

## National Testing Agency

Question Paper Name :	B TECH EA 17th March 2021 Shift 2
Subject Name :	B TECH EA
Creation Date :	2021-03-18 10:47:32
Duration :	180
Number of Questions :	90
Total Marks :	300
Display Marks:	Yes

**B TECH EA**

Group Number :	1
Group Id :	86435141
Group Maximum Duration :	0
Group Minimum Duration :	180
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300
Is this Group for Examiner? :	No

**Physics Section A**

Section Id :	864351241
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
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 :	864351241
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 8643513601 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

A carrier signal  $C(t) = 25 \sin(2.512 \times 10^{10}t)$  is amplitude modulated by a message signal  $m(t) = 5 \sin(1.57 \times 10^8 t)$  and transmitted through an antenna. What will be the bandwidth of the modulated signal ?

Options :

86435110801. 50 MHz

86435110802. 8 GHz

86435110803. 2.01 GHz

86435110804. 1987.5 MHz

Question Number : 1 Question Id : 8643513601 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

এটা বাহক সংকেত  $C(t) = 25 \sin(2.512 \times 10^{10}t)$  ক এটা বার্তা সংকেত  $m(t) = 5 \sin(1.57 \times 10^8 t)$  ৰ সহায়ত  
বিস্তাৰ কলিত কৰা হৈছে আৰু এডাল এণ্টেনাদি প্ৰেৰণ কৰা হৈছে। কলিত সংকেতৰ পটিবেধ কিমান হ'ব ?

Options :

86435110801. 50 MHz

86435110802. 8 GHz

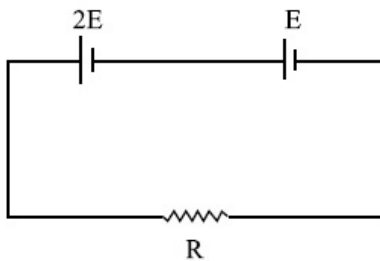
86435110803. 2.01 GHz

86435110804. 1987.5 MHz

Question Number : 2 Question Id : 8643513602 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two cells of emf  $2E$  and  $E$  with internal resistance  $r_1$  and  $r_2$  respectively are connected in series to an external resistor  $R$  (see figure). The value of  $R$ , at which the potential difference across the terminals of the first cell becomes zero is



Options :

86435110805.  $\frac{r_1}{2} - r_2$

86435110806.  $\frac{r_1}{2} + r_2$

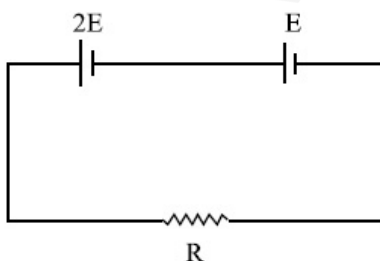
86435110807.  $r_1 - r_2$

86435110808.  $r_1 + r_2$

Question Number : 2 Question Id : 8643513602 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা বহিঃবোধ  $R$  ৰ সৈতে শ্ৰেণীবদ্ধভাৱে ক্ৰমে  $r_1$  আৰু  $r_2$  অন্তঃবোধ সম্পন্ন বিদ্যুৎচালক বল  $2E$  আৰু  $E$  ৰ দুটা কোষ  
সংযোগ কৰা হৈছে। প্ৰথম কোষটোৰ দুয়োমূৰৰ মাজত বিভৱাস্তৰ শূন্য হ'বৰ বাবে  $R$  ৰ মান হ'ব :



Options :

86435110805.  $\frac{r_1}{2} - r_2$

86435110806.  $\frac{r_1}{2} + r_2$

86435110807.  $r_1 - r_2$

86435110808.  $r_1 + r_2$

**Question Number : 3 Question Id : 8643513603 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A sound wave of frequency 245 Hz travels with the speed of  $300 \text{ ms}^{-1}$  along the positive  $x$ -axis. Each point of the wave moves to and fro through a total distance of 6 cm. What will be the mathematical expression of this travelling wave ?

**Options :**

86435110809.  $Y(x, t) = 0.03 [ \sin 5.1x - (0.2 \times 10^3)t ]$

86435110810.  $Y(x, t) = 0.03 [ \sin 5.1x - (1.5 \times 10^3)t ]$

86435110811.  $Y(x, t) = 0.06 [ \sin 5.1x - (1.5 \times 10^3)t ]$

86435110812.  $Y(x, t) = 0.06 [ \sin 0.8x - (0.5 \times 10^3)t ]$

**Question Number : 3 Question Id : 8643513603 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধনাত্মক  $x$ -অক্ষৰ দিশত 245 Hz কম্পনাংকৰ এটা শব্দ তৰংগই  $300 \text{ ms}^{-1}$  দ্রুতিৰে গতি কৰে। তৰংগটোৰ প্ৰতিটো কণাই মুঠ 6 cm দূৰত্ব ধৰি আগলৈ আৰু পিছলৈ গতি কৰে। চলমান তৰংগটোৰ গাণিতিক প্ৰকাশ ৰাশি কি হ'ব ?

**Options :**

86435110809.  $Y(x, t) = 0.03 [ \sin 5.1x - (0.2 \times 10^3)t ]$

86435110810.  $Y(x, t) = 0.03 [ \sin 5.1x - (1.5 \times 10^3)t ]$

86435110811.  $Y(x, t) = 0.06 [ \sin 5.1x - (1.5 \times 10^3)t ]$

86435110812.  $Y(x, t) = 0.06 [ \sin 0.8x - (0.5 \times 10^3)t ]$

**Question Number : 4 Question Id : 8643513604 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A geostationary satellite is orbiting around an arbitrary planet 'P' at a height of  $11R$  above the surface of 'P',  $R$  being the radius of 'P'. The time period of another satellite in hours at a height of  $2R$  from the surface of 'P' is \_\_\_\_\_. 'P' has the time period of 24 hours.

**Options :**

86435110813. 5

86435110814.  $6\sqrt{2}$

86435110815. 3

86435110816.  $\frac{6}{\sqrt{2}}$

**Question Number : 4 Question Id : 8643513604 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

যিকোনো এটা গ্ৰহ 'P' ৰ পৃষ্ঠৰ পৰা 11R উচ্চতাত, R 'P' ৰ ব্যাসার্ধ, এটা জিঅ'ষ্টেচনাৰী/ভূ-স্থৈতিক উপগ্ৰহে 'P' ৰ চাৰিওফালে পৰিভ্ৰমণ কৰি আছে। 'P' ৰ পৃষ্ঠৰ পৰা 2R উচ্চতাত থকা অন্য এটা উপগ্ৰহৰ পৰ্যায়কাল ঘণ্টা হিচাপত হ'ব \_\_\_\_\_। 'P' ৰ পৰ্যায়কাল 24 ঘণ্টা।

**Options :**

86435110813. 5

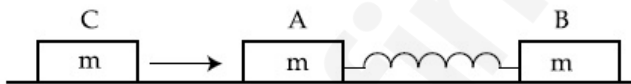
86435110814.  $6\sqrt{2}$

86435110815. 3

86435110816.  $\frac{6}{\sqrt{2}}$

**Question Number : 5 Question Id : 8643513605 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Two identical blocks A and B each of mass  $m$  resting on the smooth horizontal floor are connected by a light spring of natural length  $L$  and spring constant  $K$ . A third block C of mass  $m$  moving with a speed  $v$  along the line joining A and B collides with A. The maximum compression in the spring is



**Options :**

86435110817.  $\sqrt{\frac{m}{2K}}$

86435110818.  $v\sqrt{\frac{m}{2K}}$

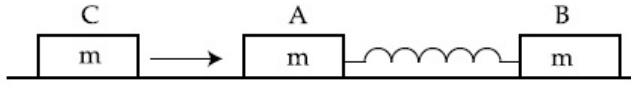
86435110819.  $\sqrt{\frac{mv}{K}}$

86435110820.  $\sqrt{\frac{mv}{2K}}$

**Question Number : 5 Question Id : 8643513605 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

প্ৰাকৃতিক দৈৰ্ঘ্য  $L$  আৰু স্প্ৰিং ধ্ৰুৱক  $K$  ৰ এডাল পাতল স্প্ৰিং ৰ সহায়ত এখন মিহি তলত থকা প্ৰতিটো  $m$  ভৰৰ দুটা সাইলাখ একেই ব্লক  $A$  আৰু  $B$  ক সংযোগ কৰা হৈছে।  $A$  আৰু  $B$  ৰ সংযোগ ৰেখাৰ দিশত  $v$  দ্ৰুতিৰ সৈতে গতি কৰা  $m$  ভৰৰ তৃতীয় এটা ব্লক  $C$  য়ে  $A$  ৰ সৈতে সংঘাত কৰিছে। স্প্ৰিং ডালত হোৱা সৰ্ব্বোচ্চ সংকোচন হ'ব :



Options :

86435110817.  $\sqrt{\frac{m}{2K}}$

86435110818.  $v\sqrt{\frac{m}{2K}}$

86435110819.  $\sqrt{\frac{mv}{K}}$

86435110820.  $\sqrt{\frac{mv}{2K}}$

Question Number : 6 Question Id : 8643513606 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Two particles A and B of equal masses are suspended from two massless springs of spring constants  $K_1$  and  $K_2$  respectively. If the maximum velocities during oscillations are equal, the ratio of the amplitude of A and B is

Options :

86435110821.  $\frac{K_1}{K_2}$

86435110822.  $\sqrt{\frac{K_1}{K_2}}$

86435110823.  $\frac{K_2}{K_1}$

86435110824.  $\sqrt{\frac{K_2}{K_1}}$

Question Number : 6 Question Id : 8643513606 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

স্প্ৰিং ধ্ৰুৱক ক্ৰমে  $K_1$  আৰু  $K_2$  ৰ দুডাল ভৰহীন স্প্ৰিং ৰ পৰা সমান ভৰৰ দুটা কণা  $A$  আৰু  $B$  ওলমাই ৰখা হৈছে। যদিহে দোলনৰ সময়ত সৰ্ব্বোচ্চ বেগ সমান হয়,  $A$  আৰু  $B$  ৰ বিস্তাৰৰ অনুপাত হ'ব :

Options :

86435110821.  $\frac{K_1}{K_2}$

$$86435110822. \sqrt{\frac{K_1}{K_2}}$$

$$86435110823. \frac{K_2}{K_1}$$

$$86435110824. \sqrt{\frac{K_2}{K_1}}$$

**Question Number : 7 Question Id : 8643513607 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**

- |   |  |
|---|--|
| (a) Phase difference between current and voltage in a purely resistive AC circuit | (i) $\frac{\pi}{2}$ ; current leads voltage      |
| (b) Phase difference between current and voltage in a pure inductive AC circuit   | (ii) zero  |
| (c) Phase difference between current and voltage in a pure capacitive AC circuit  | (iii) $\frac{\pi}{2}$ ; current lags voltage     |
| (d) Phase difference between current and voltage in an LCR series circuit         | (iv) $\tan^{-1}\left(\frac{X_C - X_L}{R}\right)$ |

Choose the most appropriate answer from the options given below :

**Options :**

$$86435110825. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)$$

$$86435110826. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)$$

$$86435110827. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)$$

$$86435110828. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)$$

**Question Number : 7 Question Id : 8643513607 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

তালিকা - I ৰ সৈতে তালিকা - II মিলোৱা :

তালিকা - I

তালিকা - II

- |  |  |
|--|--|
| (a) এটা বিশুদ্ধ বোধযুক্ত পৰিবর্তী বৰ্তনীত<br>প্রবাহ আৰু বিভৱৰ দশা পাৰ্থক্য | (i) $\frac{\pi}{2}$ ; প্রবাহ বিভৱতকৈ আগ বাঢ়িব।  |
| (b) এটা বিশুদ্ধ আৱেশীয় পৰিবর্তী বৰ্তনীত<br>প্রবাহ আৰু বিভৱৰ দশা পাৰ্থক্য  | (ii) শূন্য                                       |
| (c) এটা বিশুদ্ধ ধাৰকীয় পৰিবর্তী বৰ্তনীত<br>প্রবাহ আৰু বিভৱৰ দশা পাৰ্থক্য  | (iii) $\frac{\pi}{2}$ ; প্রবাহ বিভৱতকৈ পিছপৰিব।  |
| (d) এটা LCR শ্ৰেণীবদ্ধ বৰ্তনীত প্রবাহ আৰু<br>বিভৱৰ দশা পাৰ্থক্য            | (iv) $\tan^{-1}\left(\frac{X_C - X_L}{R}\right)$ |

তলৰ বিকল্পসমূহৰ পৰা সৰ্বোপযুক্ত উত্তৰ চয়ন কৰা :

**Options :**

86435110825. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
86435110826. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
86435110827. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
86435110828. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

**Question Number : 8 Question Id : 8643513608 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

What happens to the inductive reactance and the current in a purely inductive circuit if the frequency is halved ?

**Options :**

86435110829. Inductive reactance will be doubled and current will be halved.
86435110830. Inductive reactance will be halved and current will be doubled.
86435110831. Both, inductive reactance and current will be halved.
86435110832. Both, inducting reactance and current will be doubled.

**Question Number : 8 Question Id : 8643513608 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

এটা বিশুদ্ধ আৱেশীয় বৰ্তনীত যদি কম্পনাংক আধা কৰি দিয়া হয় তেন্তে বৰ্তনীটোৰ আৱেশীয় প্ৰতিবোধ আৰু প্রবাহৰ কি হ'ব ?

**Options :**

86435110829. আৱেশীয় প্ৰতিৰোধ দুগুণ হ'ব আৰু প্ৰৱাহ আধা হ'ব।

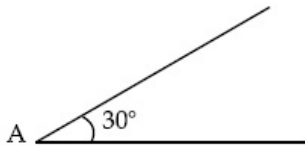
86435110830. আৱেশীয় প্ৰতিৰোধ আধা হ'ব আৰু প্ৰৱাহ দুগুণ হ'ব।

86435110831. আৱেশীয় প্ৰতিৰোধ আৰু প্ৰৱাহ দুয়োটাই আধা হ'ব।

86435110832. আৱেশীয় প্ৰতিৰোধ আৰু প্ৰৱাহ দুয়োটাই দুগুণ হ'ব।

**Question Number : 9 Question Id : 8643513609 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A sphere of mass 2 kg and radius 0.5 m is rolling with an initial speed of  $1 \text{ ms}^{-1}$  goes up an inclined plane which makes an angle of  $30^\circ$  with the horizontal plane, without slipping. How long will the sphere take to return to the starting point A ?



**Options :**

86435110833. 0.60 s

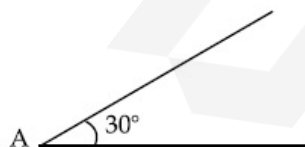
86435110834. 0.57 s

86435110835. 0.52 s

86435110836. 0.80 s

**Question Number : 9 Question Id : 8643513609 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

আনুভূমিক তলৰ সৈতে  $30^\circ$  কোণ কৰি থকা এখন হেলনীয়া তলত, 2 kg ভৰৰ আৰু 0.5 m ব্যাসাৰ্ধৰ এটা গোলকে  $1 \text{ ms}^{-1}$  প্ৰাৰম্ভিক দ্ৰুতিৰ সৈতে পোনপটীয়াকৈ ওপৰলৈ নিপিছলাকৈ বাগৰিবলৈ আৰম্ভ কৰিছে। ঘূৰি আহি প্ৰাৰম্ভিক বিন্দু A পাবলৈ গোলকটোৰ কিমান সময় লাগিব ?



**Options :**

86435110833. 0.60 s

86435110834. 0.57 s

86435110835. 0.52 s

86435110836. 0.80 s

**Question Number : 10 Question Id : 8643513610 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A rubber ball is released from a height of 5 m above the floor. It bounces back repeatedly, always rising to  $\frac{81}{100}$  of the height through which it falls. Find the average speed of the ball.

(Take  $g = 10 \text{ ms}^{-2}$ )

**Options :**

86435110837.  $2.0 \text{ ms}^{-1}$ 86435110838.  $2.50 \text{ ms}^{-1}$ 86435110839.  $3.0 \text{ ms}^{-1}$ 86435110840.  $3.50 \text{ ms}^{-1}$ 

**Question Number : 10 Question Id : 8643513610 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ফ'ৰ ওপৰৰ 5 m উচ্চতাৰ পৰা এটা বাৱাৰ বল এৰি দিয়া হৈছে। যিমান উচ্চতাৰ পৰা ই পৰে, সদায়েই তাৰ  $\frac{81}{100}$  ভাগ

উচ্চতালৈ ই বাৰে বাৰে উচ্ছলিত হয়। বলটোৰ গড় দ্ৰুতি নিৰ্ণয় কৰা।

(  $g = 10 \text{ ms}^{-2}$  লোৱা)

**Options :**

86435110837.  $2.0 \text{ ms}^{-1}$ 86435110838.  $2.50 \text{ ms}^{-1}$ 86435110839.  $3.0 \text{ ms}^{-1}$ 86435110840.  $3.50 \text{ ms}^{-1}$ 

**Question Number : 11 Question Id : 8643513611 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The velocity of a particle is  $v = v_0 + gt + Ft^2$ . Its position is  $x = 0$  at  $t = 0$ ; then its displacement after time ( $t = 1$ ) is :

**Options :**

86435110841.  $v_0 + \frac{g}{2} + F$ 86435110842.  $v_0 + 2g + 3F$ 86435110843.  $v_0 + \frac{g}{2} + \frac{F}{3}$

86435110844.  $v_0 + g + F$

**Question Number : 11 Question Id : 8643513611 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

এটা কণার দ্রুতি  $v = v_0 + gt + Ft^2$ । ইয়ার অরছান  $t=0$  ত  $x=0$ ; তেন্তে  $(t=1)$  সময়ৰ পাছত ইয়াৰ সৰণ হয় :

**Options :**

86435110841.  $v_0 + \frac{g}{2} + F$

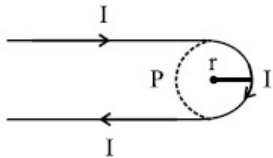
86435110842.  $v_0 + 2g + 3F$

86435110843.  $v_0 + \frac{g}{2} + \frac{F}{3}$

86435110844.  $v_0 + g + F$

**Question Number : 12 Question Id : 8643513612 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A hairpin like shape as shown in figure is made by bending a long current carrying wire. What is the magnitude of a magnetic field at point P which lies on the centre of the semicircle ?



**Options :**

86435110845.  $\frac{\mu_0 I}{2\pi r}(2 - \pi)$

86435110846.  $\frac{\mu_0 I}{2\pi r}(2 + \pi)$

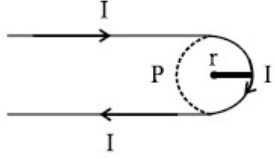
86435110847.  $\frac{\mu_0 I}{4\pi r}(2 + \pi)$

86435110848.  $\frac{\mu_0 I}{4\pi r}(2 - \pi)$

**Question Number : 12 Question Id : 8643513612 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

এডাল দীঘল প্ৰবাহ কঢ়িয়াই থকা তাঁৰ বেঁকা কৰি চিত্ৰত দেখুওৱা ধৰণে চুলিৰ কাঁটাৰ দৰে এটা আকৃতি বনোৱা হ'ল।

অৰ্ধবৃত্তটোৰ কেন্দ্ৰত থকা বিন্দু P ত চৌম্বিক ক্ষেত্ৰৰ মান কিমান হ'ব ?



Options :

86435110845.  $\frac{\mu_0 I}{2\pi r}(2 - \pi)$

86435110846.  $\frac{\mu_0 I}{2\pi r}(2 + \pi)$

86435110847.  $\frac{\mu_0 I}{4\pi r}(2 + \pi)$

86435110848.  $\frac{\mu_0 I}{4\pi r}(2 - \pi)$

Question Number : 13 Question Id : 8643513613 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The atomic hydrogen emits a line spectrum consisting of various series. Which series of hydrogen atomic spectra is lying in the visible region ?

Options :

86435110849. Paschen series

86435110850. Balmer series

86435110851. Lyman series

86435110852. Brackett series

Question Number : 13 Question Id : 8643513613 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

হাইড্ৰ'জেন পৰমাণুৰ পৰা কেবাটাও শ্ৰেণীৰ ৰেখা বৰ্ণালী নিৰ্গত হয়। হাইড্ৰ'জেন পৰমাণুৰ কোনটো শ্ৰেণীৰ বৰ্ণালী দৃশ্যমান পৰিসৰৰ ভিতৰত আছে ?

Options :

86435110849. পাশ্চেন শ্ৰেণী

86435110850. বামাৰ শ্ৰেণী

86435110851. লিমেন শ্ৰেণী

86435110852. ব্ৰেকেট শ্ৰেণী

Question Number : 14 Question Id : 8643513614 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Two identical photocathodes receive the light of frequencies  $f_1$  and  $f_2$  respectively. If the velocities of the photo-electrons coming out are  $v_1$  and  $v_2$  respectively, then

Options :

86435110853.  $v_1 - v_2 = \left[ \frac{2h}{m}(f_1 - f_2) \right]^{\frac{1}{2}}$

86435110854.  $v_1^2 - v_2^2 = \frac{2h}{m}[f_1 - f_2]$

86435110855.  $v_1 + v_2 = \left[ \frac{2h}{m}(f_1 + f_2) \right]^{\frac{1}{2}}$

86435110856.  $v_1^2 + v_2^2 = \frac{2h}{m}[f_1 + f_2]$

Question Number : 14 Question Id : 8643513614 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

দুডাল সাইলাখ একেই ফ'ট'কেথডে  $f_1$  আৰু  $f_2$  কম্পনাংকৰ পোহৰ পাইছে। যদিহে নিৰ্গত ফ'ট'ইলেকট্ৰনসমূহৰ বেগ ক্ৰমে  $v_1$  আৰু  $v_2$  হয়, তেন্তে :

Options :

86435110853.  $v_1 - v_2 = \left[ \frac{2h}{m}(f_1 - f_2) \right]^{\frac{1}{2}}$

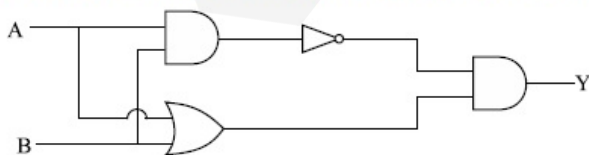
86435110854.  $v_1^2 - v_2^2 = \frac{2h}{m}[f_1 - f_2]$

86435110855.  $v_1 + v_2 = \left[ \frac{2h}{m}(f_1 + f_2) \right]^{\frac{1}{2}}$

86435110856.  $v_1^2 + v_2^2 = \frac{2h}{m}[f_1 + f_2]$

Question Number : 15 Question Id : 8643513615 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Which one of the following will be the output of the given circuit ?



Options :

86435110857. AND Gate

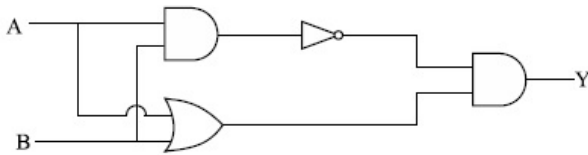
86435110858. NAND Gate

86435110859. XOR Gate

86435110860. NOR Gate

**Question Number : 15 Question Id : 8643513615 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

দিয়া বৰ্তনীটোৰ আউটপুট তলৰ কোনটো হ'ব ?



**Options :**

86435110857. AND গেট

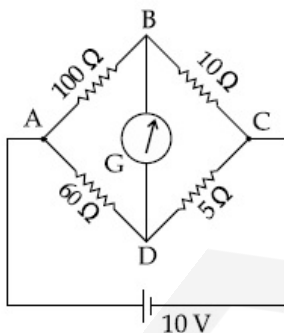
86435110858. NAND গেট

86435110859. XOR গেট

86435110860. NOR গেট

**Question Number : 16 Question Id : 8643513616 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The four arms of a Wheatstone bridge have resistances as shown in the figure. A galvanometer of  $15\ \Omega$  resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of  $10\ \text{V}$  is maintained across AC.



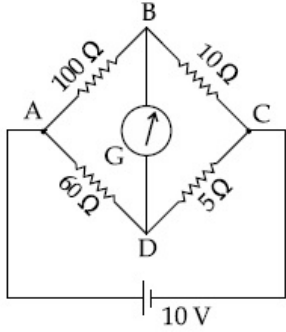
**Options :**

86435110861.  $2.44\ \mu\text{A}$ 86435110862.  $2.44\ \text{mA}$ 86435110863.  $4.87\ \mu\text{A}$ 86435110864.  $4.87\ \text{mA}$ 

**Question Number : 16 Question Id : 8643513616 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

এটা ছইটষ্ট 'ন ব্রীজৰ চাৰিওটা বাহুৰ বোধ চিত্ৰত দেখুওৱা ধৰণে আছে। BD ৰ দুয়োমূৰে  $15\ \Omega$  বোধৰ এটা গেলভেন'মিটাৰ সংযোগ কৰা হৈছে। যেতিয়া AC ৰ দুয়োমূৰে  $10\ \text{V}$  ৰ বিভৱভেদ বজাই ৰখা হয়, গেলভেন'মিটাৰৰ মাজেৰে যোৱা প্ৰবাহ নিৰ্ণয় কৰা।



Options :

86435110861.  $2.44\ \mu\text{A}$
86435110862.  $2.44\ \text{mA}$
86435110863.  $4.87\ \mu\text{A}$
86435110864.  $4.87\ \text{mA}$

Question Number : 17 Question Id : 8643513617 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A block of mass  $1\ \text{kg}$  attached to a spring is made to oscillate with an initial amplitude of  $12\ \text{cm}$ . After 2 minutes the amplitude decreases to  $6\ \text{cm}$ . Determine the value of the damping constant for this motion. ( take  $\ln 2 = 0.693$  )

Options :

86435110865.  $1.16 \times 10^2\ \text{kg s}^{-1}$
86435110866.  $0.69 \times 10^2\ \text{kg s}^{-1}$
86435110867.  $5.7 \times 10^{-3}\ \text{kg s}^{-1}$
86435110868.  $3.3 \times 10^2\ \text{kg s}^{-1}$

Question Number : 17 Question Id : 8643513617 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

এডাল স্প্ৰিঙৰ সৈতে সংলগ্ন  $1\ \text{kg}$  ভৰৰ এটা ব্লকক প্ৰান্তভিক বিস্তাৰ  $12\ \text{cm}$  ৰ সৈতে দোলায়িত কৰা হৈছে। 2 মিনিট পাছত বিস্তাৰ  $6\ \text{cm}$  লৈ হ্রাস পায়। এই গতিৰ বাবে অৱমন্দন ধ্ৰুৱক নিৰ্ণয় কৰা। ( $\ln 2 = 0.693$  লোৱা)

Options :

86435110865.  $1.16 \times 10^2\ \text{kg s}^{-1}$
86435110866.  $0.69 \times 10^2\ \text{kg s}^{-1}$

86435110867.  $5.7 \times 10^{-3} \text{ kg s}^{-1}$ 86435110868.  $3.3 \times 10^2 \text{ kg s}^{-1}$ 

**Question Number : 18 Question Id : 8643513618 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If one mole of the polyatomic gas is having two vibrational modes and  $\beta$  is the ratio of molar

specific heats for polyatomic gas  $\left( \beta = \frac{C_P}{C_V} \right)$  then the value of  $\beta$  is :

**Options :**

86435110869. 1.25

86435110870. 1.2

86435110871. 1.35

86435110872. 1.02

**Question Number : 18 Question Id : 8643513618 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

যদিহে এক ম'ল পবিমাণৰ এক বহুপাৰমাণৱিক গেছৰ দুটা কম্পনৰ পছা (mode) আছে আৰু বহুপাৰমাণৱিক গেছটোৰ

বাবে ম'লাৰ আপেক্ষিক তাপৰ অনুপাত  $\beta \left( \beta = \frac{C_P}{C_V} \right)$  হয়, তেন্তে  $\beta$  ৰ মান হ'ব :

**Options :**

86435110869. 1.25

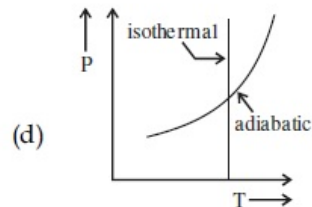
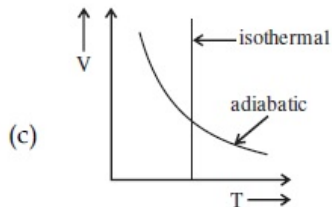
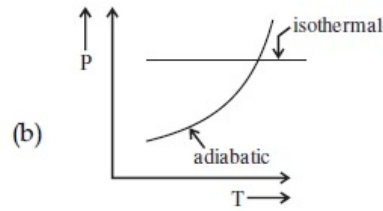
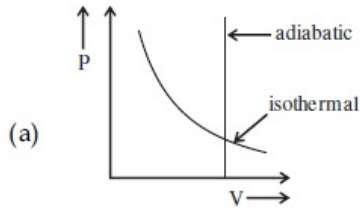
86435110870. 1.2

86435110871. 1.35

86435110872. 1.02

**Question Number : 19 Question Id : 8643513619 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Which one is the correct option for the two different thermodynamic processes ?



**Options :**

86435110873. (a) only

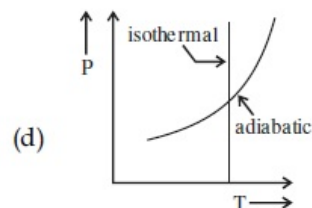
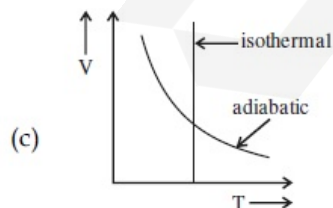
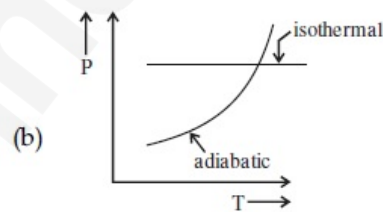
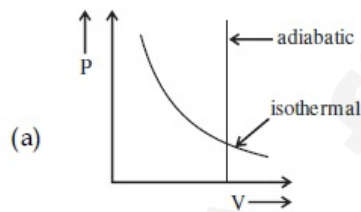
86435110874. (b) and (c)

86435110875. (c) and (a)

86435110876. (c) and (d)

**Question Number : 19 Question Id : 8643513619 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

দুটা ভিন্ন তাপগতিক প্রক্রিয়ার বাবে তলৰ কোনটো শুদ্ধ বিকল্প হয় ?



**Options :**

86435110873. মাত্র (a)

86435110874. (b) আৰু (c)

86435110875. (c) আৰু (a)

86435110876. (c) আৰু (d)

**Question Number : 20 Question Id : 8643513620 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

An object is located at 2 km beneath the surface of the water. If the fractional compression

$\frac{\Delta V}{V}$  is 1.36%, the ratio of hydraulic stress to the corresponding hydraulic strain will be

\_\_\_\_\_.

[ Given : density of water is  $1000 \text{ kgm}^{-3}$  and  $g = 9.8 \text{ ms}^{-2}$ .]

**Options :**

86435110877.  $1.96 \times 10^7 \text{ Nm}^{-2}$

86435110878.  $1.44 \times 10^7 \text{ Nm}^{-2}$

86435110879.  $2.26 \times 10^9 \text{ Nm}^{-2}$

86435110880.  $1.44 \times 10^9 \text{ Nm}^{-2}$

**Question Number : 20 Question Id : 8643513620 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

জলপৃষ্ঠৰ পৰা 2 km তলত এটা বস্তু পোৱা গৈছে। যদিহে আংশিক সংকোচন  $\frac{\Delta V}{V}$  1.36% হয়, জলীয় প্ৰতিচাপৰ সৈতে

আনুসংগিক জলীয় বিকৃতিৰ অনুপাত হ'ব \_\_\_\_\_।

[দিয়া আছে : পানীৰ ঘনত্ব  $1000 \text{ kgm}^{-3}$  আৰু  $g = 9.8 \text{ ms}^{-2}$ ]

**Options :**

86435110877.  $1.96 \times 10^7 \text{ Nm}^{-2}$

86435110878.  $1.44 \times 10^7 \text{ Nm}^{-2}$

86435110879.  $2.26 \times 10^9 \text{ Nm}^{-2}$

86435110880.  $1.44 \times 10^9 \text{ Nm}^{-2}$

## Physics Section B

<b>Section Id :</b>	864351242
<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

Sub-Section Number :

1

Sub-Section Id :

864351242

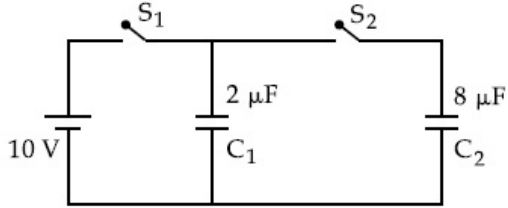
Question Shuffling Allowed :

Yes

Question Number : 21 Question Id : 8643513621 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A  $2\ \mu\text{F}$  capacitor  $C_1$  is first charged to a potential difference of  $10\ \text{V}$  using a battery. Then the battery is removed and the capacitor is connected to an uncharged capacitor  $C_2$  of  $8\ \mu\text{F}$ . The charge in  $C_2$  on equilibrium condition is \_\_\_\_\_  $\mu\text{C}$ . (Round off to the Nearest Integer)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

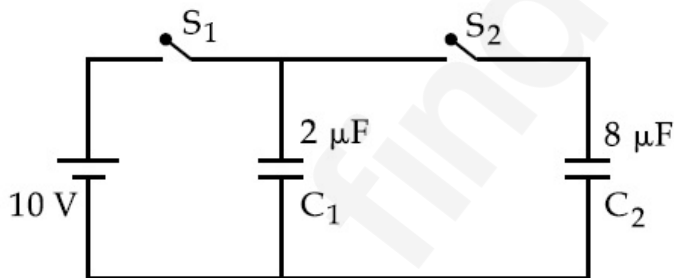
Possible Answers :

100

Question Number : 21 Question Id : 8643513621 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা বেটেৰীৰ সহায়ত এটা  $2\ \mu\text{F}$  ৰ ধাৰক  $C_1$  ক প্ৰথমে  $10\ \text{V}$  বিভৱভেদলৈ আহিত কৰা হ'ল। তাৰপাছত বেটেৰীটো আঁতৰাই ধাৰকটো  $8\ \mu\text{F}$  ৰ এটা আধানৰহিত ধাৰক  $C_2$  ৰ সৈতে সংযোগ কৰা হ'ল। সাম্যাবস্থাত  $C_2$  ৰ আধানৰ পৰিমাণ \_\_\_\_\_  $\mu\text{C}$ । (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

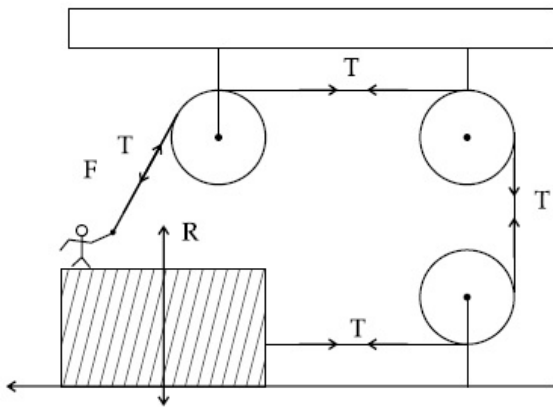
100

Question Number : 22 Question Id : 8643513622 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A boy of mass 4 kg is standing on a piece of wood having mass 5 kg. If the coefficient of friction between the wood and the floor is 0.5, the maximum force that the boy can exert on the rope so that the piece of wood does not move from its place is \_\_\_\_\_ N. (Round off to the Nearest Integer)

[Take  $g = 10 \text{ ms}^{-2}$ ]



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

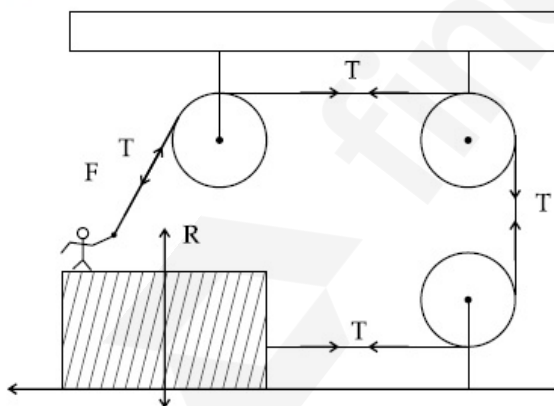
100

**Question Number :** 22 **Question Id :** 8643513622 **Question Type :** SA

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

4 kg ভৰৰ এটা ল'ৰা 5 kg ভৰৰ এটুকুৰা কাঠৰ ওপৰত থিয় হৈ আছে। যদিহে ফ্ল'ৰ আৰু কাঠটুকুৰাৰ মাজৰ ঘৰ্ষণ গুণাংক 0.5 হয়, কাঠটুকুৰা যাতে ইয়াৰ তলৰ পৰা গতি নকৰে তাৰ বাবে ল'ৰাজনে বহীডালত দিব পৰা সৰ্ব্বোচ্চ বল হয় \_\_\_\_\_ N। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

[ $g = 10 \text{ ms}^{-2}$  লোৱা]



**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 :** 8643513623 **Question Type :** SA

Correct Marks : 4 Wrong Marks : 0

The image of an object placed in air formed by a convex refracting surface is at a distance of

10 m behind the surface. The image is real and is at  $\frac{2}{3}$  of the distance of the object from

the surface. The wavelength of light inside the surface is  $\frac{2}{3}$  times the wavelength in air. The

radius of the curved surface is  $\frac{x}{13}$  m. The value of 'x' is \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 23 Question Id : 8643513623 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এখন প্রতিসারী উত্তল পৃষ্ঠৰ দ্বাৰা পৃষ্ঠৰ পাছফালে 10 m দূৰত্বত বায়ুত থকা এক লক্ষ্যবস্তুৰ প্ৰতিবিন্ম গঠিত হয় ।

প্ৰতিবিন্মটো সং আৰু লক্ষ্যবস্তুটোৰ পৃষ্ঠৰ পৰা দূৰত্ব  $\frac{2}{3}$  ভাগ। পৃষ্ঠৰ ভিতৰত পোহৰৰ তৰংগদৈৰ্ঘ্য বায়ুত পোহৰৰ

তৰংগদৈৰ্ঘ্যৰ  $\frac{2}{3}$  গুণ। বক্রপৃষ্ঠৰ ব্যাসার্ধ হয়  $\frac{x}{13}$  m । 'x' ৰ মান \_\_\_\_\_ ।

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 : 8643513624 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The electric field intensity produced by the radiation coming from a 100 W bulb at a distance of 3 m is E. The electric field intensity produced by the radiation coming from 60 W at the same distance is

$\sqrt{\frac{x}{5}}$  E. Where the value of x = \_\_\_\_\_.

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 : 8643513624 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

100 W ৰ বাস্তব পৰা অহা বিকিৰণৰ দ্বাৰা 3 m দূৰত্বত উৎপন্ন হোৱা বৈদ্যুতিক ক্ষেত্ৰৰ প্ৰাৱল্য হয় E । 60 W ৰ বাস্তব

পৰা অহা বিকিৰণৰ দ্বাৰা একেই দূৰত্বত উৎপন্ন হোৱা বৈদ্যুতিক ক্ষেত্ৰৰ প্ৰাৱল্য হয়  $\sqrt{\frac{x}{5}}$  E । য'ত x ৰ মান

= \_\_\_\_\_ ।

**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 :** 8643513625 **Question Type :** SA

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

Seawater at a frequency  $f=9 \times 10^2$  Hz, has permittivity  $\epsilon=80\epsilon_0$  and resistivity

$\rho=0.25 \Omega\text{m}$ . Imagine a parallel plate capacitor is immersed in seawater and is driven by an

alternating voltage source  $V(t)=V_0 \sin(2\pi ft)$ . Then the conduction current density

becomes  $10^x$  times the displacement current density after time  $t = \frac{1}{800}$  s. The value of x is

\_\_\_\_\_.

(Given :  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$ )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 25 **Question Id :** 8643513625 **Question Type :** SA

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

$f=9 \times 10^2$  Hz কম্পনাংকত সাগৰৰ পানীৰ প্ৰৱেশ্যতা  $\epsilon=80\epsilon_0$  আৰু বোধকতা  $\rho=0.25 \Omega\text{m}$  । কল্পনা কৰা যে এটা সমান্তৰাল পাত ধাৰক সাগৰৰ পানীত ডুবাই দিয়া হৈছে আৰু এক পৰিবহী বিভৱ উৎস  $V(t)=V_0 \sin(2\pi ft)$  ৰে চালিত

কৰা হৈছে। তেন্তে  $t = \frac{1}{800}$  s সময়ৰ পাছত পৰিবহণ প্ৰবাহ ঘনত্বৰ মান সৰণ (displacement) প্ৰবাহ ঘনত্বৰ  $10^x$

গুণ হয়গৈ । x ৰ মান \_\_\_\_\_ ।

(দিয়া আছে :  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$ )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

Question Number : 26 Question Id : 8643513626 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

The electric field in a region is given by  $\vec{E} = \frac{2}{5}E_0\hat{i} + \frac{3}{5}E_0\hat{j}$  with  $E_0 = 4.0 \times 10^3 \frac{N}{C}$ . The flux of this field through a rectangular surface area  $0.4 \text{ m}^2$  parallel to the Y-Z plane is \_\_\_\_\_  $\text{Nm}^2 \text{C}^{-1}$ .

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 : 8643513626 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

এক অঞ্চলৰ বৈদ্যুতিক ক্ষেত্র দিয়া হৈছে  $\vec{E} = \frac{2}{5}E_0\hat{i} + \frac{3}{5}E_0\hat{j}$ , য'ত  $E_0 = 4.0 \times 10^3 \frac{N}{C}$ । Y-Z তলৰ সমান্তৰাল  $0.4 \text{ m}^2$  কালিৰ এক আয়তাকাৰ পৃষ্ঠৰ মাজেদি এই ক্ষেত্রৰ অভিবাহ হয় \_\_\_\_\_  $\text{Nm}^2 \text{C}^{-1}$ ।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

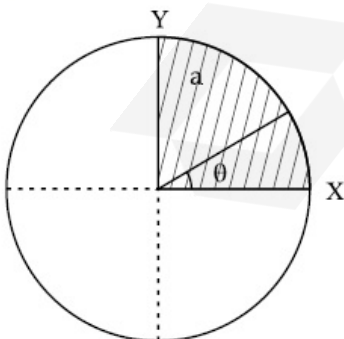
Text Areas : PlainText

Possible Answers :

100

Question Number : 27 Question Id : 8643513627 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

The disc of mass M with uniform surface mass density  $\sigma$  is shown in the figure. The centre of mass of the quarter disc (the shaded area) is at the position  $\frac{x}{3} \frac{a}{\pi}, \frac{x}{3} \frac{a}{\pi}$  where x is \_\_\_\_\_. (Round off to the Nearest Integer)  
[a is an area as shown in the figure ]



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

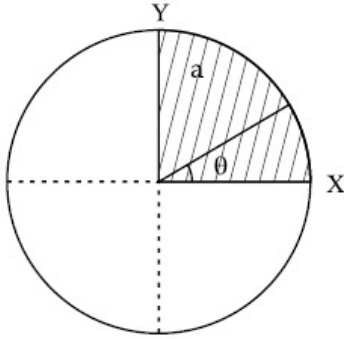
Question Number : 27 Question Id : 8643513627 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

সুষম পৃষ্ঠ ঘনত্ব  $\sigma$  ব সৈতে ভৰ M ব এখন থাল চিত্ৰত দেখুওৱা হৈছে।  $\left(\frac{x}{3} \frac{a}{\pi}, \frac{x}{3} \frac{a}{\pi}\right)$  অৱস্থানত থালখনৰ এক

চতুৰ্থাংশৰ (ছাঁ পৰা অংশ) ভৰকেন্দ্ৰটো আছে। য'ত  $x$  হয় \_\_\_\_\_। (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

[a এটা কালি হিচাবে চিত্ৰত দেখুওৱা হৈছে।]



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 : 8643513628 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A body of mass 1 kg rests on a horizontal floor with which it has a coefficient of static

friction  $\frac{1}{\sqrt{3}}$ . It is desired to make the body move by applying the minimum possible force

F N. The value of F will be \_\_\_\_\_. (Round off to the Nearest Integer)

[ Take  $g = 10 \text{ ms}^{-2}$  ]

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 : 8643513628 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এখন আনুভূমিক তলত 1 kg ভৰৰ এটা বস্তু স্থিৰ অৱস্থাত আছে আৰু তলখনৰ সৈতে বস্তুটোৰ স্থৈতিক ঘৰ্ষণ গুণাংক

$\frac{1}{\sqrt{3}}$ । সৰ্বনিম্ন সম্ভৱপৰ বল F N প্ৰয়োগ কৰি বস্তুটোক গতি কৰাব পৰা যাব বুলি আশা কৰা গৈছে। F ৰ মান হ'ব

\_\_\_\_\_। (নিকটতম অখণ্ড সংখ্যালৈ গোটকৰণ কৰা )

[  $g = 10 \text{ ms}^{-2}$  লোৱা ]

**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 :** 8643513629 **Question Type :** SA

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

A particle of mass m moves in a circular orbit in a central potential field  $U(r) = U_0 r^4$ . If

Bohr's quantization conditions are applied, radii of possible orbitals  $r_n$  vary with  $n^{\frac{1}{\alpha}}$ , where

$\alpha$  is \_\_\_\_\_.

**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 :** 8643513629 **Question Type :** SA

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

এক কেন্দ্ৰীয় বিভৱ ক্ষেত্ৰ  $U(r) = U_0 r^4$  ত m ভৰৰ এটা কণাই বৃত্তাকাৰ কক্ষত গতি কৰিছে। যদিহে ব'ৰৰ কোৱাণ্টিকৰণৰ

চৰ্ত আৰোপ কৰা হয়, সম্ভাৱিত কক্ষসমূহৰ ব্যাসার্ধ  $r_n$   $n^{\frac{1}{\alpha}}$  ৰ সৈতে পৰিবৰ্তন হয়, য'ত  $\alpha$  হয় \_\_\_\_\_।

**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 :** 8643513630 **Question Type :** SA

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

Suppose you have taken a dilute solution of oleic acid in such a way that its concentration

becomes  $0.01 \text{ cm}^3$  of oleic acid per  $\text{cm}^3$  of the solution. Then you make a thin film of this

solution (monomolecular thickness) of area  $4 \text{ cm}^2$  by considering 100 spherical drops of

radius  $\left(\frac{3}{40\pi}\right)^{\frac{1}{3}} \times 10^{-3} \text{ cm}$ . Then the thickness of oleic acid layer will be  $x \times 10^{-14} \text{ m}$ .

Where  $x$  is \_\_\_\_\_.

**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 :** 8643513630 **Question Type :** SA

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

ধৰি লোৱা অ'লেইক এচিডৰ এক পাতল দ্ৰৱ তুমি এনে ধৰণে লৈছা যাতে ইয়াৰ ঘনত্ব প্ৰতি  $\text{cm}^3$  দ্ৰৱত  $0.01 \text{ cm}^3$

অ'লেইক এচিড হয়গৈ। তাৰপাছত এই দ্ৰৱৰ  $\left(\frac{3}{40\pi}\right)^{\frac{1}{3}} \times 10^{-3} \text{ cm}$  ব্যাসাৰ্ধৰ 100 টা গোলাকাৰ টোপাল লৈ  $4 \text{ cm}^2$

কালিৰ এখন পাতল ফিল্ম (এক আণৱিক গাঢ়তাৰ) বনোৱা। তেতিয়া অ'লেইক এচিডৰ পাতল তৰপৰ বেধ হ'ব  $x \times 10^{-14} \text{ m}$ । য'ত  $x$  ৰ মান \_\_\_\_\_।

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

## Chemistry Section A

<b>Section Id :</b>	864351243
<b>Section Number :</b>	3
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	864351243
<b>Question Shuffling Allowed :</b>	Yes

**Question Number :** 31 **Question Id :** 8643513631 **Question Type :** MCQ **Option Shuffling :** Yes **Is Question Mandatory :** No

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

Amongst the following, the linear species is :

Options :

86435110891.  $N_3^-$

86435110892.  $NO_2$

86435110893.  $O_3$

86435110894.  $Cl_2O$

Question Number : 31 Question Id : 8643513631 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

নমুনাসমূহৰ ভিতৰত, বৈখিক নমুনাটো হ'ল :

Options :

86435110891.  $N_3^-$

86435110892.  $NO_2$

86435110893.  $O_3$

86435110894.  $Cl_2O$

Question Number : 32 Question Id : 8643513632 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

During which of the following processes, does entropy decrease ?

- (A) Freezing of water to ice at  $0^\circ C$
- (B) Freezing of water to ice at  $-10^\circ C$
- (C)  $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
- (D) Adsorption of  $CO(g)$  on lead surface.
- (E) Dissolution of  $NaCl$  in water

Choose the correct answer from the options given below :

Options :

86435110895. (A), (B), (C) and (D) only

86435110896. (A), (C) and (E) only

86435110897. (A) and (E) only

86435110898. (B) and (C) only

Question Number : 32 Question Id : 8643513632 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

নিম্নলিখিত কোনটো প্ৰক্ৰিয়াৰ সময়ছোৱাত, এণ্ট্ৰপী কমে ?

- (A) পানীৰ  $0^{\circ}\text{C}$  ত বৰফলৈ হিমায়িত হওঁতে  
 (B) পানীৰ  $-10^{\circ}\text{C}$  ত বৰফলৈ হিমায়িত হওঁতে  
 (C)  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$   
 (D) লেড পৃষ্ঠত  $\text{CO}(\text{g})$  ৰ অধিশোষণত  
 (E) পানীত  $\text{NaCl}$  ৰ দ্ৰৱীভূতকৰণত

নিম্নলিখিত বিকল্পৰপৰা শুদ্ধ উত্তৰটো বাছি উলিওৱা :

**Options :**

86435110895. (A), (B), (C) আৰু (D) মাত্ৰ

86435110896. (A), (C) আৰু (E) মাত্ৰ

86435110897. (A) আৰু (E) মাত্ৰ

86435110898. (B) আৰু (C) মাত্ৰ

**Question Number : 33 Question Id : 8643513633 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

For the coagulation of a negative sol, the species below, that has the highest flocculating power is :

**Options :**

86435110899.  $\text{Ba}^{2+}$

86435110900.  $\text{Na}^{+}$

86435110901.  $\text{PO}_4^{3-}$

86435110902.  $\text{SO}_4^{2-}$

**Question Number : 33 Question Id : 8643513633 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

এটা ঋণাত্মক ছলৰ আতঞ্জনৰ বাবে, তলত দিয়াবোৰৰ ভিতৰত যাৰ আটাইতকৈ বেছি আতঞ্জন ক্ষমতা আছে, হ'ল :

**Options :**

86435110899.  $\text{Ba}^{2+}$

86435110900.  $\text{Na}^{+}$

86435110901.  $\text{PO}_4^{3-}$

86435110902.  $\text{SO}_4^{2-}$

**Question Number : 34 Question Id : 8643513634 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The set of elements that differ in mutual relationship from those of the other sets is :

**Options :**

86435110903. Be - Al

86435110904. B - Si

86435110905. Li - Na

86435110906. Li - Mg

**Question Number : 34 Question Id : 8643513634 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

মৌলৰ শ্ৰেণী যিটো বাকী থকা মৌলৰ শ্ৰেণীতকৈ বেলেগ :

**Options :**

86435110903. Be - Al

86435110904. B - Si

86435110905. Li - Na

86435110906. Li - Mg

**Question Number : 35 Question Id : 8643513635 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
(a) Haematite	(i) $\text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
(b) Bauxite	(ii) $\text{Fe}_2\text{O}_3$
(c) Magnetite	(iii) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
(d) Malachite	(iv) $\text{Fe}_3\text{O}_4$

Choose the correct answer from the options given below :

**Options :**

86435110907. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

86435110908. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435110909. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

86435110910. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

**Question Number : 35 Question Id : 8643513635 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

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

তালিকা - I	তালিকা - II
(a) হেমেটাইট	(i) $Al_2O_3 \cdot xH_2O$
(b) বক্সাইট	(ii) $Fe_2O_3$
(c) মেগনেটাইট	(iii) $CuCO_3 \cdot Cu(OH)_2$
(d) মেলেকাইট	(iv) $Fe_3O_4$

নিম্নলিখিত বিকল্পৰপৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

**Options :**

86435110907. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

86435110908. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435110909. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

86435110910. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

**Question Number : 36 Question Id : 8643513636 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The functional groups that are responsible for the ion-exchange property of cation and anion exchange resins, respectively, are :

**Options :**

86435110911.  $-SO_3H$  and  $-NH_2$

86435110912.  $-NH_2$  and  $-COOH$

86435110913.  $-NH_2$  and  $-SO_3H$

86435110914.  $-SO_3H$  and  $-COOH$

**Question Number : 36 Question Id : 8643513636 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

কেটায়ন আৰু এনায়ন সলনীকৰণ বেজিনৰ আয়ন-সলনীকৰণ (exchange) ধৰ্মৰ বাবে দায়ী কাৰ্য্যকৰীমূলক হ'ল,

যথাক্রমে :

**Options :**

86435110911.  $-SO_3H$  আৰু  $-NH_2$

86435110912.  $-NH_2$  আৰু  $-COOH$

86435110913.  $-NH_2$  আৰু  $-SO_3H$

86435110914.  $-SO_3H$  আৰু  $-COOH$

**Question Number : 37 Question Id : 8643513637 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

One of the by-products formed during the recovery of  $\text{NH}_3$  from Solvay process is :

**Options :**

86435110915.  $\text{NH}_4\text{Cl}$

86435110916.  $\text{Ca}(\text{OH})_2$

86435110917.  $\text{CaCl}_2$

86435110918.  $\text{NaHCO}_3$

**Question Number : 37 Question Id : 8643513637 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ছলভে প্রক্রিয়াত  $\text{NH}_3$  ব পুনঃপ্ৰাপ্তিৰ সময়ত পোৱা এটা উপ-উৎপাদন হ'ল :

**Options :**

86435110915.  $\text{NH}_4\text{Cl}$

86435110916.  $\text{Ca}(\text{OH})_2$

86435110917.  $\text{CaCl}_2$

86435110918.  $\text{NaHCO}_3$

**Question Number : 38 Question Id : 8643513638 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The set that represents the pair of neutral oxides of nitrogen is :

**Options :**

86435110919.  $\text{NO}$  and  $\text{N}_2\text{O}$

86435110920.  $\text{N}_2\text{O}$  and  $\text{NO}_2$

86435110921.  $\text{NO}$  and  $\text{NO}_2$

86435110922.  $\text{N}_2\text{O}$  and  $\text{N}_2\text{O}_3$

**Question Number : 38 Question Id : 8643513638 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

নাইট্ৰজেনৰ প্ৰথম অক্সাইডৰ যোৰ বুজোৱা সমূহটো হ'ল :

**Options :**

86435110919.  $\text{NO}$  আৰু  $\text{N}_2\text{O}$

86435110920.  $\text{N}_2\text{O}$  আৰু  $\text{NO}_2$

86435110921.  $\text{NO}$  আৰু  $\text{NO}_2$

86435110922.  $N_2O$  আৰু  $N_2O_3$

**Question Number : 39 Question Id : 8643513639 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The common positive oxidation states for an element with atomic number 24, are :

**Options :**

86435110923. +1 to +6

86435110924. +2 to +6

86435110925. +1 and +3 to +6

86435110926. +1 and +3

**Question Number : 39 Question Id : 8643513639 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

পাৰমাণৱিক সংখ্যা 24 ৰ এটা মৌলৰ সাধাৰণ জাৰণ অৱস্থা হ'ল :

**Options :**

86435110923. +1 ৰ পৰা +6 লৈ

86435110924. +2 ৰ পৰা +6 লৈ

86435110925. +1 আৰু +3 ৰ পৰা +6 লৈ

86435110926. +1 আৰু +3

**Question Number : 40 Question Id : 8643513640 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

- |                               |                               |
|-------------------------------|-------------------------------|
| (a) $[Co(NH_3)_6][Cr(CN)_6]$  | (i) Linkage isomerism         |
| (b) $[Co(NH_3)_3(NO_2)_3]$    | (ii) Solvate isomerism        |
| (c) $[Cr(H_2O)_6]Cl_3$        | (iii) Co-ordination isomerism |
| (d) $cis-[CrCl_2(ox)_2]^{3-}$ | (iv) Optical isomerism        |

Choose the correct answer from the options given below :

**Options :**

86435110927. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

86435110928. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

86435110929. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

86435110930. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

**Question Number : 40 Question Id : 8643513640 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

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

তালিকা - I

তালিকা - II

- |   |                          |
|---|--------------------------|
| (a) $[\text{Co}(\text{NH}_3)_6] [\text{Cr}(\text{CN})_6]$ | (i) সংযোগ সমযোগিতা       |
| (b) $[\text{Co}(\text{NH}_3)_3 (\text{NO}_2)_3]$          | (ii) দ্ৰৱক ঘটিত সমযোগিতা |
| (c) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$        | (iii) সমন্বয়ী সমযোগিতা  |
| (d) $\text{cis-}[\text{CrCl}_2(\text{ox})_2]^{3-}$        | (iv) আলোক সমযোগিতা       |

নিম্নলিখিত বিকল্পবপৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

**Options :**

86435110927. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

86435110928. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

86435110929. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

86435110930. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

**Question Number : 41 Question Id : 8643513641 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Which of the following statement(s) is (are) incorrect reason for eutrophication ?

- (A) excess usage of fertilisers
- (B) excess usage of detergents
- (C) dense plant population in water bodies
- (D) lack of nutrients in water bodies that prevent plant growth

Choose the most appropriate answer from the options given below :

**Options :**

86435110931. (A) only

86435110932. (B) and (D) only

86435110933. (C) only

86435110934. (D) only

**Question Number : 41 Question Id : 8643513641 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

অতিপুষ্টি কৰণৰ বিষয়ে নিম্নলিখিত কোন(বোৰ) উক্তি (উক্তিবোৰ) অশুদ্ধ ?

- (A) অতিৰিক্ত ৰসায়নিক সাৰৰ ব্যৱহাৰ
- (B) অতিৰিক্ত অপমাৰ্জকৰ ব্যৱহাৰ
- (C) পানীত উদ্ভিদৰ বংশবৃদ্ধি
- (D) পানীত পুষ্টি কাৰক পদাৰ্থৰ অভাৱ যিয়ে উদ্ভিদৰ বৃদ্ধি ৰোধ কৰে

নিম্নলিখিত বিকল্পবপৰা আটাইতকৈ উপযুক্ত উত্তৰ বাছি উলিওৱা :

**Options :**

86435110931. (A) মাত্ৰ

86435110932. (B) আৰু (D) মাত্ৰ

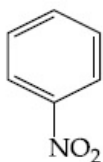
86435110933. (C) মাত্ৰ

86435110934. (D) মাত্ৰ

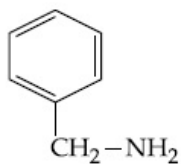
Question Number : 42 Question Id : 8643513642 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Nitrogen can be estimated by Kjeldahl's method for which of the following compound ?

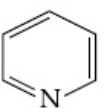
Options :



86435110935.



86435110936.



86435110937.

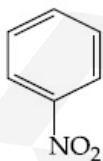


86435110938.

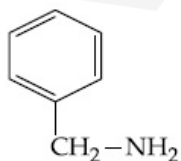
Question Number : 42 Question Id : 8643513642 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

নিম্নলিখিত কোনটো যৌগৰ বাবে জেলডল পদ্ধতিৰে নাইট্ৰজেনৰ মান উলিয়াব পৰা যায়।

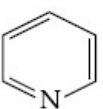
Options :



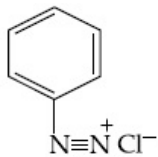
86435110935.



86435110936.



86435110937.



86435110938.

**Question Number : 43 Question Id : 8643513643 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The correct pair(s) of the ambident nucleophiles is (are) :

- (A) AgCN/KCN
- (B) RCOOAg/RCOOK
- (C) AgNO<sub>2</sub>/KNO<sub>2</sub>
- (D) AgI/KI

**Options :**

86435110939. (A) only

86435110940. (B) only

86435110941. (A) and (C) only

86435110942. (B) and (C) only

**Question Number : 43 Question Id : 8643513643 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

উভদন্তী নিউক্লিয়ারফাইলৰ শুদ্ধ যোৰ (বোৰ) হ'ল :

- (A) AgCN/KCN
- (B) RCOOAg/RCOOK
- (C) AgNO<sub>2</sub>/KNO<sub>2</sub>
- (D) AgI/KI

**Options :**

86435110939. (A) মাত্ৰ

86435110940. (B) মাত্ৰ

86435110941. (A) আৰু (C)

86435110942. (B) আৰু (C)

**Question Number : 44 Question Id : 8643513644 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

**Statement I :** 2-methylbutane on oxidation with KMnO<sub>4</sub> gives 2-methylbutan-2-ol.

**Statement II :** n-alkanes can be easily oxidised to corresponding alcohols with KMnO<sub>4</sub>.

Choose the correct option :

**Options :**

86435110943. Both statement I and statement II are correct
86435110944. Both statement I and statement II are incorrect
86435110945. Statement I is correct but statement II is incorrect
86435110946. Statement I is incorrect but statement II is correct

Question Number : 44 Question Id : 8643513644 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

তলত দুটা উক্তি দিয়া আছে।

উক্তি I : 2-মিঠাইল বিউটেনৰ  $\text{KMnO}_4$  ৰ সৈতে জাৰণত দিয়ে 2-মিঠাইল বিউটান-2-অ'ল ।

উক্তি II : n-এলকেনক  $\text{KMnO}_4$  ৰ সৈতে বিক্ৰিয়া কৰি সহজে ইয়াৰ সদৃশ এলক'হললৈ জাৰিত কৰিব পাৰি ।

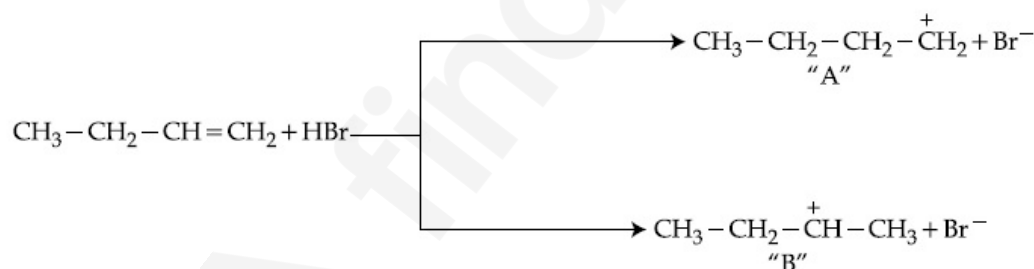
শুদ্ধ বিকল্প বাছি উলিওৱা :

Options :

86435110943. উক্তি I আৰু উক্তি II দুয়োটা সত্য
86435110944. উক্তি I আৰু উক্তি II দুয়োটা অসত্য
86435110945. উক্তি I সত্য কিন্তু উক্তি II অসত্য
86435110946. উক্তি I অসত্য কিন্তু উক্তি II সত্য

Question Number : 45 Question Id : 8643513645 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Choose the correct statement regarding the formation of carbocations A and B given.



Options :

86435110947. Carbocation A is more stable and formed relatively at slow rate
86435110948. Carbocation B is more stable and formed relatively at slow rate
86435110949. Carbocation A is more stable and formed relatively at faster rate
86435110950. Carbocation B is more stable and formed relatively at faster rate

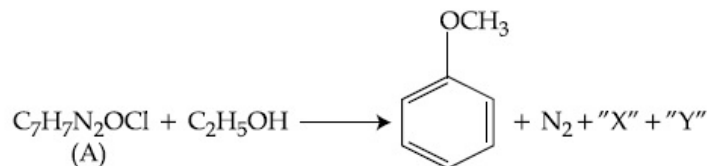
Question Number : 45 Question Id : 8643513645 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1



86435110953. ইনভারটেজ আৰু এমাইলেজ

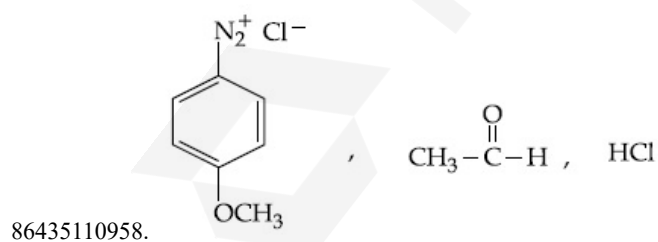
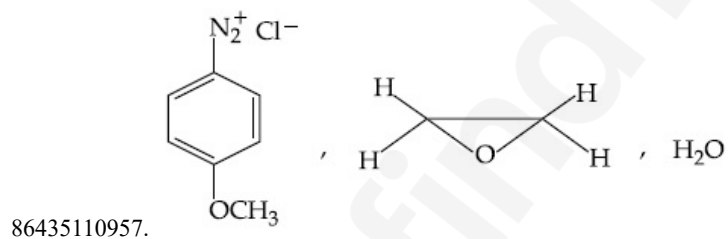
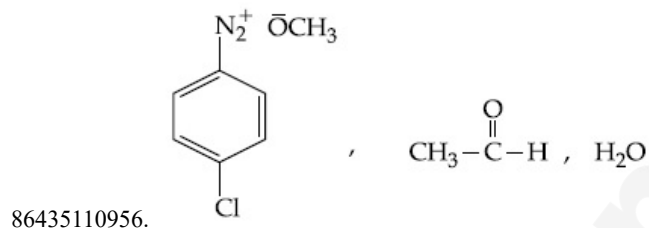
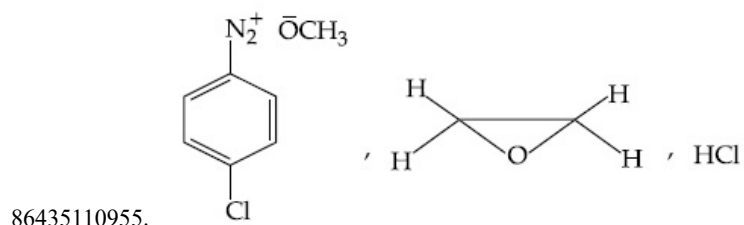
86435110954. এমাইলেজ আৰু ইনভারটেজ

Question Number : 47 Question Id : 8643513647 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

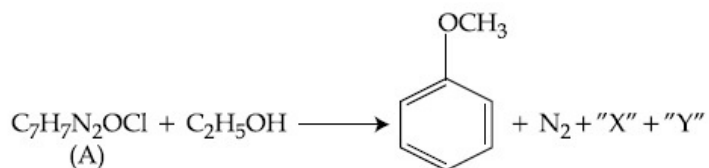


In the above reaction, the structural formula of (A), "X" and "Y" respectively are :

Options :

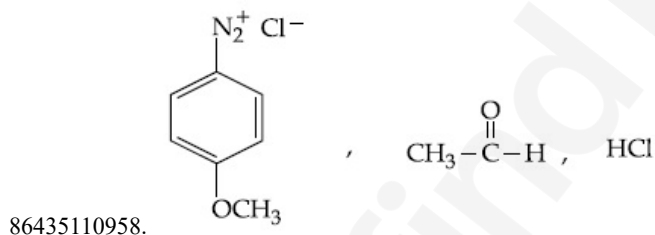
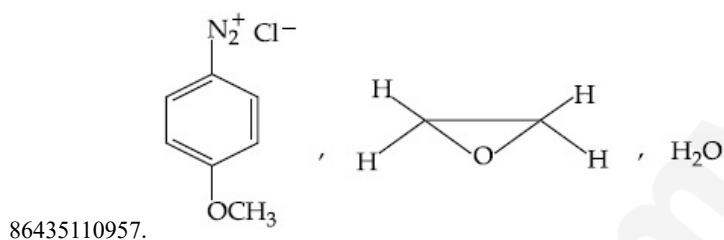
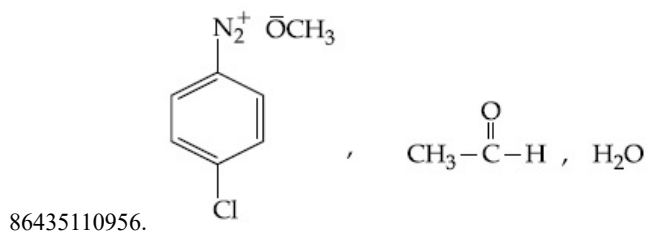
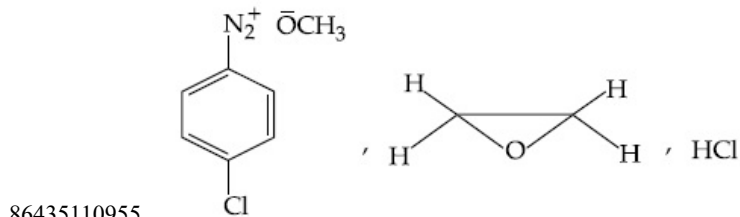


Question Number : 47 Question Id : 8643513647 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1



ওপৰৰ বিক্ৰিয়াত, (A), "X" আৰু "Y" ৰ গঠন সংকেত যথাক্ৰমে :

Options :



Question Number : 48 Question Id : 8643513648 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Primary, secondary and tertiary amines can be separated using :

Options :

86435110959. Chloroform and KOH

86435110960. Benzene sulphonic acid

86435110961. para-Toluene sulphonyl chloride

86435110962. Acetyl amide

Question Number : 48 Question Id : 8643513648 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

প্রাইমাৰী, ছেকেণ্ডাৰী আৰু টাৰছিয়াৰী এমাইন পৃথক কৰিব পাৰি ব্যৱহাৰ কৰি :

**Options :**

86435110959. ক্ল'ৰ'ফ'ৰ্ম আৰু KOH

86435110960. বেনজিন ছালফ'নিক এছিড

86435110961. পেৰা-টলুইন ছালফ'নিক ক্ল'ৰাইড

86435110962. এছিটাইল এমাইড

**Question Number : 49 Question Id : 8643513649 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
Chemical Compound	Used as
(a) Sucralose	(i) Synthetic detergent
(b) Glyceryl ester of stearic acid	(ii) Artificial sweetener
(c) Sodium benzoate	(iii) Antiseptic
(d) Bithionol	(iv) Food preservative

Choose the correct match :

**Options :**

86435110963. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

86435110964. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435110965. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

86435110966. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

**Question Number : 49 Question Id : 8643513649 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

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

তালিকা - I	তালিকা - II
ৰসায়নিক যৌগ	ব্যৱহৃত হয়
(a) ছুক্ৰাল'জ	(i) সাংশ্লেষিক অপমাৰ্জক
(b) ষ্টেৰিক এছিডৰ গ্লিছাৰিল এষ্টাৰ	(ii) কৃত্ৰিম মিঠাকাবী
(c) ছ'ডিয়াম বেনজ'এট	(iii) বিজাণুবাৰক
(d) বিটিঅ'ন'ল	(iv) খাদ্য সংৰক্ষক

শুদ্ধ মিলনটো বাছি উলিওৱা :

**Options :**

86435110963. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

86435110964. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

86435110965. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

86435110966. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Question Number : 50 Question Id : 8643513650 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Fructose is an example of :

Options :

86435110967. Aldohexose

86435110968. Ketohexose

86435110969. Pyranose

86435110970. Heptose

Question Number : 50 Question Id : 8643513650 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

ফ্রুক্ট'জ এটা উদাহরণ হ'ল :

Options :

86435110967. এলড'হেক্সজ

86435110968. কিট'হেক্সজ

86435110969. পাইরান'জ

86435110970. হেপ্ট'জ

## Chemistry Section B

Section Id :	864351244
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	864351244
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 8643513651 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

The number of chlorine atoms in 20 mL of chlorine gas at STP is \_\_\_\_\_ $10^{21}$ . (Round off to the Nearest Integer).

[Assume chlorine is an ideal gas at STP

 $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$ ,  $N_A = 6.023 \times 10^{23}$ ]

Response Type : Numeric  
 Evaluation Required For SA : Yes  
 Show Word Count : Yes  
 Answers Type : Equal  
 Text Areas : PlainText  
 Possible Answers :  
 100

Question Number : 51 Question Id : 8643513651 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

STP ত 20 mL ক্লোরিন গ্যাসের অণুর সংখ্যা হ'ল \_\_\_\_\_ $10^{21}$ । (নিকটতম অখণ্ড সংখ্যাত)।

[ধরি লোহা, STP ত, ক্লোরিন এটা আদর্শ গ্যাস]

$R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$ ,  $N_A = 6.023 \times 10^{23}$ ]

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 : 8643513652 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

KBr is doped with  $10^{-5}$  mole percent of  $\text{SrBr}_2$ . The number of cationic vacancies in 1 g of KBr crystal is \_\_\_\_\_ $10^{14}$ . (Round off to the Nearest Integer).

[Atomic Mass : K : 39.1 u, Br : 79.9 u

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

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 : 8643513652 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$10^{-5}$  ম'ল শতাংশ  $\text{SrBr}_2$  বে KBr ক ড'প (dope) করা হ'ল। 1 g KBr ক্রিস্টলেত কেটায়নিক বন্ধুর সংখ্যা হল \_\_\_\_\_ $10^{14}$ । (নিকটতম অখণ্ড সংখ্যাত)।

[পারমাণবিক ভর : K : 39.1 u Br : 79.9 u

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

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 : 8643513653 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In the ground state of atomic Fe( $Z=26$ ), the spin-only magnetic moment is \_\_\_\_\_  $\times 10^{-1}$  BM. (Round off to the Nearest Integer).

[Given :  $\sqrt{3} = 1.73$ ,  $\sqrt{2} = 1.41$ ]

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 : 8643513653 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Fe( $Z=26$ ) ৰ ভূমিস্তৰ অৱস্থাত, ঘূৰ্ণনমাত্ৰ চুম্বকীয় ভ্ৰামক \_\_\_\_\_  $\times 10^{-1}$  BM। (নিকটতম অখণ্ড সংখ্যাত)।

[দিয়া আছে :  $\sqrt{3} = 1.73$ ,  $\sqrt{2} = 1.41$ ]

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 : 8643513654 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A 1 molal  $K_4Fe(CN)_6$  solution has a degree of dissociation of 0.4. Its boiling point is equal to that of another solution which contains 18.1 weight percent of a non electrolytic solute A. The molar mass of A is \_\_\_\_\_ u. (Round off to the Nearest Integer).

[Density of water =  $1.0 \text{ g cm}^{-3}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 54 Question Id : 8643513654 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা 1 ম'লাল  $K_4Fe(CN)_6$  দ্ৰৱৰ বিয়োজনৰ মাত্ৰা 0.4। ইয়াৰ উতলাংক আন এটা দ্ৰৱ, যিয়ে 18.1 ভৰ শতাংশৰ এটা অবিদ্যুৎবিশ্লেষ্য দ্ৰব্য A বহন কৰে, তাৰ সমান হয়। A ৰ ম'লাৰ ভৰ হ'ল \_\_\_\_\_ u। (নিকটতম অখণ্ড সংখ্যাত)।

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

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 8643513655 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the reaction  $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ . The temperature at which  $K_C = 20.4$  and

$K_P = 600.1$ , is \_\_\_\_\_ K. (Round off to the Nearest Integer).

[Assume all gases are ideal and  $R = 0.0831 \text{ L bar K}^{-1} \text{ mol}^{-1}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 8643513655 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

বিক্রিয়াটো ধৰা  $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ । উষ্ণতা, যেতিয়া  $K_C = 20.4$  আৰু  $K_P = 600.1$ , হ'ল \_\_\_\_\_

K। (নিকটতম অখণ্ড সংখ্যাত)।

[ধৰি লোৱা সকলোবোৰ গেছ আদৰ্শ আৰু  $R = 0.0831 \text{ L bar K}^{-1} \text{ mol}^{-1}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 56 Question Id : 8643513656 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A KCl solution of conductivity  $0.14 \text{ S m}^{-1}$  shows a resistance of  $4.19 \Omega$  in a conductivity cell.

If the same cell is filled with an HCl solution, the resistance drops to  $1.03 \Omega$ . The conductivity

of the HCl solution is \_\_\_\_\_  $\times 10^{-2} \text{ S m}^{-1}$ . (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 : 56 Question Id : 8643513656 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা KCl দ্ৰৱৰ যাৰ পৰিবাহিতা  $0.14 \text{ S m}^{-1}$ , এটা পৰিবাহিতা কোষত ৰোধ দেখুৱায়  $4.19 \Omega$ । যদি সেই একে কোষটো

HCl দ্ৰবৰে পূৰোৱা হয়, ৰোধ  $1.03 \Omega$  লৈ নামি আহে। HCl দ্ৰবৰ পৰিবাহিতা হ'ল \_\_\_\_\_

$\times 10^{-2} \text{ S m}^{-1}$ । (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 : 57 Question Id : 8643513657 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The reaction  $2A + B_2 \rightarrow 2AB$  is an elementary reaction.

For a certain quantity of reactants, if the volume of the reaction vessel is reduced by a factor of 3, the rate of the reaction increases by a factor of \_\_\_\_\_. (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 : 8643513657 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

বিক্রিয়া  $2A + B_2 \rightarrow 2AB$  এটা মৌলিক বিক্রিয়া। এটা নির্দিষ্ট পৰিমাণৰ বিক্ৰিয়কৰ বাবে, যদি বিক্রিয়া পাত্ৰটোৰ আয়তন 3 গুণ কমাই দিয়া হয়, বিক্রিয়াটোৰ বেগৰ বাঢ়ি যোৱা গুণ হ'ল \_\_\_\_\_। (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 : 8643513658 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

On complete reaction of  $FeCl_3$  with oxalic acid in aqueous solution containing KOH, resulted in the formation of product A. The secondary valency of Fe in the product A 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 : 58 Question Id : 8643513658 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$FeCl_3$  ৰ অক্সালিক এছিডৰ KOH থকা পানীৰ দ্ৰৱত বিক্রিয়া কৰিলে, জাতদ্রব্য A পোৱা যায়। জাতদ্রব্য A ত Fe ৰ ছেকেণ্ডাৰী যোজ্যতা হ'ল \_\_\_\_\_। (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 : 8643513659 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The total number of C-C sigma bond/s in mesityl oxide ( $C_6H_{10}O$ ) 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 : 59 Question Id : 8643513659 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এছটি'নৰ NaOH ৰ সৈতে বিক্ৰিয়াত দিয়ে মেছিটাইল অক্সাইড ( $C_6H_{10}O$ )। মুঠ C-C ছিগমা বান্ধনি/বোৰ মেছিটাইল অক্সাইডত হ'ল \_\_\_\_\_. (নিকটতম অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

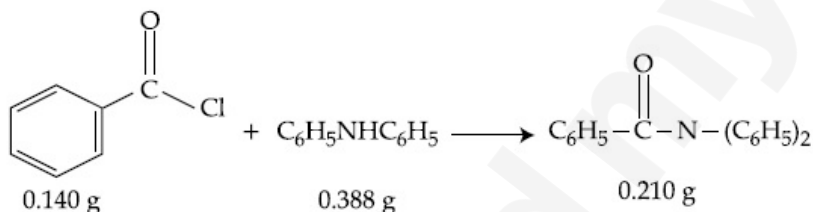
Text Areas : PlainText

Possible Answers :

100

Question Number : 60 Question Id : 8643513660 Question Type : SA

Correct Marks : 4 Wrong Marks : 0



Consider the above reaction. The percentage yield of amide product is \_\_\_\_\_. (Round off to the Nearest Integer).

(Given : Atomic mass : C : 12.0 u, H : 1.0 u, N : 14.0 u, O : 16.0 u, Cl : 35.5 u)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

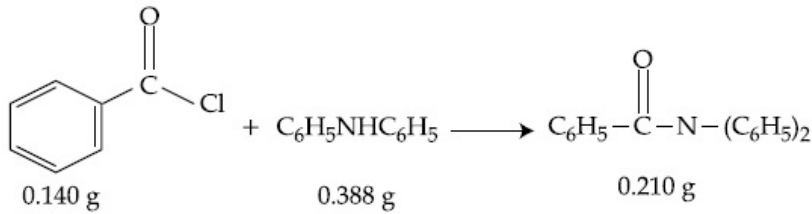
Text Areas : PlainText

Possible Answers :

100

Question Number : 60 Question Id : 8643513660 Question Type : SA

Correct Marks : 4 Wrong Marks : 0



ওপৰৰ ৰসায়নিক বিক্ৰিয়াটো ভাবা। এমাইড জাতদ্রব্যৰ শতকৰা উৎপাদন হ'ল \_\_\_\_\_। (নিকটতম অখণ্ড সংখ্যাত)।

(দিয়া আছে : পাৰমাণৱিক ভৰ : C : 12.0 u, H : 1.0 u, N : 14.0 u, O : 16.0 u, Cl : 35.5 u)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

## Mathematics Section A

Section Id :	864351245
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
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 :	864351245
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 8643513661 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The number of solutions of the equation  $\sin^{-1}\left[x^2 + \frac{1}{3}\right] + \cos^{-1}\left[x^2 - \frac{2}{3}\right] = x^2$ , for

$x \in [-1, 1]$ , and  $[x]$  denotes the greatest integer less than or equal to  $x$ , is :

**Options :**

86435110981. 0

86435110982. 2

86435110983. 4

86435110984. Infinite

Question Number : 61 Question Id : 8643513661 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

$$\sin^{-1}\left[x^2 + \frac{1}{3}\right] + \cos^{-1}\left[x^2 - \frac{2}{3}\right] = x^2, x \in [-1, 1] \text{ ৰ বাবে সমীকৰণটোৰ সমাধানৰ সংখ্যা হ'ব :}$$

যত  $[x] = x$  ৰ সমান বা  $x$  তকৈ সৰু গৰিষ্ঠ অখণ্ড সংখ্যা।

Options :

86435110981. 0

86435110982. 2

86435110983. 4

86435110984. অসীম

Question Number : 62 Question Id : 8643513662 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If the Boolean expression  $(p \wedge q) \otimes (p \otimes q)$  is a tautology, then  $\otimes$  and  $\otimes$  are respectively given by :

Options :

86435110985.  $\wedge, \vee$

86435110986.  $\vee, \rightarrow$

86435110987.  $\rightarrow, \rightarrow$

86435110988.  $\wedge, \rightarrow$

Question Number : 62 Question Id : 8643513662 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

যদি  $(p \wedge q) \otimes (p \otimes q)$  বুলি বাশিটো এটা পুনৰুক্তি হয়, তেন্তে  $\otimes$  আৰু  $\otimes$  মান হ'ব :

Options :

86435110985.  $\wedge, \vee$

86435110986.  $\vee, \rightarrow$

86435110987.  $\rightarrow, \rightarrow$

86435110988.  $\wedge, \rightarrow$

Question Number : 63 Question Id : 8643513663 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let O be the origin. Let  $\vec{OP} = x\hat{i} + y\hat{j} - \hat{k}$  and  $\vec{OQ} = -\hat{i} + 2\hat{j} + 3x\hat{k}$ ,  $x, y \in \mathbf{R}$ ,  $x > 0$ , be

such that  $|\vec{PQ}| = \sqrt{20}$  and the vector  $\vec{OP}$  is perpendicular to  $\vec{OQ}$ . If  $\vec{OR} = 3\hat{i} + z\hat{j} - 7\hat{k}$ ,

$z \in \mathbf{R}$ , is coplanar with  $\vec{OP}$  and  $\vec{OQ}$ , then the value of  $x^2 + y^2 + z^2$  is equal to :

Options :

86435110989. 1

86435110990. 2

86435110991. 7

86435110992. 9

Question Number : 63 Question Id : 8643513663 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

ধরা হ'ল  $O$  মূলবিন্দু। ধরা হ'ল  $\vec{OP} = x\hat{i} + y\hat{j} - \hat{k}$  আৰু  $\vec{OQ} = -\hat{i} + 2\hat{j} + 3x\hat{k}$ ,  $x, y \in \mathbb{R}$ ,  $x > 0$ , যাতে

$|\vec{PQ}| = \sqrt{20}$  আৰু  $\vec{OP}$  ভেক্টৰটো  $\vec{OQ}$  ৰ ওপৰত লম্ব। যদি  $\vec{OR} = 3\hat{i} + z\hat{j} - 7\hat{k}$ ,  $z \in \mathbb{R}$ , ভেক্টৰটো  $\vec{OP}$

আৰু  $\vec{OQ}$  ৰ সৈতে একসমতলীয় হয়, তেন্তে  $x^2 + y^2 + z^2$  ৰ মান সমান হ'ব:

Options :

86435110989. 1

86435110990. 2

86435110991. 7

86435110992. 9

Question Number : 64 Question Id : 8643513664 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

If  $x, y, z$  are in arithmetic progression with common difference  $d$ ,  $x \neq 3d$ , and the determinant

of the matrix  $\begin{bmatrix} 3 & 4\sqrt{2} & x \\ 4 & 5\sqrt{2} & y \\ 5 & k & z \end{bmatrix}$  is zero, then the value of  $k^2$  is :

Options :

86435110993. 6

86435110994. 12

86435110995. 36

86435110996. 72

Question Number : 64 Question Id : 8643513664 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

যদি  $x, y, z$  সমান্তর প্রগতির যাব সাধারণ অন্তর  $d, x \neq 3d$ , আৰু  $\begin{bmatrix} 3 & 4\sqrt{2} & x \\ 4 & 5\sqrt{2} & y \\ 5 & k & z \end{bmatrix}$  মৌলিকসংকটৰ মান শূন্য হয়, তেন্তে

$k^2$  ৰ মান হ'ব :

**Options :**

86435110993. 6

86435110994. 12

86435110995. 36

86435110996. 72

**Question Number : 65 Question Id : 8643513665 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The value of the limit  $\lim_{\theta \rightarrow 0} \frac{\tan(\pi \cos^2 \theta)}{\sin(2\pi \sin^2 \theta)}$  is equal to :

**Options :**

86435110997.  $\frac{1}{4}$

86435110998.  $-\frac{1}{2}$

86435110999.  $-\frac{1}{4}$

86435111000. 0

**Question Number : 65 Question Id : 8643513665 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$\lim_{\theta \rightarrow 0} \frac{\tan(\pi \cos^2 \theta)}{\sin(2\pi \sin^2 \theta)}$  সীমাতোৰ মান সমান হ'ব :

**Options :**

86435110997.  $\frac{1}{4}$

86435110998.  $-\frac{1}{2}$

86435110999.  $-\frac{1}{4}$

86435111000. 0

Question Number : 66 Question Id : 8643513666 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the integral  $\int_0^{10} \frac{[\sin 2\pi x]}{e^x - [x]} dx = \alpha e^{-1} + \beta e^{-\frac{1}{2}} + \gamma$ , where  $\alpha, \beta, \gamma$  are integers and  $[x]$  denotes

the greatest integer less than or equal to  $x$ , then the value of  $\alpha + \beta + \gamma$  is equal to :

Options :

86435111001. 0

86435111002. 10

86435111003. 20

86435111004. 25

Question Number : 66 Question Id : 8643513666 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যদি  $\int_0^{10} \frac{[\sin 2\pi x]}{e^x - [x]} dx = \alpha e^{-1} + \beta e^{-\frac{1}{2}} + \gamma$ , যত  $\alpha, \beta, \gamma$  অখণ্ড সংখ্যা আৰু  $[x] = x$  ব সমান বা  $x$ , তকৈ সৰু

অখণ্ড সংখ্যা বুজায়, তেন্তে  $\alpha + \beta + \gamma$  ৰ মান সমান হ'ব :

Options :

86435111001. 0

86435111002. 10

86435111003. 20

86435111004. 25

Question Number : 67 Question Id : 8643513667 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the curve  $y=y(x)$  is the solution of the differential equation

$2(x^2 + x^{5/4}) dy - y(x + x^{1/4}) dx = 2x^{9/4} dx$ ,  $x > 0$  which passes through the point

$\left(1, 1 - \frac{4}{3} \log_e 2\right)$ , then the value of  $y(16)$  is equal to :

Options :

86435111005.  $4\left(\frac{31}{3} - \frac{8}{3} \log_e 3\right)$

86435111006.  $\left(\frac{31}{3} - \frac{8}{3} \log_e 3\right)$

86435111007.  $\left(\frac{31}{3} + \frac{8}{3} \log_e 3\right)$

$$4\left(\frac{31}{3} + \frac{8}{3} \log_e 3\right)$$

86435111008.

**Question Number : 67 Question Id : 8643513667 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

যদি  $2(x^2 + x^{5/4}) dy - y(x + x^{1/4}) dx = 2x^{9/4} dx$ ,  $x > 0$  অৱকলন সমীকৰণৰ সমাধানটো যদি  $y = y(x)$  হয়

আৰু যি  $\left(1, 1 - \frac{4}{3} \log_e 2\right)$ , বিন্দুৰে যায়, তেন্তে  $y(16)$  ৰ মান সমান হ'ব :

Options :

$$4\left(\frac{31}{3} - \frac{8}{3} \log_e 3\right)$$

86435111005.

$$\left(\frac{31}{3} - \frac{8}{3} \log_e 3\right)$$

86435111006.

$$\left(\frac{31}{3} + \frac{8}{3} \log_e 3\right)$$

86435111007.

$$4\left(\frac{31}{3} + \frac{8}{3} \log_e 3\right)$$

86435111008.

**Question Number : 68 Question Id : 8643513668 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let  $y = y(x)$  be the solution of the differential equation

$\cos x(3\sin x + \cos x + 3) dy = (1 + y \sin x(3\sin x + \cos x + 3)) dx$ ,  $0 \leq x \leq \frac{\pi}{2}$ ,  $y(0) = 0$ . Then,  $y\left(\frac{\pi}{3}\right)$  is

equal to :

Options :

$$2 \log_e \left(\frac{3\sqrt{3} - 8}{4}\right)$$

86435111009.

$$2 \log_e \left(\frac{\sqrt{3} + 7}{2}\right)$$

86435111010.

$$2 \log_e \left(\frac{2\sqrt{3} + 9}{6}\right)$$

86435111011.

$$2 \log_e \left(\frac{2\sqrt{3} + 10}{11}\right)$$

86435111012.

**Question Number : 68 Question Id : 8643513668 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল  $\cos x(3\sin x + \cos x + 3) dy = (1 + y \sin x(3\sin x + \cos x + 3))dx$ ,  $0 \leq x \leq \frac{\pi}{2}$ ,  $y(0) = 0$ . অৱকলন

সমীকৰণটোৰ সমাধান  $y = y(x)$ । তেন্তে  $y\left(\frac{\pi}{3}\right)$  সমান হ'ব :

Options :

86435111009.  $2 \log_e \left( \frac{3\sqrt{3} - 8}{4} \right)$

86435111010.  $2 \log_e \left( \frac{\sqrt{3} + 7}{2} \right)$

86435111011.  $2 \log_e \left( \frac{2\sqrt{3} + 9}{6} \right)$

86435111012.  $2 \log_e \left( \frac{2\sqrt{3} + 10}{11} \right)$

Question Number : 69 Question Id : 8643513669 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Consider the function  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = \begin{cases} \left(2 - \sin\left(\frac{1}{x}\right)\right) |x|, & x \neq 0 \\ 0, & x = 0 \end{cases}$ . Then  $f$  is :

Options :

86435111013. monotonic on  $(0, \infty)$  only

86435111014. monotonic on  $(-\infty, 0)$  only

86435111015. monotonic on  $(-\infty, 0) \cup (0, \infty)$

86435111016. not monotonic on  $(-\infty, 0)$  and  $(0, \infty)$

Question Number : 69 Question Id : 8643513669 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $f: \mathbb{R} \rightarrow \mathbb{R}$  ফলনটো বৰ্ণিত যাতে  $f(x) = \begin{cases} \left(2 - \sin\left(\frac{1}{x}\right)\right) |x|, & x \neq 0 \\ 0, & x = 0 \end{cases}$ . তেন্তে  $f$  ফলনটো :

Options :

86435111013.  $(0, \infty)$  ত একদিষ্ট

86435111014.  $(-\infty, 0)$  ত একদিষ্ট

86435111015.  $(-\infty, 0) \cup (0, \infty)$  ত একদিষ্ট

86435111016.  $(-\infty, 0)$  আৰু  $(0, \infty)$  ত একদিক্ৰি নহয়।

**Question Number : 70 Question Id : 8643513670 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The value of

$$\lim_{n \rightarrow \infty} \frac{[r] + [2r] + \dots + [nr]}{n^2},$$

where  $r$  is a non-zero real number and  $[r]$  denotes the greatest integer less than or equal to  $r$ , is equal to :

**Options :**

86435111017.  $r$

86435111018.  $\frac{r}{2}$

86435111019.  $2r$

86435111020.  $0$

**Question Number : 70 Question Id : 8643513670 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$$\lim_{n \rightarrow \infty} \frac{[r] + [2r] + \dots + [nr]}{n^2} \text{ সীমাটোৰ মান সমান হ'ব :}$$

যত  $r$  অশূন্য বাস্তৱ সংখ্যা আৰু  $[r] = r$  ৰ সমান বা  $r$  তকৈ সৰু গৰিষ্ঠ অখণ্ড সংখ্যা বুজাইছে।

**Options :**

86435111017.  $r$

86435111018.  $\frac{r}{2}$

86435111019.  $2r$

86435111020.  $0$

**Question Number : 71 Question Id : 8643513671 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let a computer program generate only the digits 0 and 1 to form a string of binary numbers

with probability of occurrence of 0 at even places be  $\frac{1}{2}$  and probability of occurrence of 0 at

the odd place be  $\frac{1}{3}$ . Then the probability that '10' is followed by '01' is equal to :

**Options :**

86435111021.  $\frac{1}{9}$

86435111022.  $\frac{1}{6}$

86435111023.  $\frac{1}{3}$

86435111024.  $\frac{1}{18}$

**Question Number : 71 Question Id : 8643513671 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল এটা কম্পিউটাৰ প্ৰোগ্ৰামিংয়ে দ্বৈত সংখ্যা প্ৰণালীৰ পৰা 0 আৰু 1 উৎপন্ন কৰে। যুগ্মস্থানত 0 ব সন্ভাৰিতা  $\frac{1}{2}$  আৰু

অযুগ্ম স্থানত 0 ব সন্ভাৰিতা  $\frac{1}{3}$ । '01' ব পিছৰ '10' ব সন্ভাৰিতা সমান হ'ব :

**Options :**

86435111021.  $\frac{1}{9}$

86435111022.  $\frac{1}{6}$

86435111023.  $\frac{1}{3}$

86435111024.  $\frac{1}{18}$

**Question Number : 72 Question Id : 8643513672 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If the sides AB, BC and CA of a triangle ABC have 3, 5 and 6 interior points respectively, then the total number of triangles that can be constructed using these points as vertices, is equal to :

**Options :**

86435111025. 360

86435111026. 364

86435111027. 333

86435111028. 240

**Question Number : 72 Question Id : 8643513672 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল ABC ত্ৰিভুজটোৰ AB, BC আৰু CA বাহুৰ ক্ৰমে 3, 5 আৰু 6 টা অন্তঃবিন্দু আছে। তেন্তে এই বিন্দুবোৰ শীৰ্ষক দু হিচাবেলৈ গঠন কৰিব পৰা ত্ৰিভুজৰ সংখ্যা সমান হ'ব :

**Options :**

86435111025. 360

86435111026. 364

86435111027. 333

86435111028. 240

**Question Number : 73 Question Id : 8643513673 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let the tangent to the circle  $x^2 + y^2 = 25$  at the point R(3, 4) meet  $x$ -axis and  $y$ -axis at points P and Q, respectively. If  $r$  is the radius of the circle passing through the origin O and having centre at the incentre of the triangle OPQ, then  $r^2$  is equal to :

**Options :**

86435111029.  $\frac{125}{72}$

86435111030.  $\frac{625}{72}$

86435111031.  $\frac{529}{64}$

86435111032.  $\frac{585}{66}$

**Question Number : 73 Question Id : 8643513673 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল  $x^2 + y^2 = 25$  বৃত্তৰ R(3, 4) বিন্দুত টনা স্পৰ্শকডাল ক্ৰমে  $x$ -অক্ষ আৰু  $y$ -অক্ষৰ P আৰু Q, বিন্দুত মিলিত হৈছে। যদি মূলবিন্দু O ৰে যোৱা বৃত্তটোৰ ব্যাসার্ধ  $r$  আৰু কেন্দ্ৰ OPQ ত্ৰিভুজৰ অন্তঃকেন্দ্ৰত থাকে তেন্তে  $r^2$  সমান হ'ব :

**Options :**

86435111029.  $\frac{125}{72}$

86435111030.  $\frac{625}{72}$

86435111031.  $\frac{529}{64}$

86435111032.  $\frac{585}{66}$

**Question Number : 74 Question Id : 8643513674 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let  $S_1, S_2$  and  $S_3$  be three sets defined as

$$S_1 = \{z \in \mathbb{C} : |z-1| \leq \sqrt{2}\}$$

$$S_2 = \{z \in \mathbb{C} : \operatorname{Re}((1-i)z) \geq 1\}$$

$$S_3 = \{z \in \mathbb{C} : \operatorname{Im}(z) \leq 1\}$$

Then the set  $S_1 \cap S_2 \cap S_3$

**Options :**

86435111033. has exactly two elements

86435111034. has exactly three elements

86435111035. is a singleton

86435111036. has infinitely many elements

**Question Number : 74 Question Id : 8643513674 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল  $S_1, S_2$  আৰু  $S_3$  তিনিটা সংহতি বৰ্ণিত আছে যাতে

$$S_1 = \{z \in \mathbb{C} : |z-1| \leq \sqrt{2}\}$$

$$S_2 = \{z \in \mathbb{C} : \operatorname{Re}((1-i)z) \geq 1\}$$

$$S_3 = \{z \in \mathbb{C} : \operatorname{Im}(z) \leq 1\}$$

তেন্তে  $S_1 \cap S_2 \cap S_3$  সংহতিটোৰ আছে :

**Options :**

86435111033. কেৱলমাত্ৰ দুটা মৌল

86435111034. কেৱলমাত্ৰ তিনিটা মৌল

86435111035. একক সংহতি

86435111036. অসীম সংখ্যক মৌল আছে

**Question Number : 75 Question Id : 8643513675 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = e^{-x} \sin x$ . If  $F: [0, 1] \rightarrow \mathbb{R}$  is a differentiable function such

that  $F(x) = \int_0^x f(t) dt$ , then the value of  $\int_0^1 (F'(x) + f(x))e^x dx$  lies in the interval

**Options :**

86435111037.  $\left[ \frac{330}{360}, \frac{331}{360} \right]$

86435111038.  $\left[ \frac{327}{360}, \frac{329}{360} \right]$

86435111039.  $\left[ \frac{331}{360}, \frac{334}{360} \right]$

86435111040.  $\left[ \frac{335}{360}, \frac{336}{360} \right]$

**Question Number : 75 Question Id : 8643513675 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

ধৰা হ'ল  $f: \mathbb{R} \rightarrow \mathbb{R}$  যাতে  $f(x) = e^{-x} \sin x$ . যদি  $F: [0, 1] \rightarrow \mathbb{R}$  ফলনটো অৱকলনীয় যাতে  $F(x) = \int_0^x f(t) dt$ ,

তেন্তে  $\int_0^1 (F'(x) + f(x))e^x dx$  অনুকলনটোৰ মান থকা অন্তৰালটো হ'ব :

**Options :**

86435111037.  $\left[ \frac{330}{360}, \frac{331}{360} \right]$

86435111038.  $\left[ \frac{327}{360}, \frac{329}{360} \right]$

86435111039.  $\left[ \frac{331}{360}, \frac{334}{360} \right]$

86435111040.  $\left[ \frac{335}{360}, \frac{336}{360} \right]$

**Question Number : 76 Question Id : 8643513676 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The value of  $\sum_{r=0}^6 \binom{6}{r} \cdot \binom{6}{6-r}$  is equal to :

**Options :**

86435111041. 924

86435111042. 1024

86435111043. 1124

86435111044. 1324

**Question Number : 76 Question Id : 8643513676 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

$$\sum_{r=0}^6 ({}^6C_r \cdot {}^6C_{6-r}) \text{ ৰ মান সমান হ'ব :}$$

Options :

86435111041. 924
86435111042. 1024
86435111043. 1124
86435111044. 1324

Question Number : 77 Question Id : 8643513677 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

If the equation of plane passing through the mirror image of a point (2, 3, 1) with respect to

$$\text{line } \frac{x+1}{2} = \frac{y-3}{1} = \frac{z+2}{-1} \text{ and containing the line } \frac{x-2}{3} = \frac{1-y}{2} = \frac{z+1}{1} \text{ is}$$

$\alpha x + \beta y + \gamma z = 24$ , then  $\alpha + \beta + \gamma$  is equal to :

Options :

86435111045. 21
86435111046. 20
86435111047. 19
86435111048. 18

Question Number : 77 Question Id : 8643513677 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

$$\frac{x-2}{3} = \frac{1-y}{2} = \frac{z+1}{1} \text{ ৰেখা থাকাকৈ } \frac{x+1}{2} = \frac{y-3}{1} = \frac{z+2}{-1} \text{ ৰেখাটো সাপেক্ষে যদি (2, 3, 1) বিন্দু}$$

এটাৰ দাপোন প্ৰতিবিন্দুৰ মাজেৰে যোৱা সমতলৰ সমীকৰণটো  $\alpha x + \beta y + \gamma z = 24$ , হয় তেন্তে  $\alpha + \beta + \gamma$  সমান হ'ব :

Options :

86435111045. 21
86435111046. 20
86435111047. 19
86435111048. 18

Question Number : 78 Question Id : 8643513678 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Two tangents are drawn from a point P to the circle  $x^2 + y^2 - 2x - 4y + 4 = 0$ , such that the angle between these tangents is  $\tan^{-1}\left(\frac{12}{5}\right)$ , where  $\tan^{-1}\left(\frac{12}{5}\right) \in (0, \pi)$ . If the centre of the circle is denoted by C and these tangents touch the circle at points A and B, then the ratio of the areas of  $\Delta PAB$  and  $\Delta CAB$  is :

**Options :**

86435111049. 9 : 4

86435111050. 3 : 1

86435111051. 2 : 1

86435111052. 11 : 4

**Question Number : 78 Question Id : 8643513678 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$x^2 + y^2 - 2x - 4y + 4 = 0$  বৃত্তৰ P বিন্দুৰ পৰা দুডাল স্পৰ্শক টনা হ'ল যাতে স্পৰ্শক দুডালৰ মাজৰ কোণ  $\tan^{-1}\left(\frac{12}{5}\right)$ ,

যত  $\tan^{-1}\left(\frac{12}{5}\right) \in (0, \pi)$ । যদি বৃত্তটোৰ কেন্দ্ৰ C ৰ দ্বাৰা বুজোৱা হয় আৰু স্পৰ্শক দুডালে বৃত্তৰ A আৰু B, বিন্দুত

স্পৰ্শ কৰে তেন্তে  $\Delta PAB$  আৰু  $\Delta CAB$  ত্ৰিভুজ দুটাৰ কালিৰ অনুপাত হ'ব :

**Options :**

86435111049. 9 : 4

86435111050. 3 : 1

86435111051. 2 : 1

86435111052. 11 : 4

**Question Number : 79 Question Id : 8643513679 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The number of solutions of the equation  $x + 2 \tan x = \frac{\pi}{2}$  in the interval  $[0, 2\pi]$  is :

**Options :**

86435111053. 2

86435111054. 3

86435111055. 4

86435111056. 5

Question Number : 79 Question Id : 8643513679 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

$[0, 2\pi]$  অন্তৰালত  $x + 2 \tan x = \frac{\pi}{2}$  সমীকৰণটোৰ সমাধানৰ সংখ্যা হ'ব :

Options :

86435111053. 2

86435111054. 3

86435111055. 4

86435111056. 5

Question Number : 80 Question Id : 8643513680 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Let L be a tangent line to the parabola  $y^2 = 4x - 20$  at  $(6, 2)$ . If L is also a tangent to the ellipse

$\frac{x^2}{2} + \frac{y^2}{b} = 1$ , then the value of b is equal to :

Options :

86435111057. 11

86435111058. 14

86435111059. 16

86435111060. 20

Question Number : 80 Question Id : 8643513680 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল  $y^2 = 4x - 20$  অধিবৃত্তৰ  $(6, 2)$  বিন্দুত স্পৰ্শকৰেখাডাল হ'ল L। যদি L,  $\frac{x^2}{2} + \frac{y^2}{b} = 1$  উপবৃত্তৰো

স্পৰ্শক হয়, তেন্তে b ৰ মান সমান হ'ব :

Options :

86435111057. 11

86435111058. 14

86435111059. 16

86435111060. 20

## Mathematics Section B

Section Id :

864351246

Section Number :

6

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	864351246
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 8643513681 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

Let  $I_n = \int_1^e x^{19} (\log|x|)^n dx$ , where  $n \in \mathbb{N}$ . If  $(20)I_{10} = \alpha I_9 + \beta I_8$ , for natural numbers  $\alpha$  and  $\beta$ ,

then  $\alpha - \beta$  equals 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 : 8643513681 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $I_n = \int_1^e x^{19} (\log|x|)^n dx$ , যত  $n \in \mathbb{N}$ । যদি  $(20)I_{10} = \alpha I_9 + \beta I_8$  হয় তেন্তে স্বাভাৱিক সংখ্যা  $\alpha$  আৰু  $\beta$

ৰ বাবে  $\alpha - \beta$  সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643513682 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

Let  $\tan \alpha$ ,  $\tan \beta$  and  $\tan \gamma$ ;  $\alpha, \beta, \gamma \neq \frac{(2n-1)\pi}{2}$ ,  $n \in \mathbb{N}$  be the slopes of three line segments OA,

OB and OC, respectively, where O is origin. If circumcentre of  $\Delta ABC$  coincides with origin

and its orthocentre lies on  $y$ -axis, then the value of  $\left( \frac{\cos 3\alpha + \cos 3\beta + \cos 3\gamma}{\cos \alpha \cos \beta \cos \gamma} \right)^2$  is equal to

\_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643513682 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল তিনিডাল বেখাখণ্ড OA, OB আৰু OC ৰ প্ৰৱণতা ক্ৰমে  $\tan\alpha$ ,  $\tan\beta$  আৰু  $\tan\gamma$ ;  $\alpha, \beta, \gamma \neq \frac{(2n-1)\pi}{2}$ ,

$n \in \mathbb{N}$  যত O মূলবিন্দু। যদি  $\Delta ABC$  ৰ পৰিকেন্দ্ৰ মূলবিন্দুৰ সৈতে মিলি যায় আৰু পাদিকেন্দ্ৰ  $y$ -অক্ষৰ ওপৰত থাকে,

তেন্তে  $\left(\frac{\cos 3\alpha + \cos 3\beta + \cos 3\gamma}{\cos \alpha \cos \beta \cos \gamma}\right)^2$  ৰ মান সমান হ'ব \_\_\_\_\_।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643513683 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If 1,  $\log_{10}(4^x - 2)$  and  $\log_{10}\left(4^x + \frac{18}{5}\right)$  are in arithmetic progression for a real number  $x$ , then

the value of the determinant  $\begin{vmatrix} 2\left(x - \frac{1}{2}\right) & x - 1 & x^2 \\ 1 & 0 & x \\ x & 1 & 0 \end{vmatrix}$  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 : 8643513683 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

যদি এটা বাস্তৱ সংখ্যা  $x$ , ৰ বাবে, 1,  $\log_{10}(4^x - 2)$  আৰু  $\log_{10}\left(4^x + \frac{18}{5}\right)$  সমান্তৰ প্ৰগতিত থাকে,

তেন্তে  $\begin{vmatrix} 2\left(x - \frac{1}{2}\right) & x - 1 & x^2 \\ 1 & 0 & x \\ x & 1 & 0 \end{vmatrix}$  নিৰ্ণায়কটোৰ 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 : 8643513684 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider a set of  $3n$  numbers having variance 4. In this set, the mean of first  $2n$  numbers is 6 and the mean of the remaining  $n$  numbers is 3. A new set is constructed by adding 1 into each of first  $2n$  numbers, and subtracting 1 from each of the remaining  $n$  numbers. If the variance of the new set is  $k$ , then  $9k$  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 : 8643513684 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

3n সংখ্যার সংহতি এটা বিবেচনা করা হ'ল যার প্রসরণ 4। এই সংহতিতে 1ম 2n সংখ্যার মাধ্য 6 আৰু অৱশিষ্ট n সংখ্যক মাধ্য 3। 2n সংখ্যার প্রত্যেক 1ম সংখ্যার লগত 1 যোগ কৰি আৰু অৱশিষ্ট n সংখ্যার প্রতিটোৰ পৰা 1 বিয়োগ কৰি এটা নতুন সংহতি গঠন করা হ'ল। যদি নতুন সংহতিটোৰ প্রসরণ k হয়, তেন্তে 9k 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 : 8643513685 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $f: [-1, 1] \rightarrow \mathbb{R}$  be defined as  $f(x) = ax^2 + bx + c$  for all  $x \in [-1, 1]$ , where  $a, b, c \in \mathbb{R}$  such that  $f(-1) = 2, f'(-1) = 1$  and for  $x \in (-1, 1)$  the maximum value of  $f''(x)$  is  $\frac{1}{2}$ . If  $f(x) \leq \alpha$ ,  $x \in [-1, 1]$ , then the least value of  $\alpha$  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 : 8643513685 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $f: [-1, 1] \rightarrow \mathbb{R}$  বৰ্ণিত যাতে  $f(x) = ax^2 + bx + c$  সকলো  $x \in [-1, 1]$  ৰ বাবে, যত  $a, b, c \in \mathbb{R}$  যাতে  $f(-1) = 2, f'(-1) = 1$  আৰু  $f''(x)$  ৰ গৰিষ্ঠমান  $\frac{1}{2}$ , সকলো  $x \in (-1, 1)$  ৰ বাবে। যদি  $f(x) \leq \alpha$ ,  $x \in [-1, 1]$ , তেন্তে  $\alpha$  ৰ সৰ্বনিম্ন 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 : 86 Question Id : 8643513686 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let the coefficients of third, fourth and fifth terms in the expansion of  $\left(x + \frac{a}{x^2}\right)^n$ ,  $x \neq 0$ , be

in the ratio 12 : 8 : 3. Then the term independent of  $x$  in the expansion, 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 : 8643513686 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধরা হ'ল  $\left(x + \frac{a}{x^2}\right)^n$ ,  $x \neq 0$ , বিস্তারিত ওয়, ৪র্থ আৰু ৫ম পদৰ সহগ 12 : 8 : 3. অনুপাতত আছে। তেন্তে উক্ত

বিস্তারিত  $x$  বহিত পদৰ সহগটো 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 : 8643513687 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $f: [-3, 1] \rightarrow \mathbb{R}$  be given as

$$f(x) = \begin{cases} \min \{(x+6), x^2\}, & -3 \leq x \leq 0 \\ \max \{\sqrt{x}, x^2\}, & 0 \leq x \leq 1. \end{cases}$$

If the area bounded by  $y=f(x)$  and  $x$ -axis is  $A$ , then the value of  $6A$  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 : 8643513687 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল  $f: [-3, 1] \rightarrow \mathbb{R}$  দিয়া আছে যাতে  $f(x) = \begin{cases} \min \{(x+6), x^2\}, & -3 \leq x \leq 0 \\ \max \{\sqrt{x}, x^2\}, & 0 \leq x \leq 1. \end{cases}$

যদি  $y = f(x)$  আৰু  $x$ -অক্ষৰ দ্বাৰা আশ্ৰিত ক্ষেত্ৰৰ কালি  $A$  হয় তেন্তে  $6A$  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 :** 88 **Question Id :** 8643513688 **Question Type :** SA

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

Let  $P$  be an arbitrary point having sum of the squares of the distances from the planes  $x + y + z = 0$ ,  $lx - nz = 0$  and  $x - 2y + z = 0$ , equal to 9. If the locus of the point  $P$  is  $x^2 + y^2 + z^2 = 9$ , then the value of  $l - n$  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 :** 88 **Question Id :** 8643513688 **Question Type :** SA

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

ধৰা হ'ল  $P$  এটা যিকোনো বিন্দু যাতে  $x + y + z = 0$ ,  $lx - nz = 0$  আৰু  $x - 2y + z = 0$ , সমতলবোৰৰ পৰা  $P$  বিন্দুৰ দূৰত্বৰ বৰ্গৰ যোগফল 9। যদি  $P$  বিন্দুৰ সঞ্চাৰ পথ  $x^2 + y^2 + z^2 = 9$  হয়, তেন্তে  $l - n$  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 :** 89 **Question Id :** 8643513689 **Question Type :** SA

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

Let  $\vec{x}$  be a vector in the plane containing vectors  $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$  and  $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ . If the vector  $\vec{x}$  is perpendicular to  $(3\hat{i} + 2\hat{j} - \hat{k})$  and its projection on  $\vec{a}$  is  $\frac{17\sqrt{6}}{2}$ , then the value of

$|\vec{x}|^2$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

Possible Answers :

100

Question Number : 89 Question Id : 8643513689 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধরা হ'ল  $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$  আৰু  $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$  ভেক্টৰ দুটা থকা সমতলত  $\vec{x}$  এটা ভেক্টৰ। যদি  $\vec{x}$  ভেক্টৰটো

$(3\hat{i} + 2\hat{j} - \hat{k})$  ৰ ওপৰত লম্ব আৰু  $\vec{a}$  ৰ ওপৰত অভিক্ষেপ  $\frac{17\sqrt{6}}{2}$  হয়, তেন্তে  $|\vec{x}|^2$  ৰ মান সমান

হ'ব \_\_\_\_\_ ।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 90 Question Id : 8643513690 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  and  $B = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \end{bmatrix}$  such that  $AB = B$  and  $a + d = 2021$ , then the value of  $ad - bc$

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 : 8643513690 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধরা হ'ল  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  আৰু  $B = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \end{bmatrix}$  যাতে  $AB = B$  আৰু  $a + d = 2021$ , তেন্তে  $ad - bc$  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