

# National Testing Agency

<b>Question Paper Name :</b>	B TECH EA 16th March 2021 Shift 2
<b>Subject Name :</b>	B TECH EA
<b>Creation Date :</b>	2021-03-16 21:03:25
<b>Duration :</b>	180
<b>Number of Questions :</b>	90
<b>Total Marks :</b>	300
<b>Display Marks:</b>	Yes

## B TECH EA

<b>Group Number :</b>	1
<b>Group Id :</b>	86435114
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	180
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	300
<b>Is this Group for Examiner? :</b>	No

## Physics Section A

<b>Section Id :</b>	86435179
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	86435179
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 1 Question Id : 8643511171 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Two identical antennas mounted on identical towers are separated from each other by a distance of 45 km. What should nearly be the minimum height of receiving antenna to receive the signals in line of sight ?

(Assume radius of earth is 6400 km)

Options :

8643513511. 79.1 m

8643513512. 39.55 m

8643513513. 158.2 m

8643513514. 19.77 m

Question Number : 1 Question Id : 8643511171 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ইটোৰ পৰা সিটো 45 km দূৰত্বৰ ব্যৱধানত থকা দুটা সাইলাখ একেই স্তম্ভৰ ওপৰত দুডাল সাইলাখ একেই এণ্টেনা আৰোহণ কৰোৱা হৈছে। দৃষ্টি পৰিসৰৰ ভিতৰত সংকেত গ্ৰহণ কৰিবৰ বাবে গ্ৰাহক এণ্টেনাৰ নিম্নতম উচ্চতা প্ৰায় কি হ'ব লাগিব ?

(ধৰি লোৱা পৃথিৱীৰ ব্যাসাৰ্ধ 6400 km)

Options :

8643513511. 79.1 m

8643513512. 39.55 m

8643513513. 158.2 m

8643513514. 19.77 m

Question Number : 2 Question Id : 8643511172 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The de-Broglie wavelength associated with an electron and a proton were calculated by accelerating them through same potential of 100 V. What should nearly be the ratio of their wavelengths ? ( $m_p = 1.00727u$   $m_e = 0.00055u$ )

Options :

8643513515. 43 : 1

8643513516. 1860 : 1

8643513517. 41.4 : 1

8643513518.  $(1860)^2 : 1$

**Question Number : 2 Question Id : 8643511172 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

100 V ব একেই বিভৱৰ মাজেদি স্থৰিত কৰি এটা ইলেক্ট্ৰন আৰু প্ৰ'টনৰ সৈতে জড়িত দ্য-ব্ৰয়ৰ তৰংগদৈৰ্ঘ্য গণনা কৰা হৈছে। সিহঁতৰ তৰংগদৈৰ্ঘ্যৰ অনুপাত প্ৰায় কি হ'ব ? ( $m_p = 1.00727u$   $m_e = 0.00055u$ )

**Options :**

8643513515. 43 : 1

8643513516. 1860 : 1

8643513517. 41.4 : 1

8643513518.  $(1860)^2 : 1$

**Question Number : 3 Question Id : 8643511173 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The refractive index of a converging lens is 1.4. What will be the focal length of this lens if it is placed in a medium of same refractive index ? Assume the radii of curvature of the faces of lens are  $R_1$  and  $R_2$  respectively.

**Options :**

8643513519. Zero

8643513520. 1

8643513521. Infinite

$$\frac{R_1 R_2}{R_1 - R_2}$$

8643513522.

**Question Number : 3 Question Id : 8643511173 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

এখন অভিসৰী লেন্সৰ প্ৰতিসৰাংক 1.4। যদিহে ইয়াক একেই প্ৰতিসৰাংকৰ এক মাধ্যমত বখা যায় এই লেন্সখনৰ নাভিদ্ৰিষ্ঠ্য কি হ'ব? ধৰিলোৱা লেন্সখনৰ দুই ফলকৰ ভাঁজব্যাসাৰ্থ্য ক্ৰমে  $R_1$  আৰু  $R_2$ ।

**Options :**

8643513519. শূন্য

8643513520. 1

8643513521. অসীম

$$\frac{R_1 R_2}{R_1 - R_2}$$

8643513522.

**Question Number : 4 Question Id : 8643511174 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

Red light differs from blue light as they have :

**Options :**

8643513523. Same frequencies and same wavelengths

8643513524. Different frequencies and different wavelengths

8643513525. Same frequencies and different wavelengths

8643513526. Different frequencies and same wavelengths

**Question Number : 4 Question Id : 8643511174 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

নীলা পোহৰতকৈ বঙা পোহৰ বেলেগ যিহেতু সিহঁতৰ :

Options :

8643513523. কম্পনাংক একেই আৰু তৰংগদৈৰ্ঘ্য একেই।

8643513524. কম্পনাংক পৃথক আৰু তৰংগদৈৰ্ঘ্য পৃথক।

8643513525. কম্পনাংক একেই আৰু তৰংগদৈৰ্ঘ্য পৃথক।

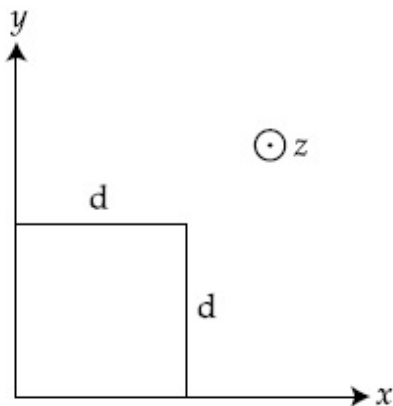
8643513526. কম্পনাংক পৃথক আৰু তৰংগদৈৰ্ঘ্য একেই।

Question Number : 5 Question Id : 8643511175 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The magnetic field in a region is given by  $\vec{B} = B_0 \left(\frac{x}{a}\right) \hat{k}$ . A square loop of side  $d$  is placed with its edges along the  $x$  and  $y$  axes. The loop is moved with a constant velocity  $\vec{v} = v_0 \hat{i}$ .

The emf induced in the loop is :



Options :

8643513527.  $\frac{B_0 v_0 d}{2a}$

8643513528.  $\frac{B_0 v_0 d^2}{a}$

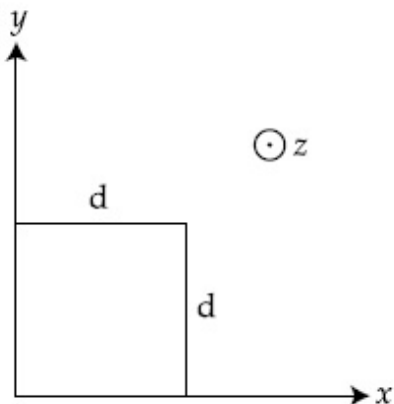
8643513529.  $\frac{B_0 v_0^2 d}{2a}$

8643513530.  $\frac{B_0 v_0 d^2}{2a}$

Question Number : 5 Question Id : 8643511175 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এক অঞ্চলৰ চৌম্বিক ক্ষেত্র দিয়া আছে  $\vec{B} = B_0 \left(\frac{x}{a}\right) \hat{k}$ ।  $x$  আৰু  $y$  অক্ষৰ দিশত ইয়াৰ ধাৰসমূহ থাকাকৈ 'd' পাস্ৰবিশিষ্ট এটা বৰ্গাকৃতিৰ লুপ বখা হৈছে। লুপটো এক ধ্ৰুৱক বেগ  $\vec{v} = v_0 \hat{i}$  বে গতি কৰিৱা হৈছে। লুপটোত আহিত হোৱা বিদ্যুৎ চালক বল হয় :



Options :

$$\frac{B_0 v_0 d}{2a}$$

8643513527.

$$\frac{B_0 v_0 d^2}{a}$$

8643513528.

$$\frac{B_0 v_0^2 d}{2a}$$

8643513529.

$$\frac{B_0 v_0 d^2}{2a}$$

8643513530.

Question Number : 6 Question Id : 8643511176 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Amplitude of a mass-spring system, which is executing simple harmonic motion decreases with time. If mass = 500g, Decay constant = 20 g/s then how much time is required for the amplitude of the system to drop to half of its initial value ?

( $\ln 2 = 0.693$ )

Options :

8643513531. 34.65 s

8643513532. 15.01 s

8643513533. 0.034 s

8643513534. 17.32 s

Question Number : 6 Question Id : 8643511176 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

সৰল পৰ্যাবৃত্ত গতি সম্পাদন কৰি থকা এক ভৰ-স্প্ৰিং নিকায়ৰ বিস্তাৰ সময়ৰ সৈতে হ্রাস হয় । যদি ভৰ = 500g, বিঘটন ধ্রুবক = 20 g/s হয়, নিকায়টোৰ বিস্তাৰ ইয়াৰ প্ৰাৰম্ভিক মানৰ আধা হ'বলৈ কিমান সময়ৰ প্ৰয়োজন হয় ?

(  $\ln 2 = 0.693$  )

Options :

8643513531. 34.65 s

8643513532. 15.01 s

8643513533. 0.034 s

8643513534. 17.32 s

Question Number : 7 Question Id : 8643511177 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Calculate the value of mean free path ( $\lambda$ ) for oxygen molecules at temperature 27°C and pressure  $1.01 \times 10^5$  Pa. Assume the molecular diameter 0.3 nm and the gas is ideal. ( $k = 1.38 \times 10^{-23} \text{ JK}^{-1}$ )

Options :

8643513535. 32 nm

8643513536. 58 nm

8643513537. 86 nm

8643513538. 102 nm

**Question Number : 7 Question Id : 8643511177 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$1.01 \times 10^5$  Pa চাপ আৰু  $27^\circ\text{C}$  উষ্ণতাত থকা অক্সিজেন অণুৰ বাবে গড় মুক্ত পথ ( $\lambda$ ) ৰ মান গণনা কৰা। ধৰি লোৱা যে গেছটো আদৰ্শ গেছ আৰু আণৱিক ব্যাস  $0.3 \text{ nm}$ । ( $k = 1.38 \times 10^{-23} \text{ JK}^{-1}$ )

**Options :**

8643513535. 32 nm

8643513536. 58 nm

8643513537. 86 nm

8643513538. 102 nm

**Question Number : 8 Question Id : 8643511178 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

What will be the nature of flow of water from a circular tap, when its flow rate increased from  $0.18 \text{ L/min}$  to  $0.48 \text{ L/min}$ ? The radius of the tap and viscosity of water are  $0.5 \text{ cm}$  and  $10^{-3} \text{ Pa s}$ , respectively.

(Density of water :  $10^3 \text{ kg/m}^3$ )

**Options :**

8643513539. Steady flow to unsteady flow

8643513540. Unsteady to steady flow

8643513541. Remains steady flow



8643513542. Remains turbulent flow

Question Number : 8 Question Id : 8643511178 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যেতিয়া ইয়াৰ প্ৰবাহৰ হাৰ  $0.18 \text{ L/min}$  ৰ পৰা  $0.48 \text{ L/min}$  লৈ বৃদ্ধি পায়, এটা বৃত্তাকাৰ টেপ/নলৰ পৰা পানীৰ প্ৰবাহৰ প্ৰকৃতি কি হ'ব ? নলটোৰ ব্যাসাৰ্ধ আৰু পানীৰ সান্দ্ৰতা ক্ৰমে  $0.5 \text{ cm}$  আৰু  $10^{-3} \text{ Pa s}$ ।  
(পানীৰ ঘনত্ব :  $10^3 \text{ kg/m}^3$ )

Options :

8643513539. স্থিৰ প্ৰবাহৰ পৰা অস্থিৰ প্ৰবাহলৈ।

8643513540. অস্থিৰ প্ৰবাহৰ পৰা স্থিৰ প্ৰবাহলৈ।

8643513541. স্থিৰ প্ৰবাহেই থাকিব।

8643513542. অশান্ত প্ৰবাহেই থাকিব।

Question Number : 9 Question Id : 8643511179 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A charge  $Q$  is moving  $d\vec{l}$  distance in the magnetic field  $\vec{B}$ . Find the value of work done by  $\vec{B}$ .

Options :

8643513543. 1

8643513544. Zero

8643513545. Infinite

8643513546. -1

Question Number : 9 Question Id : 8643511179 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



এক চৌম্বিক ক্ষেত্র  $\vec{B}$  ত এক আধান  $Q$  য়ে  $d\vec{l}$  দূৰত্ব গতি কৰিছে।  $\vec{B}$  য়ে সম্পাদন কৰা কাৰ্যৰ পৰিমাণ নিৰ্ণয় কৰা।

**Options :**

8643513543. 1

8643513544. শূন্য

8643513545. অসীম

8643513546. -1

**Question Number : 10 Question Id : 8643511180 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Calculate the time interval between 33% decay and 67% decay if half-life of a substance is 20 minutes.

**Options :**

8643513547. 20 minutes

8643513548. 40 minutes

8643513549. 60 minutes

8643513550. 13 minutes

**Question Number : 10 Question Id : 8643511180 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

যদিহে এটা পদাৰ্থৰ অৰ্ধায়ু 20 minutes হয় তেন্তে 33% বিঘটন আৰু 67% বিঘটনৰ মাজৰ সময়ৰ অন্তৰাল গণনা কৰা।

**Options :**

8643513547. 20 minutes

8643513548. 40 minutes

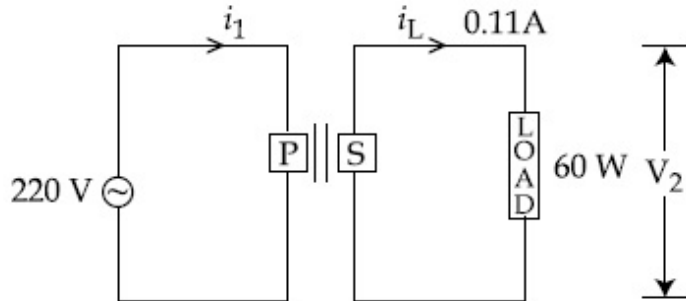
8643513549. 60 minutes

8643513550. 13 minutes

Question Number : 11 Question Id : 8643511181 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the given circuit, comment on the type of transformer used.



Options :

8643513551. Step - up transformer

8643513552. Step down transformer

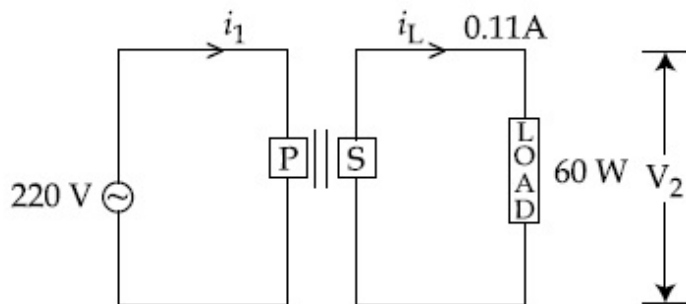
8643513553. Auto transformer

8643513554. Auxilliary transformer

Question Number : 11 Question Id : 8643511181 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

দিয়া বৰ্তনীটোত ব্যৱহাৰ কৰা কপাস্তৰকৰ প্ৰকাৰৰ বিষয়ে মন্তব্য কৰা।



Options :

8643513551. বিবৰ্ধক কপাস্তৰক

8643513552. হ্রাসক কপান্তরক

8643513553. অট' কপান্তরক

8643513554. সহায়ক কপান্তরক

**Question Number : 12 Question Id : 8643511182 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The half-life of  $\text{Au}^{198}$  is 2.7 days. The activity of 1.50 mg of  $\text{Au}^{198}$  if its atomic weight is 198 g mol<sup>-1</sup> is, ( $N_A = 6 \times 10^{23}$ /mol).

**Options :**

8643513555. 240 Ci

8643513556. 357 Ci

8643513557. 252 Ci

8643513558. 535 Ci

**Question Number : 12 Question Id : 8643511182 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$\text{Au}^{198}$  ৰ অৰ্ধায়ু 2.7 দিন। যদিহে ইয়াৰ পাৰমাণৱিক ভাৰ 198 g mol<sup>-1</sup> হয় 1.50 mg,  $\text{Au}^{198}$  ৰ সক্ৰিয়তা হয় \_\_\_\_\_। ( $N_A = 6 \times 10^{23}$ /mol).

**Options :**

8643513555. 240 Ci

8643513556. 357 Ci

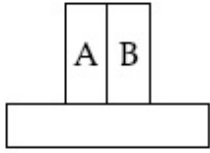
8643513557. 252 Ci

8643513558. 535 Ci

**Question Number : 13 Question Id : 8643511183 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A bimetallic strip consists of metals A and B. It is mounted rigidly as shown. The metal A has higher coefficient of expansion compared to that of metal B. When the bimetallic strip is placed in a cold bath, it will :



**Options :**

8643513559. Bend towards the right

8643513560. Bend towards the left

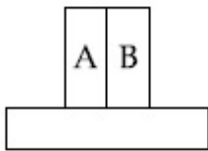
8643513561. Not bend but shrink

8643513562. Neither bend nor shrink

**Question Number : 13 Question Id : 8643511183 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধাতু A আৰু B ৰে এক দ্বিধাতৱীয় পটী বনোৱা হৈছে। দেখুওৱা ধৰণে ইয়াক দৃঢ়ভাৱে আৰোহণ কৰোৱা হৈছে। ধাতু B ৰ তুলনাত ধাতু A ৰ প্ৰসাৰণ গুণাংক বেছি। যেতিয়া এই দ্বিধাতৱীয় পটীটোক এক শীতল আধাৰত ৰখা হয়, ই ?



**Options :**

8643513559. সোঁফালে বেঁকা হৈ যাব

8643513560. বাওঁফালে বেঁকা হৈ যাব

8643513561. বেঁকা নহয় কিন্তু সংকোচন হ'ব

8643513562. বেঁকাও নহয় সংকোচিত ও নহয়

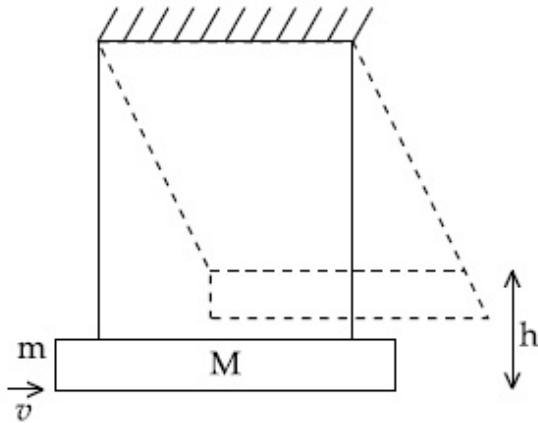
Question Number : 14 Question Id : 8643511184 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A large block of wood of mass  $M=5.99$  kg is hanging from two long massless cords. A bullet of mass  $m=10$  g is fired into the block and gets embedded in it. The (block + bullet) then swing upwards, their centre of mass rising a vertical distance  $h=9.8$  cm before the (block + bullet) pendulum comes momentarily to rest at the end of its arc. The speed of the bullet just before collision is :

(take  $g=9.8$  ms<sup>-2</sup>)



Options :

8643513563. 811.4 m/s

8643513564. 821.4 m/s

8643513565. 831.4 m/s

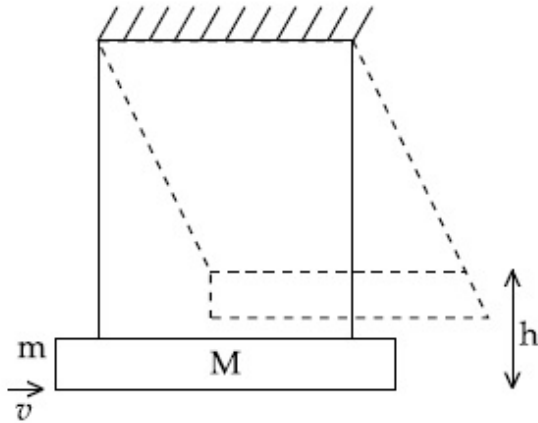
8643513566. 841.4 m/s

Question Number : 14 Question Id : 8643511184 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$M = 5.99 \text{ kg}$  ভৰৰ এক ডাঙৰ কাঠৰ টুকুৰা/ব্লক দুডাল দীঘল ভৰহীন কৰ্ডৰ পৰা ওলমাই ৰখা হৈছে।  $m = 10 \text{ g}$  ভৰৰ এটা বুলেট টুকুৰাটোত ফায়াৰ কৰা হয় আৰু ই তাত সোমাই যায়। (বুলেট + ব্লক)টো তেতিয়া উৰ্দ্ধদিশত দোলিত হয়, ইয়াৰ আৰ্ৰৰ শেষত (বুলেট + ব্লক) দোলকটো ক্ষণিকৰ বাবে স্থিৰ অৱস্থালৈ অহাৰ আগতে সিহঁতৰ ভৰকেন্দ্ৰটো উলম্বদিশত  $h = 9.8 \text{ cm}$  দূৰত্বলৈ আৰোহণ কৰে। সংঘাত হোৱা ঠিক আগমুহূৰ্ত্তত বুলেটটোৰ দ্ৰুতি হয় : ( $g = 9.8 \text{ ms}^{-2}$  লোৱা)



Options :

8643513563. 811.4 m/s

8643513564. 821.4 m/s

8643513565. 831.4 m/s

8643513566. 841.4 m/s

Question Number : 15 Question Id : 8643511185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Statement I : A cyclist is moving on an unbanked road with a speed of  $7 \text{ kmh}^{-1}$  and takes a sharp circular turn along a path of radius of  $2\text{m}$  without reducing the speed. The static friction coefficient is  $0.2$ . The cyclist will not slip and pass the curve. ( $g = 9.8 \text{ m/s}^2$ )

Statement II : If the road is banked at an angle of  $45^\circ$ , cyclist can cross the curve of  $2\text{m}$  radius with the speed of  $18.5 \text{ kmh}^{-1}$  without slipping.

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

Options :

8643513567. Both statement I and statement II are true

8643513568. Both statement I and statement II are false

8643513569. Statement I is correct and statement II is incorrect

8643513570. Statement I is incorrect and statement II is correct

**Question Number : 15 Question Id : 8643511185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

**বিবৃতি I :** এজন চাইকেলবিদে এটা অহেলনীয়া বাস্তৱত  $7 \text{ kmh}^{-1}$  দ্ৰুতিৰে গতি কৰি আছে আৰু দ্ৰুতি হ্রাস নকৰাকৈ পথত থকা  $2\text{m}$  ব্যাসাৰ্ধৰ এটা তীব্ৰ বৃত্তাকাৰ পাক লৈছে। স্থৈতিক ঘৰ্ষণ গুণাংক  $0.2$ । চাইকেলবিদজন পিছল নাখায় আৰু বক্রটো পাৰ হৈ যাব। ( $g = 9.8 \text{ m/s}^2$ )

**বিবৃতি II :** যদিহে বাস্তৱটো  $45^\circ$  কোণত হেলনীয়া হৈ থাকে, চাইকেলবিদজনে নিপিছলাকৈ  $18.5 \text{ kmh}^{-1}$  দ্ৰুতিৰে  $2\text{m}$  ব্যাসাৰ্ধৰ বক্রটো পাৰ হৈ যাব পাৰিব।

উপৰোক্ত দুই উক্তিৰ প্ৰকাশত, তলৰ বিকল্পৰ পৰা শুদ্ধ উত্তৰ চয়ন কৰা।

**Options :**

8643513567. বিবৃতি I আৰু বিবৃতি II দুয়োটাই সঁচা।

8643513568. বিবৃতি I আৰু বিবৃতি II দুয়োটাই মিছা।

8643513569. বিবৃতি I টো শুদ্ধ আৰু বিবৃতি II টো অশুদ্ধ।

8643513570. বিবৃতি I টো অশুদ্ধ আৰু বিবৃতি II টো শুদ্ধ।

**Question Number : 16 Question Id : 8643511186 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A mosquito is moving with a velocity  $\vec{v} = 0.5t^2\hat{i} + 3t\hat{j} + 9\hat{k} \text{ m/s}$  and accelerating in uniform conditions. What will be the direction of mosquito after 2 s ?

**Options :**

8643513571.  $\tan^{-1}\left(\frac{5}{2}\right)$  from x-axis



8643513572.  $\tan^{-1}\left(\frac{5}{2}\right)$  from  $y$ -axis

8643513573.  $\tan^{-1}\left(\frac{2}{3}\right)$  from  $x$ -axis

8643513574.  $\tan^{-1}\left(\frac{2}{3}\right)$  from  $y$ -axis

**Question Number : 16 Question Id : 8643511186 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

এটা মহে  $\vec{v} = 0.5t^2\hat{i} + 3t\hat{j} + 9\hat{k}$  m/s বেগেৰে গতি কৰি আছে আৰু সুৰম অৱস্থাত ত্বৰিত হৈছে। 2 s ৰ পাছত মহটোৰ দিশ কি হ'ব ?

**Options :**

8643513571.  $x$ -অক্ষৰ পৰা  $\tan^{-1}\left(\frac{5}{2}\right)$

8643513572.  $y$ -অক্ষৰ পৰা  $\tan^{-1}\left(\frac{5}{2}\right)$

8643513573.  $x$ -অক্ষৰ পৰা  $\tan^{-1}\left(\frac{2}{3}\right)$

8643513574.  $y$ -অক্ষৰ পৰা  $\tan^{-1}\left(\frac{2}{3}\right)$

**Question Number : 17 Question Id : 8643511187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

In order to determine the Young's Modulus of a wire of radius 0.2 cm (measured using a scale of least count=0.001 cm) and length 1m (measured using a scale of least count=1 mm), a weight of mass 1 kg (measured using a scale of least count=1 g) was hanged to get the elongation of 0.5 cm (measured using a scale of least count 0.001 cm). What will be the fractional error in the value of Young's Modulus determined by this experiment ?

**Options :**

8643513575. 1.4 %

8643513576. 0.9 %

8643513577. 0.14 %

8643513578. 9 %

**Question Number : 17 Question Id : 8643511187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

0.2 cm ব্যাসার্ধৰ (নিম্নতম গণনা = 0.001 cm ব এডাল স্কেলৰ ব্যৱহাৰ কৰি মাপ কৰা) আৰু 1m দৈৰ্ঘ্যৰ (নিম্নতম গণনা = 1 mm ব এডাল স্কেলৰ ব্যৱহাৰ কৰি মাপ কৰা) এডাল তাঁৰৰ ইয়ঙৰ গুণাংক নিৰ্ণয় কৰিবৰ বাবে, 0.5 cm (নিম্নতম গণনা 0.001 cm ব এডাল স্কেল ব্যৱহাৰ কৰি মাপ কৰা) দৈৰ্ঘ্য প্ৰসাৰণ পাবলৈ এটা 1 kg ভৰৰ ওজন (নিম্নতম গণনা = 1 g ব এডাল স্কেলৰ ব্যৱহাৰ কৰি মাপ কৰা) ওলোমাই থোৱা হৈছিল।

এই পৰীক্ষাটোৰ দ্বাৰা নিৰ্দ্ধাৰণ কৰা ইয়ঙৰ গুণাংকৰ মানৰ ভগ্নাংশ ক্ৰটি কি হ'ব ?

**Options :**

8643513575. 1.4 %

8643513576. 0.9 %

8643513577. 0.14 %

8643513578. 9 %

**Question Number : 18 Question Id : 8643511188 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A resistor develops 500 J of thermal energy in 20 s when a current of 1.5A is passed through it. If the current is increased from 1.5 A to 3 A, what will be the energy developed in 20 s.

**Options :**

8643513579. 500 J

8643513580. 1000 J

8643513581. 1500 J

8643513582. 2000 J

**Question Number : 18 Question Id : 8643511188 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

যেতিয়া ইয়াৰ মাজেৰে 1.5 A বিদ্যুৎ প্রবাহিত হয় এটা বোধকে 20 s ত 500 J তাপ শক্তি বিকাশ কৰে। যদিহে প্রবাহ 1.5 A ৰ পৰা 3 A লৈ বঢ়াই দিয়া হয়, 20s ত কিমান শক্তি বিকশিত হ'ব?

**Options :**

8643513579. 500 J

8643513580. 1000 J

8643513581. 1500 J

8643513582. 2000 J

**Question Number : 19 Question Id : 8643511189 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Find out the surface charge density at the intersection of point  $x=3$  m plane and  $x$ -axis, in the region of uniform line charge of 8 nC/m lying along the  $z$ -axis in free space.

**Options :**

8643513583. 47.88 C/m

8643513584. 0.07 nC m<sup>-2</sup>

8643513585. 0.424 nC m<sup>-2</sup>

8643513586. 4.0 nC m<sup>-2</sup>

**Question Number : 19 Question Id : 8643511189 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

মুক্ত স্থানত (free space)  $z$ -অক্ষৰ দিশত থকা  $8 \text{ nC/m}$  ৰ সুষম বৈখিক আধানযুক্ত এক অঞ্চলত  $x=3 \text{ m}$  বিন্দুত পৃষ্ঠ আধান ঘনত্ব নিৰ্ণয় কৰা।

Options :

8643513583.  $47.88 \text{ C/m}$

8643513584.  $0.07 \text{ nC m}^{-2}$

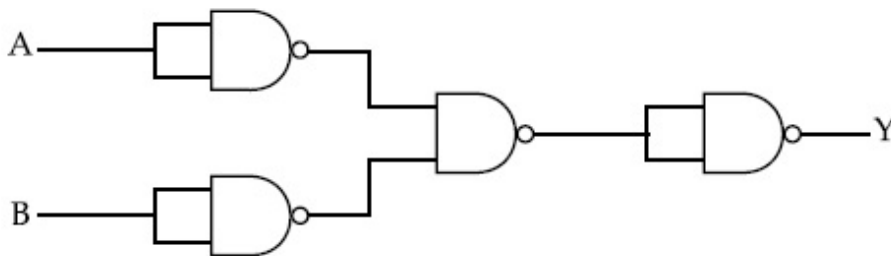
8643513585.  $0.424 \text{ nC m}^{-2}$

8643513586.  $4.0 \text{ nC m}^{-2}$

Question Number : 20 Question Id : 8643511190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The following logic gate is equivalent to :



Options :

8643513587. AND Gate

8643513588. NAND Gate

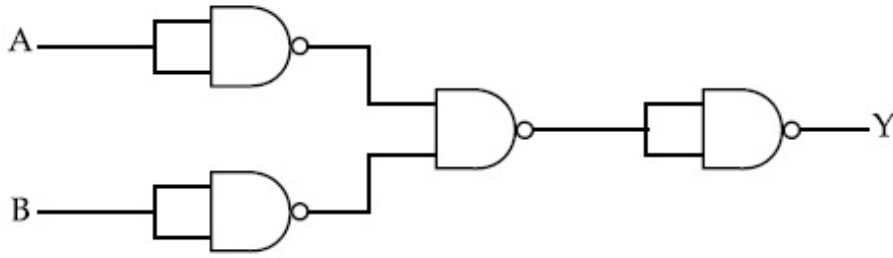
8643513589. OR Gate

8643513590. NOR Gate

Question Number : 20 Question Id : 8643511190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলৰ ল'জিক বৰ্তনীটো সমতুল্য হ'ব :



**Options :**

8643513587. AND গেট

8643513588. NAND গেট

8643513589. OR গেট

8643513590. NOR গেট

## Physics Section B

<b>Section Id :</b>	86435180
<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>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	86435180
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 21 Question Id : 8643511191 Question Type : SA**  
**Correct Marks : 4 Wrong Marks : 0**

If one wants to remove all the mass of the earth to infinity in order to break it up completely.

The amount of energy that needs to be supplied will be  $\frac{x}{5} \frac{GM^2}{R}$  where  $x$  is \_\_\_\_\_

(Round off to the Nearest Integer)

(M is the mass of earth, R is the radius of earth, G is the gravitational constant)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 21 **Question Id :** 8643511191 **Question Type :** SA

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

যদি এজন পৃথিবীৰ সমস্ত ভৰ অসীমলৈ (to infinity) আঁতৰাই পেলাব বিচাৰে যাতে ইয়াক সম্পূৰ্ণৰূপে ভাঙি পেলাব

পাৰি। তেন্তে যোগান ধৰিব লগা শক্তিৰ পৰিমাণ হ'ব  $\frac{x}{5} \frac{GM^2}{R}$ , য'ত  $x$  হয় \_\_\_\_\_। (নিকটতম পূৰ্ণসংখ্যালৈ

গোটকৰণ কৰা)

(পৃথিবীৰ ভৰ M, পৃথিবীৰ ব্যাসার্ধ R, মহাকর্ষনিক ধ্রুবক G )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 22 **Question Id :** 8643511192 **Question Type :** SA

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

A swimmer can swim with velocity of 12 km/h in still water. Water flowing in a river has velocity 6 km/h. The direction with respect to the direction of flow of river water he should swim in order to reach the point on the other bank just opposite to his starting point is \_\_\_\_\_°. (Round off to the Nearest Integer)

(Find the angle in degrees)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 22 Question Id : 8643511192 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ছিৰ পানীত এজন সাতোঁৰবিদে 12 km/h বেগেৰে সাতোঁৰিব পাৰে। এখন নদীত পানীৰ বেগ 6 km/h তেওঁৰ আৰম্ভণি বিন্দুৰ ঠিক বিপৰীতে থকা আনটো পাৰৰ বিন্দুটো সাতুঁৰি পাৰৰ বাবে নদীৰ পানীৰ সোঁতৰ দিশ অনুযায়ী তেওঁৰ সাতোঁৰৰ দিশ হয় \_\_\_\_\_°। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

(কোণটোৰ মান ডিগ্ৰী এককত নিৰ্ণয় কৰা )

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 23 Question Id : 8643511193 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A body of mass 2 kg moves under a force of  $(2\hat{i} + 3\hat{j} + 5\hat{k})$  N. It starts from rest and was at the origin initially. After 4 s, its new coordinates are (8, b, 20). The value of b is \_\_\_\_\_.

(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 :

100

Question Number : 23 Question Id : 8643511193 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এক বল  $(2\hat{i} + 3\hat{j} + 5\hat{k})$  N ৰ ক্ৰিয়াৰ ফলত 2 kg ভৰৰ এক বস্তুৱে গতি কৰে। ই স্থিৰ অৱস্থাৰ পৰা আৰম্ভ কৰে আৰু আৰম্ভণিতে ই মূলবিন্দুত আছিল। 4 s পাছত ইয়াৰ নতুন স্থানাংক (8, b, 20)। b ৰ মান হয় \_\_\_\_\_।  
(নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 24 **Question Id :** 8643511194 **Question Type :** SA

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

A force  $\vec{F} = 4\hat{i} + 3\hat{j} + 4\hat{k}$  is applied on an intersection point of  $x = 2$  plane and  $x$ -axis. The magnitude of torque of this force about a point (2, 3, 4) is \_\_\_\_\_. (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 :**

100

**Question Number :** 24 **Question Id :** 8643511194 **Question Type :** SA

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

$x$ -অক্ষ আৰু  $x = 2$  তলৰ এটা ছেদবিন্দুত এক বল  $\vec{F} = 4\hat{i} + 3\hat{j} + 4\hat{k}$  প্ৰয়োগ কৰা হ'ল। এটা বিন্দু (2, 3, 4) সাপেক্ষে এই বলৰ টৰ্কৰ মান হ'ব \_\_\_\_\_. (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100



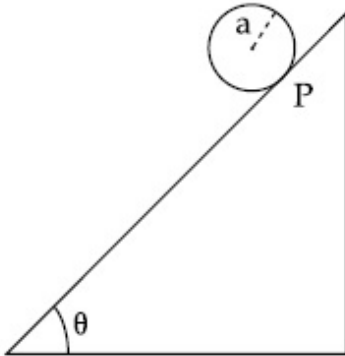
Question Number : 25 Question Id : 8643511195 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A solid disc of radius 'a' and mass 'm' rolls down without slipping on an inclined plane making an angle  $\theta$  with the horizontal. The acceleration of the disc will be  $\frac{2}{b} g \sin\theta$  where b is \_\_\_\_\_. (Round off to the Nearest Integer)

(g = acceleration due to gravity

$\theta$  = angle as shown in figure)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

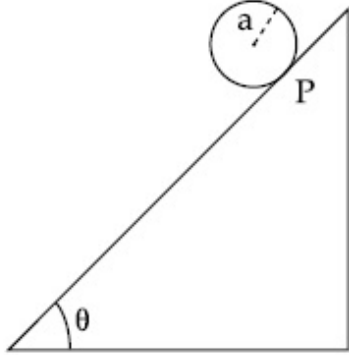
Question Number : 25 Question Id : 8643511195 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

আনুভূমিকৰ সৈতে  $\theta$  কোণ কৰি থকা এখন হেলনীয়া তলত 'a' ব্যাসার্ধ আৰু 'm' ভৰৰ এখন গোটা খাল নিপিছলকৈ তললৈ বাগৰি যায়। খালখনৰ ত্বৰণ হ'ব  $\frac{2}{b} g \sin\theta$ , য'ত b হয় \_\_\_\_\_। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

(g = মাধ্যাকৰ্ষণিক ত্বৰণ

$\theta$  = চিত্ৰত দেখুওৱা ধৰণে কোণ)



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 26 **Question Id :** 8643511196 **Question Type :** SA

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

For an ideal heat engine, the temperature of the source is  $127^\circ\text{C}$ . In order to have 60% efficiency the temperature of the sink should be \_\_\_\_\_ $^\circ\text{C}$ . (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 :**

100

**Question Number :** 26 **Question Id :** 8643511196 **Question Type :** SA

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

এটা আদৰ্শ তাপ ইঞ্জিনৰ বাবে, উৎসৰ উষ্ণতা  $127^{\circ}\text{C}$ । 60% দক্ষতা পাবৰ বাবে কুপৰ উষ্ণতা হ'ব লাগিব \_\_\_\_\_  $^{\circ}\text{C}$ ।

(নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

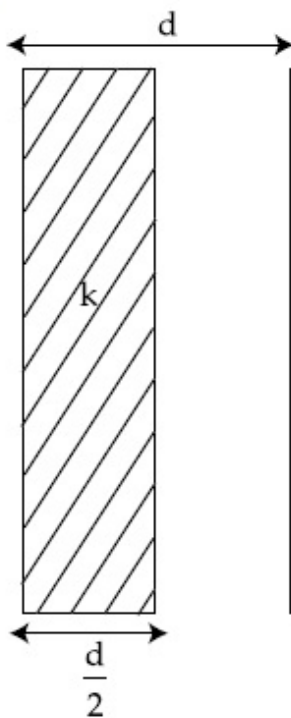
**Possible Answers :**

100

**Question Number :** 27 **Question Id :** 8643511197 **Question Type :** SA

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

In a parallel plate capacitor set up, the plate area of capacitor is  $2\text{ m}^2$  and the plates are separated by 1 m. If the space between the plates are filled with a dielectric material of thickness 0.5 m and area  $2\text{ m}^2$  (see fig) the capacitance of the set-up will be \_\_\_\_\_  $\epsilon_0$ . (Dielectric constant of the material = 3.2) (Round off to the Nearest Integer)



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

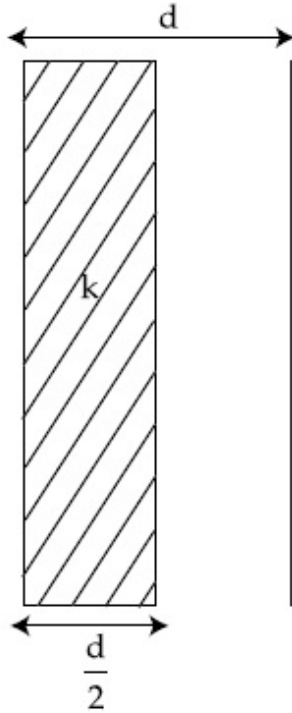
**Possible Answers :**

100

**Question Number :** 27 **Question Id :** 8643511197 **Question Type :** SA

Correct Marks : 4 Wrong Marks : 0

এক সমান্তরাল পাত ধাৰক ব্যৱহৃত ধাৰকৰ পাতৰ কালি হয়  $2 \text{ m}^2$  আৰু প্লেটদুখন  $1\text{m}$  ব্যৱধানত আছে। যদিহে এক পৰাবৈদ্যুতিক পদাৰ্থৰে পাতদুখনৰ মাজৰ স্থানক  $0.5 \text{ m}$  ডাঠ আৰু  $2 \text{ m}^2$  কালিৰ এক পৰাবৈদ্যুতিক পদাৰ্থৰে ভৰোৱা হয়, ব্যৱহাৰটোৰ ধাৰকত্ব হ'ব (পদাৰ্থটোৰ পৰাবৈদ্যুতিক ধ্ৰুৱক  $= 3.2$ ) \_\_\_\_\_  $\epsilon_0$ . (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 28 Question Id : 8643511198 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The energy dissipated by a resistor is  $10 \text{ mJ}$  in  $1 \text{ s}$  when an electric current of  $2 \text{ mA}$  flows through it. The resistance is \_\_\_\_\_  $\Omega$ . (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 :

100

**Question Number : 28 Question Id : 8643511198 Question Type : SA**

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

যেতিয়া ইয়াৰ মাজেদি 2 mA বিদ্যুৎ প্ৰবাহ প্ৰবাহিত হয় এটা বোধকে 1 s ত 10 mJ শক্তি ক্ষয় কৰে। বোধ হয় \_\_\_\_\_  $\Omega$ । (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 29 Question Id : 8643511199 Question Type : SA**

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

A deviation of  $2^\circ$  is produced in the yellow ray when prism of crown and flint glass are achromatically combined. Taking dispersive powers of crown and flint glass as 0.02 and 0.03 respectively and refractive index for yellow light for these glasses are 1.5 and 1.6 respectively. The refracting angles for crown glass prism will be \_\_\_\_\_  $^\circ$  (in degree). (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 :**

100

**Question Number : 29 Question Id : 8643511199 Question Type : SA**

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

যেতিয়া অবৰ্ণক ভাৱে (achromatically) ক্ৰাউন (crown) আৰু ফ্লিন্ট (flint) কাঁচৰ প্ৰিজমক সংলগ্ন কৰা হয় হালধীয়া বৰ্ণিত  $2^\circ$  ৰ বিচ্যুতি উৎপন্ন হয়। ক্ৰাউন কাঁচ আৰু ফ্লিন্ট কাঁচৰ বিচ্ছৰণৰ ক্ষমতা ক্ৰমে 0.02 আৰু 0.03 ৰূপে লোৱা আৰু এই কাঁচসমূহৰ বাবে হালধীয়া পোহৰৰ প্ৰতিসৰাংক ক্ৰমে 1.5 আৰু 1.6 লোৱা। ক্ৰাউন কাঁচ প্ৰিজমৰ বাবে প্ৰতিসৰণ কোণ হ'ব \_\_\_\_\_। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

Question Number : 30 Question Id : 8643511200 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A closed organ pipe of length  $L$  and an open organ pipe contain gases of densities  $\rho_1$  and  $\rho_2$  respectively. The compressibility of gases are equal in both the pipes. Both the pipes are

vibrating in their first overtone with same frequency. The length of the open pipe is  $\frac{x}{3} L \sqrt{\frac{\rho_1}{\rho_2}}$  where  $x$  is \_\_\_\_\_. (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 :

100

Question Number : 30 Question Id : 8643511200 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$L$  দৈৰ্ঘ্যৰ এডাল বন্ধ অৰ্গেন পাইপ আৰু এডাল খোলা অৰ্গেন পাইপে ক্ৰমে  $\rho_1$  আৰু  $\rho_2$  ঘনত্বৰ গেছ কঢ়িয়াইছে। দুয়োডাল পাইপতে গেছৰ সংনমনীয়তা সমান। দুয়োডাল পাইপেই সিহঁতৰ প্ৰথম অধিস্বৰকত (overtone) একেই কম্পনাংকৰে

কম্পিত (vibrating) হৈছে। খোলা পাইপডালৰ দৈৰ্ঘ্য  $\frac{x}{3} L \sqrt{\frac{\rho_1}{\rho_2}}$  য'ত  $x$  হয় \_\_\_\_\_। (নিকটতম পূৰ্ণসংখ্যালৈ

গোটকৰণ কৰা)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

## Chemistry Section A

Section Id :

86435181

Section Number :

3

Section type :

Online

Mandatory or Optional :

Mandatory



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Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	86435181
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 8643511201 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The INCORRECT statement regarding the structure of  $C_{60}$  is :

Options :

8643513601. It contains 12 six-membered rings and 24 five-membered rings.
8643513602. The six-membered rings are fused to both six and five-membered rings.
8643513603. The five-membered rings are fused only to six-membered rings.
8643513604. Each carbon atom forms three sigma bonds.

Question Number : 31 Question Id : 8643511201 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

$C_{60}$  ৰ গঠনৰ বিষয়ে অশুদ্ধ উক্তিটো হ'ল :

Options :

8643513601. ই 12টা ষড়ভূজ আৰু 24টা পঞ্চভূজীয় বলয় বহন কৰে।
8643513602. ষড়ভূজীয় বলয়, ষড়ভূজীয় আৰু পঞ্চভূজীয় বলয়ৰ দুয়োৰে লগত যোজিত হৈ থাকে।
8643513603. পঞ্চভূজীয় বলয়বোৰ কেৱল ষড়ভূজীয় বলয়ৰ লগত যোজিত হৈ থাকে।
8643513604. প্ৰতিটো কাৰ্বন পৰমাণুৱে তিনিডাল ছিগমা বান্ধনি গঠন কৰে।

Question Number : 32 Question Id : 8643511202 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1



The **INCORRECT** statements below regarding colloidal solutions is :

**Options :**

8643513605. A colloidal solution shows colligative properties.
8643513606. A colloidal solution shows Brownian motion of colloidal particles.
8643513607. The flocculating power of  $Al^{3+}$  is more than that of  $Na^{+}$ .
8643513608. An ordinary filter paper can stop the flow of colloidal particles.

**Question Number : 32 Question Id : 8643511202 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

কলয়ডৰ দ্ৰৱৰ বিষয়ে নিম্নলিখিতৰ বিষয়ে অশুদ্ধ উক্তিটো হ'ল :

**Options :**

8643513605. এটা কলয়ডৰ দ্ৰৱই সংখ্যাগত ধৰ্মসমূহ দেখুৱায়।
8643513606. এটা কলয়ডীয় দ্ৰৱৰ কলয়ডীয় কণাসমূহে ব্ৰাউনীয় গতি দেখুৱায়।
8643513607.  $Al^{3+}$  ৰ আতঞ্জন ক্ষমতা  $Na^{+}$  তকৈ বেছি।
8643513608. এখন সাধাৰণ ফিল্টাৰ কাগজে কলয়ডীয় কণিকাবোৰ সৰকি যোৱা বন্ধ কৰিব পাৰে।

**Question Number : 33 Question Id : 8643511203 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

The characteristics of elements X, Y and Z with atomic numbers, respectively, 33, 53 and 83 are :

**Options :**

8643513609. X, Y and Z are metals.
8643513610. X and Z are non-metals and Y is a metalloid.
8643513611. X is a metalloid, Y is a non-metal and Z is a metal.





8643513612. X and Y are metalloids and Z is a metal.

Question Number : 33 Question Id : 8643511203 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

X, Y আৰু Z মৌল যাৰ পাৰমাণৱিক সংখ্যা যথাক্ৰমে 33, 53 আৰু 83, তাৰ বৈশিষ্ট্যসমূহ হ'ল :

Options :

8643513609. X, Y আৰু Z ধাতু।

8643513610. X আৰু Z অধাতু আৰু Y এটা ধাতুকল্প।

8643513611. X এটা ধাতুকল্প, Y এটা অধাতু আৰু Z এটা ধাতু।

8643513612. X আৰু Y ধাতুকল্প আৰু Z এটা ধাতু।

Question Number : 34 Question Id : 8643511204 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following reduction reaction CANNOT be carried out with coke ?

Options :

8643513613.  $\text{Fe}_2\text{O}_3 \rightarrow \text{Fe}$

8643513614.  $\text{ZnO} \rightarrow \text{Zn}$

8643513615.  $\text{Cu}_2\text{O} \rightarrow \text{Cu}$

8643513616.  $\text{Al}_2\text{O}_3 \rightarrow \text{Al}$

Question Number : 34 Question Id : 8643511204 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলত দিয়া কোনটো বিজাৰণ বিক্ৰিয়া ক'কৰ সৈতে কৰিব নোৱাৰি ?

Options :

8643513613.  $\text{Fe}_2\text{O}_3 \rightarrow \text{Fe}$

8643513614.  $\text{ZnO} \rightarrow \text{Zn}$

8643513615.  $\text{Cu}_2\text{O} \rightarrow \text{Cu}$

8643513616.  $\text{Al}_2\text{O}_3 \rightarrow \text{Al}$

**Question Number : 35 Question Id : 8643511205 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The correct statements about  $\text{H}_2\text{O}_2$  are :

- (A) used in the treatment of effluents.
- (B) used as both oxidising and reducing agents.
- (C) the two hydroxyl groups lie in the same plane.
- (D) miscible with water.

Choose the correct answer from the options given below :

**Options :**

8643513617. (A), (B) and (D) only

8643513618. (B), (C) and (D) only

8643513619. (A), (C) and (D) only

8643513620. (A), (B), (C) and (D)

**Question Number : 35 Question Id : 8643511205 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

H<sub>2</sub>O<sub>2</sub> ৰ বিষয়ে শুদ্ধ উক্তিবিবৰ হ'ল :

- (A) বৰ্জিত দ্ৰব্যৰ শোধনত (treatment) ব্যৱহাৰ কৰা হয়।
- (B) জাৰণ আৰু বিজাৰণ কৰ্তা, দুয়োটা হিচাবে ব্যৱহাৰ কৰা হয়।
- (C) দুটা হাইড্ৰক্সিল থূপ একে সমতলতে থাকে।
- (D) পানীৰ লগত মিহলি হয়।

নিম্নলিখিত বিকল্পৰ পৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

Options :

8643513617. (A), (B) আৰু (D) মাত্ৰ

8643513618. (B), (C) আৰু (D) মাত্ৰ

8643513619. (A), (C) আৰু (D) মাত্ৰ

8643513620. (A), (B), (C) আৰু (D)

Question Number : 36 Question Id : 8643511206 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Identify the elements X and Y using the ionisation energy values given below :

Ionization energy (kJ/mol)

	1 <sup>st</sup>	2 <sup>nd</sup>
X	495	4563
Y	731	1450

Options :

8643513621. X = Na ; Y = Mg

8643513622. X = Mg ; Y = Na

8643513623. X = F ; Y = Mg

8643513624. X = Mg ; Y = F

Question Number : 36 Question Id : 8643511206 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলত দিয়া আয়নীয় শক্তিৰ মানৰ পৰা মৌল X আৰু Y ক চিনাক্ত কৰা।

	আয়নীয় শক্তি	(kJ/mol)
	1 জ	2 জ
X	495	4563
Y	731	1450

Options :

8643513621. X = Na ; Y = Mg

8643513622. X = Mg ; Y = Na

8643513623. X = F ; Y = Mg

8643513624. X = Mg ; Y = F

Question Number : 37 Question Id : 8643511207 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The exact volumes of 1 M NaOH solution required to neutralise 50 mL of 1 M  $H_3PO_3$  solution and 100 mL of 2 M  $H_3PO_2$  solution, respectively, are :

Options :

8643513625. 50 mL and 50 mL

8643513626. 100 mL and 50 mL

8643513627. 100 mL and 200 mL

8643513628. 100 mL and 100 mL

Question Number : 37 Question Id : 8643511207 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

50 mL 1 M  $H_3PO_3$  দ্ৰৱ আৰু 100 mL 2 M  $H_3PO_2$  দ্ৰৱক প্ৰশম কৰিবলৈ দৰকাৰ হোৱা সঠিক 1 M NaOH ৰ আয়তন যথাক্ৰমে হ'ল :



**Options :**

8643513625. 50 mL আৰু 50 mL

8643513626. 100 mL আৰু 50 mL

8643513627. 100 mL আৰু 200 mL

8643513628. 100 mL আৰু 100 mL

**Question Number : 38 Question Id : 8643511208 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Arrange the following metal complex/compounds in the increasing order of spin only magnetic moment. Presume all the three, high spin system.

(Atomic numbers Ce = 58, Gd = 64 and Eu = 63.)

(a)  $(\text{NH}_4)_2[\text{Ce}(\text{NO}_3)_6]$  (b)  $\text{Gd}(\text{NO}_3)_3$  and (c)  $\text{Eu}(\text{NO}_3)_3$

Answer is :

**Options :**

8643513629. (a) < (b) < (c)

8643513630. (a) < (c) < (b)

8643513631. (b) < (a) < (c)

8643513632. (c) < (a) < (b)

**Question Number : 38 Question Id : 8643511208 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

তলত দিয়া ধাতুৰ জটিল/যৌগসমূহক ঘূৰ্ণনমাত্ৰ চুম্বকীয় ভ্ৰামকৰ উৰ্দ্ধক্রমত সজোৱা। ধৰি লোৱা তিনিওটা উচ্চ স্পিন জটিল তন্ত্ৰ।

(পাৰমাণৱিক সংখ্যা Ce = 58, Gd = 64 আৰু Eu = 63)

(a)  $(\text{NH}_4)_2[\text{Ce}(\text{NO}_3)_6]$  (b)  $\text{Gd}(\text{NO}_3)_3$  আৰু (c)  $\text{Eu}(\text{NO}_3)_3$

উত্তৰটো হ'ল :



**Options :**

8643513629. (a) < (b) < (c)

8643513630. (a) < (c) < (b)

8643513631. (b) < (a) < (c)

8643513632. (c) < (a) < (b)

**Question Number : 39 Question Id : 8643511209 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$Fex_2$  and  $Fey_3$  are known when  $x$  and  $y$  are :

**Options :**

8643513633.  $x = F, Cl, Br, I$  and  $y = F, Cl, Br, I$

8643513634.  $x = F, Cl, Br, I$  and  $y = F, Cl, Br$

8643513635.  $x = F, Cl, Br$  and  $y = F, Cl, Br, I$

8643513636.  $x = Cl, Br, I$  and  $y = F, Cl, Br, I$

**Question Number : 39 Question Id : 8643511209 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$Fex_2$  আৰু  $Fey_3$  জনা যায় যেতিয়া  $x$  আৰু  $y$  হ'ল :

**Options :**

8643513633.  $x = F, Cl, Br, I$  আৰু  $y = F, Cl, Br, I$

8643513634.  $x = F, Cl, Br, I$  আৰু  $y = F, Cl, Br$

8643513635.  $x = F, Cl, Br$  আৰু  $y = F, Cl, Br, I$

8643513636.  $x = Cl, Br, I$  আৰু  $y = F, Cl, Br, I$

Question Number : 40 Question Id : 8643511210 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The green house gas/es is (are) :

- (A) Carbon dioxide
- (B) Oxygen
- (C) Water vapour
- (D) Methane

Choose the most appropriate answer from the options given below :

Options :

8643513637. (A) only

8643513638. (A) and (C) only

8643513639. (A), (C) and (D) only

8643513640. (A) and (B) only

Question Number : 40 Question Id : 8643511210 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

সেউজ গৃহ গেছ (গেছবোৰ) হ'ল :

- (A) কাৰ্বন ডাইঅক্সাইড
- (B) অক্সিজেন
- (C) পানীৰ ভাপ
- (D) মিঠেন

নিম্নলিখিত বিকল্পৰ পৰা আটাইতকৈ উপযুক্ত উত্তৰটো বাছি উলিওৱা :

Options :

8643513637. (A) মাত্ৰ

8643513638. (A) আৰু (C) মাত্ৰ

8643513639. (A), (C) আৰু (D) মাত্ৰ

8643513640. (A) আৰু (B) মাত্ৰ

Question Number : 41 Question Id : 8643511211 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List-I with List-II :

List-I	List-II
Test/Reagents/Observation(s)	Species detected
(a) Lassaigne's Test	(i) Carbon
(b) Cu(II) oxide	(ii) Sulphur
(c) Silver nitrate	(iii) N, S, P, and halogen
(d) The sodium fusion extract gives black precipitate with acetic acid and lead acetate	(iv) Halogen Specifically

The correct match is :

Options :

8643513641. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

8643513642. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

8643513643. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

8643513644. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

Question Number : 41 Question Id : 8643511211 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



তালিকা - I ক তালিকা - II ৰ সৈতে মিলোৱা :

তালিকা - I

পৰীক্ষা/বিকাৰক/পৰ্যবেক্ষণ

- (a) লেজাইনৰ পৰীক্ষা
- (b) Cu(II) অক্সাইড
- (c) ছিলভাৰ নাইট্ৰেট
- (d) ছডিয়াম বিগলন আৰুকে এছেটিক  
এছিড আৰু লেড এছিটেটৰ  
লগত কলা অধঃক্ষেপ দিয়ে।

শুদ্ধ মিলনটো হ'ল :

তালিকা - II

বিচাৰি উলিওৱা প্ৰজাতি

- (i) কাৰ্বন
- (ii) ছালফাৰ
- (iii) N, S, P আৰু হেল'জেন
- (iv) বিশেষভাৱে হেল'জেন

Options :

8643513641. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

8643513642. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

8643513643. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

8643513644. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

Question Number : 42 Question Id : 8643511212 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Statement I : Sodium hydride can be used as an oxidising agent.

Statement II : The lone pair of electrons on nitrogen in pyridine makes it basic.

Choose the CORRECT answer from the options given below :

Options :

8643513645. Both statement I and statement II are true

8643513646. Both statement I and statement II are false

8643513647. Statement I is true but statement II is false

Statement I is false but statement II is true

8643513648.

Question Number : 42 Question Id : 8643511212 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

উক্তি I : ছডিয়াম হাইড্ৰাইডক জাৰণ কৰ্তা হিচাবে ব্যৱহাৰ কৰিব পৰা যায়।

উক্তি II : পিৰিডিনৰ নাইট্ৰজেনত থকা একাকী ইলেকট্ৰন যুগ্মই ইয়াক ক্ষাৰকীয় বনায়।

নিম্নলিখিত বিকল্পৰ পৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

Options :

8643513645. উক্তি I আৰু উক্তি II দুয়োটা সত্য

8643513646. উক্তি I আৰু উক্তি II দুয়োটা অসত্য

8643513647. উক্তি I সত্য কিন্তু উক্তি II অসত্য

8643513648. উক্তি I অসত্য কিন্তু উক্তি II সত্য

Question Number : 43 Question Id : 8643511213 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

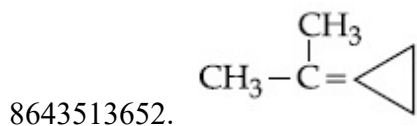
An unsaturated hydrocarbon X on ozonolysis gives A. Compound A when warmed with ammonical silver nitrate forms a bright silver mirror along the sides of the test tube. The unsaturated hydrocarbon X is :

Options :

8643513649.  $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$

8643513650.  $\text{CH}_3 - \underset{\text{CH}_3}{\text{C}} = \underset{\text{CH}_3}{\text{C}} - \text{CH}_3$

8643513651.  $\text{HC} \equiv \text{C} - \text{CH}_2 - \text{CH}_3$

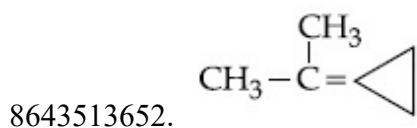
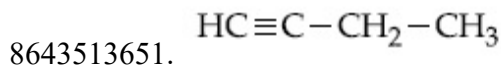
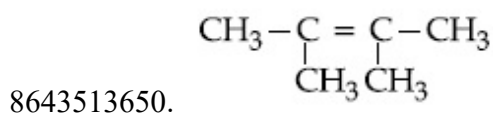
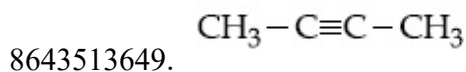


Question Number : 43 Question Id : 8643511213 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

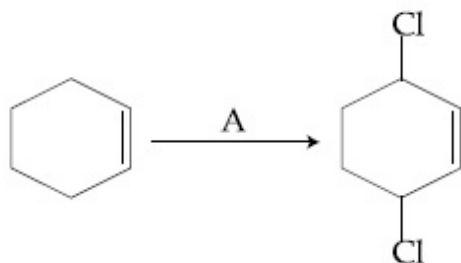
এটা অসংপূক্ত হাইড্ৰকাৰ্বন X এ অ'জ'ন'লাইছিছত দিয়ে A। যৌগ A ক যেতিয়া এমোনিয়ামযুক্ত ছিলভাৰ নাইট্ৰেটৰ লগত গৰম কৰা হয়, টেষ্ট টিউবৰ কাষত উজ্জ্বল ৰূপৰ আইনা উৎপন্ন কৰে। অসংপূক্ত হাইড্ৰকাৰ্বন X হ'ল :

Options :



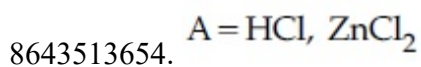
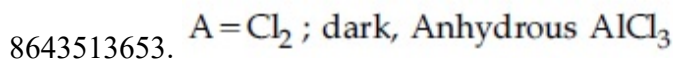
Question Number : 44 Question Id : 8643511214 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



Identify the reagent(s) 'A' and condition(s) for the reaction

Options :

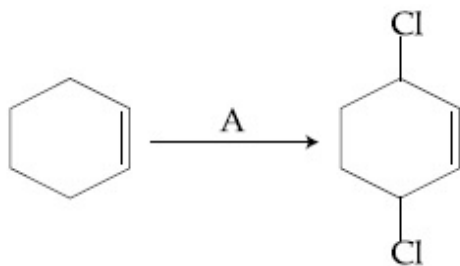


8643513655.  $A = Cl_2$  ; UV light

8643513656.  $A = HCl$  ; Anhydrous  $AlCl_3$

Question Number : 44 Question Id : 8643511214 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



বিকারক (বিকারকবোর) 'A' আৰু বিক্ৰিয়াটোৰ বাবে চৰ্ত (চৰ্তবোর) চিনাক্ত কৰা

Options :

8643513653.  $A = Cl_2$  ; অন্ধকাৰ, অনাদ্ৰ  $AlCl_3$

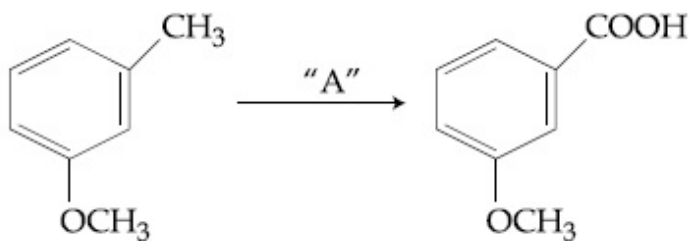
8643513654.  $A = HCl$ ,  $ZnCl_2$

8643513655.  $A = Cl_2$  ; UV পোহৰ

8643513656.  $A = HCl$  ; অনাদ্ৰ  $AlCl_3$

Question Number : 45 Question Id : 8643511215 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



In the above reaction, the reagent "A" is :

Options :

8643513657.  $LiAlH_4$

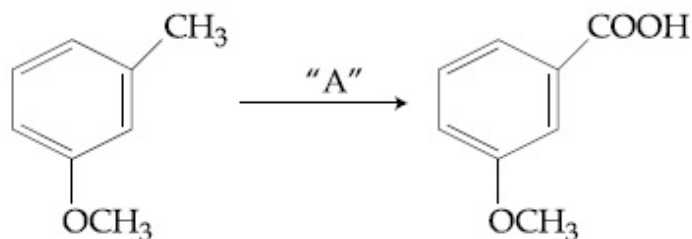
8643513658. Alkaline  $\text{KMnO}_4$ ,  $\text{H}^+$

8643513659.  $\text{HCl}$ ,  $\text{Zn} - \text{Hg}$

8643513660.  $\text{NaBH}_4$ ,  $\text{H}_3\text{O}^+$

Question Number : 45 Question Id : 8643511215 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



ওপৰৰ বিক্ৰিয়াত, বিকাৰক "A" হ'ল :

Options :

8643513657.  $\text{LiAlH}_4$

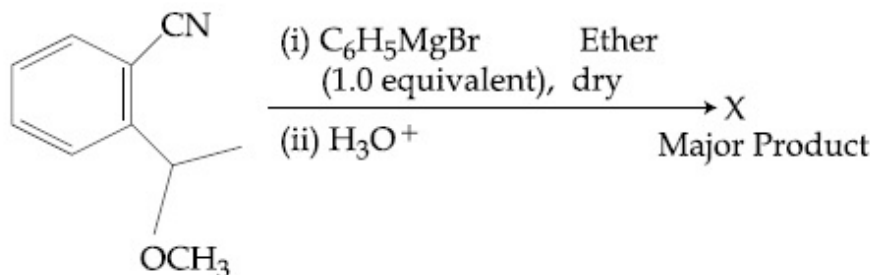
8643513658. ক্ষাৰকীয়  $\text{KMnO}_4$ ,  $\text{H}^+$

8643513659.  $\text{HCl}$ ,  $\text{Zn} - \text{Hg}$

8643513660.  $\text{NaBH}_4$ ,  $\text{H}_3\text{O}^+$

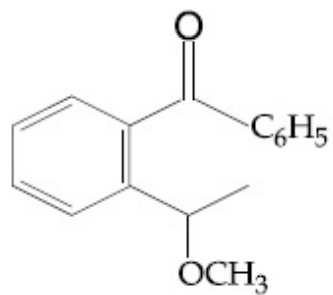
Question Number : 46 Question Id : 8643511216 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

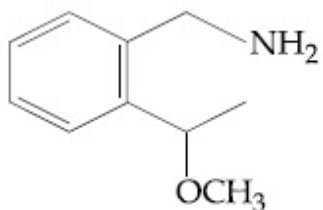


The structure of X is :

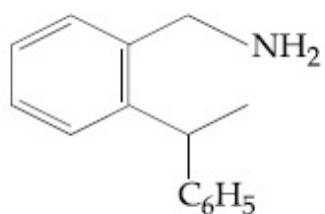
Options :



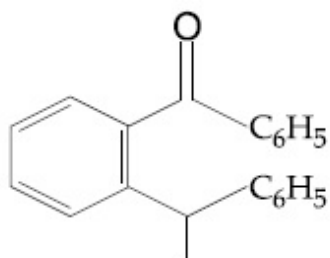
8643513661.



8643513662.



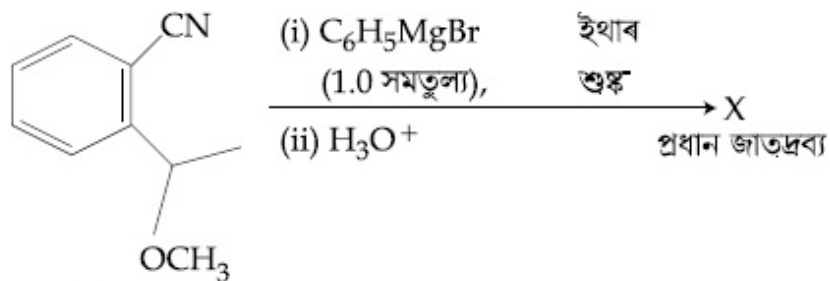
8643513663.



8643513664.

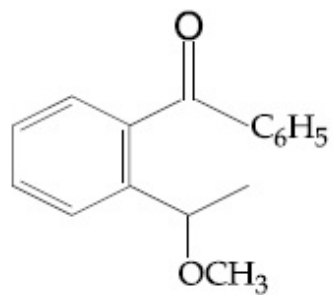
Question Number : 46 Question Id : 8643511216 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

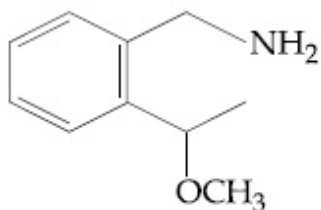


X ৰ গঠন হ'ল :

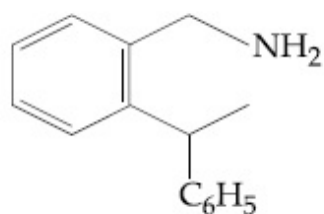
Options :



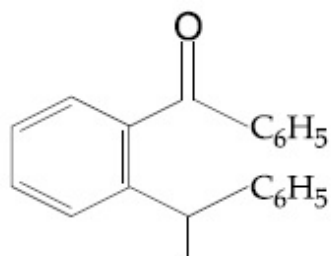
8643513661.



8643513662.



8643513663.



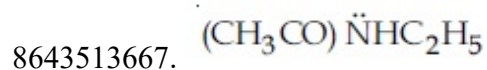
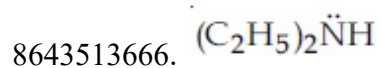
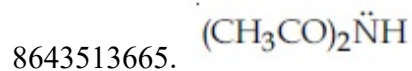
8643513664.

Question Number : 47 Question Id : 8643511217 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following is least basic ?

Options :



8643513668.  $(\text{C}_2\text{H}_5)_3\ddot{\text{N}}$

**Question Number : 47 Question Id : 8643511217 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

তলৰ কোনটো আটাইতকৈ কম ক্ষাৰকীয় ?

**Options :**

8643513665.  $(\text{CH}_3\text{CO})_2\ddot{\text{N}}\text{H}$

8643513666.  $(\text{C}_2\text{H}_5)_2\ddot{\text{N}}\text{H}$

8643513667.  $(\text{CH}_3\text{CO})\ddot{\text{N}}\text{HC}_2\text{H}_5$

8643513668.  $(\text{C}_2\text{H}_5)_3\ddot{\text{N}}$

**Question Number : 48 Question Id : 8643511218 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Ammonolysis of Alkyl halides followed by the treatment with NaOH solution can be used to prepare primary, secondary and tertiary amines. The purpose of NaOH in the reaction is :

**Options :**

8643513669. to remove basic impurities

8643513670. to activate  $\text{NH}_3$  used in the reaction

8643513671. to increase the reactivity of alkyl halide

8643513672. to remove acidic impurities

**Question Number : 48 Question Id : 8643511218 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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



এলকাইল হেলাইডৰ এম'ন'লাইছিছ কৰি তাৰপাছত NaOH দ্ৰৱৰ লগত মিহলালে প্ৰাইমাৰী, ছেকেণ্ডাৰী আৰু টাৰছিয়েৰী এমাইন বনাব পৰা যায়। NaOH ৰ এই বিক্ৰিয়াত উদ্দেশ্য হ'ল :

**Options :**

8643513669. ক্ষাৰকীয় অশুদ্ধি আঁতৰ কৰিবলৈ
8643513670. বিক্ৰিয়াত ব্যৱহাৰ কৰা  $NH_3$  ক সক্ৰিয় কৰিবলৈ
8643513671. এলকাইল হেলাইডৰ সক্ৰিয়তা বৃদ্ধি কৰাৰ কাৰণে
8643513672. অম্লীয় অশুদ্ধি আঁতৰ কৰিবলৈ

**Question Number : 49 Question Id : 8643511219 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Which of the following polymer is used in the manufacture of wood laminates ?

**Options :**

8643513673. Melamine formaldehyde resin
8643513674. Urea formaldehyde resin
8643513675. *cis*-poly isoprene
8643513676. Phenol and formaldehyde resin

**Question Number : 49 Question Id : 8643511219 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

তলৰ কোনটো বহুযোগী কাঠৰ ফলকী শ্বীত (laminated sheet) বনোৱাত ব্যৱহাৰ কৰা হয় ?

**Options :**

8643513673. মেলামাইন ফ'ৰমেলডিহাইড বেজিন
8643513674. ইউৰিয়া ফ'ৰমেলডিহাইড বেজিন
8643513675. ছিছ-প'লী আইছ'প্ৰিন

8643513676. ফিনল আৰু ফ'বমেলডিহাইড বেজিন

**Question Number : 50 Question Id : 8643511220 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

The secondary structure of protein is stabilised by :

**Options :**

8643513677. van der Waals forces

8643513678. Peptide bond

8643513679. Hydrogen bonding

8643513680. glycosidic bond

**Question Number : 50 Question Id : 8643511220 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

প্রটিনৰ ছেকেণ্ডাৰী গঠনটো সুস্থিৰ কৰা হয় :

**Options :**

8643513677. ভান্-ডাৰ বাল বল

8643513678. পেপটাইড বান্ধনি

8643513679. হাইড্ৰজেন বান্ধনি

8643513680. গ্লাইক'ছাইডিক বান্ধনি

## Chemistry Section B

<b>Section Id :</b>	86435182
<b>Section Number :</b>	4
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5

Section Marks : 20  
Mark As Answered Required? : Yes  
Sub-Section Number : 1  
Sub-Section Id : 86435182  
Question Shuffling Allowed : Yes

Question Number : 51 Question Id : 8643511221 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

When 35 mL of 0.15 M lead nitrate solution is mixed with 20 mL of 0.12 M chromic sulphate solution, \_\_\_\_\_  $\times 10^{-5}$  moles of lead sulphate precipitate out. (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 :

100

Question Number : 51 Question Id : 8643511221 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

যেতিয়া 35 mL 0.15 M লেড নাইট্ৰেট দ্ৰৱ, 20 mL 0.12 M ক্ৰ'মিক ছালফেটৰ লগত মিহলোৱা হয়, \_\_\_\_\_  $\times 10^{-5}$  ম'ল লেড ছালফেট অধঃক্ষেপিত হয়। (নিকটতম অখণ্ড সংখ্যাত)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 52 Question Id : 8643511222 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Ga (atomic mass 70 u) crystallizes in a hexagonal close packed structure. The total number of voids in 0.581 g of Ga is \_\_\_\_\_  $\times 10^{21}$ . (Round off to the Nearest Integer).

[Given :  $N_A = 6.023 \times 10^{23}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

**Possible Answers :**

100

**Question Number : 52 Question Id : 8643511222 Question Type : SA**

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

Ga (পাৰামাণৱিক ভৰ 70 u) ৰ স্ফটিকীকৰণ হয় এটা ষড়ভূজীয় নিৰন্ধ সংকুলন গঠনত। 0.581 g Ga ত মুঠ বন্ধৰ সংখ্যা হ'ল \_\_\_\_\_  $\times 10^{21}$ । (নিকটতম অখণ্ড সংখ্যাত)

[দিয়া আছে :  $N_A = 6.023 \times 10^{23}$ ]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 53 Question Id : 8643511223 Question Type : SA**

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

The number of orbitals with  $n=5$ ,  $m_l = +2$  is \_\_\_\_\_. (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 :**

100

**Question Number : 53 Question Id : 8643511223 Question Type : SA**

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

$n=5$ ,  $m_l = +2$  ৰ সৈতে অৰবিটেলৰ সংখ্যা \_\_\_\_\_. (নিকটতম অখণ্ড সংখ্যাত)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 54 Question Id : 8643511224 Question Type : SA**

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

At 25°C, 50 g of iron reacts with HCl to form FeCl<sub>2</sub>. The evolved hydrogen gas expands against a constant pressure of 1 bar. The work done by the gas during this expansion is \_\_\_\_\_ J.

(Round off to the Nearest Integer).

[Given : R = 8.314 J mol<sup>-1</sup> K<sup>-1</sup>. Assume, hydrogen is an ideal gas]

[Atomic mass of Fe is 55.85 u]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 54 **Question Id :** 8643511224 **Question Type :** SA

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

25°C ত 50 g লোরে HCl ৰ সৈতে বিক্রিয়া কৰি FeCl<sub>2</sub> উৎপন্ন কৰে। নিৰ্গত হোৱা হাইড্ৰজেন গেছৰ 1 bar ৰ এটা স্থিৰ চাপৰ বিপৰীতে প্ৰসাৰণ হয়। গেছটোৱে প্ৰসাৰণত খৰা কাৰ্য্য সম্পাদন \_\_\_\_\_ J।  
(নিকটতম অখণ্ড সংখ্যাত)

[দিয়া আছে : R = 8.314 J mol<sup>-1</sup> K<sup>-1</sup>। ধৰিলোৱা হাইড্ৰজেন এটা আদৰ্শ গেছ]

[পাৰমাণৱিক ভৰ Fe ৰ = 55.85 u]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 55 **Question Id :** 8643511225 **Question Type :** SA

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

At 363 K, the vapour pressure of A is 21 kPa and that of B is 18 kPa. One mole of A and 2 moles of B are mixed. Assuming that this solution is ideal, the vapour pressure of the mixture is \_\_\_\_\_ kPa. (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 :

100

Question Number : 55 Question Id : 8643511225 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

363 K ত, A ৰ বাষ্পীয় চাপ 21 kPa আৰু B ৰ 18 kPa। A ৰ এক ম'ল আৰু B ৰ 2 ম'ল মিহলি কৰা হ'ল। ধৰিলোৱা যে এই দ্ৰৱটো এটা আদৰ্শ দ্ৰৱ, মিশ্ৰণটোৰ বাষ্পীয় চাপ \_\_\_\_\_ kPa। (নিকটতম অখণ্ড সংখ্যাত)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 56 Question Id : 8643511226 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Sulphurous acid ( $H_2SO_3$ ) has  $K_{a1} = 1.7 \times 10^{-2}$  and  $K_{a2} = 6.4 \times 10^{-8}$ . The pH of 0.588 M  $H_2SO_3$  is \_\_\_\_\_. (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 :

100

Question Number : 56 Question Id : 8643511226 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ছালফিউৰাছ এছিড ( $H_2SO_3$ ) ৰ  $K_{a1} = 1.7 \times 10^{-2}$  আৰু  $K_{a2} = 6.4 \times 10^{-8}$ । 0.588 M  $H_2SO_3$  ৰ pH \_\_\_\_\_। (নিকটতম অখণ্ড সংখ্যাত)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 57 Question Id : 8643511227 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A  $5.0 \text{ m mol dm}^{-3}$  aqueous solution of KCl has a conductance of 0.55 mS when measured in a cell of cell constant  $1.3 \text{ cm}^{-1}$ . The molar conductivity of this solution is \_\_\_\_\_  $\text{mSm}^2 \text{ mol}^{-1}$ . (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 :

100

Question Number : 57 Question Id : 8643511227 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা  $5.0 \text{ m mol dm}^{-3}$  KCl ৰ জলীয় দ্ৰৱৰ পৰিবাহিতা 0.55 mS, যেতিয়া এটা কোষ যাৰ কোষ ধ্ৰুৱক  $1.3 \text{ cm}^{-1}$  ত জোখা হয়। এই দ্ৰৱটোৰ ম'লাৰ পৰিবহণতা \_\_\_\_\_  $\text{mSm}^2 \text{ mol}^{-1}$ । (নিকটতম অখণ্ড সংখ্যাত)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 58 Question Id : 8643511228 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A and B decompose via first order kinetics with half-lives 54.0 min and 18.0 min respectively. Starting from an equimolar non reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is \_\_\_\_\_ min. (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 :

100

Question Number : 58 Question Id : 8643511228 Question Type : SA

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

প্রথম ক্রমৰ গতিবিজ্ঞান অনুসৰি A আৰু B বিয়োজিত হয় যাৰ অৰ্ধজীৱনকাল যথাক্ৰমে 54.0 min আৰু 18.0 min। এটা সম ম'লৰ অসক্রিয় A আৰু B ৰ মিশ্ৰণ পৰা আৰম্ভ কৰি, A ৰ গাঢ়তা B ৰ 16 গুণ হোৱাত লগা সময় \_\_\_\_\_ min। (নিকটতম অখণ্ড সংখ্যাত)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 59 Question Id : 8643511229 Question Type : SA**

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

$[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  absorbs light of wavelength 498 nm during a d – d transition. The octahedral splitting energy for the above complex is \_\_\_\_\_  $\times 10^{-19}$  J. (Round off to the Nearest Integer).  $h = 6.626 \times 10^{-34}$  Js;  $c = 3 \times 10^8$  ms<sup>-1</sup>

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 59 Question Id : 8643511229 Question Type : SA**

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

$[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  এ 498 nm ৰ পোহৰৰ তৰংগদৈৰ্ঘ্য d – d সংক্ৰমণৰ সময়ত শোষণ কৰে। ওপৰৰ জটিলৰ অষ্ট ফলকীয় বিভাজন শক্তি হ'ল \_\_\_\_\_  $\times 10^{-19}$  J। (নিকটতম অখণ্ড সংখ্যাত)  
 $h = 6.626 \times 10^{-34}$  Js;  $c = 3 \times 10^8$  ms<sup>-1</sup>

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 60 Question Id : 8643511230 Question Type : SA**

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



In Duma's method of estimation of nitrogen, 0.1840 g of an organic compound gave 30 mL of nitrogen collected at 287 K and 758 mm of Hg pressure. The percentage composition of nitrogen in the compound is \_\_\_\_\_. (Round off to the Nearest Integer).

[Given : Aqueous tension at 287 K = 14 mm of Hg]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 60 **Question Id :** 8643511230 **Question Type :** SA

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

নাইট্রজেন মাপ কৰাৰ ডুমাৰ পদ্ধতিত, 287 K আৰু 758 mm Hg চাপত 0.1840 g ৰ এটা জৈৱ যৌগই দিয়ে 30 mL নাইট্রজেন। যৌগটোত নাইট্রজেনৰ শতকৰা সংযুতি হ'ল \_\_\_\_\_। (নিকটতম অখণ্ড সংখ্যাত)

[দিয়া আছে : জলীয় টান 287 K ত = 14 mm Hg]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

## Mathematics Section A

<b>Section Id :</b>	86435183
<b>Section Number :</b>	5
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	86435183
<b>Question Shuffling Allowed :</b>	Yes

**Question Number :** 61 **Question Id :** 8643511231 **Question Type :** MCQ Option  
**Question Mandatory :** No

Correct Marks : 4 Wrong Marks : 1

If the foot of the perpendicular from point (4, 3, 8) on the line  $L_1 : \frac{x-a}{l} = \frac{y-2}{3} = \frac{z-b}{4}$ ,  $l \neq 0$  is (3, 5, 7), then the shortest distance between the line  $L_1$  and line  $L_2 : \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$  is equal to :

Options :

8643513691.  $\frac{1}{\sqrt{6}}$

8643513692.  $\frac{1}{2}$

8643513693.  $\frac{1}{\sqrt{3}}$

8643513694.  $\sqrt{\frac{2}{3}}$

Question Number : 61 Question Id : 8643511231 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যদি  $L_1 : \frac{x-a}{l} = \frac{y-2}{3} = \frac{z-b}{4}$   $l \neq 0$  ৰেখাৰ ওপৰত (4, 3, 8) বিন্দুৰ পৰা লম্বৰ পাদবিন্দু (3, 5, 7) হয় তেন্তে

$L_1$  আৰু  $L_2 : \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$  ৰেখাদুডালৰ মাজৰ হ্রস্বতম দূৰত্ব সমান হ'ব :

Options :

8643513691.  $\frac{1}{\sqrt{6}}$

8643513692.  $\frac{1}{2}$

8643513693.  $\frac{1}{\sqrt{3}}$

8643513694.  $\sqrt{\frac{2}{3}}$

**Question Number : 62 Question Id : 8643511232 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let the lengths of intercepts on  $x$ -axis and  $y$ -axis made by the circle  $x^2 + y^2 + ax + 2ay + c = 0$ , ( $a < 0$ ) be  $2\sqrt{2}$  and  $2\sqrt{5}$ , respectively. Then the shortest distance from origin to a tangent to this circle which is perpendicular to the line  $x + 2y = 0$ , is equal to :

**Options :**

8643513695.  $\sqrt{10}$

8643513696.  $\sqrt{11}$

8643513697.  $\sqrt{7}$

8643513698.  $\sqrt{6}$

**Question Number : 62 Question Id : 8643511232 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল  $x^2 + y^2 + ax + 2ay + c = 0$  বৃত্তৰ দ্বাৰা  $x$ -অক্ষ আৰু  $y$ -অক্ষৰ ওপৰত ক্ৰমে ছেদাংশৰ দৈৰ্ঘ্য  $2\sqrt{2}$  আৰু  $2\sqrt{5}$ , ( $a < 0$ ) তেন্তে এই বৃত্তৰ স্পৰ্শক যি  $x + 2y = 0$  ৰেখাৰ ওপৰত লম্ব আৰু মূলবিন্দুৰ পৰা হ্রস্বতম দূৰত্ব সমান হ'ব:

**Options :**

8643513695.  $\sqrt{10}$

8643513696.  $\sqrt{11}$

8643513697.  $\sqrt{7}$

8643513698.  $\sqrt{6}$

**Question Number : 63 Question Id : 8643511233 Question Type : MCQ Option Shuffling : Yes Is**

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$  and  $\vec{b} = 2\hat{i} - 3\hat{j} + 5\hat{k}$ . If  $\vec{r} \times \vec{a} = \vec{b} \times \vec{r}$ ,  $\vec{r} \cdot (\alpha\hat{i} + 2\hat{j} + \hat{k}) = 3$

and  $\vec{r} \cdot (2\hat{i} + 5\hat{j} - \alpha\hat{k}) = -1$ ,  $\alpha \in \mathbb{R}$ , then the value of  $\alpha + |\vec{r}|^2$  is equal to :

Options :

8643513699. 9

8643513700. 11

8643513701. 13

8643513702. 15

Question Number : 63 Question Id : 8643511233 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$  আৰু  $\vec{b} = 2\hat{i} - 3\hat{j} + 5\hat{k}$  যদি  $\vec{r} \times \vec{a} = \vec{b} \times \vec{r}$ ,

$\vec{r} \cdot (\alpha\hat{i} + 2\hat{j} + \hat{k}) = 3$  আৰু  $\vec{r} \cdot (2\hat{i} + 5\hat{j} - \alpha\hat{k}) = -1$ ,  $\alpha \in \mathbb{R}$  তেন্তে  $\alpha + |\vec{r}|^2$  ৰ মান সমান হ'ব :

Options :

8643513699. 9

8643513700. 11

8643513701. 13

8643513702. 15

Question Number : 64 Question Id : 8643511234 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $f$  be a real valued function, defined on  $\mathbb{R} - \{-1, 1\}$  and given by

$$f(x) = 3 \log_e \left| \frac{x-1}{x+1} \right| - \frac{2}{x-1}.$$

Then in which of the following intervals, function  $f(x)$  is increasing ?

**Options :**

8643513703.  $(-\infty, \infty) - \{-1, 1\}$

8643513704.  $(-\infty, -1) \cup \left( \left[ \frac{1}{2}, \infty \right) - \{1\} \right)$

8643513705.  $(-\infty, \frac{1}{2}] - \{-1\}$

8643513706.  $(-1, \frac{1}{2}]$

**Question Number : 64 Question Id : 8643511234 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল  $\mathbb{R} - \{-1, 1\}$  অন্তৰালত  $f$  এটা বাস্তৱ ফলন বৰ্ণিত আছে আৰু  $f(x) = 3 \log_e \left| \frac{x-1}{x+1} \right| - \frac{2}{x-1}$  বুলি দিয়া

আছে। তেন্তে তলৰ কোনটো অন্তৰালত  $f(x)$  ফলনটো বৰ্ধমান হ'ব ?

**Options :**

8643513703.  $(-\infty, \infty) - \{-1, 1\}$

8643513704.  $(-\infty, -1) \cup \left( \left[ \frac{1}{2}, \infty \right) - \{1\} \right)$

8643513705.  $(-\infty, \frac{1}{2}] - \{-1\}$

8643513706.  $(-1, \frac{1}{2}]$

**Question Number : 65 Question Id : 8643511235 Question Type : MCQ Option Shuffling : Yes**

**Question Mandatory : No**

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

If the points of intersections of the ellipse  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  and the circle  $x^2 + y^2 = 4b$ ,  $b > 4$  lie on the curve  $y^2 = 3x^2$ , then b is equal to :

**Options :**

8643513707. 5

8643513708. 6

8643513709. 10

8643513710. 12

**Question Number : 65 Question Id : 8643511235 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

যদি  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  উপবৃত্ত আৰু  $x^2 + y^2 = 4b$ ,  $b > 4$  বৃত্তৰ ছেদবিন্দুবোৰ  $y^2 = 3x^2$  বক্ৰৰ ওপৰত থাকে, তেন্তে b সমান হ'ব :

**Options :**

8643513707. 5

8643513708. 6

8643513709. 10

8643513710. 12

**Question Number : 66 Question Id : 8643511236 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

Let C be the locus of the mirror image of a point on the parabola  $y^2 = 4x$  with respect to the line  $y = x$ . Then the equation of tangent to C at P(2, 1) is :

**Options :**

8643513711.  $x + 3y = 5$

8643513712.  $2x + y = 5$

8643513713.  $x - y = 1$

8643513714.  $x + 2y = 4$

**Question Number : 66 Question Id : 8643511236 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল  $y = x$  ৰেখা সাপেক্ষে  $y^2 = 4x$  অধিবৃত্তৰ ওপৰত  $C$  হ'ল এটা বিন্দুৰ দাপোন প্ৰতিবিন্দুৰ সম্ভাৰ পথ। তেন্তে  $P(2, 1)$  বিন্দুত  $C$  ৰ স্পৰ্শকৰ সমীকৰণ হ'ব :

**Options :**

8643513711.  $x + 3y = 5$

8643513712.  $2x + y = 5$

8643513713.  $x - y = 1$

8643513714.  $x + 2y = 4$

**Question Number : 67 Question Id : 8643511237 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let A denote the event that a 6-digit integer formed by 0, 1, 2, 3, 4, 5, 6 without repetitions, be divisible by 3. Then probability of event A is equal to :

**Options :**

8643513715.  $\frac{4}{9}$

8643513716.  $\frac{3}{7}$

8643513717.  $\frac{11}{27}$

8643513718.  $\frac{9}{56}$

**Question Number : 67 Question Id : 8643511237 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল অংকবোৰৰ পুনৰাবৃতি নোহোৱাকৈ 0, 1, 2, 3, 4, 5, 6 অংকৰে গঠিত যি 3 ৰে বিভাজ্য হোৱা 6 অংকীয়া অখণ্ড সংখ্যাৰ ঘটনা A। তেন্তে A - ঘটনাটোৰ সম্ভাৱিতা সমান হ'ব :

**Options :**

8643513715.  $\frac{4}{9}$

8643513716.  $\frac{3}{7}$

8643513717.  $\frac{11}{27}$

8643513718.  $\frac{9}{56}$

**Question Number : 68 Question Id : 8643511238 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

If  $y=y(x)$  is the solution of the differential equation  $\frac{dy}{dx} + (\tan x) y = \sin x$ ,  $0 \leq x \leq \frac{\pi}{3}$ , with

$y(0)=0$ , then  $y\left(\frac{\pi}{4}\right)$  equal to :

**Options :**

8643513719.  $\left(\frac{1}{2\sqrt{2}}\right) \log_e 2$

8643513720.  $\frac{1}{2} \log_e 2$

8643513721.  $\log_e 2$



8643513722.  $\frac{1}{4} \log_e 2$

**Question Number : 68 Question Id : 8643511238 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

যদি  $\frac{dy}{dx} + (\tan x) y = \sin x, 0 \leq x \leq \frac{\pi}{3}, y(0) = 0$  অৱকলন সমীকৰণটোৰ  $y = y(x)$  এটা সমাধান হয়, তেন্তে  $y\left(\frac{\pi}{4}\right)$  সমান হ'ব :

**Options :**

8643513719.  $\left(\frac{1}{2\sqrt{2}}\right) \log_e 2$

8643513720.  $\frac{1}{2} \log_e 2$

8643513721.  $\log_e 2$

8643513722.  $\frac{1}{4} \log_e 2$

**Question Number : 69 Question Id : 8643511239 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $\alpha \in \mathbb{R}$  be such that the function  $f(x) = \begin{cases} \frac{\cos^{-1}(1 - \{x\}^2) \sin^{-1}(1 - \{x\})}{\{x\} - \{x\}^3}, & x \neq 0 \\ \alpha, & x = 0 \end{cases}$  is

continuous at  $x=0$ , where  $\{x\} = x - [x]$ ,  $[x]$  is the greatest integer less than or equal to  $x$ . Then :

**Options :**

8643513723.  $\alpha = 0$

8643513724. no such  $\alpha$  exists

8643513725.  $\alpha = \frac{\pi}{\sqrt{2}}$

8643513726.  $\alpha = \frac{\pi}{4}$

**Question Number : 69 Question Id : 8643511239 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধরা হ'ল  $\alpha \in \mathbb{R}$  যাতে  $f(x) = \begin{cases} \frac{\cos^{-1}(1 - \{x\}^2) \sin^{-1}(1 - \{x\})}{\{x\} - \{x\}^3}, & x \neq 0 \\ \alpha, & x = 0 \end{cases}$  যত  $\{x\} = x - [x]$ ,  $[x]$  ব সমান বা

$x$  তকৈ সৰু অখণ্ড সংখ্যা  $x=0$  বিন্দুত অবিচ্ছিন্ন। তেন্তে

**Options :**

8643513723.  $\alpha = 0$

8643513724. কোনো  $\alpha$  স্থিত নহয়।

8643513725.  $\alpha = \frac{\pi}{\sqrt{2}}$

8643513726.  $\alpha = \frac{\pi}{4}$

**Question Number : 70 Question Id : 8643511240 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

If  $(x, y, z)$  be an arbitrary point lying on a plane P which passes through the points  $(42, 0, 0)$ ,

$(0, 42, 0)$  and  $(0, 0, 42)$ , then the value of the expression

$$3 + \frac{x-11}{(y-19)^2 (z-12)^2} + \frac{y-19}{(x-11)^2 (z-12)^2} + \frac{z-12}{(x-11)^2 (y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)}$$

is equal to :

**Options :**

8643513727.  $-45$

8643513728. 39

8643513729. 0

8643513730. 3

**Question Number : 70 Question Id : 8643511240 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

যদি P সমতলত  $(x, y, z)$  যিকোনো এটা বিন্দু যি  $(42, 0, 0)$ ,  $(0, 42, 0)$  আৰু  $(0, 0, 42)$  বিন্দুৰে পাৰ হয়, তেন্তে

$$3 + \frac{x-11}{(y-19)^2 (z-12)^2} + \frac{y-19}{(x-11)^2 (z-12)^2} + \frac{z-12}{(x-11)^2 (y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)}$$

ৰাশিটোৰ মান সমান হ'ব :

**Options :**

8643513727. -45

8643513728. 39

8643513729. 0

8643513730. 3

**Question Number : 71 Question Id : 8643511241 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $A = \{2, 3, 4, 5, \dots, 30\}$  and ' $\simeq$ ' be an equivalence relation on  $A \times A$ , defined by  $(a, b) \simeq (c, d)$ , if and only if  $ad = bc$ . Then the number of ordered pairs which satisfy this equivalence relation with ordered pair  $(4, 3)$  is equal to :

**Options :**

8643513731. 5

8643513732. 6

8643513733. 7

8643513734. 8

Question Number : 71 Question Id : 8643511241 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $A = \{2, 3, 4, 5, \dots, 30\}$  আৰু  $A \times A$  ৰ ওপৰত ' $\simeq$ ' এটা সমতুল্যতা সম্পৰ্ক বৰ্ণিত যাতে  $(a, b) \simeq (c, d)$  যদি আৰু যদিহে  $ad = bc$ । তেন্তে এই সমতুল্যতা সম্পৰ্কটো সিদ্ধ কৰা আৰু  $(4, 3)$  ক্ৰমিত যোৰৰ সৈতে যুক্ত ক্ৰমিত যোৰৰ সংখ্যা সমান হ'ব :

Options :

8643513731. 5

8643513732. 6

8643513733. 7

8643513734. 8

Question Number : 72 Question Id : 8643511242 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $P(x) = x^2 + bx + c$  be a quadratic polynomial with real coefficients such that  $\int_0^1 P(x) dx = 1$

and  $P(x)$  leaves remainder 5 when it is divided by  $(x - 2)$ . Then the value of  $9(b + c)$  is equal to :

Options :

8643513735. 7

8643513736. 9

8643513737. 11

8643513738. 15

Question Number : 72 Question Id : 8643511242 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $P(x) = x^2 + bx + c$  বাস্তৱ সহগৰ সৈতে এটা দ্বিঘাত বহুপদ বাশি যাতে  $\int_0^1 P(x) dx = 1$  আৰু ইয়াক  $(x-2)$  ৰে ভাগ কৰাত  $P(x)$  ৰ ভাগশেষ 5 থাকে। তেন্তে  $9(b+c)$  ৰ মান সমান হ'ব :

Options :

8643513735. 7

8643513736. 9

8643513737. 11

8643513738. 15

Question Number : 73 Question Id : 8643511243 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider a rectangle ABCD having 5, 7, 6, 9 points in the interior of the line segments AB, CD, BC, DA respectively. Let  $\alpha$  be the number of triangles having these points from different sides as vertices and  $\beta$  be the number of quadrilaterals having these points from different sides as vertices. Then  $(\beta - \alpha)$  is equal to :

Options :

8643513739. 1173

8643513740. 1890

8643513741. 717

8643513742. 795

Question Number : 73 Question Id : 8643511243 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

AB, CD, BC, DA ৰেখাখণ্ডবোৰৰ অন্তৰ অংশত 5, 7, 6, 9 বিন্দুবোৰ থকাকৈ ABCD এটা আয়তক্ষেত্ৰ। ধৰা হ'ল  $\alpha$  হ'ল বিভিন্ন বাহুৰ পৰা অহা এই বিন্দুবোৰক শীৰ্ষবিন্দু হিচাপে লৈ ত্ৰিভুজৰ সংখ্যা আৰু  $\beta$  হ'ল বিভিন্ন বাহুৰ পৰা অহা এই বিন্দুবোৰক শীৰ্ষবিন্দু হিচাপে লৈ চতুৰ্ভুজৰ সংখ্যা। তেন্তে  $(\beta - \alpha)$  সমান হ'ব :

Options :

8643513739. 1173

8643513740. 1890

8643513741. 717

8643513742. 795

**Question Number : 74 Question Id : 8643511244 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Consider the integral

$$I = \int_0^{10} \frac{[x] e^{[x]}}{e^{x-1}} dx,$$

where  $[x]$  denotes the greatest integer less than or equal to  $x$ . Then the value of  $I$  is equal

to :

**Options :**

8643513743. 45 (e + 1)

8643513744. 9 (e + 1)

8643513745. 45 (e - 1)

8643513746. 9 (e - 1)

**Question Number : 74 Question Id : 8643511244 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$$I = \int_0^{10} \frac{[x] e^{[x]}}{e^{x-1}} dx$$
 অনুকলনটো বিবেচনা কৰা হ'ল, যত  $[x]$  এ  $x$  ৰ সমান বা  $x$  তকৈ সৰু গৰিষ্ঠ অখণ্ড সংখ্যা

বুজাইছে। তেন্তে  $I$  ৰ মান সমান হ'ব :

**Options :**

8643513743. 45 (e + 1)

8643513744.  $9(e+1)$

8643513745.  $45(e-1)$

8643513746.  $9(e-1)$

**Question Number : 75 Question Id : 8643511245 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $A(-1, 1)$ ,  $B(3, 4)$  and  $C(2, 0)$  be given three points. A line  $y = mx$ ,  $m > 0$ , intersects lines AC and BC at point P and Q respectively. Let  $A_1$  and  $A_2$  be the areas of  $\Delta ABC$  and  $\Delta PQC$  respectively, such that  $A_1 = 3A_2$ , then the value of  $m$  is equal to :

**Options :**

8643513747. 1

8643513748.  $\frac{4}{15}$

8643513749. 2

8643513750. 3

**Question Number : 75 Question Id : 8643511245 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল  $A(-1, 1)$ ,  $B(3, 4)$  আৰু  $C(2, 0)$  তিনিটা প্ৰদত্ত বিন্দু।  $y = mx$ ,  $m > 0$  ৰেখাডালে AC আৰু BC ৰেখাদুডালক P আৰু Q বিন্দুত কাটে। ধৰা হ'ল  $\Delta ABC$  আৰু  $\Delta PQC$  ত্ৰিভুজ দুটাৰ কালি  $A_1$  আৰু  $A_2$  যাতে  $A_1 = 3A_2$ , তেন্তে  $m$  ৰ মান সমান হ'ব :

**Options :**

8643513747. 1

8643513748.  $\frac{4}{15}$

8643513749. 2

8643513750. 3

Question Number : 76 Question Id : 8643511246 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The least value of  $|z|$  where  $z$  is complex number which satisfies the inequality

$$\exp\left(\frac{(|z| + 3)(|z| - 1)}{|z| + 1} \log_e 2\right) \geq \log_{\sqrt{2}} |5\sqrt{7} + 9i|, i = \sqrt{-1}, \text{ is equal to :}$$

Options :

8643513751. 2

8643513752.  $\sqrt{5}$

8643513753. 3

8643513754. 8

Question Number : 76 Question Id : 8643511246 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যদি  $\exp\left(\frac{(|z| + 3)(|z| - 1)}{|z| + 1} \log_e 2\right) \geq \log_{\sqrt{2}} |5\sqrt{7} + 9i|, i = \sqrt{-1}$  অসমিকাতোক সিদ্ধ কৰা  $z$  এটা জটিল

সংখ্যা হয় তেন্তে  $|z|$  ৰ নিম্নতম মান সমান হ'ব :

Options :

8643513751. 2

8643513752.  $\sqrt{5}$

8643513753. 3

8643513754. 8

Question Number : 77 Question Id : 8643511247 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



The maximum value of  $f(x) = \begin{vmatrix} \sin^2 x & 1 + \cos^2 x & \cos 2x \\ 1 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & \sin 2x \end{vmatrix}$ ,  $x \in \mathbf{R}$  is :

**Options :**

8643513755.  $\sqrt{5}$

8643513756. 5

8643513757.  $\sqrt{7}$

8643513758.  $\frac{3}{4}$

**Question Number : 77 Question Id : 8643511247 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$f(x) = \begin{vmatrix} \sin^2 x & 1 + \cos^2 x & \cos 2x \\ 1 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & \sin 2x \end{vmatrix}$ ,  $x \in \mathbf{R}$  ৰ গৰিষ্ঠ মান হ'ব :

**Options :**

8643513755.  $\sqrt{5}$

8643513756. 5

8643513757.  $\sqrt{7}$

8643513758.  $\frac{3}{4}$

**Question Number : 78 Question Id : 8643511248 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Given that the inverse trigonometric functions take principal values only. Then, the number of real values of  $x$  which satisfy  $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x$  is equal to :

Options :

8643513759. 0

8643513760. 1

8643513761. 2

8643513762. 3

Question Number : 78 Question Id : 8643511248 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

দিয়া আছে প্রতিলোম ত্রিকোণমিতীয় ফলনে মাত্র মুখ্য মান লয়। তেন্তে  $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x$  ক সিদ্ধ কৰাকৈ  $x$  ৰ বাস্তৱ মানৰ সংখ্যা সমান হ'ব :

Options :

8643513759. 0

8643513760. 1

8643513761. 2

8643513762. 3

Question Number : 79 Question Id : 8643511249 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let  $f: S \rightarrow S$  where  $S = (0, \infty)$  be a twice differentiable function such that  $f(x+1) = xf(x)$ . If  $g: S \rightarrow \mathbb{R}$  be defined as  $g(x) = \log_e f(x)$ , then the value of  $|g''(5) - g''(1)|$  is equal to :

Options :

8643513763.  $\frac{205}{144}$

$$8643513764. \frac{197}{144}$$

$$8643513765. \frac{187}{144}$$

$$8643513766. 1$$

**Question Number : 79 Question Id : 8643511249 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ধৰা হ'ল  $f: S \rightarrow S$  এটা দ্বিঅৱকলনীয় ফলন যাতে  $f(x+1) = xf(x)$  যতি  $S = (0, \infty)$  যদি  $g: S \rightarrow \mathbb{R}$  সংজ্ঞাবদ্ধ যাতে  $g(x) = \log_e f(x)$  তেন্তে  $|g''(5) - g''(1)|$  ৰ মান সমান হ'ব :

**Options :**

$$8643513763. \frac{205}{144}$$

$$8643513764. \frac{197}{144}$$

$$8643513765. \frac{187}{144}$$

$$8643513766. 1$$

**Question Number : 80 Question Id : 8643511250 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $C_1$  be the curve obtained by the solution of differential equation  $2xy \frac{dy}{dx} = y^2 - x^2, x > 0$ .

Let the curve  $C_2$  be the solution of  $\frac{2xy}{x^2 - y^2} = \frac{dy}{dx}$ . If both the curves pass through (1, 1), then

the area enclosed by the curves  $C_1$  and  $C_2$  is equal to :

**Options :**

8643513767.  $\frac{\pi}{4} + 1$

8643513768.  $\pi - 1$

8643513769.  $\frac{\pi}{2} - 1$

8643513770.  $\pi + 1$

**Question Number : 80 Question Id : 8643511250 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

ধৰা হ'ল  $2xy \frac{dy}{dx} = y^2 - x^2, x > 0$  অৱকলন সমীকৰণটো সমাধানৰ দ্বাৰা প্ৰাপ্ত হোৱা  $C_1$  এটা বক্ৰ। ধৰা হ'ল

$\frac{2xy}{x^2 - y^2} = \frac{dy}{dx}$  ৰ সমাধান হ'ল  $C_2$ । যদি দুয়ো বক্ৰ  $(1, 1)$  বিন্দুৰে পাৰ হয়, তেন্তে  $C_1$  আৰু  $C_2$  বক্ৰৰ দ্বাৰা আবদ্ধ

ক্ষেত্ৰৰ ক্ষেত্ৰফল সমান হ'ব :

**Options :**

8643513767.  $\frac{\pi}{4} + 1$

8643513768.  $\pi - 1$

8643513769.  $\frac{\pi}{2} - 1$

8643513770.  $\pi + 1$

## Mathematics Section B

<b>Section Id :</b>	86435184
<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

Mark As Answered Required? :

Yes

Sub-Section Number :

1

Sub-Section Id :

86435184

Question Shuffling Allowed :

Yes

Question Number : 81 Question Id : 8643511251 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For real numbers  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$ , if

$$\int \frac{(x^2-1) + \tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1) \tan^{-1}\left(\frac{x^2+1}{x}\right)} dx$$

$$= \alpha \log_e \left( \tan^{-1} \left( \frac{x^2+1}{x} \right) \right) + \beta \tan^{-1} \left( \frac{\gamma(x^2-1)}{x} \right) + \delta \tan^{-1} \left( \frac{x^2+1}{x} \right) + C$$

where C is an arbitrary constant, then the value of  $10(\alpha + \beta\gamma + \delta)$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 81 Question Id : 8643511251 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

বাস্তব সংখ্যা  $\alpha$ ,  $\beta$ ,  $\gamma$  আৰু  $\delta$  ৰ বাবে, যদি  $\int \frac{(x^2-1) + \tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1) \tan^{-1}\left(\frac{x^2+1}{x}\right)} dx$

$$= \alpha \log_e \left( \tan^{-1} \left( \frac{x^2+1}{x} \right) \right) + \beta \tan^{-1} \left( \frac{\gamma(x^2-1)}{x} \right) + \delta \tan^{-1} \left( \frac{x^2+1}{x} \right) + C \text{ যত}$$

C স্বেচ্ছ ধৰক। তেন্তে  $10(\alpha + \beta\gamma + \delta)$  সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643511252 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In  $\Delta ABC$ , the lengths of sides AC and AB are 12 cm and 5 cm, respectively. If the area of  $\Delta ABC$  is  $30 \text{ cm}^2$  and R and r are respectively the radii of circumcircle and incircle of  $\Delta ABC$ , then the value of  $2R + r$  (in cm) is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643511252 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$\Delta ABC$  ত AC আৰু AB বাহুৰ দৈৰ্ঘ্য ক্ৰমে 12 cm আৰু 5 cm। যদি  $\Delta ABC$  ৰ কালি  $30 \text{ cm}^2$  আৰু  $\Delta ABC$  ৰ অন্তৰ্ভূৰ ব্যাসাৰ্ধ যদি R আৰু r হয় তেন্তে  $2R + r$  (ছে.মি.ত) ৰ মান সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643511253 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the distance of the point  $(1, -2, 3)$  from the plane  $x + 2y - 3z + 10 = 0$  measured parallel to

the line,  $\frac{x-1}{3} = \frac{2-y}{m} = \frac{z+3}{1}$  is  $\sqrt{\frac{7}{2}}$ , then the value of  $|m|$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643511253 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$\frac{x-1}{3} = \frac{2-y}{m} = \frac{z+3}{1}$  ৰেখাৰ সমান্তৰাল হোৱাকৈ  $x+2y-3z+10=0$  সমতলৰ পৰা যদি  $(1, -2, 3)$  বিন্দুটোৰ

দূৰত্ব  $\sqrt{\frac{7}{2}}$  হয়, তেন্তে  $|m|$  ৰ মান সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 84 Question Id : 8643511254 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $\vec{c}$  be a vector perpendicular to the vectors  $\vec{a} = \hat{i} + \hat{j} - \hat{k}$  and  $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$ . If

$\vec{c} \cdot (\hat{i} + \hat{j} + 3\hat{k}) = 8$  then the value of  $\vec{c} \cdot (\vec{a} \times \vec{b})$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 84 Question Id : 8643511254 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $\vec{a} = \hat{i} + \hat{j} - \hat{k}$  আৰু  $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$  ভেক্টৰ দুটাৰ ওপৰত  $\vec{c}$  ভেক্টৰটো লম্ব।

যদি  $\vec{c} \cdot (\hat{i} + \hat{j} + 3\hat{k}) = 8$  হয়, তেন্তে  $\vec{c} \cdot (\vec{a} \times \vec{b})$  সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number : 85 Question Id : 8643511255 Question Type : SA**

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

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  be defined as

$$f(x) = \begin{cases} x + a, & x < 0 \\ |x - 1|, & x \geq 0 \end{cases} \text{ and } g(x) = \begin{cases} x + 1, & x < 0 \\ (x - 1)^2 + b, & x \geq 0 \end{cases}$$

where  $a, b$  are non-negative real numbers. If  $(g \circ f)(x)$  is continuous for all  $x \in \mathbb{R}$ , then  $a + b$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number : 85 Question Id : 8643511255 Question Type : SA**

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

ধরা হ'ল  $f: \mathbb{R} \rightarrow \mathbb{R}$  আৰু  $g: \mathbb{R} \rightarrow \mathbb{R}$  দুটা ফলন সংজ্ঞাবদ্ধ যাতে

$$f(x) = \begin{cases} x + a, & x < 0 \\ |x - 1|, & x \geq 0 \end{cases} \text{ আৰু } g(x) = \begin{cases} x + 1, & x < 0 \\ (x - 1)^2 + b, & x \geq 0 \end{cases}$$

$a, b$  যত অঋণাত্মক বাস্তৱ সংখ্যা। যদি সকলো  $x \in \mathbb{R}$  ৰ বাবে  $(g \circ f)(x)$  অবিচ্ছিন্ন হয়, তেন্তে  $a + b$  সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number : 86 Question Id : 8643511256 Question Type : SA**

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



Consider the statistics of two sets of observations as follows :

	Size	Mean	Variance
Observation I	10	2	2
Observation II	n	3	1

If the variance of the combined set of these two observations is  $\frac{17}{9}$ , then the value of n is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 86 **Question Id :** 8643511256 **Question Type :** SA

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

দুটা পর্যবেক্ষণ সংহতিৰ পৰিসংখ্যা তলত দিয়া ধৰণৰ :

	আকাৰ	মাধ্য	প্ৰসৰণ
পৰ্যবেক্ষণ I	10	2	2
পৰ্যবেক্ষণ II	n	3	1

যদি পর্যবেক্ষণ দুটাৰ যৌথ সংহতিৰ প্ৰসৰণ  $\frac{17}{9}$  হয়, তেন্তে n ৰ মান সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 87 **Question Id :** 8643511257 **Question Type :** SA

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

Let  $n$  be a positive integer. Let  $A = \sum_{k=0}^n (-1)^k nC_k \left[ \left(\frac{1}{2}\right)^k + \left(\frac{3}{4}\right)^k + \left(\frac{7}{8}\right)^k + \left(\frac{15}{16}\right)^k + \left(\frac{31}{32}\right)^k \right]$

If  $63A = 1 - \frac{1}{2^{30}}$ , then  $n$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 87 **Question Id :** 8643511257 **Question Type :** SA

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

ধৰা হ'ল  $n$  এটা ধনাত্মক অখণ্ড সংখ্যা ধৰা হ'ল

$A = \sum_{k=0}^n (-1)^k nC_k \left[ \left(\frac{1}{2}\right)^k + \left(\frac{3}{4}\right)^k + \left(\frac{7}{8}\right)^k + \left(\frac{15}{16}\right)^k + \left(\frac{31}{32}\right)^k \right]$  এটা ধনাত্মক অখণ্ড সংখ্যা। যদি

$63A = 1 - \frac{1}{2^{30}}$ , তেন্তে  $n$  সমান হ'ব \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 88 **Question Id :** 8643511258 **Question Type :** SA

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

Let  $A = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$  and  $B = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$  be two  $2 \times 1$  matrices with real entries such that  $A = XB$ , where

$X = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & -1 \\ 1 & k \end{bmatrix}$ , and  $k \in \mathbb{R}$ . If  $a_1^2 + a_2^2 = \frac{2}{3}(b_1^2 + b_2^2)$  and  $(k^2 + 1) b_2^2 \neq -2 b_1 b_2$ , then the

value of  $k$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 88 Question Id : 8643511258 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $A = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$  আৰু  $B = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$  দুটা  $2 \times 1$  আকাৰৰ বাস্তৱ মৌল থকা মৌলকক্ষ যাতে  $A = XB$ , যত

$X = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & -1 \\ 1 & k \end{bmatrix}$  আৰু  $k \in \mathbb{R}$ । যদি  $a_1^2 + a_2^2 = \frac{2}{3}(b_1^2 + b_2^2)$  আৰু  $(k^2 + 1) b_2^2 \neq -2 b_1 b_2$ , তেন্তে  $k$  ৰ

মান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 89 Question Id : 8643511259 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $\frac{1}{16}$ ,  $a$  and  $b$  be in G.P. and  $\frac{1}{a}$ ,  $\frac{1}{b}$ ,  $6$  be in A.P., where  $a, b > 0$ . Then  $72(a + b)$  is equal to

\_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 89 Question Id : 8643511259 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $\frac{1}{16}$ ,  $a$  আৰু  $b$  গুণোত্তৰ প্ৰগতিত আছে আৰু  $\frac{1}{a}$ ,  $\frac{1}{b}$ ,  $6$  সমান্তৰ প্ৰগতিত আছে বত  $a, b > 0$ , তেন্তে

$72(a + b)$  সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 90 Question Id : 8643511260 Question Type : SA**

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

Let

$$S_n(x) = \log_{a^{1/2}} x + \log_{a^{1/3}} x + \log_{a^{1/6}} x + \log_{a^{1/11}} x + \log_{a^{1/18}} x + \log_{a^{1/27}} x + \dots \text{ up to n-terms,}$$

where  $a > 1$ . If  $S_{24}(x) = 1093$  and  $S_{12}(2x) = 265$ , then value of  $a$  is equal to \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100

**Question Number : 90 Question Id : 8643511260 Question Type : SA**

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

ধৰা  $S_n(x) = \log_{a^{1/2}} x + \log_{a^{1/3}} x + \log_{a^{1/6}} x + \log_{a^{1/11}} x + \log_{a^{1/18}} x + \log_{a^{1/27}} x + \dots$  n তম পদলৈ, যত,

$a > 1$ । যদি  $S_{24}(x) = 1093$  আৰু  $S_{12}(2x) = 265$ , তেন্তে  $a$  ৰ মান সমান হ'ব \_\_\_\_\_।

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

100