାକାର ସ୍କେଲ୍‌ଟି ପାଞ୍ଚଟି ଘୂର୍ଣ୍ଣନରେ ଏହାର ମେନ୍ ସ୍କେଲ୍ ଉପରେ 5 mm ଦୂରତା ଅତିକ୍ରମ କରେ ଏବଂ ଗୋଲାକାର ସ୍କେଲ୍‌ରେ ସମୁଦାୟ 50 ଟି ଭାଗ ରହିଛି, ତେବେ କ୍ଷୁଦ୍ରତମ ମାପ 0.001 cm ହେବ ।

କାରଣ **R** : 
$$\text{କ୍ଷୁଦ୍ରତମ ମାପ} = \frac{\text{ପିଚ୍}}{\text{ଗୋଲାକାର ସ୍କେଲ୍‌ର ସମୁଦାୟ ଭାଗ}}$$

ଉପରୋକ୍ତ କଥନ ଅନୁଯାୟୀ, ନିମ୍ନ ବିକଳ୍ପ ଗୁଡ଼ିକରୁ ଠିକ୍ ଉତ୍ତରଟି ବାଛ :

**Options :**

1. ଉଭୟ **A** ଏବଂ **R** ସଠିକ୍ ଅଟନ୍ତି ଏବଂ **A** ର **R** ହେଉଛି ଠିକ୍ ବ୍ୟାଖ୍ୟା ।

2. ଉଭୟ **A** ଏବଂ **R** ସଠିକ୍ ଅଟନ୍ତି କିନ୍ତୁ **A** ର **R** ହେଉଛି ଠିକ୍ ବ୍ୟାଖ୍ୟା ନୁହେଁ ।

3. **A** ଠିକ୍ କିନ୍ତୁ **R** ଠିକ୍ ନୁହେଁ ।

4. **A** ଠିକ୍ ନୁହେଁ କିନ୍ତୁ **R** ଠିକ୍ ଅଟେ ।

## Physics Section B

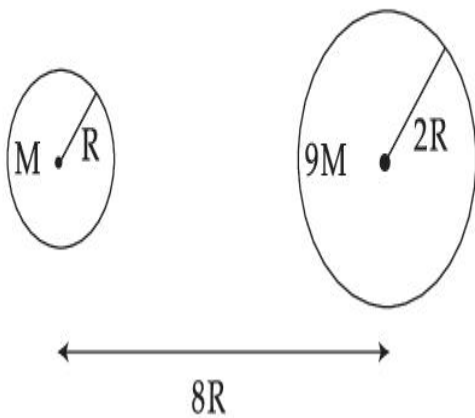
<b>Section Id :</b>	864351825
<b>Section Number :</b>	2
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	20
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511052
<b>Question Shuffling Allowed :</b>	Yes
<b>Question Type : SA</b>	
<b>Correct Marks : 4 Wrong Marks : 0</b>	



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

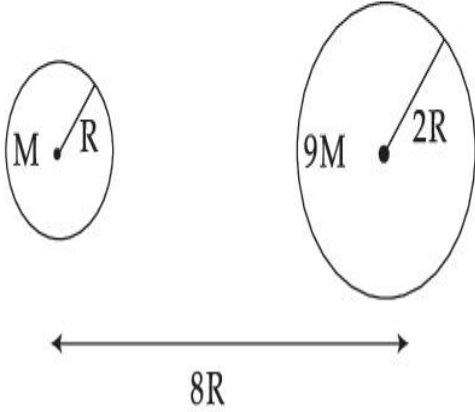
**Question Type :** SA

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

ଚିତ୍ରରେ ଦର୍ଶାଯାଇଥିବା ଅନୁସାରେ, ଯଥାକ୍ରମେ ବ୍ୟାସାର୍ଦ୍ଧ  $R$  ଏବଂ  $2R$  କିନ୍ତୁ ବସ୍ତୁତ୍ଵ  $M$  ଏବଂ  $9M$  ବିଶିଷ୍ଟ ଦୁଇଟି ଗ୍ରହ (ଗୋଲାକୃତି) ର କେନ୍ଦ୍ର ଠାରୁ କେନ୍ଦ୍ରର ବ୍ୟବଧାନ  $8R$  ରହିଛି । ବସ୍ତୁତ୍ଵ ' $M$ ' ଥିବା ଗ୍ରହର ପୃଷ୍ଠରୁ ' $m$ ' ବସ୍ତୁତ୍ଵ ବିଶିଷ୍ଟ ଗୋଟିଏ ଉପଗ୍ରହକୁ ସିଧା ଦ୍ଵିତୀୟ ଗ୍ରହର କେନ୍ଦ୍ର ଦିଗରେ ପ୍ରକ୍ଷେପ କରାଗଲା । ଦ୍ଵିତୀୟ ଗ୍ରହର ପୃଷ୍ଠରେ ପହଞ୍ଚିବା ପାଇଁ ଉପଗ୍ରହ ଦ୍ଵାରା

ଆବଶ୍ୟକ ସର୍ବନିମ୍ନ ବେଗ ' $v$ ' ଅଟେ  $\sqrt{\frac{a}{7} \frac{GM}{R}}$ , ଯେଉଁଠି ' $a$ ' ର ମୂଲ୍ୟ ଅଟେ \_\_\_\_\_ ।

(ଦତ୍ତ : ଦୁଇଟି ଯାକ ଗ୍ରହ ସେମାନଙ୍କ ସ୍ଥାନରେ ସ୍ଥିର ଅଛନ୍ତି)



**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**

ଏକ ସମ ରୁମ୍ଭକୀୟ କ୍ଷେତ୍ରରେ, ଗୋଟିଏ ରୁମ୍ଭକୀୟ ସୂଚୀର ରୁମ୍ଭକୀୟ ଆୟତ୍ତ  $9.85 \times 10^{-2} \text{ A/m}^2$  ଏବଂ ଆୟତ୍ତ ଜଡ଼ତ୍ୱ  $5 \times 10^{-6} \text{ kg m}^2$  ରହିଛି । ଯଦି ଏହା 5 ସେକେଣ୍ଡରେ 10 ଗୋଟି ପୂର୍ଣ୍ଣ ଦୋଳନ ସମ୍ପୂର୍ଣ୍ଣ କରିଥାଏ ତେବେ ରୁମ୍ଭକୀୟ କ୍ଷେତ୍ରର ପରିମାଣ \_\_\_\_\_ mT । ( $\pi^2 = 9.85$  ନିଅ)

**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**

0.04 m ପରିମାଣର ଟଣାଯାଇଥିବା 0.1 m ଦୈର୍ଘ୍ୟ ଏବଂ  $10^{-6} \text{ m}^2$  ପ୍ରସ୍ଥଚ୍ଛେଦ କ୍ଷେତ୍ରଫଳ ବିଶିଷ୍ଟ ଏକ ରବର ବାଟୁଳି ଖଡ଼ା(କାଟାପଲ୍ଲ) ରୁ 20 g ବସ୍ତୁକୁ ବିଶିଷ୍ଟ ଏକ ଯଥର ଖଣ୍ଡକୁ ପ୍ରକ୍ଷେପ କରାଯାଉଛି । ପ୍ରକ୍ଷେପିତ ଯଥର ଖଣ୍ଡର ବେଗ ହେବ \_\_\_\_\_ m/s ।

(ରବରର ଯଙ୍ଗଳ ଗୁଣାଙ୍କ  $= 0.5 \times 10^9 \text{ N/m}^2$ )

**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**

ଗୋଟିଏ ପ୍ରଫିଲ୍ଡରକୁ ସାଧାରଣ ଉତ୍ସର୍ଜକ ବିନ୍ୟାସରେ ସଂଯୋଗ କରାଯାଇଛି, ସଂଗ୍ରାହକକୁ ଯୋଗାଯାଉଥିବା ଭୋଲଟେଜ୍ 10 V ଅଟେ ଏବଂ ସଂଗ୍ରାହକ ପରିପଥରେ 1000  $\Omega$  ର ବିଦ୍ୟୁତ୍ ପ୍ରତିରୋଧକ ଦୁଇମୁଣ୍ଡରେ ହେଉଥିବା ବିଭବାନ୍ତର 0.6 V ଅଟେ । ଯଦି ବିଦ୍ୟୁତ୍ ସ୍ରୋତ ଲକ୍ଷ ଭଗ୍ନାଂଶ କରେଣ୍ଟ୍ ଗେନ୍ ଫାକ୍ଟର ( $\beta$ ) ଟି 24 ହୁଏ, ତେବେ ବେସ୍ ବିଦ୍ୟୁତ୍ ସ୍ରୋତ ହେଉଛି \_\_\_\_\_  $\mu\text{A}$  । (ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

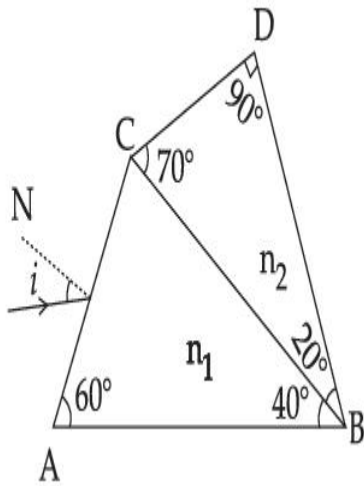
**Question Type : SA**

**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

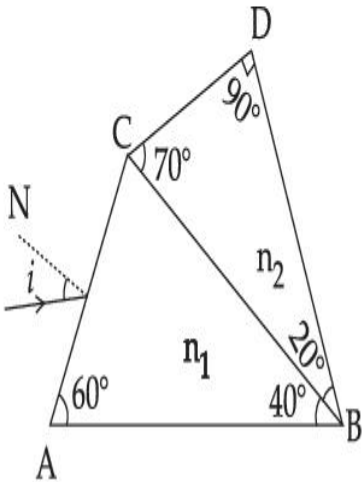
**Question Type :** SA

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

ପ୍ରତିସରଣାଙ୍କ  $n_1$  ଥିବା ଗୋଟିଏ ପ୍ରୃଷ୍ଠକୁ ପ୍ରତିସରଣାଙ୍କ  $n_2$  ଥିବା ଅନ୍ୟ ଏକ ପ୍ରୃଷ୍ଠ ସହ ଯୋଡ଼ାଗଲା (ଚିତ୍ରରେ ଦର୍ଶାଯାଇଥିବା

ଭଳି) ।  $n_1 = 1.2 + \frac{10.8 \times 10^{-14}}{\lambda^2}$  ଏବଂ  $n_2 = 1.45 + \frac{1.8 \times 10^{-14}}{\lambda^2}$  ସଂପର୍କ ଅନୁସାରେ ପ୍ରତିସରଣାଙ୍କ  $n_1$  ଏବଂ

$n_2$  ଆଲୋକର ( $\lambda$ ) ତରଙ୍ଗ ଦୈର୍ଘ୍ୟ ଉପରେ ନିର୍ଭର କରନ୍ତି, ଯେଉଁଠାରେ । BC ପାର୍ଶ୍ଵରେ ଯେକୌଣସି କୋଣରେ ଆପତିତ ହୋଇ ସେଠାରେ ନ ବଙ୍କାଇ ଗତି କରୁଥିବା ରଶ୍ମିର ତରଙ୍ଗ ଦୈର୍ଘ୍ୟ \_\_\_\_\_ nm ହେବ ।



**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 ବସ୍ତୁ ବିଶିଷ୍ଟ ଗୋଟିଏ କଣିକା  $10^6$  m/s ବେଗରେ ଏକ ମାଧ୍ୟମରେ ଗତି କରୁଛି ଏବଂ ବିକିରଣର  $10^{-27}$  kg m/s ରୈଖିକ ସଂବେଗ ଥିବା ଫୋଟନ୍ ଶୂନ୍ୟ (ଭାକ୍ୟୁମ୍)ରେ ଗତି କରୁଛି । ଫୋଟନ୍ ତରଙ୍ଗ ଦୈର୍ଘ୍ୟ କଣିକାଟିର ତରଙ୍ଗ ଦୈର୍ଘ୍ୟର \_\_\_\_\_ ଗୁଣ ହେବ ।

**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**

ହାରାହାରି ଆୟୁକାଳ 30 ms ଥିବା ଗୋଟିଏ ଡେଜର୍ଭିକ୍ସ ନମୁନା କ୍ଷୟୀତ ହେଉଛି । 200  $\mu$ F ଧାରିତା ବିଶିଷ୍ଟ ଏକ ଧାରିତ୍ରକୁ ପ୍ରଥମେ ଚାର୍ଜ କରାଗଲା ଏବଂ ପରେ ଗୋଟିଏ ବିଦ୍ୟୁତ୍ ପ୍ରତିରୋଧକ 'R' ସହ ସଂଯୁକ୍ତ କରାଗଲା । ଯଦି ସମୟ ସହ ଧାରିତ୍ରରେ ଥିବା ଚାର୍ଜ ଏବଂ ଡେଜର୍ଭିକ୍ସ ନମୁନାର ଅନୁଜ୍ଞାପନର ଅନୁପାତ ସ୍ଥିର(ନିର୍ଦ୍ଦିଷ୍ଟ) ରହେ ତେବେ 'R' ର ମୂଲ୍ୟ \_\_\_\_\_  $\Omega$  ହେବା ଉଚିତ ।

**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**

ବୋହରଙ୍କ ଆଣବିକ ମଡେଲରେ, ଧରି ନିଆଯାଉ ଇଲେକ୍ଟ୍ରନ୍  $0.5 \text{ \AA}$  ବିଶିଷ୍ଟ ଏକ ବୃତ୍ତାକାର କକ୍ଷ ପଥରେ ଘୁରୁଅଛି । ଯଦି ଇଲେକ୍ଟ୍ରନ୍ ବେଗ  $2.2 \times 10^6 \text{ m/s}$  ହୁଏ, ତେବେ ଇଲେକ୍ଟ୍ରନ୍ ସହ ସଂଶ୍ଳିଷ୍ଟ ବିଦ୍ୟୁତ୍ ସ୍ରୋତର ପରିମାଣ

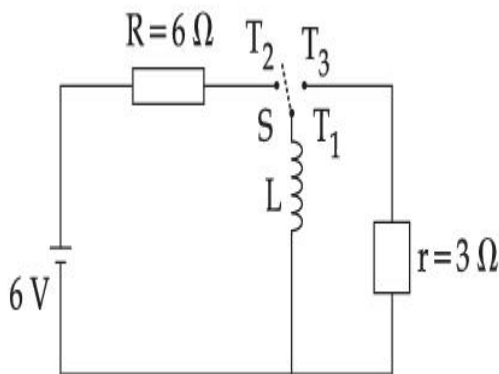
\_\_\_\_\_  $\times 10^{-2} \text{ mA}$  ହେବ । (ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)  $[\pi = \frac{22}{7} \text{ ନିଅ}]$

**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 :**

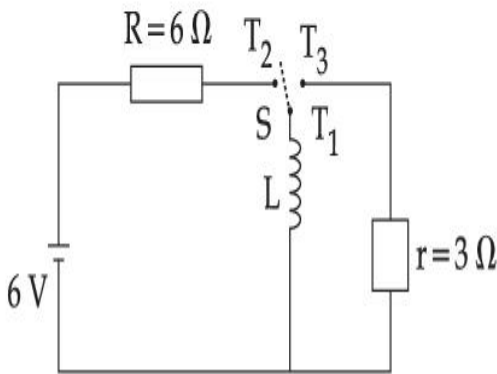
1

**Question Type :** SA

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

ଦୁଇ ପରିଆ ସୁଇଚ୍ (S) ଥିବା ଗୋଟିଏ ବିଦ୍ୟୁତ୍ ପରିପଥକୁ ବିଚାରକୁ ନିଅ । ଆରମ୍ଭରେ, 'S' ଟି ମୁକୁଳା ଅଛି ଏବଂ ମୁଣ୍ଡ  $T_1$  ମୁଣ୍ଡ  $T_2$  ସହ ଯୋଡ଼ାଯାଇଛି । ଯେତେବେଳେ,  $R=6\ \Omega$  ମଧ୍ୟରେ ପ୍ରବାହିତ ବିଦ୍ୟୁତ୍ ସ୍ରୋତ ସର୍ବାଧିକ ମୂଲ୍ୟ ସହ ଅପରିବର୍ତ୍ତିତ ଅବସ୍ଥାକୁ ଆସିଯାଏ, ମୁଣ୍ଡ  $T_1$  କୁ ମୁଣ୍ଡ  $T_2$  ଠାରୁ ବିଚ୍ଛିନ୍ନ କରି ଚତୁର୍ଥାତ୍ ମୁଣ୍ଡ  $T_3$  ସହ ସଂଯୋଗ କରାଯାଏ ।

ମୁଣ୍ଡ  $T_1$  ଟି ମୁଣ୍ଡ  $T_3$  ସହ ସଂଯୋଗ ହେବାର ଠିକ୍ ପରେ ପରେ  $r=3\ \Omega$  ର ଦୁଇମୁଣ୍ଡ ମଧ୍ୟରେ ହେଉଥିବା ବିଭବ ପାର୍ଥକ୍ୟ ହେବ \_\_\_\_\_ V । (ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ)



**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

ଯେତେବେଳେ 11.21 MHz ଆବୃତ୍ତି, ଶୀର୍ଷ ବିଭବ 15 V ବିଶିଷ୍ଟ ଗୋଟିଏ ବାହକ ସଂକେତକୁ 5 V ଆୟାମ ବିଶିଷ୍ଟ ଗୋଟିଏ 7.7 kHz sine ତରଙ୍ଗ ଦ୍ୱାରା ଆୟାମ ମଡୁଲନ କରାଯାଏ, ଆୟାମ ମଡୁଲନ (A.M.) ତରଙ୍ଗର ଉପର ସାଇଡ୍ ବ୍ୟାଣ୍ଡ ଏବଂ

ତଳ ସାଇଡ୍ ବ୍ୟାଣ୍ଡ ଯଥାକ୍ରମେ  $\frac{a}{10}$  V ଏବଂ  $\frac{b}{10}$  V ହୋଇଥାଏ । ତେବେ  $\frac{a}{b}$  ର ମୂଲ୍ୟ ହେବ \_\_\_\_\_ ।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

<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
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511053
<b>Question Shuffling Allowed :</b>	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**

ଏକ ବସ୍ତୁର ଏକକ ସେଲର ପାରାମିଟରଗୁଡ଼ିକ ହେଉଛି  $a=2.5$ ,  $b=3.0$ ,  $c=4.0$ ,  $\alpha=90^\circ$ ,  $\beta=120^\circ$ ,  $\gamma=90^\circ$ .

ବସ୍ତୁର କ୍ଷତିକ ତାପାଟି ହେଉଛି :

**Options :**

1. ପ୍ରାକୃତିକ
2. ହେଲ୍‌ହୋଲ୍‌ଲ
3. ଅର୍ଥୋରୋମିକ୍
4. ମନୋକ୍ରିମିକ୍

**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**

ନିମ୍ନରେ ଦୁଇଟି ଉକ୍ତି ଦିଆଯାଇଛି :

ଉକ୍ତି I : ରଦରଫୋର୍ଡ୍‌ଙ୍କ ସୁନାପାତ ପରୀକ୍ଷା ହାଇଡ୍ରୋଜେନ୍ ପରମାଣୁର ଚୈତ୍ସ୍ୱକ ବର୍ଣ୍ଣାଳୀକୁ ବୁଝାଇ ପାରିବ ନାହିଁ ।

ଉକ୍ତି II : ହାଇଡ୍ରୋଜେନ୍ ପରମାଣୁର ବୋହରଙ୍କ ମଡେଲ୍ ହାଇସେନ୍‌ବର୍ଗଙ୍କ ଅନିଶ୍ଚିତତା ନୀତିକୁ ବିରୋଧ କରେ ।

ଉପରୋକ୍ତ ଉକ୍ତି ଅନୁସାରେ ନିମ୍ନ ବକ୍ତ୍ର ମଧ୍ୟରୁ ସର୍ବାଧିକ ଉପଯୁକ୍ତ ଉତ୍ତରଟି ବାଛି :

**Options :**

1. ଉଭୟ ଉକ୍ତି I ଏବଂ ଉକ୍ତି II ସତ୍ୟ ।

2. ଉଭୟ ଉକ୍ତି I ଏବଂ ଉକ୍ତି II ମିଥ୍ୟା ।

3. ଉକ୍ତି I ସତ୍ୟ କିନ୍ତୁ ଉକ୍ତି II ମିଥ୍ୟା ।

4. ଉକ୍ତି I ମିଥ୍ୟା କିନ୍ତୁ ଉକ୍ତି II ସତ୍ୟ ।

**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**

n-କ୍ରମ ପ୍ରତିକ୍ରିୟାଟିରେ ହାର ସ୍ଥିରାଙ୍କର ଏକକ ହେଉଛି :

**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**

ତାଲିକା - I ସହିତ ତାଲିକା - II କୁ ମିଳାଅ :

ତାଲିକା - I	ତାଲିକା - II
(a) NaOH	(i) ଅମ୍ଳୀୟ
(b) Be(OH) <sub>2</sub>	(ii) କ୍ଷାରୀୟ
(c) Ca(OH) <sub>2</sub>	(iii) ଉଦ୍ଭୟର୍ଣୀ
(d) B(OH) <sub>3</sub>	
(e) Al(OH) <sub>3</sub>	

ନିମ୍ନ ବକ୍ତବ୍ୟ ମଧ୍ୟରୁ ସର୍ବାଧିକ ଉପଯୁକ୍ତ ଉତ୍ତରଟି ବାଛି :

**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**

ଏଲିଙ୍ଗହାମ ଚିତ୍ର ବିଷୟରେ ଭୁଲ ଉକ୍ତିଟି ହେଉଛି :

**Options :**

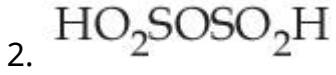
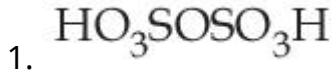
1. ଧାତବ ଅକ୍ସାଇଡର ବିଜାରଣ ବିଷୟରେ ଧାରଣା ଦେଇଥାଏ ।
2. ପ୍ରତିକ୍ରିୟାର ହାର ବିଷୟରେ ଧାରଣା ଦେଇଥାଏ ।
3. ଫ୍ରି ଶକ୍ତି ପରିବର୍ତ୍ତନ ବିଷୟରେ ଧାରଣା ଦେଇଥାଏ ।
4. ପ୍ରତିକ୍ରିୟା ସମୟରେ ଫେଜ୍ ପରିବର୍ତ୍ତନ ବିଷୟରେ ଧାରଣା ଦେଇଥାଏ ।

**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 :**

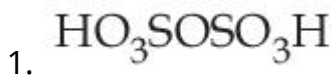


**Question Type : MCQ Is Question Mandatory : No**

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

ଅମ୍ଳୀୟ ସଲଫେଟ ଦ୍ରବଣର ବୈଦ୍ୟୁତିକ ଜାରଣରୁ ଉତ୍ପନ୍ନ ଉତ୍ପାଦ ହେଉଛି :

**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 some what 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**

ନିମ୍ନରେ ଦୁଇଟି ଉକ୍ତି ଦିଆଯାଇଛି । ଗୋଟିଏ ଦୃଢ଼ୋକ୍ତି **A** ଏବଂ ଅନ୍ୟଟି କାରଣ **R** ।

ଦୃଢ଼ୋକ୍ତି **A :** ଲିଥିୟମ୍ ହାଲାଇଡସ୍ କିଛିମାତ୍ରାରେ ସମଯୋଜୀ।

କାରଣ **R :** ଲିଥିୟମ୍‌ରେ ଅଛି ଉଚ୍ଚ ଧ୍ରୁବଣ ସକ୍ଷମତା

ଉପରୋକ୍ତ ଉକ୍ତି ଅନୁସାରେ ନିମ୍ନ ବିକଳ୍ପ ମଧ୍ୟରୁ ସର୍ବାଧିକ ଉପଯୁକ୍ତ ଉତ୍ତରଟି ବାଛି :

**Options :**

1. ଉଭୟ **A** ଏବଂ **R** ସତ୍ୟ ଅଟେ ଏବଂ **A** ର ସଠିକ୍ ବ୍ୟାଖ୍ୟା ହେଉଛି **R** ।
2. ଉଭୟ **A** ଏବଂ **R** ସତ୍ୟ ଅଟେ ଏବଂ **A** ର ସଠିକ୍ ବ୍ୟାଖ୍ୟା ନୁହେଁ **R** ।

3. A ସତ୍ୟ କିନ୍ତୁ R ମିଥ୍ୟା ଅଟେ ।

4. A ମିଥ୍ୟା କିନ୍ତୁ R ସତ୍ୟ ଅଟେ ।

**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**

$H_4P_2O_7$ ,  $H_4P_2O_5$  ଏବଂ  $H_4P_2O_6$  ରେ 'P' ର ଜାରଣ ଅବସ୍ଥା ଯଥାକ୍ରମେ ହେଉଛି :

**Options :**

1. 6, 4 ଏବଂ 5

2. 5, 4 ଏବଂ 3

3. 5, 3 ଏବଂ 4

4. 7, 5 ଏବଂ 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**

କମ୍ପ୍ଲେକ୍ସ  $[\text{MnCl}_6]^{3-}$  ର ଶଙ୍କରୀକରଣ ଏବଂ ତୁମ୍ଭକୀୟ ଗୁଣ ଯଥାକ୍ରମେ ହେଉଛି :

**Options :**

1.  $d^2sp^3$  ଏବଂ ଅନୁତୁମ୍ଭକୀୟ
2.  $sp^3d^2$  ଏବଂ ପ୍ରତିତୁମ୍ଭକୀୟ
3.  $sp^3d^2$  ଏବଂ ଅନୁତୁମ୍ଭକୀୟ

4.  $d^2sp^3$  ଏବଂ ପ୍ରତିରୁମକାୟ

**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**

$[PtCl_2(NH_3)_2]$ ,  $[Ni(CO)_4]$ ,  $[Ru(H_2O)_3Cl_3]$  ଏବଂ  $[CoCl_2(NH_3)_4]^+$  ଧାତୁ କମ୍ପ୍ଲେକ୍ସରେ ମିଳୁଥିବା ଜ୍ୟାମିତିକ ସମାବନ୍ଧର ସଂଖ୍ୟା ଯଥାକ୍ରମେ ହେଉଛି :

**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**

ନିମ୍ନଲିଖିତ ଉକ୍ତି ମଧ୍ୟରୁ କେଉଁଟି ଠିକ୍ ନୁହେଁ ?

**Options :**

1. 6 ppm ରୁ କମ୍ ଦ୍ରବିତ ଅମ୍ଳଜାନର ଗାଢତା ମତ୍ସ୍ୟ ବୃଦ୍ଧିକୁ ପ୍ରତିରୋଧ କରେ ।
2. ୟୁଟ୍ରୋଫିକେସନ୍ ସୂଚାଇ ଦିଏ ଯେ ଜଳାଶୟଟି ପ୍ରଦୂଷିତ ନୁହେଁ ।
3. ୟୁଟ୍ରୋଫିକେସନ୍ ଜଳରେ ଅମ୍ଳଜାନ ପରିମାଣ ବୃଦ୍ଧି କରିଥାଏ ।
4. ୟୁଟ୍ରୋଫିକେସନ୍ ଅମ୍ଳଜାନରହିତ ସ୍ଥିତି ସୃଷ୍ଟି କରିଥାଏ ।



**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**

ଡାଇସାକାରାଇଡ୍‌ରୁ ମନସାକାରାଇଡ୍‌ର ଭିନ୍ନତା ଦର୍ଶାଇବା ପାଇଁ ନିମ୍ନଲିଖିତ ମଧ୍ୟରୁ କେଉଁ ରାସାୟନିକ ପରୀକ୍ଷା ବ୍ୟବହାର କରାଯାଇଥାଏ ?

**Options :**

1. ସେଲିଓ୍ଵାନୋଫ ପରୀକ୍ଷା
2. ବାରଫୋଡ୍ ପରୀକ୍ଷା
3. ଟଲେନ୍ ପରୀକ୍ଷା
4. ଆୟୋଡିନ୍ ପରୀକ୍ଷା

**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**

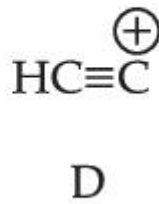
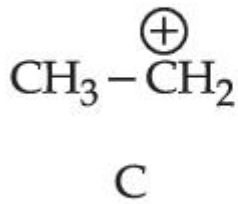
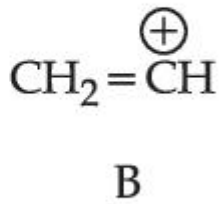
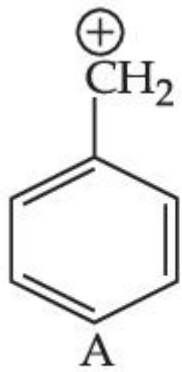
ଇଥେନ୍‌ର ଷ୍ଟାଗର୍ଡ ଏବଂ ଏକ୍ଲିପ୍ସଡ୍ କନଫରମରସ୍‌ଗୁଡ଼ିକ ହେଉଛନ୍ତି :

**Options :**

1. ରୋଟାମରସ
2. ଦର୍ପଣ ପ୍ରତିଛବି
3. ଏନାନ୍‌ସିଓମରସ
4. ବହୁଳକ

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

Correct Marks : 4 Wrong Marks : 1



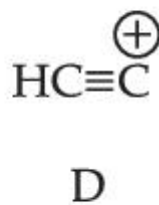
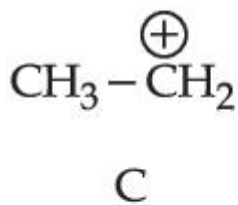
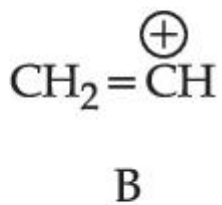
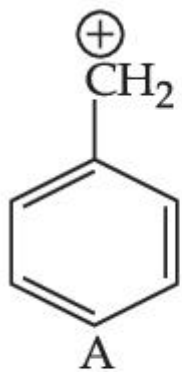
The correct order of stability of given carbocations is :

Options :

1.  $\text{D} > \text{B} > \text{C} > \text{A}$
2.  $\text{A} > \text{C} > \text{B} > \text{D}$
3.  $\text{C} > \text{A} > \text{D} > \text{B}$
4.  $\text{D} > \text{B} > \text{A} > \text{C}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



ପ୍ରଦତ୍ତ କାର୍ବୋକାଟାୟନ ଗୁଡ଼ିକର ସ୍ଥିରତାର ସଠିକ୍ କ୍ରମଟି ହେଉଛି :

Options :

1.  $\text{D} > \text{B} > \text{C} > \text{A}$

2.  $A > C > B > D$

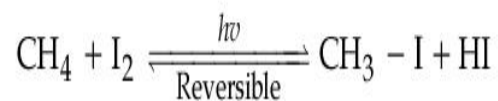
3.  $C > A > D > B$

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**

କେଉଁ ଅଭିକାର୍ଯ୍ୟକର ଉପସ୍ଥିତି ନିମ୍ନଲିଖିତ ପ୍ରତିକ୍ରିୟାଟିର ଉତ୍କ୍ରମଣୀୟତାକୁ ପ୍ରଭାବିତ କରିବ ଏବଂ ଏହାକୁ ଅନୁତ୍କ୍ରମଣୀୟ ପ୍ରତିକ୍ରିୟାରେ ପରିବର୍ତ୍ତନ କରିଦେବ ।



**Options :**

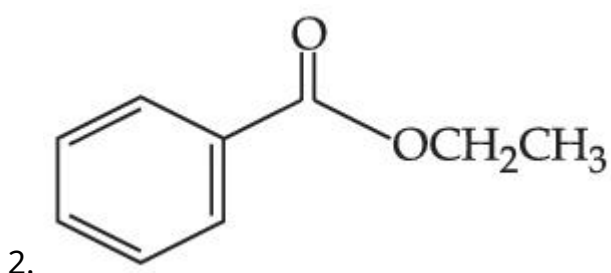
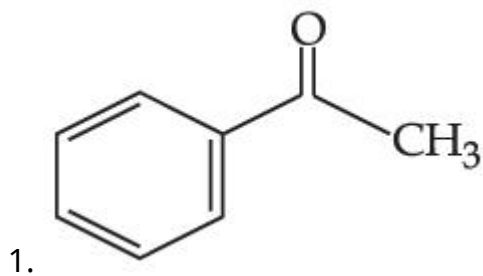
1. ଗାଓ  $\text{HIO}_3$
2.  $\text{HOCl}$
3. ତରଳ  $\text{NH}_3$
4. ଲଘୁ  $\text{HNO}_2$

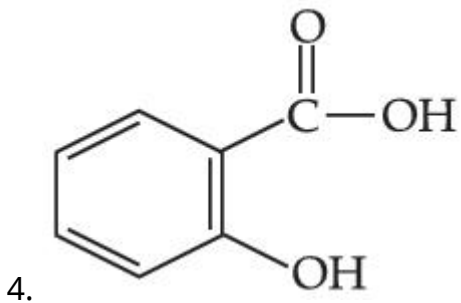
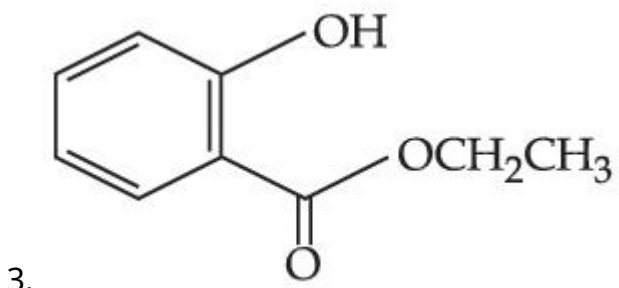
**Question Type : MCQ Is Question Mandatory : No**

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

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

**Options :**



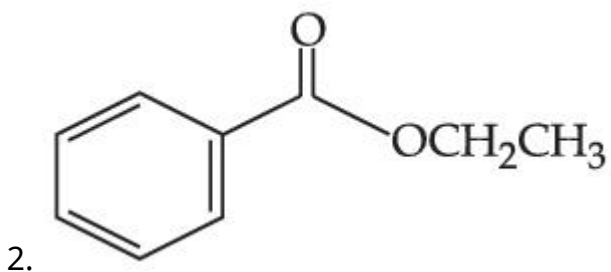
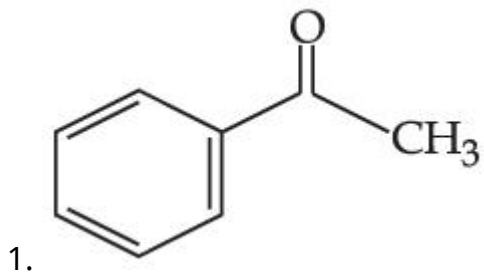


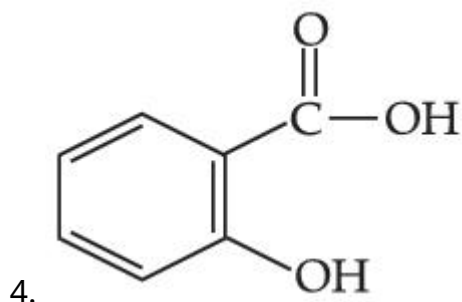
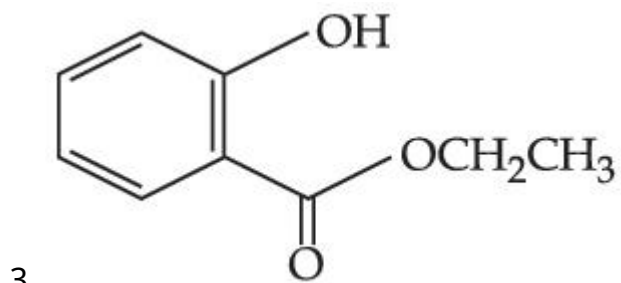
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ନିମ୍ନଲିଖିତ କେଉଁ ଯୌଗିକଟି 2, 4-ଡାଇନାଇଟ୍ରୋଫିନାଇଲ୍ ହାଇଡ୍ରାଜିନ୍ ସହିତ ପ୍ରତିକ୍ରିୟା କରି କମଳା ରଙ୍ଗ ଅବଶେଷ ଉତ୍ପନ୍ନ କରେ ?

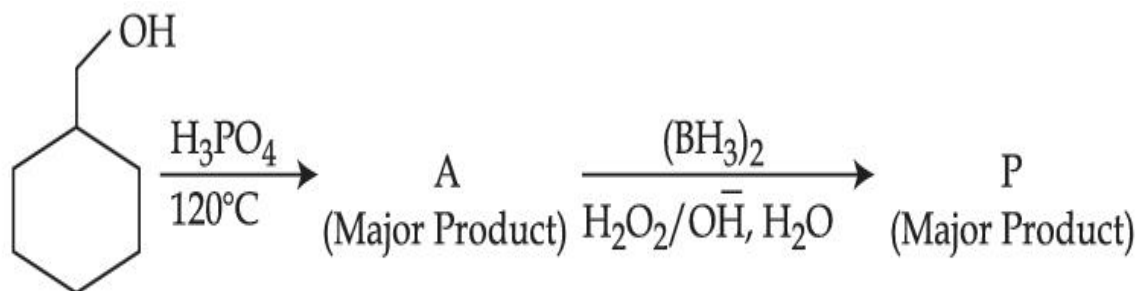
Options :





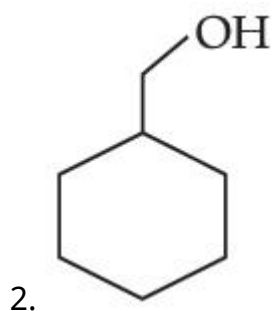
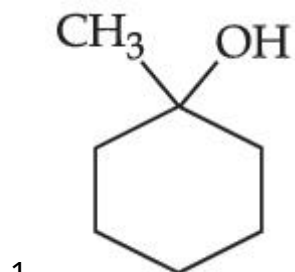
Question Type : MCQ Is Question Mandatory : No

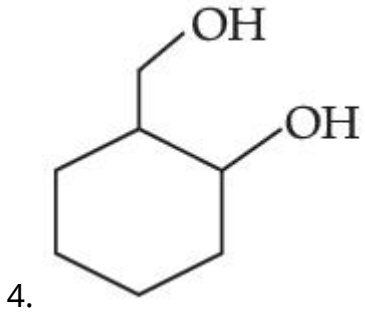
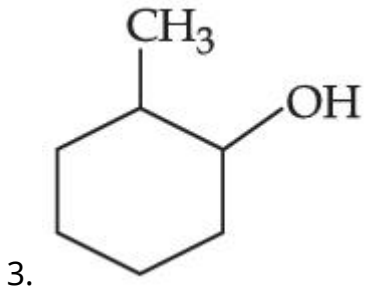
Correct Marks : 4 Wrong Marks : 1



Consider the above reaction and identify the Product P :

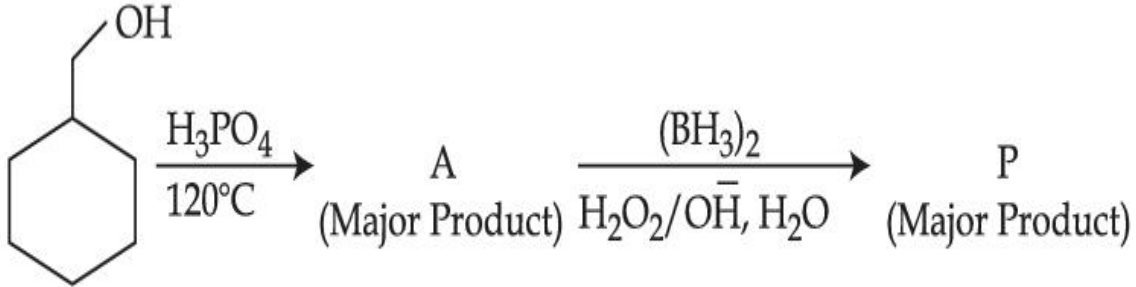
Options :





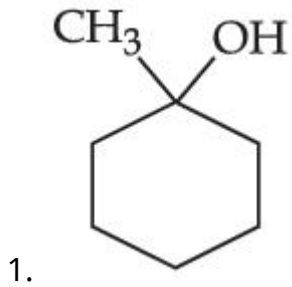
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



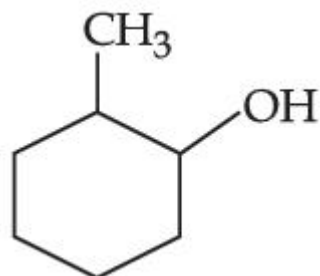
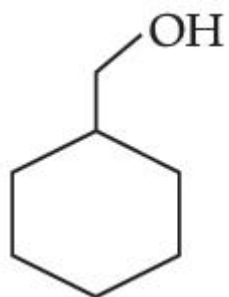
ଉପରୋକ୍ତ ପ୍ରତିକ୍ରିୟାଟିକୁ ବିଚାର କରି ଏବଂ ଉତ୍ପାଦ P ଚିହ୍ନଟି କରାଅ :

Options :

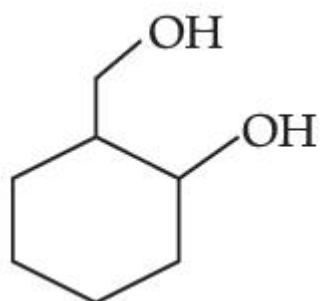


2.





3.



4.

**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**

ନିମ୍ନରେ ଦୁଇଟି ଉକ୍ତି ଦିଆଯାଇଛି :

**ଉକ୍ତି I :** ଏସିଟାମାଇଡ୍ ଅପେକ୍ଷା ଆନିଲିନ୍ କମ୍ କ୍ଷାରୀୟ ।

**ଉକ୍ତି II :** ଆନିଲିନରେ ନାଇଟ୍ରୋଜେନ୍ର ଏକାକୀ ଇଲେକ୍ଟ୍ରନ୍ ଯୋଡ଼ା ରେଜୋନାନ୍ସ ଯୋଗୁଁ ବେଞ୍ଜିନ୍ ରିଙ୍ଗରେ ଅସ୍ଥାନୀକରଣ ହୋଇଥାନ୍ତି ଏବଂ ତେଣୁ ପ୍ରୋଟନ୍ ପ୍ରତି କମ୍ ସହଜ ଲଭ୍ୟ ହୁଅନ୍ତି ।

ସର୍ବାଧିକ ଉପଯୁକ୍ତ ବିକଳ୍ପଟି ବାଛି :

**Options :**

1. ଉଭୟ ଉକ୍ତି I ଏବଂ ଉକ୍ତି II ସତ୍ୟ ଅଟେ ।
2. ଉଭୟ ଉକ୍ତି I ଏବଂ ଉକ୍ତି II ମିଥ୍ୟା ଅଟେ ।
3. ଉକ୍ତି I ସତ୍ୟ କିନ୍ତୁ ଉକ୍ତି II ମିଥ୍ୟା ଅଟେ ।
4. ଉକ୍ତି I ମିଥ୍ୟା କିନ୍ତୁ ଉକ୍ତି II ସତ୍ୟ ଅଟେ ।

**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**

ତାଲିକା - I ସହିତ ତାଲିକା - II କୁ ମିଳାଅ :

ତାଲିକା - I

(ଔଷଧ)

- (a) ପ୍ୟୁରାସିନ୍
- (b) ଆର୍ସଫେନାମିନ୍
- (c) ଡାଇମେଟୋନ୍
- (d) ଭାଲିୟମ୍

ତାଲିକା - II

(ଔଷଧ ଶ୍ରେଣୀ)

- (i) ପ୍ରତିଜୈବିକ
- (ii) ନିସ୍ତୁତ୍ତକାରକ
- (iii) ଜୀବାଣୁନାଶକ
- (iv) ସାଂଶ୍ଳେଷିକ ଏଣ୍ଟିହିଷ୍ଟାମିନ୍

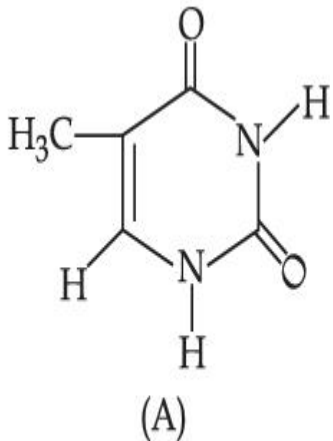
ସର୍ବାଧିକ ଉପଯୁକ୍ତ ମେଳକଟି ବାଛି :

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



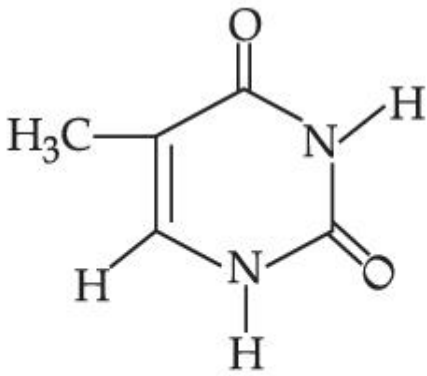
The compound 'A' is a complementary base of \_\_\_\_\_ in DNA strands.

**Options :**

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

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

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



(A)

DNA ସ୍ତ୍ରୀରେ \_\_\_\_\_ ହେଉଛି ଯୌଗିକ 'A' ର କମ୍ପ୍ଲିମେଣ୍ଟାରି ସ୍ଥାନ ।

**Options :**

1. ଗୁଆନାଇନ୍
2. ଆଡେନାଇନ୍
3. ସାଇଟୋସାଇନ୍
4. ଥିରାସାଇନ୍

## Chemistry Section B

Section Id :	864351827
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511054
Question Shuffling Allowed :	Yes

**Question Type : SA**

**Correct Marks : 4 Wrong Marks : 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**

NaOH ଦ୍ରବଣର ସାନ୍ଦ୍ରତା ହେଉଛି  $1.2 \text{ g cm}^{-3}$  । ଏହି ଦ୍ରବଣର ମୋଲାର୍‌ଲିଟି ହେଉଛି \_\_\_\_\_ m ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

(ବ୍ୟବହାର କର : ପାରମାଣବିକ ବସ୍ତୁତ୍ୱ : Na : 23.0 u O : 16.0 u H : 1.0 u ଜଳର ସାନ୍ଦ୍ରତା  $\text{H}_2\text{O} : 1.0 \text{ g cm}^{-3}$ )

**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**

The difference between bond orders of CO and  $\text{NO}^{\oplus}$  is  $\frac{x}{2}$  where  $x =$  \_\_\_\_\_ . (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 ଏବଂ  $\text{NO}^{\oplus}$  ମଧ୍ୟରେ ବନ୍ଧକ୍ରମର ଭିନ୍ନତା ହେଉଛି  $\frac{x}{2}$ , ଯେଉଁଠି  $x = \underline{\hspace{2cm}}$  ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

**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,

$\Delta_{\text{vap}} H - \Delta_{\text{vap}} U = \underline{\hspace{2cm}} \times 10^2 \text{ J mol}^{-1}$ . (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



ଜଳପାଇଁ  $100^\circ\text{C}$  ଏବଂ  $1$  ବାର ରେ  $\Delta_{\text{vap}} H - \Delta_{\text{vap}} U = \text{_____} \times 10^2 \text{ J mol}^{-1}$  ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

(ବ୍ୟବହାର କର :  $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ )

( $\text{H}_2\text{O}(l)$  ର ଆନ୍ତତନ  $\text{H}_2\text{O}(g)$  ର ଆନ୍ତତନ ଅପେକ୍ଷା କମ୍ ଗ୍ରହଣ କର ।  $\text{H}_2\text{O}(g)$  କୁ ଏକ ଆଦର୍ଶ ଗ୍ୟାସ ଭାବେ ଗ୍ରହଣ କର)

**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 \_\_\_\_\_  $\times 10^4 \text{ g mol}^{-1}$ . (Round off to the Nearest Integer)

[Use :  $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$ ]

**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 ରେ 100 mL ଜଳରେ 1.46 g ର ଜୈବ ବହୁଳକ ଦ୍ରବିତ୍ୱ ହେଲେ ଅସମୋଟିକ୍ ଚାପ  $2.42 \times 10^{-3}$  bar ପ୍ରୟୋଗ ହୋଇଥାଏ ।

ଜୈବ ବହୁଳକର ମୋଲାର ବସ୍ତୁତ୍ୱ ହେଉଛି \_\_\_\_\_  $\times 10^4$  g mol<sup>-1</sup> ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

(ବ୍ୟବହାର କର :  $R = 0.083$  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

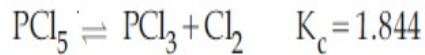
**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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



3.0 moles of PCl<sub>5</sub> is introduced in a 1 L closed reaction vessel at 380 K. The number of moles of PCl<sub>5</sub> 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

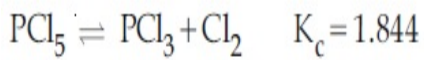
**Text Areas :** PlainText

**Possible Answers :**

1

**Question Type :** SA

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



380 K ତାପମାତ୍ରାରେ ଏକ 1 L ବନ୍ଦ ପ୍ରତିକ୍ରିୟା ପାତ୍ରରେ 3.0 ମୋଲ୍ସ  $\text{PCl}_5$  କୁ ପ୍ରବେଶ କରାଗଲା । ସାମ୍ୟାବସ୍ଥାରେ  $\text{PCl}_5$  ମୋଲ୍ ସଂଖ୍ୟା ହେଉଛି \_\_\_\_\_  $\times 10^{-3}$  ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

**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

$0.001 \text{ mol L}^{-1}$  ଦୁର୍ବଳ ଅମ୍ଳ HA ର ପରିବାହିତା  $2.0 \times 10^{-5} \text{ S cm}^{-1}$  । ଯଦି  $\Lambda_m^\circ(\text{HA}) = 190 \text{ S cm}^2 \text{ mol}^{-1}$

ହୁଏ, HA ର ଆୟନୀକରଣ ସ୍ଥିରାଙ୍କ ( $K_a$ ) ସମାନ ହେବ \_\_\_\_\_  $\times 10^{-6}$  ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

**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

$\text{CO}_2$  gas adsorbs on charcoal following Freundlich adsorption isotherm. For a given amount of charcoal, the mass of  $\text{CO}_2$  adsorbed becomes 64 times when the pressure of  $\text{CO}_2$  is doubled. The value of  $n$  in the Freundlich isotherm equation is \_\_\_\_\_  $\times 10^{-2}$ . (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

ଫ୍ରେଣ୍ଡଲିର୍ ଅଧିଶୋଷଣ ସମତାପରେଖାକୁ ଅନୁସରଣ କରି ଚାରକୋଲ ଉପରେ  $\text{CO}_2$  ଗ୍ୟାସ୍ ଅଧିଶୋଷଣ ହୁଏ । ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ ପରିମାଣ ଚାରକୋଲ ପାଇଁ ଅଧିଶୋଷିତ  $\text{CO}_2$  ର ବସ୍ତୁତ୍ତ୍ୱ ହୁଏ 64 ଗ୍ରାମ, ଯେତେବେଳେ  $\text{CO}_2$  ର ଚାପ ଦୁଇଗୁଣ ହୋଇଯାଏ । ଫ୍ରେଣ୍ଡଲିର୍ ସମତାପରେଖା ସମୀକରଣରେ  $n$  ର ମୂଲ୍ୟ ହେଉଛି \_\_\_\_\_  $\times 10^{-2}$  ।  
(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

**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**

ଟ୍ରାଇଆମିନ୍ ଟ୍ରାଇନାଇଟ୍ରୋକୋବାଲ୍ଟ (III) ରେ ସମ୍ଭବାବିତ ଜ୍ୟାମିତିକ ସମାବୟବ ସଂଖ୍ୟା X ଏବଂ ଟ୍ରାଇଅକ୍ସାଲୋକ୍ରୋମେଟ୍ (III) ରେ Y ଅଟେ । ତାହେଲେ X+Y ର ମୂଲ୍ୟ \_\_\_\_\_ ।

**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**

ବାଷ୍ପୀୟ ତ୍ରୀକ ଇଥାଇଲ୍ ଆମିନ୍‌ରେ “-C-N-C-” ବନ୍ଧକୋଣ ହେଉଛି \_\_\_\_\_ ଡିଗ୍ରୀ ।

**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**

5.0 g କ୍ଲୋରିନ୍ ବ୍ୟବହାର କରି ଏକ ଜୈବ ଯୌଗିକର କ୍ଲୋରିନେସନ୍ କଲେ ମିଳିଥାଏ ଏକ ଯୌଗିକ A । 0.5 g ର ଯୌଗିକ A କୁ ଯେତେବେଳେ  $\text{AgNO}_3$  ସହିତ ପ୍ରତିକ୍ରିୟା କରାଯାଏ (କେରିଅସ୍ ପ୍ରଣାଳୀ) ଯୌଗିକ A ରେ କ୍ଲୋରିନ୍ର ଶତକଡ଼ା ହେଉଛି \_\_\_\_\_ ଯେତେବେଳେ ଏହା 0.3849 g,  $\text{AgCl}$  ଗଠନ କରେ ।

(ନିକଟତମ ପୂର୍ଣ୍ଣସଂଖ୍ୟାରେ ପରିଣତ କର)

(Ag ଏବଂ Cl ପରମାଣବିକ ବସ୍ତୁତ୍ତ୍ୱ ହେଉଛି ଯଥାକ୍ରମେ 107.87 ଏବଂ 35.5)

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

1

## Mathematics Section A

Section Id :	864351828
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511055
Question Shuffling Allowed :	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**

ମନେକର  $P$  ଏବଂ  $Q$  ଏକ ବୃତ୍ତ ଉପରେ ଦୁଇଟି ପୃଥକ ବିନ୍ଦୁ ଯାହାର କେନ୍ଦ୍ର ବିନ୍ଦୁ  $C(2, 3)$  ଏବଂ ଏହା(ବୃତ୍ତ) ମୂଳବିନ୍ଦୁ  $O$  ମଧ୍ୟରେ ଗତିକରେ ।  $OC$ , ଉଭୟ ରେଖାଖଣ୍ଡ  $CP$  ଏବଂ  $CQ$  ପ୍ରତି ଲମ୍ବ ଅଟେ, ତେବେ ସେଟ୍  $\{P, Q\}$  ସମାନ :

**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

$\left( \vec{a} + \vec{b} \right) \times \left( \vec{a} \times \left( \left( \vec{a} - \vec{b} \right) \times \vec{b} \right) \right) \times \vec{b}$  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**

ମନେକର  $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$  ଏବଂ  $\vec{b} = -\hat{i} + 2\hat{j} + 3\hat{k}$  । ତେବେ

$(\vec{a} + \vec{b}) \times \left( \left( \vec{a} \times \left( (\vec{a} - \vec{b}) \times \vec{b} \right) \right) \times \vec{b} \right)$  ଦିଶାଇ ଗୁଣଫଳ ସମାନ :

**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**

ଯଦି  $\left(x^2 + \frac{1}{bx}\right)^{11}$  ର ପ୍ରସାରଣରେ  $x^7$  ର ସହଗ, ଏବଂ  $\left(x - \frac{1}{bx^2}\right)^{11}$  ର ପ୍ରସାରଣରେ  $x^{-7}$  ର ସହଗ,

$b \neq 0$  ସମାନ ଅଟେ ତେବେ  $b$  ର ମୂଲ୍ୟ ସମାନ :

**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**

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

$\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$  ଅଟେ, ତେବେ  $(\alpha + \beta - 2\gamma)^2$  ର ମୂଲ୍ୟ ସମାନ :

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

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

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

ମନେକର  $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$  । ଯଦି  $A^{-1} = \alpha I + \beta A$ ,  $\alpha, \beta \in \mathbf{R}$ ,  $I$  ଏକ  $2 \times 2$  ଅଭେଦ ମାଟ୍ରିକ୍ସ, ତେବେ  $4(\alpha - \beta)$

ସମାନ :

**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**

ବୃତ୍ତ  $x^2 + y^2 - 2x - 6y + 6 = 0$  ପ୍ରତି ବିନ୍ଦୁ  $P(-1, 1)$  ଠାରୁ ଦୁଇଟି ସ୍ପର୍ଶକ ଟାଣାଯାଇଅଛି । ଯଦି ଏହି ସ୍ପର୍ଶକମାନେ ବୃତ୍ତକୁ A ଓ B ବିନ୍ଦୁରେ ସ୍ପର୍ଶ କରନ୍ତି ଏବଂ D ବୃତ୍ତ ଉପରିସ୍ଥ ଏକ ବିନ୍ଦୁ ଯେପରିକି ରେଖାଖଣ୍ଡ AB ଏବଂ AD ର ଦୈର୍ଘ୍ୟ ସମାନ ଅଟନ୍ତି, ତେବେ ତ୍ରିଭୁଜ ABD ର କ୍ଷେତ୍ରଫଳ ସମାନ :

**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  $\mathbf{C}$  be the set of all complex numbers. Let

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

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

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

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**

ମନେକର  $C$  ସମସ୍ତ ସମ୍ପୂର୍ଣ୍ଣ(କମ୍ପ୍ଲେକ୍ସ) ସଂଖ୍ୟାମାନଙ୍କର ସେଟ୍ ।

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

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

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

ତେବେ ସେଟ୍  $S_1 \cap S_2 \cap S_3$  ର ଉପାଦାନ ସଂଖ୍ୟା ସମାନ :

**Options :**

1. 0
2. 1
3. 2
4. ଅସୀମ

**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**

ମାନିନିଆ ବିନ୍ଦୁ  $(-1, 0, -2)$  ମଧ୍ୟଦେଇ ଗଠିକରୁଥିବା ଏବଂ ପ୍ରତ୍ୟେକ ସମତଳ  $2x+y-z=2$  ଏବଂ  $x-y-z=3$  କୁ  
ଲମ୍ବ ହେଉଥିବା ସମତଳଟି  $ax+by+cz+8=0$ , ତେବେ  $a+b+c$  ର ମୂଲ୍ୟ ସମାନ :

**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**

ମାନନିଅ ସମୀକରଣ  $x^2 + (20)^{\frac{1}{4}}x + (5)^{\frac{1}{2}} = 0$  ର  $\alpha, \beta$  ଦୁଇଟି ମୂଳ(ବାଜ), ତେବେ  $\alpha^8 + \beta^8$  ସମାନ :

**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**

ମନେକର ଫଳନ  $f : \left(-\frac{\pi}{4}, \frac{\pi}{4}\right) \rightarrow \mathbf{R}$  କୁ ଏହିପରି ପ୍ରକାଶ କରାଯାଇଛି ।

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

ଯଦି ମୂଳବିନ୍ଦୁ  $x=0$  ଠାରେ ଫଳନ  $f$  ଅବିଚ୍ଛିନ୍ନ ହୁଏ, ତେବେ  $6a + b^2$  ର ମୂଲ୍ୟ ସମାନ :

**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**

ମାନିନିଅ

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

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

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

ତେବେ  $|r|$  ର ସର୍ବନିମ୍ନ (ନ୍ୟୁନତମ) ମୂଲ୍ୟ, (ଯେପରିକି  $A \cup B \subseteq C$ ) ଅଟେ :

**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**

ଯଦି ତଥ୍ୟାବଳୀ 6, 10, 7, 13, a, 12, b, 12 ମାନଙ୍କର ମଧ୍ୟକ(ମିନ) ଓ ପ୍ରସରଣ(ଭାରିଆନସ) ଯଥାକ୍ରମେ 9 ଏବଂ  $\frac{37}{4}$ ,

ତେବେ  $(a-b)^2$  ସମାନ :

**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**

ମାନିନିଅ ଅବକଳ ସମୀକରଣ  $\log_e\left(\frac{dy}{dx}\right) = 3x + 4y$ ,  $y(0) = 0$  ରିର  $y = y(x)$  ସମାଧାନ ଅଟେ । ଯଦି

$y\left(-\frac{2}{3} \log_e 2\right) = \alpha \log_e 2$ , ତେବେ  $\alpha$  ର ମୂଲ୍ୟ ସମାନ :

**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**

ଯଦି  $\sin\theta + \cos\theta = \frac{1}{2}$  , ତେବେ  $16(\sin(2\theta) + \cos(4\theta) + \sin(6\theta))$  ସମାନ :

**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**

$\{n \in \mathbb{N} : (2^n - 2) \text{ 3ର ଗୁଣିତକ}\}$  ସେଟ୍ରେ ମନଇଚ୍ଛା ଏକ ଦୁଇଅଙ୍କ ବିଶିଷ୍ଟ ସଂଖ୍ୟା ବାଛିବାର ସମ୍ଭାବ୍ୟତା ସମାନ :

**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**

ବିନ୍ଦୁ  $(2, 1)$  ମଧ୍ୟଦେଇ ଏକ ଆଲୋକ ରଶ୍ମି  $y$ -ଅକ୍ଷ ଉପରେ  $P$  ବିନ୍ଦୁ ଠାରେ ପ୍ରତିଫଳିତ ହୋଇ ବିନ୍ଦୁ  $(5, 3)$  ମଧ୍ୟଦେଇ ଗତିକରେ । ଯଦି ଏହି ପ୍ରତିଫଳିତ ରଶ୍ମି  $\frac{1}{3}$  ଉତ୍କେନ୍ଦ୍ରତା (ଏକ୍ସେଣ୍ଟ୍ରିସିଟି) ଥିବା ଏକ ଦୀର୍ଘବୃତ୍ତ(ଇଲିପ୍ସ) ର ନିୟାମକ ରେଖା

(ଡାଇରେକ୍ଟ୍ରିକ୍ସ) ହୁଏ ଏବଂ ନିୟାମକ ରେଖା ଠାରୁ ନିକଟତର ନାଭି(ଫୋକସ୍) ର ଦୂରତା  $\frac{8}{\sqrt{53}}$  ହୁଏ, ତେବେ ଅନ୍ୟ ନିୟାମକ

ରେଖାଟିର ସମୀକରଣ ଅଟେ :

**Options :**

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

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

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

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

**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**

ଯୌଗିକ କଥନ  $(P \vee Q) \wedge (\sim P) \Rightarrow Q$  ସମତୁଲ୍ୟ ଅଟେ :

**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**

ମାନନିଅ  $f : \mathbb{R} \rightarrow \mathbb{R}$  ଏକ ଫଳନ ଯେପରିକି  $f(2)=4$  ଏବଂ  $f'(2)=1$  । ତେବେ  $\lim_{x \rightarrow 2} \frac{x^2 f(2) - 4f(x)}{x - 2}$  ର ମୂଲ୍ୟ

ସମାନ :

**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

$\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{j=1}^n \frac{(2j-1) + 8n}{(2j-1) + 4n}$  ର ମୂଲ୍ୟ ସମାନ :

**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

ସମାକଳନ  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{(1 + e^{x \cos x})(\sin^4 x + \cos^4 x)}$  ର ମୂଲ୍ୟ ସମାନ :

Options :

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

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

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

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

## Mathematics Section B

<b>Section Number :</b>	6
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	20
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8643511056
<b>Question Shuffling Allowed :</b>	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**



ମନେକର ଏକ ସମତଳ P, ବିନ୍ଦୁ  $(3, 7, -7)$  ମଧ୍ୟଦେଇ ଗତିକରେ ଓ ରେଖା  $\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$  କୁ ଧାରଣ

କରେ । ଯଦି ମୂଳବିନ୍ଦୁଠାରୁ ସମତଳ P ର ଦୂରତା d ହୁଏ, ତେବେ  $d^2$  ସମାନ \_\_\_\_\_ ।

**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

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

ତେବେ  $f(x)$  ର ସର୍ବାଧିକ ମୂଲ୍ୟ ସମାନ \_\_\_\_\_ ।

**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  $F : [3, 5] \rightarrow \mathbb{R}$  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**

ମନେକର  $F : [3, 5] \rightarrow \mathbb{R}$  ଏକ ଦୁଇ ଗୁଣ ଅଧିକ ଅବକଳନୀୟ ଫଳନ  $(3, 5)$  ଯେପରିକି

$$F(x) = e^{-x} \int_3^x (3t^2 + 2t + 4F'(t)) dt \quad | \quad \text{ଯଦି } F'(4) = \frac{\alpha e^\beta - 224}{(e^\beta - 4)^2} \text{ ହୁଏ, ତେବେ } \alpha + \beta \text{ ସମାନ}$$

\_\_\_\_\_ |

**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**

ମାନିନିଅ  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ ,  $\vec{b} = \hat{j} - \hat{k}$  ଚିନିଗୋଟି ଦିଶାଙ୍କ ଯେପରିକି  $\vec{a} \times \vec{b} = \vec{c}$  ଏବଂ

$\vec{a} \cdot \vec{b} = 1$  । ଯଦି  $\vec{b}$  ଦିଶାଙ୍କର  $\vec{a} \times \vec{c}$  ଦିଶାଙ୍କ ଉପରେ ଅଭିକ୍ଷେପ(ପ୍ରକ୍ଷେପ) ର ଲମ୍ବ(ଦୈର୍ଘ୍ୟ)  $l$  ଅଟେ, ତେବେ  $3l^2$

ର ମୂଲ୍ୟ ସମାନ \_\_\_\_\_ ।

**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 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 :**

1

**Question Type :** SA

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

ମନେକର ଫଳନ  $f(x) = \log_4 \left( \log_5 \left( \log_3 \left( 18x - x^2 - 77 \right) \right) \right)$  ର ପରିସର (ଡୋମେନ୍)  $(a, b)$  ଅଟେ । ତେବେ

ସମାକଳନ  $\int_a^b \frac{\sin^3 x}{(\sin^3 x + \sin^3(a + b - x))} dx$  ର ମୂଲ୍ୟ ସମାନ \_\_\_\_\_ ।

**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**

ଯଦି  $\log_3 2, \log_3(2^x - 5), \log_3\left(2^x - \frac{7}{2}\right)$  ଏକ ସମାନ୍ତର ଶ୍ରେଣୀ(ପ୍ରଗତି)ରେ ରୁହନ୍ତି, ତେବେ  $x$  ର ମୂଲ୍ୟ ସମାନ

\_\_\_\_\_ |

**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**

ବାସ୍ତବ ସଂଖ୍ୟା  $\alpha$  ଏବଂ  $\beta$  ପାଇଁ ନିମ୍ନ ଏକତ୍ଵାତ ସହ ସମୀକରଣ ସମୂହକୁ ବିଚାର କର :

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

ଯଦି ଏହି ସମୀକରଣ ସମୂହର ଅସଂଖ୍ୟ ସମାଧାନ ଅଛି, ତେବେ  $\alpha + \beta$  ସମାନ \_\_\_\_\_ ।

**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**

ମନେକର  $S = \{1, 2, 3, 4, 5, 6, 7\}$  ଫଳନ  $f: S \rightarrow S$ , ଯେପରିକି  $f(m \cdot n) = f(m) \cdot f(n)$  (ପ୍ରତ୍ୟେକ  $m, n \in S$  ପାଇଁ)

ହୁଏ, ତେବେ ସେହି  $S$  ରୁ ସେହି  $S$  କୁ ସମ୍ଭାବ୍ୟ ଫଳନ ସଂଖ୍ୟା ସମାନ \_\_\_\_\_ ।

**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**

ଯଦି ଅବକଳ ସମୀକରଣ  $\sec y \frac{dy}{dx} - \sin(x + y) - \sin(x - y) = 0$ ,  $y(0) = 0$  ର  $y = y(x)$ ,  $y \in \left[0, \frac{\pi}{2}\right)$  ଏକ

ସମାଧାନ ହୁଏ, ତେବେ  $5y'\left(\frac{\pi}{2}\right)$  ସମାନ \_\_\_\_\_ ।



**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  $f: [0, 3] \rightarrow \mathbb{R}$  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**

ମାନିନିଅ  $f: [0, 3] \rightarrow \mathbf{R}$  ଫଳନଟିକୁ  $f(x) = \min\{x - [x], 1 + [x] - x\}$ , ଏହିପରି ରୂପେ ବର୍ଣ୍ଣନା କରାଯାଇଅଛି ।  
(ଯେଉଁଠାରେ  $[x]$  ଏକ ସର୍ବାଧିକ ପୂର୍ଣ୍ଣସଂଖ୍ୟା,  $x$  ଠାରୁ ସାନ ବା  $x$  ସହ ସମାନ ପାଇଁ)

ମନେକର ସମସ୍ତ  $x \in [0, 3]$  ସେଟ୍‌କୁ  $P$  ନାମକରଣ କରାଗଲା, ଯେଉଁଠାରେ  $f$  ବିଚ୍ଛିନ୍ନ ଅଟେ ଏବଂ ସମସ୍ତ  $x \in (0, 3)$  ସେଟ୍‌କୁ  $Q$  ନାମକରଣ କରାଗଲା, ଯେଉଁଠାରେ  $f$  ଅବକଳନୀୟ ନୁହେଁ । ତେବେ ସେଟ୍  $P$  ଏବଂ ସେଟ୍  $Q$  ର ଉପାଦାନ ମାନଙ୍କର ଯୋଗଫଳ ସମାନ \_\_\_\_\_ ।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1