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B TECH

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Physics Section A

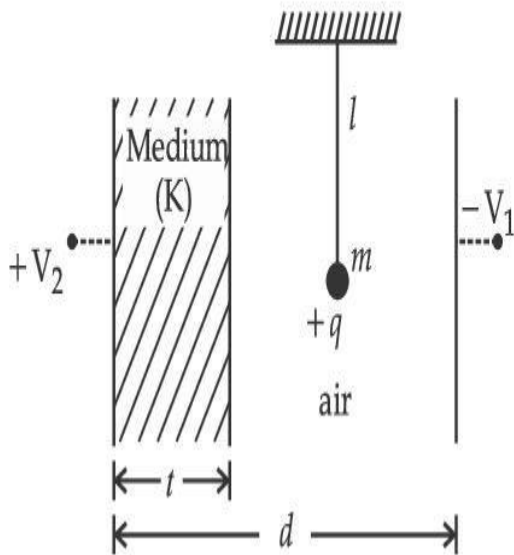
Section Id : 864351848
Section Number : 1
Section type : Online

Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Response :	Yes Clear
Sub-Section Number :	1
Sub-Section Id :	8643511075
Question Shuffling Allowed :	Yes

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A simple pendulum of mass ' m ', length ' l ' and charge ' $+q$ ' suspended in the electric field produced by two conducting parallel plates as shown. The value of deflection of pendulum in equilibrium position will be :



Options :

1.
$$\tan^{-1} \left[\frac{q}{mg} \times \frac{C_1(V_1 + V_2)}{(C_1 + C_2)(d - t)} \right]$$

2. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_2(V_1 + V_2)}{(C_1 + C_2)(d - t)} \right]$

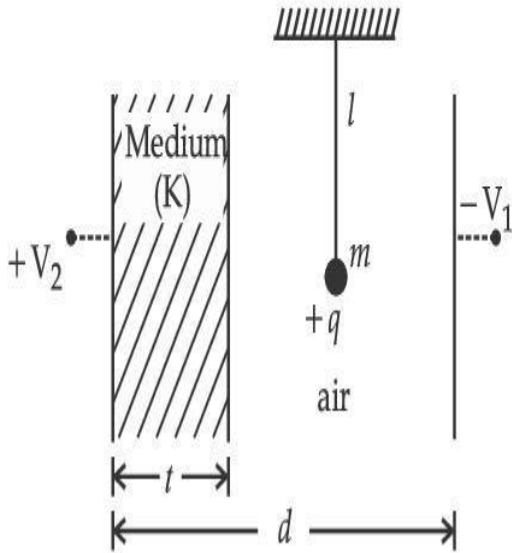
3. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_1(V_2 - V_1)}{(C_1 + C_2)(d - t)} \right]$

4. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_2(V_2 - V_1)}{(C_1 + C_2)(d - t)} \right]$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

চিত্রত দেখুওৱা ধৰণে, দুখন পৰিবাহী সমান্তৰাল প্লেটৰ দ্বাৰা উৎপাদিত বিদ্যুৎ ক্ষেত্ৰত, ' m ' ভৰযুক্ত, ' l ' দৈৰ্ঘ্যৰ আৰু ' $+q$ ' আধানযুক্ত এটা সৰল দোলক ওলমাই ৰখা হৈছে। সাম্যাৱস্থাত দোলকটোৰ বিচ্যুতিৰ (deflection) পৰিমাণ হ'ব :



Options :

1. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_1(V_1 + V_2)}{(C_1 + C_2)(d - t)} \right]$

2. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_2(V_1 + V_2)}{(C_1 + C_2)(d - t)} \right]$

3. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_1(V_2 - V_1)}{(C_1 + C_2)(d - t)} \right]$

4. $\tan^{-1} \left[\frac{q}{mg} \times \frac{C_2(V_2 - V_1)}{(C_1 + C_2)(d - t)} \right]$



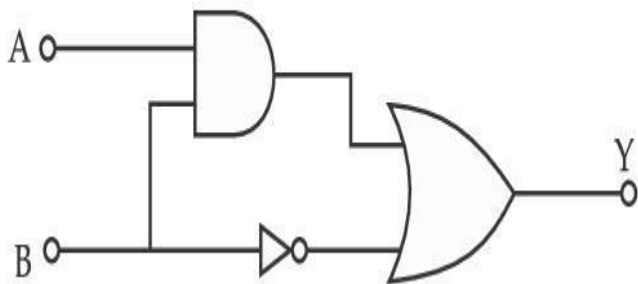
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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Find the truth table for the function Y of A and B represented in the following figure.



Options :

1.

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	0

2.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	1

3.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

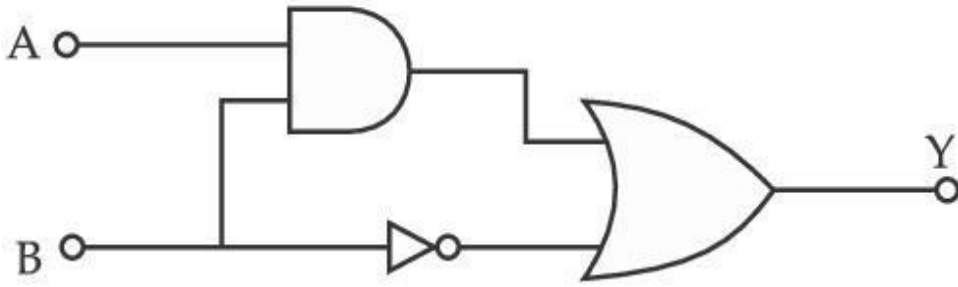
4.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলৰ চিত্ৰত দিয়া, A আৰু B ৰ ফলন Y ৰ বাবে ট্ৰুথ টেবুল নিৰ্ণয় কৰা ।



Options :

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	0

1.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	1

2.

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A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

3.

4.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A particle of mass M originally at rest is subjected to a force whose direction is constant but magnitude varies with time according to the relation

$$F = F_0 \left[1 - \left(\frac{t - T}{T} \right)^2 \right]$$

Where F_0 and T are constants. The force acts only for the time interval $2T$. The velocity v of the particle after time $2T$ is :

Options :

1. $F_0 T / 3M$

2. $4F_0T/3M$

3. $F_0T/2M$

4. $2F_0T/M$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

প্ৰাৰম্ভিকতে স্থিৰ অৱস্থাত থকা M ভৰৰ এটা কণাৰ ওপৰত এটা বলে ক্ৰিয়া কৰিছে যাৰ দিশ স্থিৰ, কিন্তু বলৰ মান সময়ৰ সৈতে নিম্নোক্ত সম্বন্ধ অনুসৰি সলনি হৈছে,

$$F = F_0 \left[1 - \left(\frac{t - T}{T} \right)^2 \right]$$

য'ত F_0 আৰু T ধ্ৰুৱক। বলটোৱে কেৱল $2T$ সময় ব্যৱধানৰ বাবে ক্ৰিয়া কৰিছে। $2T$ সময়ৰ পাছত কণাটোৰ বেগ v হয়,

Options :

1. $F_0T/3M$

2. $4F_0T/3M$

3. $F_0T/2M$

4. $2F_0T/M$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II.

List I

- (a) Capacitance, C
- (b) Permittivity of free space, ϵ_0
- (c) Permeability of free space, μ_0
- (d) Electric field, E

List II

- (i) $M^1 L^1 T^{-3} A^{-1}$
- (ii) $M^{-1} L^{-3} T^4 A^2$
- (iii) $M^{-1} L^{-2} T^4 A^2$
- (iv) $M^1 L^1 T^{-2} A^{-2}$

Choose the correct answer from the options given below :

Options :

1. (a) \rightarrow (iii), (b) \rightarrow (iv), (c) \rightarrow (ii), (d) \rightarrow (i)

2. (a) \rightarrow (iv), (b) \rightarrow (ii), (c) \rightarrow (iii), (d) \rightarrow (i)

3. (a) \rightarrow (iii), (b) \rightarrow (ii), (c) \rightarrow (iv), (d) \rightarrow (i)

4. (a) \rightarrow (iv), (b) \rightarrow (iii), (c) \rightarrow (ii), (d) \rightarrow (i)

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তালিকা I ৰ সৈতে তালিকা II মিলোৱা।

তালিকা I	তালিকা II
(a) ধাৰকত্ব, C	(i) $M^1 L^1 T^{-3} A^{-1}$
(b) শূন্যস্থানৰ মাধ্যমাংক, ϵ_0	(ii) $M^{-1} L^{-3} T^4 A^2$
(c) শূন্যস্থানৰ প্ৰৱেশ্যতা, μ_0	(iii) $M^{-1} L^{-2} T^4 A^2$
(d) বিদ্যুৎ ক্ষেত্ৰ, E	(iv) $M^1 L^1 T^{-2} A^{-2}$

তলৰ বিকল্পৰ পৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

Options :

1. (a) \rightarrow (iii), (b) \rightarrow (iv), (c) \rightarrow (ii), (d) \rightarrow (i)

2. (a) \rightarrow (iv), (b) \rightarrow (ii), (c) \rightarrow (iii), (d) \rightarrow (i)

3. (a) \rightarrow (iii), (b) \rightarrow (ii), (c) \rightarrow (iv), (d) \rightarrow (i)

4. (a) \rightarrow (iv), (b) \rightarrow (iii), (c) \rightarrow (ii), (d) \rightarrow (i)

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

One mole of an ideal gas is taken through an adiabatic process where the temperature rises from 27°C to 37°C . If the ideal gas is composed of polyatomic molecule that has 4 vibrational modes, which of the following is true ?

$$[R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}]$$

Options :

1. work done by the gas is close to 582 J

2. work done on the gas is close to 582 J
3. work done by the gas is close to 332 J
4. work done on the gas is close to 332 J

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এক তাপবোধী প্ৰক্ৰিয়াৰ মাজেৰে এটা আদৰ্শ গেছৰ এক ম'ল পৰিমাণক পঠিওৱা হৈছে য'ত উষ্ণতা 27°C ৰ পৰা 37°C লৈ বৃদ্ধি হৈছে। যদিহে 4 প্ৰকাৰৰ কম্পনযুক্ত (vibrational modes) বহুপাৰমাণৱিক অণুৰে আদৰ্শ গেছটো গঠিত (composed), তেন্তে তলৰ কোনটো সঁচা ?

$$[R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}]$$

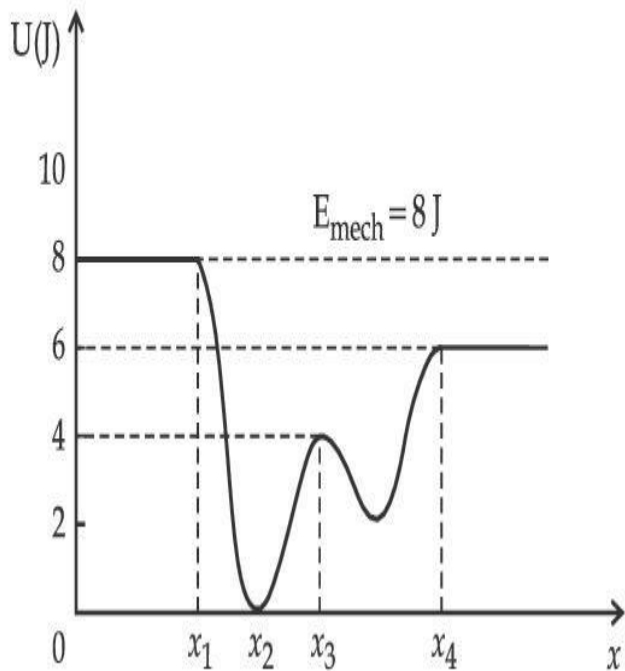
Options :

1. গেছটোৰ দ্বাৰা সম্পাদিত কাৰ্যৰ পৰিমাণ প্ৰায় 582 J
2. গেছটোৰ ওপৰত সম্পাদিত কাৰ্যৰ পৰিমাণ প্ৰায় 582 J
3. গেছটোৰ দ্বাৰা সম্পাদিত কাৰ্যৰ পৰিমাণ প্ৰায় 332 J
4. গেছটোৰ ওপৰত সম্পাদিত কাৰ্যৰ পৰিমাণ প্ৰায় 332 J

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below is the plot of a potential energy function $U(x)$ for a system, in which a particle is in one dimensional motion, while a conservative force $F(x)$ acts on it. Suppose that $E_{\text{mech}} = 8 \text{ J}$, the incorrect statement for this system is :



[where K.E. = kinetic energy]

Options :

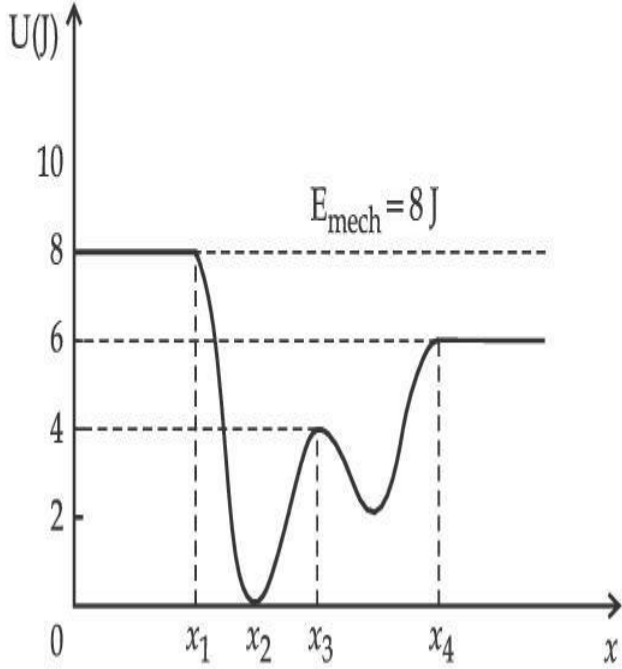
1. at $x = x_2$, K.E. is greatest and the particle is moving at the fastest speed.
2. at $x < x_1$, K.E. is smallest and the particle is moving at the slowest speed.
3. at $x > x_4$, K.E. is constant throughout the region.
4. at $x = x_3$, K.E. = 4 J.

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

চিত্ৰত এটা নিকায়ৰ বাবে স্থিতিশক্তি $U(x)$ ৰ লেখচিত্ৰ দেখুওৱা হৈছে, য'ত এক বক্ষণশীল শক্তি $F(x)$ য়ে ক্ৰিয়া কৰাৰ বাবে এটা কণাই একমাত্ৰিক গতি কৰিছে। ধৰা $E_{\text{mech}} = 8 \text{ J}$, নিকায়টোৰ বাবে অশুদ্ধ উক্তিটো হয়,

[য'ত K.E. = kinetic energy/গতি-শক্তি]



Options :

1. $x = x_2$ ত, গতিশক্তি সৰ্বোচ্চ আৰু কণাটো সৰ্বোচ্চ দ্ৰুতিত গতি কৰিছে।
2. $x < x_1$ ত, গতিশক্তি সৰ্বনিম্ন আৰু কণাটো সৰ্বনিম্ন দ্ৰুতিত গতি কৰিছে।
3. $x > x_4$ ত, অঞ্চলটোৰ বাবে গতি-শক্তি ধ্ৰুৱক।
4. $x = x_3$ ত, গতি-শক্তি = 4 J.

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the following statements :

- A. Atoms of each element emit characteristics spectrum.
- B. According to Bohr's Postulate, an electron in a hydrogen atom, revolves in a certain stationary orbit.
- C. The density of nuclear matter depends on the size of the nucleus.
- D. A free neutron is stable but a free proton decay is possible.
- E. Radioactivity is an indication of the instability of nuclei.

Choose the correct answer from the options given below :

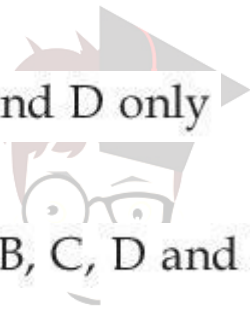
Options :

1. A, B and E only

2. A, C and E only

3. B and D only

4. A, B, C, D and E



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলৰ উক্তি সমূহ বিবেচনা কৰা :

- A. প্ৰতিটো মৌলৰে পৰমাণুসমূহ বৈশিষ্ট্য সূচক বৰ্ণালী নিৰ্গত কৰে।
- B. ব'ৰ স্বীকাৰ্য্য অনুসৰি, এটা হাইড্ৰ'জেন পৰমাণুত, এটা ইলেক্ট্ৰনে এক নিৰ্দিষ্ট সুস্থিৰ কক্ষপথত ঘূৰি থাকে।
- C. নিউক্লিয়াৰ মেটাৰৰ ঘনত্ব নিউক্লিয়াছৰ আকাৰৰ ওপৰত নিৰ্ভৰ কৰে।
- D. এটা মুক্ত নিউট্ৰন সুস্থিৰ, কিন্তু এটা মুক্ত প্ৰট'নৰ বিঘটন সম্ভৱ।
- E. নিউক্লিয়াছৰ অস্থিৰতাৰ এটা লক্ষণ তেজস্ক্ৰিয়তা।

তলত দিয়া বিকল্পৰ পৰা উপযুক্ত উত্তৰটো বাছি উলিওৱা :

Options :

1. A, B আৰু E কেৱল

2. A, C আৰু E কেৱল

3. B আৰু D কেৱল

4. A, B, C, D আৰু E



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A raindrop with radius $R=0.2$ mm falls from a cloud at a height $h=2000$ m above the ground. Assume that the drop is spherical throughout its fall and the force of buoyance may be neglected, then the terminal speed attained by the raindrop is :

[Density of water $f_w = 1000 \text{ kg m}^{-3}$

and Density of air $f_a = 1.2 \text{ kg m}^{-3}$,

$g = 10 \text{ m/s}^2$

Coefficient of viscosity of air $= 1.8 \times 10^{-5} \text{ Nsm}^{-2}$]

Options :

1. 250.6 ms^{-1}
2. 4.94 ms^{-1}
3. 14.4 ms^{-1}
4. 43.56 ms^{-1}

Question Type : MCQ Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

ভূ-পৃষ্ঠৰ পৰা $h=2000 \text{ m}$ উচ্চতাত থকা এটুকুৰা ডাৱৰৰ পৰা এটা $R=0.2 \text{ mm}$ ব্যাসাৰ্ধৰ এটা বৰষুণৰ টোপাল সৰি পৰিছে। ধৰিলোৱা তললৈ আহি থকা সম্পূৰ্ণ সময়ছোৱাত টোপালটো গোলাকাৰ হৈ আছে আৰু উৎপ্ৰাৰন বলক নগন্য বুলিব পাৰি, তেন্তে টোপালটোৰ অন্তিম দ্ৰুতি হ'ব :

[পানীৰ ঘনত্ব $f_w = 1000 \text{ kg m}^{-3}$

আৰু বায়ুৰ ঘনত্ব $f_a = 1.2 \text{ kg m}^{-3}$,

$g = 10 \text{ m/s}^2$

Coefficient of viscosity of air $= 1.8 \times 10^{-5} \text{ Nsm}^{-2}$]

Options :

1. 250.6 ms^{-1}
2. 4.94 ms^{-1}
3. 14.4 ms^{-1}
4. 43.56 ms^{-1}

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

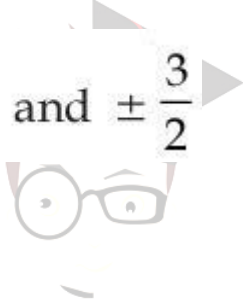
A physical quantity 'y' is represented by the formula $y = m^2 r^{-4} g^x l^{-\frac{3}{2}}$

If the percentage errors found in y, m, r, l and g are 18, 1, 0.5, 4 and p respectively, then find the value of x and p .

Options :

1. 4 and ± 3
2. 5 and ± 2
3. 8 and ± 2

4. $\frac{16}{3}$ and $\pm \frac{3}{2}$



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা ভৌতিক রাশি 'y' ক প্রতিনিধিত্ব কৰা ফৰ্মুলা হৈছে, $y = m^2 r^{-4} g^x l^{-\frac{3}{2}}$

যদিহে ক্ৰমান্বয়ে y, m, r, l আৰু g ৰ শতকৰা ত্ৰুটি ক্ৰমে 18, 1, 0.5, 4 আৰু p হয়, তেন্তে x আৰু p ৰ মান নিৰ্ণয় কৰা।

Options :

1. 4 আৰু ± 3
2. 5 আৰু ± 2
3. 8 আৰু ± 2

4. $\frac{16}{3}$ আৰু $\pm \frac{3}{2}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two Carnot engines A and B operate in series such that engine A absorbs heat at T_1 and rejects heat to a sink at temperature T . Engine B absorbs half of the heat rejected by Engine A and rejects heat to the sink at T_3 . When workdone in both the cases is equal, the value of T is :

Options :

1.

$$\frac{2}{3}T_1 + \frac{1}{3}T_3$$

2.

$$\frac{3}{2}T_1 + \frac{1}{3}T_3$$

3.

$$\frac{2}{3}T_1 + \frac{3}{2}T_3$$

4.

$$\frac{1}{3}T_1 + \frac{2}{3}T_3$$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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শ্রেণীবদ্ধভাৱে দুটা কাণ্ঠ ইঞ্জিন A আৰু B য়ে ক্ৰিয়া কৰি আছে যাতে A য়ে T_1 উষ্ণতাত তাপ শোষণ কৰে আৰু T উষ্ণতাত কৃপত তাপ বৰ্জন কৰে। A ইঞ্জিনে বৰ্জন কৰা তাপৰ আধা B ইঞ্জিনে শোষণ কৰে আৰু T_3 উষ্ণতাত কৃপত তাপ বৰ্জন কৰে। যেতিয়া দুয়োটা পৰিঘটনাত সম্পাদন হোৱা কাৰ্যৰ পৰিমাণ সমান হয়, তেতিয়া T ৰ মান হয় :

Options :

1. $\frac{2}{3}T_1 + \frac{1}{3}T_3$

2. $\frac{3}{2}T_1 + \frac{1}{3}T_3$

3. $\frac{2}{3}T_1 + \frac{3}{2}T_3$

4. $\frac{1}{3}T_1 + \frac{2}{3}T_3$



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The planet Mars has two moons, if one of them has a period 7 hours, 30 minutes and an orbital radius of 9.0×10^3 km. Find the mass of Mars.

$$\left\{ \text{Given } \frac{4\pi^2}{G} = 6 \times 10^{11} \text{ N}^{-1} \text{ m}^{-2} \text{ kg}^2 \right\}$$

Options :

1. $5.96 \times 10^{19} \text{ kg}$

2. $3.25 \times 10^{21} \text{ kg}$

3. $6.00 \times 10^{23} \text{ kg}$

4. $7.02 \times 10^{25} \text{ kg}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

মঙ্গল গ্রহৰ দুটা উপগ্রহ আছে। যদিহে দুয়োটাৰ ভিতৰত এটা উপগ্রহৰ পৰিভ্ৰমণকাল 7 ঘণ্টা 30 মিনিট হয় আৰু কক্ষীয় ব্যাসার্ধ $9.0 \times 10^3 \text{ km}$ হয়, মঙ্গল গ্রহৰ ভৰ নিৰ্ণয় কৰা।

$$\left\{ \text{Given } \frac{4\pi^2}{G} = 6 \times 10^{11} \text{ N}^{-1} \text{ m}^{-2} \text{ kg}^2 \right\}$$

Options :

1. $5.96 \times 10^{19} \text{ kg}$

2. $3.25 \times 10^{21} \text{ kg}$

3. $6.00 \times 10^{23} \text{ kg}$

4. $7.02 \times 10^{25} \text{ kg}$

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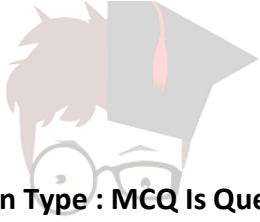
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An object of mass 0.5 kg is executing simple harmonic motion. Its amplitude is 5 cm and time period (T) is 0.2 s. What will be the potential energy of the object at an instant $t = \frac{T}{4}$ s starting from mean position. Assume that the initial phase of the oscillation is zero.

Options :

1. 6.2×10^{-3} J
2. 1.2×10^3 J
3. 0.62 J
4. 6.2×10^3 J



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

0.5 kg ভৰৰ এটা বস্তুৰে সৰল পৰ্যাবৃত্ত গতি সাব্যস্ত কৰি আছে। ইয়াৰ পৰ্যায়কাল (T) 0.2 s আৰু বিস্তাৰ 5 cm।

মাধ্যমস্থানৰ পৰা আৰম্ভ কৰি $t = \frac{T}{4}$ ত বস্তুটোৰ স্থিতিশক্তি কি হ'ব। ধৰিলোৱা দোলনৰ প্ৰাৰম্ভিক দশা শূন্য।

Options :

1. 6.2×10^{-3} J
2. 1.2×10^3 J
3. 0.62 J

4. $6.2 \times 10^3 \text{ J}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An automobile of mass ' m ' accelerates starting from origin and initially at rest, while the engine supplies constant power P . The position is given as a function of time by :

Options :

1. $\left(\frac{9P}{8m}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$

2. $\left(\frac{8P}{9m}\right)^{\frac{1}{2}} t^{\frac{2}{3}}$

3. $\left(\frac{8P}{9m}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$

4. $\left(\frac{9m}{8P}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$

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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যেতিয়া ইঞ্জিনে স্থিৰ ধ্ৰুৱক শক্তি P যোগান ধৰে, তেতিয়া মূলবিন্দুৰ ব পৰা আৰু প্ৰাৰম্ভিকতে স্থিৰ অৱস্থানৰ পৰা আৰম্ভ কৰি এক 'm' ভৰৰ অ'ট'মবাইল ত্বড়িত হয়। ইয়াৰ অৱস্থানক সময়ৰ ফলন হিচাপে দেখুওৱা পাৰি :

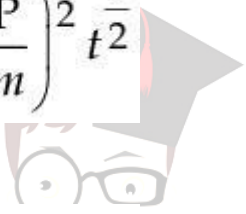
Options :

1. $\left(\frac{9P}{8m}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$

2. $\left(\frac{8P}{9m}\right)^{\frac{1}{2}} t^{\frac{2}{3}}$

3. $\left(\frac{8P}{9m}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$

4. $\left(\frac{9m}{8P}\right)^{\frac{1}{2}} t^{\frac{3}{2}}$



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Question Type : MCQ Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Figure A and B show two long straight wires of circular cross-section (a and b with $a < b$), carrying current I which is uniformly distributed across the cross-section. The magnitude of magnetic field B varies with radius r and can be represented as :

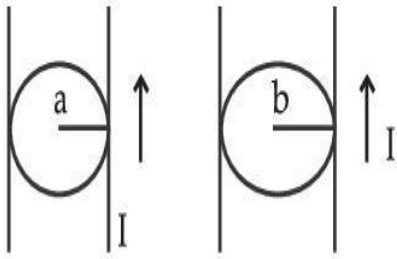
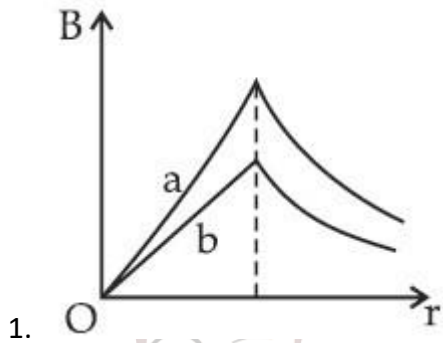


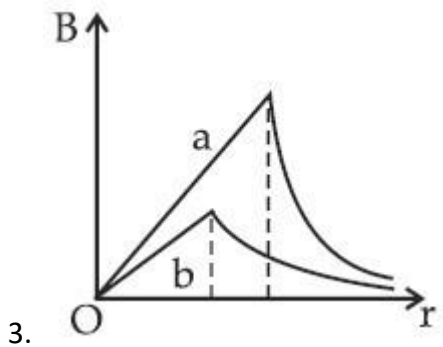
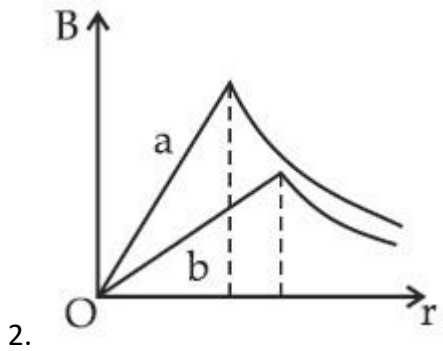
Fig. A

Fig. B

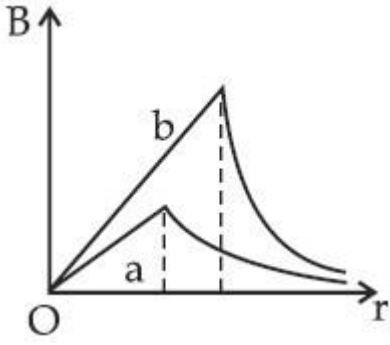
Options :



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4.



Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

চিএ A আৰু B ত, I বিদ্যুৎ কঢ়িওৱা, যি বিদ্যুৎ সুষমভাৱে পৃষ্ঠচ্ছেদত বিস্তৃত হৈ আছে, বৃত্তাকাৰ পৃষ্ঠচ্ছেদৰ (a আৰু b যাতে $a < b$) দুডাল দীঘল সবলবৈখিক তাঁৰ, দেখুওৱা হৈছে। চৌম্বিক ক্ষেত্ৰ B ৰ মান ব্যাসার্ধ r ৰ সৈতে সলনি হয় আৰু ইয়াক দৰ্শাৰ পাৰি :

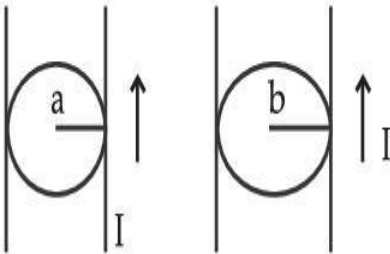
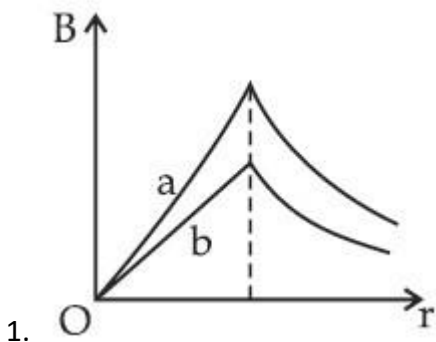


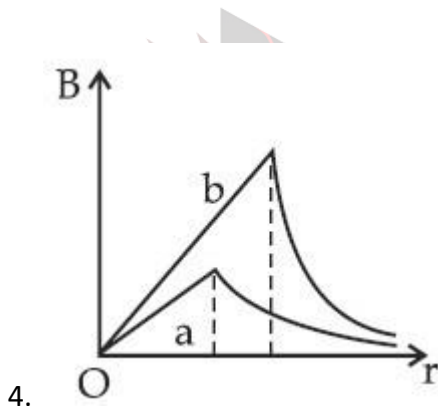
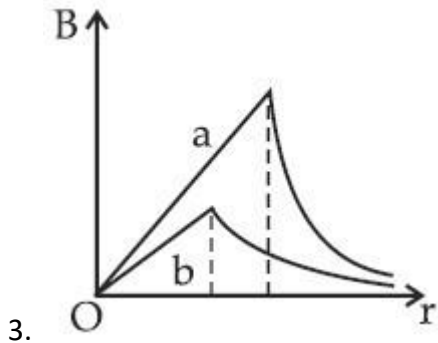
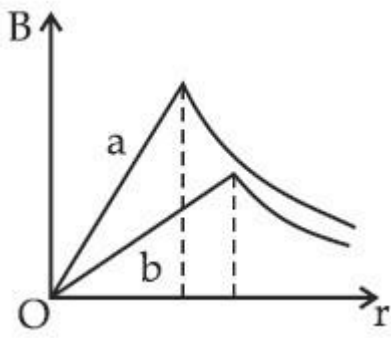
Fig. A

Fig. B

Options :



2.



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two identical particles of mass 1 kg each go round a circle of radius R , under the action of their mutual gravitational attraction. The angular speed of each particle is :

Options :

1. $\sqrt{\frac{G}{2R^3}}$

2.

$$\frac{1}{2} \sqrt{\frac{G}{R^3}}$$

3.

$$\frac{1}{2R} \sqrt{\frac{1}{G}}$$

4.

$$\sqrt{\frac{2G}{R^3}}$$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

R-ব্যাসার্ধৰ এটা বৃত্তৰ চাৰিওফালে, প্রতিটো 1 kg ভৰৰ দুটা সাইলাখ একেই কণাই, সিহঁতৰ পাৰস্পৰিক মাধ্যাকৰ্ষণিক আকৰ্ষণৰ ফলস্বৰূপে ঘূৰি আছে। প্রতিটো কণাৰ কৌণিক দ্ৰুতি হ'ব :

Options :

1.

$$\sqrt{\frac{G}{2R^3}}$$

2.

$$\frac{1}{2} \sqrt{\frac{G}{R^3}}$$

3.

$$\frac{1}{2R} \sqrt{\frac{1}{G}}$$

4. $\sqrt{\frac{2G}{R^3}}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An electron and proton are separated by a large distance. The electron starts approaching the proton with energy 3 eV. The proton captures the electron and forms a hydrogen atom in second excited state. The resulting photon is incident on a photosensitive metal of threshold wavelength 4000 Å. What is the maximum kinetic energy of the emitted photoelectron?

Options :

1. 3.3 eV

2. No photoelectron would be emitted

3. 7.61 eV

4. 1.41 eV



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা ইলেক্ট্ৰন আৰু প্ৰট'ন বৃহৎ দূৰত্বৰ ব্যৱধানত অৱস্থিত। ইলেক্ট্ৰনটোৱে 3 eV শক্তিতে প্ৰট'নটোৰ দিশে গতি আৰম্ভ কৰিছে। প্ৰট'নটোৱে ইলেক্ট্ৰনটো ধৰি দ্বিতীয় উত্তেজিত স্তৰত থকা এটা হাইড্ৰ'জেন পৰমাণু গঠন কৰে। এই প্ৰক্ৰিয়াত নিৰ্গত ফট'নটো 4000 Å প্ৰাৰম্ভিক তৰংগদৈৰ্ঘ্য (threshold wavelength) সম্পন্ন এক আলোক সংবেদী ধাতুৰ ওপৰত আপতিত হৈছে। নিৰ্গত ফট'ইলেক্ট্ৰনৰ সৰ্বোচ্চ গতিশক্তি কিমান ?

Options :

1. 3.3 eV

2. কোনো ফট'ইলেক্ট্রন নিগত নহয়।

3. 7.61 eV

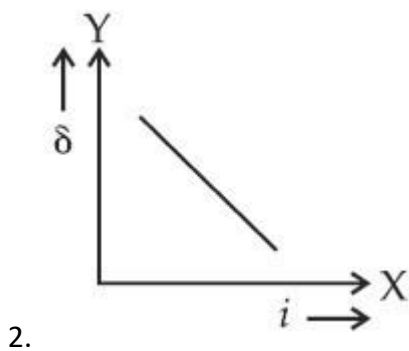
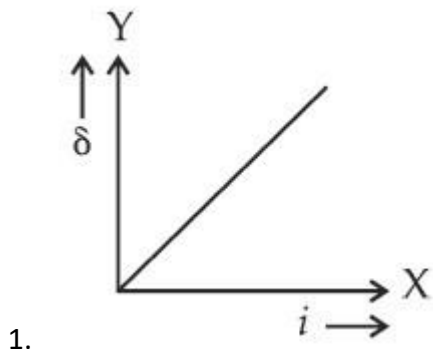
4. 1.41 eV

Question Type : MCQ Is Question Mandatory : No

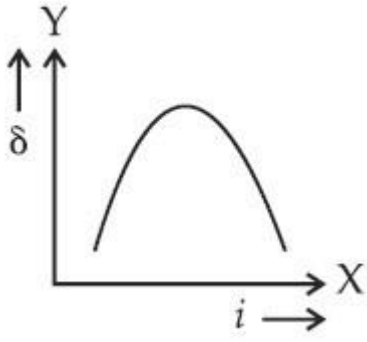
Correct Marks : 4 Wrong Marks : 1

The expected graphical representation of the variation of angle of deviation ' δ ' with angle of incidence ' i ' in a prism is :

Options :

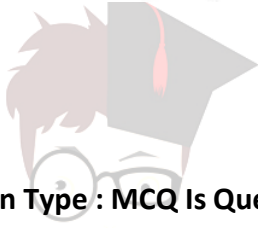
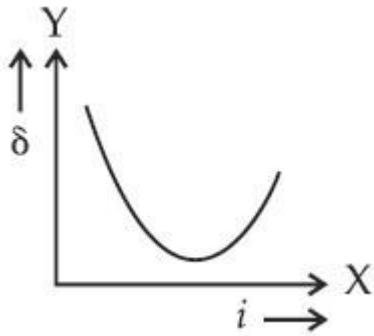


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3.

4.



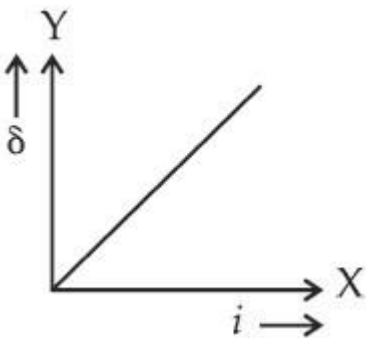
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Question Type : MCQ Is Question Mandatory : No

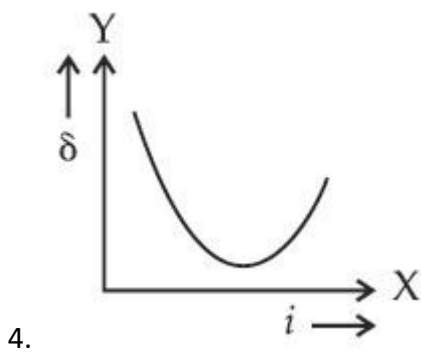
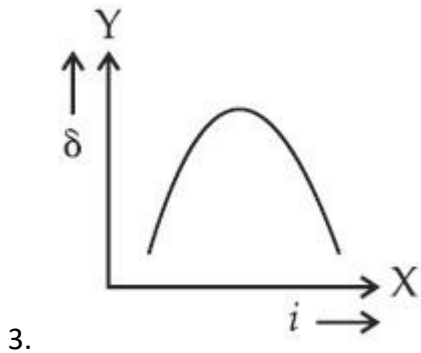
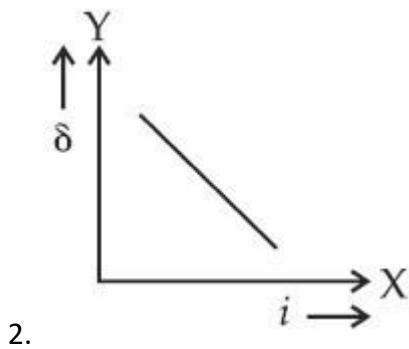
Correct Marks : 4 Wrong Marks : 1

এটা প্ৰিজমৰ আপতন কোণ 'i' ৰ সৈতে বিচ্যুতি কোণ 'δ' ৰ সলনিৰ (variation) প্ৰত্যাশিত লেখচিত্ৰ হ'ব :

Options :



1.



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A 100Ω resistance, a $0.1 \mu\text{F}$ capacitor and an inductor are connected in series across a 250 V supply at variable frequency. Calculate the value of inductance of inductor at which resonance will occur. Given that the resonant frequency is 60 Hz .

Options :

1. $7.03 \times 10^{-5} \text{ H}$

2. 70.3 H

3. 0.70 H
4. 70.3 mH

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা 250 V ৰ পৰিবৰ্তনশীল কম্পনাংকৰ উৎসৰ সৈতে এটা 100Ω বোধক, এটা $0.1 \mu\text{F}$ ধাৰক আৰু এটা আৱেশক শ্ৰেণীবদ্ধভাৱে সংযোগ কৰা হৈছে। অনুনাদ হ'বৰ বাবে প্ৰয়োজন হোৱা আৱেশকৰ মান গণনা কৰা। দিয়া আছে, অনুনাদ কম্পনাংক 60 Hz ।

Options :

1. $7.03 \times 10^{-5} \text{ H}$
2. 70.3 H
3. 0.70 H
4. 70.3 mH



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The resistance of a conductor at 15°C is 16Ω and at 100°C is 20Ω . What will be the temperature coefficient of resistance of the conductor ?

Options :

1. 0.003°C^{-1}

2. $0.010^{\circ}\text{C}^{-1}$

3. $0.033^{\circ}\text{C}^{-1}$

4. $0.042^{\circ}\text{C}^{-1}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা পৰিবাহীৰ ৰোধকতা ক্ৰমে 15°C ত $16\ \Omega$ আৰু 100°C ত $20\ \Omega$ । পৰিবাহীটোৰ ৰোধকতাৰ উষ্ণতা গুণাংক কি হ'ব ?

Options :

1. $0.003^{\circ}\text{C}^{-1}$

2. $0.010^{\circ}\text{C}^{-1}$

3. $0.033^{\circ}\text{C}^{-1}$

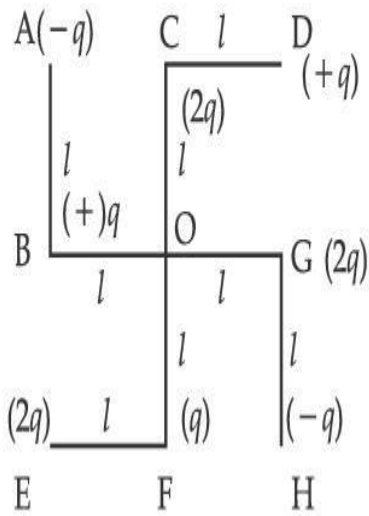
4. $0.042^{\circ}\text{C}^{-1}$

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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

What will be the magnitude of electric field at point O as shown in figure ? Each side of the figure is l and perpendicular to each other ?



Options :

1. $\frac{1}{4\pi\epsilon_0} \frac{q}{l^2}$

2. $\frac{1}{4\pi\epsilon_0} \frac{2q}{2l^2} (\sqrt{2})$

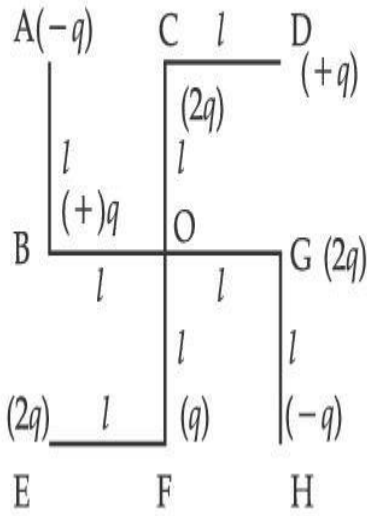
3. $\frac{1}{4\pi\epsilon_0} \frac{q}{(2l^2)} (2\sqrt{2} - 1)$

4. $\frac{q}{4\pi\epsilon_0 (2l)^2}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

চিত্রত দেখুওৱা ধৰণে, O বিন্দুত বিদ্যুৎক্ষেত্ৰৰ মান কি হ'ব ? চিত্ৰৰ প্ৰতিটো পাৰ্শ্ব বা কাষৰ মান l আৰু পৰস্পৰৰ লম্ব।



Options :

1. $\frac{1}{4\pi\epsilon_0} \frac{q}{l^2}$

2. $\frac{1}{4\pi\epsilon_0} \frac{2q}{2l^2} (\sqrt{2})$

3. $\frac{1}{4\pi\epsilon_0} \frac{q}{(2l^2)} (2\sqrt{2} - 1)$

4. $\frac{q}{4\pi\epsilon_0 (2l)^2}$

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Physics Section B

Section Id :

864351849

Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511076
Question Shuffling Allowed :	Yes

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The maximum amplitude for an amplitude modulated wave is found to be 12 V while the minimum amplitude is found to be 3 V. The modulation index is $0.6x$ where x is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal Text

Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা বিস্তাৰ কলিত তৰংগৰ বাবে ক্ৰমে সৰ্বোচ্চ বিস্তাৰ 12 V আৰু সৰ্বনিম্ন বিস্তাৰ 3 V পোৱা গৈছে। কলন সূচক $0.6x$, য'ত x _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

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

For the circuit shown, the value of current at time $t=3.2$ s will be _____ A.

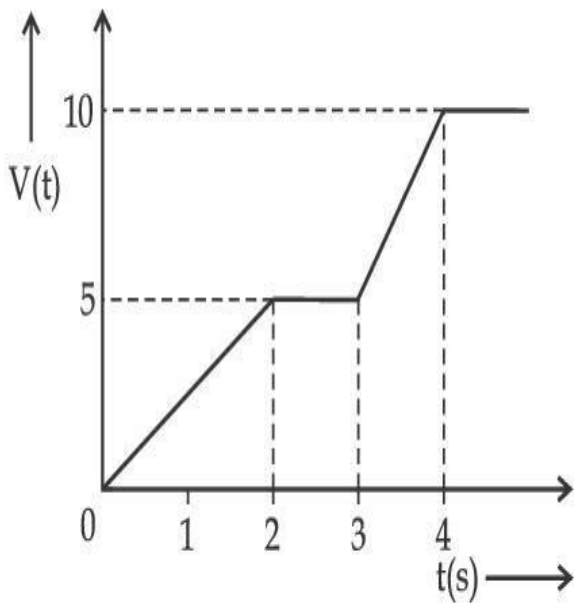


Figure 1

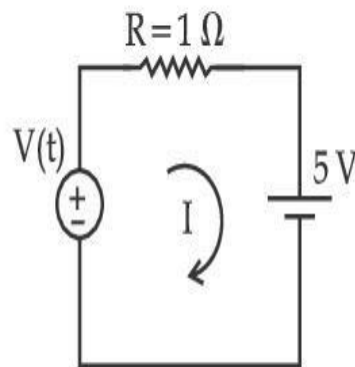


Figure 2

[Voltage distribution $V(t)$ is shown by Fig. (1) and the circuit is shown in Fig. (2)]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

তলত দেখুওৱা বৰ্তনীৰ বাবে, সময় $t=3.2$ s ত প্ৰবাহৰ মান হ'ব _____ A।

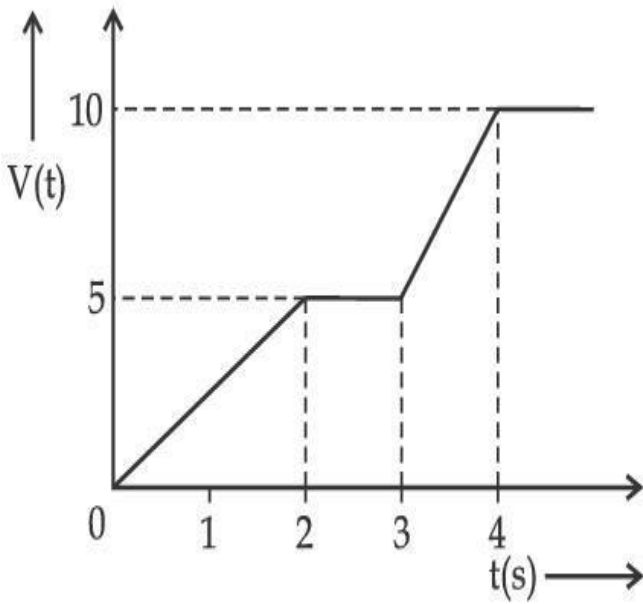


Figure 1

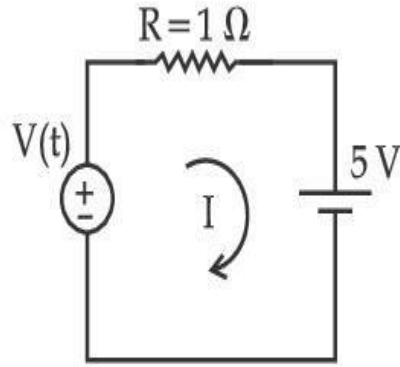


Figure 2

[চিত্ৰ (1) ত বিভিন্ন বিভাজন $V(t)$ দেখুওৱা হৈছে আৰু চিত্ৰ (2) ত বৰ্তনীটো দেখুওৱা হৈছে।]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

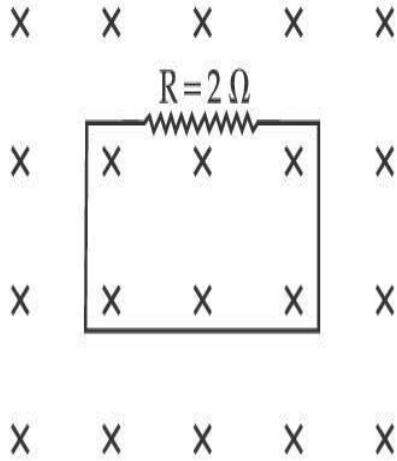
1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In the given figure the magnetic flux through the loop increases according to the relation $\phi_B(t) = 10t^2 + 20t$, where ϕ_B is in milliwebers and t is in seconds.

The magnitude of current through $R = 2 \Omega$ resistor at $t = 5$ s is _____ mA.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

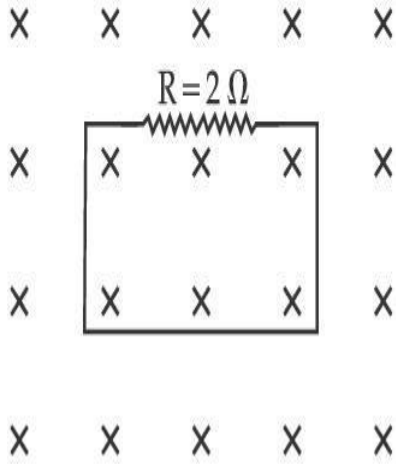
1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

দিয়া চিত্রত, $\phi_B(t) = 10t^2 + 20t$ সম্বন্ধ অনুসৰি আৱদ্ধ সজ্জাটোৰ (loop) মাজেদি চৌম্বিক অভিবাহ বৃদ্ধি পায়, য'ত ϕ_B মিলিবেৰাৰ (milliwebers) এককত আৰু t seconds এককত আছে।

$t = 5$ s ত, $R = 2 \Omega$ ৰোধকটোৰ মাজেদি যোৱা বিদ্যুতৰ মান হ'ব _____ mA।



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

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

The K_{α} X-ray of molybdenum has wavelength 0.071 nm. If the energy of a molybdenum atom with a K electron knocked out is 27.5 keV, the energy of this atom when an L electron is knocked out will be _____ keV. (Round off to the nearest integer)

[$h = 4.14 \times 10^{-15}$ eVs, $c = 3 \times 10^8$ ms $^{-1}$]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

মলিবডেনাম (molybdenum) ৰ K_{α} বৰ্ণৰ বৰ্ণৰ তৰংগদৈৰ্ঘ্য 0.071 nm । যদিহে এটা K -ইলেক্ট্ৰন আতঁৰাই পেলোৱাৰ পাছত এটা (molybdenum) পৰমাণুৰ শক্তি 27.5 keV হয়, তেন্তে এই পৰমাণুটোৰ পৰা এটা L -ইলেক্ট্ৰন আতঁৰাই পেলোৱাৰ পাছত তাৰ শক্তি হ'ব _____ keV । (নিকটতম পূৰ্ণসংখ্যালৈ গোটকৰণ কৰা)

[$h = 4.14 \times 10^{-15}$ eVs, $c = 3 \times 10^8$ ms⁻¹]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The water is filled upto height of 12 m in a tank having vertical sidewalls. A hole is made in one of the walls at a depth ' h ' below the water level. The value of ' h ' for which the emerging stream of water strikes the ground at the maximum range is _____ m.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

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Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

উলম্ব পাৰ্শ্বৰালৰ (vertical sidewalls) এটা টেংকীত 12 m উচ্চতা পৰ্যন্ত পানী ভৰোৱা হৈছে। পানী পৃষ্ঠৰ পৰা 'h' গভীৰতা তলত এখন ৰালত এটা ফুটা কৰা হ'ল। নিৰ্গত পানীৰ প্ৰবাহে (stream) সৰ্বোচ্চ বিস্তৃতিৰে মাটিত আঘাত কৰিবৰ বাবে 'h' ৰ মান হয় _____ m।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

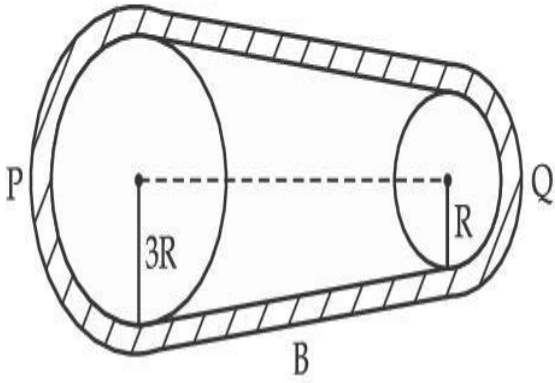
Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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In the given figure, two wheels P and Q are connected by a belt B. The radius of P is three times as that of Q. In case of same rotational kinetic energy, the ratio of rotational inertias

$\left(\frac{I_1}{I_2}\right)$ will be $x : 1$. The value of x will be _____.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

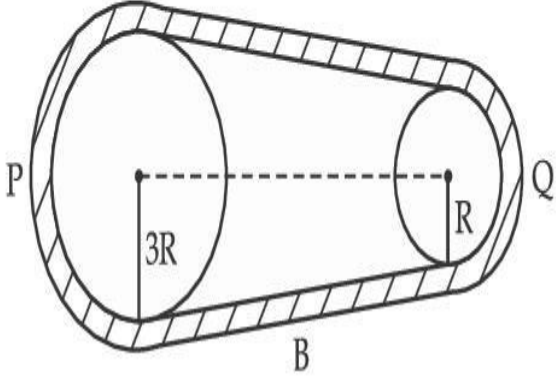
1

Question Type : SA

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

চিত্র অনুসৰি, দুটা চকা P আৰু Q এডাল বেল্ট B ৰ সহায়ত সংযোগ কৰা হৈছে। P ৰ ব্যাসার্ধ Q ৰ ব্যাসার্ধৰ তিনিগুণ।

দুয়োৰে একেই ঘূৰ্ণন গতি-শক্তিৰ বাবে $\left(\frac{I_1}{I_2}\right)$, ঘূৰ্ণন ভ্ৰামকৰ অনুপাত $x:1$ হ'ব। x ৰ মান _____ হ'ব।



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

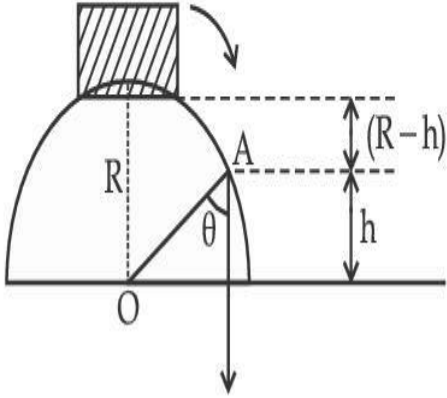
1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A small block slides down from the top of hemisphere of radius $R=3$ m as shown in the figure. The height 'h' at which the block will lose contact with the surface of the sphere is _____ m.

(Assume there is no friction between the block and the hemisphere)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

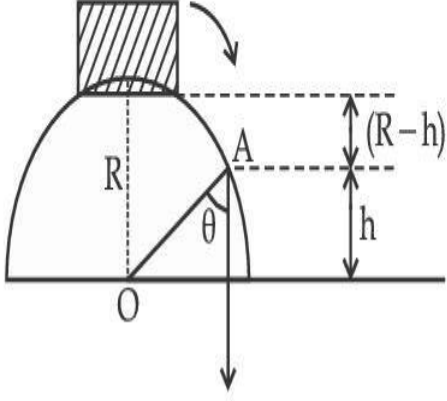
1

Question Type : SA

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

চিত্রত দেখুওৱা ধৰণে, $R = 3\text{ m}$ ব্যাসাৰ্ধৰ এটা গোলাৰ্ধৰ শিখৰৰ পৰা এটা এটা সৰু ব্লক পিচলি আহিছে। যি উচ্চতাত ব্লকটোৱে গোলাৰ্ধৰ পৃষ্ঠৰ সৈতে সংযোগ (contact) হেৰুৱাব, সেই উচ্চতা 'h' হ'ব _____ m।

(ধৰিলোৱা, ব্লকটো আৰু গোলাৰ্ধৰ মাজত কোনো ঘৰ্ষণ নাই)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

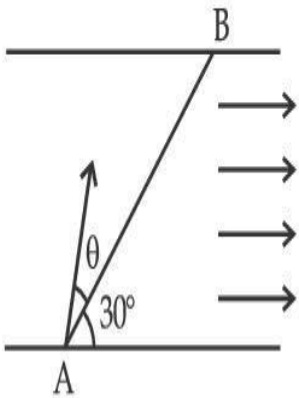
Answers :

1

Question Type : SA

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

A swimmer wants to cross a river from point A to point B. Line AB makes an angle of 30° with the flow of river. Magnitude of velocity of the swimmer is same as that of the river. The angle θ with the line AB should be _____ $^\circ$, so that the swimmer reaches point B.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

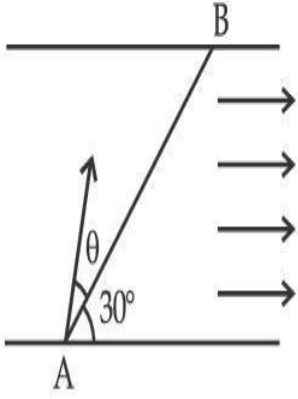
1

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Question Type : SA

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

এজন সাঁতোৰবিদে এখন নদীৰ বিন্দু A ৰ পৰা বিন্দু B লৈ পাৰ হ'ব বিচাৰিছে। AB ৰেখাই নদীৰ সোঁতৰ সৈতে 30° কোণ কৰিছে। সাঁতোৰবিদজনৰ বেগৰ মান নদীৰ বেগৰ সৈতে একেই। যাতে সাঁতোৰবিদজনে বিন্দু B পায়গৈ তাৰ বাবে AB ৰেখাৰ সৈতে কৰা কোণ θ ৰ মান হ'ব _____ $^\circ$ ।



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

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Question Type : SA

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

A particle executes simple harmonic motion represented by displacement function as

$$x(t) = A \sin(\omega t + \phi)$$

If the position and velocity of the particle at $t = 0$ s are 2 cm and 2ω cm s⁻¹ respectively, then

its amplitude is $x\sqrt{2}$ cm where 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 :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

সৰল পৰ্যাবৃত্ত গতিবিশিষ্ট কণা এটাৰ সৰণৰ ফলন হ'ল

$$x(t) = A \sin(\omega t + \phi)$$

যদিহে $t=0$ s ত কণাটোৰ অৱস্থান আৰু বেগ ক্ৰমে 2 cm আৰু 2ω cm s⁻¹ হয়, তেন্তে ইয়াৰ বিস্তাৰ হয় $x\sqrt{2}$ cm য'ত x ৰ মান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The difference in the number of waves when yellow light propagates through air and vacuum columns of the same thickness is one. The thickness of the air column is _____ mm.

[Refractive index of air = 1.0003, wavelength of yellow light in vacuum = 6000 Å]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

একেই বেধৰ (thickness) এটা বায়ুস্তম্ভ আৰু এটা শূন্যস্তম্ভৰ (vacuum columns) মাজেদি হালধীয়া পোহৰে গতি কৰোঁতে তৰংগদৈৰ্ঘ্যৰ সংখ্যাৰ পাৰ্থক্য এক (one) হয়। বায়ুস্তম্ভৰ বেধ হ'ব _____ mm।

[বায়ুৰ প্রতিসরাংক = 1.0003 হালধীয়া পোহৰৰ তৰংগদৈৰ্ঘ্য (শূন্যস্থানত) = 6000 Å]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal Text

Areas : PlainText Possible

Answers :

1

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Chemistry Section A

Section Id :	864351850
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80

Enable Mark as Answered Mark for Review and

Yes

Clear Response :

Sub-Section Number :

1

Sub-Section Id :

8643511077

Question Shuffling Allowed :

Yes

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Select the correct statements.

- (A) Crystalline solids have long range order.
- (B) Crystalline solids are isotropic.
- (C) Amorphous solids are sometimes called pseudo solids.
- (D) Amorphous solids soften over a range of temperatures.
- (E) Amorphous solids have a definite heat of fusion.

Choose the most appropriate answer from the options given below :

Options :

1. (A), (C), (D) only

2. (A), (B), (E) only

3. (C), (D) only

4. (B), (D) only

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

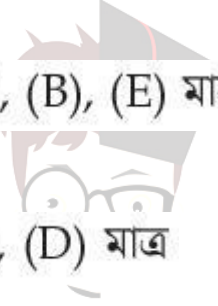
শুদ্ধ উক্তিৰোৰ বাছি উলিওৱা :

- (A) ক্ৰিষ্টেলীয় কঠিন পদাৰ্থৰ দীৰ্ঘ পৰিসৰৰ ক্ৰম আছে।
- (B) ক্ৰিষ্টেলীয় কঠিন পদাৰ্থসমূহ সমদৈশিক।
- (C) অনিয়তাকাৰ কঠিন পদাৰ্থক কেতিয়াবা ভূৱা কঠিন পদাৰ্থও কোৱা হয়।
- (D) অনিয়তাকাৰ কঠিন পদাৰ্থসমূহ উষ্ণতাৰ এক পৰিসৰত ক্ৰমান্বয়ে কোমল হয় (গলিব ধৰে)।
- (E) অনিয়তাকাৰ কঠিন পদাৰ্থসমূহৰ এটা নিৰ্দিষ্ট গলন তাপ আছে।

তলত দিয়া বিকল্পৰপৰা আটাইতকৈ উপযুক্ত বিকল্পটো বাচি উলিওৱা :

Options :

1. (A), (C), (D) মাত্ৰ
2. (A), (B), (E) মাত্ৰ
3. (C), (D) মাত্ৰ
4. (B), (D) মাত্ৰ



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the Thompson model of the atom was correct, then the result of Rutherford's gold foil experiment would have been :

Options :

1. All of the α -particles pass through the gold foil without decrease in speed.


2. α -Particles pass through the gold foil deflected by small angles and with reduced speed.
3. α -Particles are deflected over a wide range of angles.
4. All α -particles get bounced back by 180° .

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যদি পৰমাণুৰ থমছনৰ আৰ্হিটো শুদ্ধ আছিল, তেন্তে ৰাডাৰফ'ৰ্ডৰ গ'ল্ডৰ পাত পৰীক্ষাৰ ফলাফল হ'লহেতেন :

Options :

1. সকলো α -কণা গ'ল্ডৰ পাতচটাৰ মাজেৰে, গতি বেগৰ মান হ্রাস নোহোৱাকৈ পাৰ হৈ গৈছে।

2. α -কণা গ'ল্ডৰ পাতচটাৰে পাৰ হৈ যাওঁতে কম কোণত আৰু কমি যোৱা গতিবেগত মূল গতিপথৰ পৰা বিচ্যুত হৈছে।
3. α -কণাবোৰ বহল পৰিসৰৰ কোণত মূল গতিপথৰপৰা বিচ্যুত হৈছে।
4. সকলোবোৰ α -কণা 180° কোণত ঘূৰি আহিছে।

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A : $\text{SO}_2(\text{g})$ is adsorbed to a larger extent than $\text{H}_2(\text{g})$ on activated charcoal.

Reason R : $\text{SO}_2(\text{g})$ has a higher critical temperature than $\text{H}_2(\text{g})$.

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

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

নিশ্চয়োক্তি **A :** সক্ৰিয় চাৰ্ক'লত $\text{H}_2(\text{g})$ তকৈ $\text{SO}_2(\text{g})$ বেছি পৰিমাণে শোষণ হয়।

কাৰণ **R :** SO_2 ৰ H_2 তকৈ বেছি সংকট তাপ আছে।

ওপৰৰ উক্তিব আলমত, নিম্নলিখিত বিকল্পৰপৰা আটাইতকৈ উপযুক্ত উত্তৰটো বাছি উলিওৱা :

Options :

1. **A** আৰু **R** দুয়োটাই শুদ্ধ আৰু **R** হ'ল **A** ৰ শুদ্ধ ব্যাখ্যা।

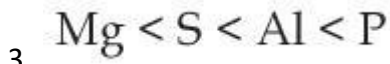
2. A আৰু R দুয়োটাই শুদ্ধ আৰু R, A ৰ শুদ্ধ ব্যাখ্যা নহয়।
3. A শুদ্ধ কিন্তু R অশুদ্ধ।
4. A শুদ্ধ নহয় কিন্তু R শুদ্ধ।

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The CORRECT order of first ionisation enthalpy is :

Options :



Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

প্রথম আয়নীয় এনথালপীৰ শুদ্ধ ক্রম হ'ল :

Options :



2. $Mg < Al < S < P$

3. $Mg < S < Al < P$

4. $Al < Mg < S < P$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The addition of silica during the extraction of copper from its sulphide ore

Options :

1. converts copper sulphide into copper silicate

2. reduces copper sulphide into metallic copper

3. converts iron oxide into iron silicate

4. reduces the melting point of the reaction mixture

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

কপাৰক ইয়াৰ ছালফাইড আকৰিকৰণৰ নিষ্কাশনৰ সময়ত ছিলিকা যোগ কৰাৰ কাৰণ হ'ল :

Options :

1. কপাৰ ছালফাইডক কপাৰ ছিলিকেটলৈ পৰিবৰ্তন কৰে

2. কপাৰ ছালফাইডক ধাতৱীয় কপাৰলৈ বিজাৰিত কৰে
3. আইৰণ অক্সাইডক আইৰণ ছিলিকেটলৈ পৰিবৰ্তন কৰে
4. বিক্ৰিয়া মিশ্ৰটোৰ গলনাংক কম কৰিবলৈ

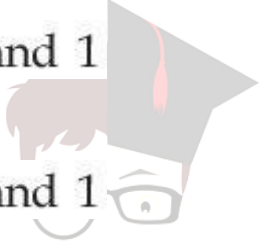
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of neutrons and electrons, respectively, present in the radioactive isotope of hydrogen is :

Options :

1. 2 and 1
2. 3 and 1
3. 2 and 2
4. 1 and 1



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

হাইড্ৰজেনৰ তেজস্ক্ৰিয় সমস্থানিকত থকা নিউট্ৰন আৰু ইলেকট্ৰনৰ সংখ্যা যথাক্ৰমে :

Options :

1. 2 আৰু 1

2. 3 আৰু 1

3. 2 আৰু 2

4. 1 আৰু 1

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

List - I	List - II
(a) Li	(i) photoelectric cell
(b) Na	(ii) absorbent of CO ₂
(c) K	(iii) coolant in fast breeder nuclear reactor
(d) Cs	(iv) treatment of cancer
	(v) bearings for motor engines

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

Options :

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

2. (a) - (v), (b) - (i), (c) - (ii), (d) - (iv)

3. (a) - (v), (b) - (ii), (c) - (iv), (d) - (i)

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

তালিকা - I	তালিকা - II
(a) Li	(i) আলোকবিদ্যুৎ কোষ
(b) Na	(ii) CO ₂ ৰ অৱশোষক
(c) K	(iii) তীব্ৰ প্ৰজনক নিউক্লীয় বিএক্টৰত শীতল কৰোঁতা হিচাবে
(d) Cs	(iv) কৰ্কটৰোগৰ চিকিৎসাত
	(v) ম'ট'ৰ ইঞ্জিনৰ বিয়েৰিঙত

নিম্নলিখিত বিকল্পৰ পৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Number of Cl=O bonds in chlorous acid, chloric acid and perchloric acid respectively are :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ক্ল'ৰাছ এছিড, ক্ল'ৰিক এছিড আৰু পাবক্ল'ৰিক এছিডত থকা $Cl=O$ বান্ধনিৰ সংখ্যা যথাক্রমে :

Options :

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

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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

To an aqueous solution containing ions such as Al^{3+} , Zn^{2+} , Ca^{2+} , Fe^{3+} , Ni^{2+} , Ba^{2+} and Cu^{2+} was added conc. HCl, followed by H_2S .

The total number of cations precipitated during this reaction is/are :

Options :

1. 3
2. 2
3. 1
4. 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Al^{3+} , Zn^{2+} , Ca^{2+} , Fe^{3+} , Ni^{2+} , Ba^{2+} আৰু Cu^{2+} আয়ন থকা জলীয় দ্ৰৱ এটাত গাঢ় HCl যোগ কৰা হ'ল, আৰু তাৰ পাছত H_2S ।

এই বিক্ৰিয়াটোত অধঃক্ষেপিত হোৱা মুঠ কেটায়নৰ সংখ্যা :

Options :

1. 3
2. 2
3. 1
4. 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ are d^2sp^3 hybridised.

Statement II : $[\text{MnCl}_6]^{3-}$ and $[\text{FeF}_6]^{3-}$ are paramagnetic and have 4 and 5 unpaired electrons, respectively.

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

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলত দুটা উক্তি দিয়া হ'ল :

উক্তি I: $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ আৰু $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ হ'ল d^2sp^3 সংকৰিত।

উক্তি II: $[\text{MnCl}_6]^{3-}$ আৰু $[\text{FeF}_6]^{3-}$ অনুচুম্বকীয় আৰু যথাক্রমে 4 টা আৰু 5 টা অযুগ্ম ইলেক্ট্ৰন আছে।

ওপৰৰ উক্তিৰ আলমত, নিম্নলিখিত বিকল্পবপৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

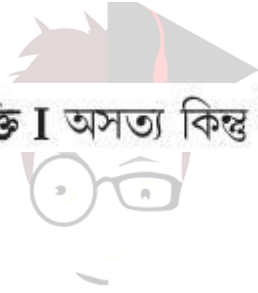
Options :

1. উক্তি I আৰু উক্তি II দুয়োটা সত্য।

2. উক্তি I আৰু উক্তি II দুয়োটা অসত্য।

3. উক্তি I সত্য কিন্তু উক্তি II অসত্য।

4. উক্তি I অসত্য কিন্তু উক্তি II সত্য।



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List - I with List - II :

List - I

(compound)

List - II

(effect/affected species)

(a) Carbon monoxide

(i) Carcinogenic

(b) Sulphur dioxide

(ii) Metabolized by pyrus plants

(c) Polychlorinated biphenyls

(iii) Haemoglobin

(d) Oxides of nitrogen

(iv) Stiffness of flower buds

Choose the correct answer from the options given below :

Options :

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

Question Type : MCQ Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

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

তালিকা - I

(যৌগ)

(a) কাৰ্বন ম'ন'অক্সাইড

(b) ছালফাৰ ডাইঅক্সাইড

(c) প'লিক্ল'ৰিনেটেড বাইফিনাইলস

(d) নাইট্ৰজেন অক্সাইড

তালিকা - II

(প্ৰগৰ/প্ৰভাৱিত প্ৰজাতি)

(i) কৰ্কটবোগৰ সৃষ্টিকাৰী

(ii) পাইৰাছ গছৰ বাসায়নিক পৰিবৰ্তনত

(iii) হিম'গ্ল'বিন

(iv) ফুলৰ কলি ঠৰঙা হোৱা

নিম্নলিখিত বিকল্পৰ পৰা শুদ্ধ উত্তৰ বাছি উলিওৱা :

Options :

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

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

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following set of elements can be detected using sodium fusion extract ?

Options :

1. Nitrogen, Phosphorous, Carbon, Sulfur

2. Sulfur, Nitrogen, Phosphorous, Halogens

3. Phosphorous, Oxygen, Nitrogen, Halogens

4. Halogens, Nitrogen, Oxygen, Sulfur

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ছডিয়ামৰ গলন আকৰৰ সহায়ত তলত দিয়া কোনবোৰ মৌল চিনাক্ত কৰিব পৰা যায় ?

Options :

1. নাইট্ৰজেন, ফছফৰাছ, কাৰ্বন, ছালফাৰ

2. ছালফাৰ, নাইট্ৰজেন, ফছফৰাছ, হেলাইডবোৰ

3. ফছফৰাছ, অক্সিজেন, নাইট্ৰজেন, হেলাইডবোৰ
4. হেলাইডবোৰ, নাইট্ৰজেন, অক্সিজেন, ছালফাৰ

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : Hyperconjugation is a permanent effect.

Statement II : Hyperconjugation in ethyl cation $(\text{CH}_3-\overset{+}{\text{C}}\text{H}_2)$ involves the overlapping of $\text{C}_{\text{sp}^2}-\text{H}_{1\text{s}}$ bond with empty 2p orbital of other carbon.

Choose the correct option :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলত দুটা উক্তি দিয়া হ'ল :

উক্তি I : অতিসংযুগ্মতা এটা স্থায়ী ঘটনা।

উক্তি II : ইথাইল কেটায়ন ($\text{CH}_3-\text{CH}_2^+$) ৰ অতিসংযুগ্মতাত লিপ্ত হয়, $\text{C}_{sp^2}-\text{H}_{1s}$ বান্ধনিৰ আনটো কাৰ্বনৰ

বিদ্ধ 2p অৰবিটেলৰ লগত ওপৰা ওপৰি হোৱাৰ ফলত।

শুদ্ধ বিকল্প বাছি উলিওৱা :

Options :

1.

উক্তি I আৰু উক্তি II দুয়োটা সত্য।

2.

উক্তি I আৰু উক্তি II দুয়োটা অসত্য।

3.

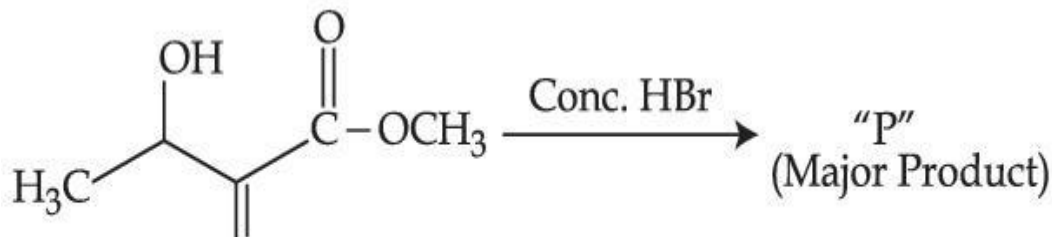
উক্তি I সত্য কিন্তু উক্তি II অসত্য।

4.

উক্তি I অসত্য কিন্তু উক্তি II সত্য।

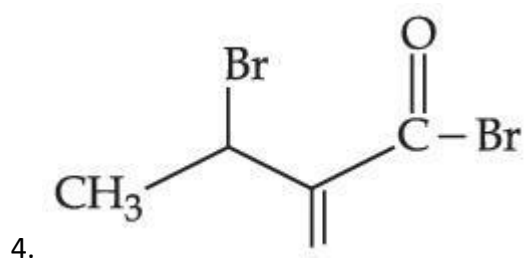
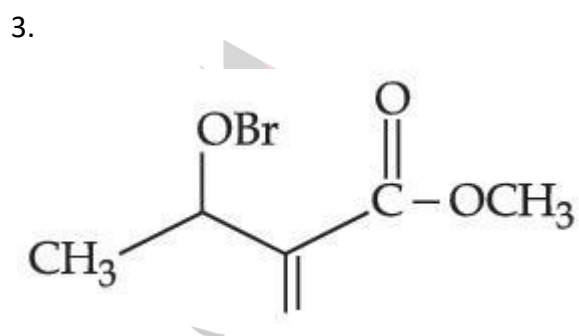
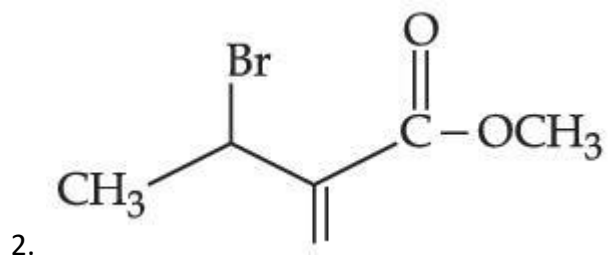
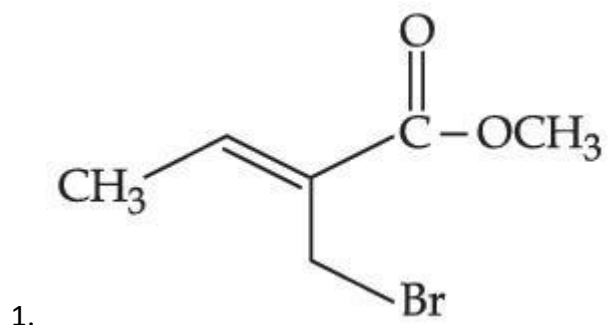
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



Consider the above reaction, the major product "P" formed is :

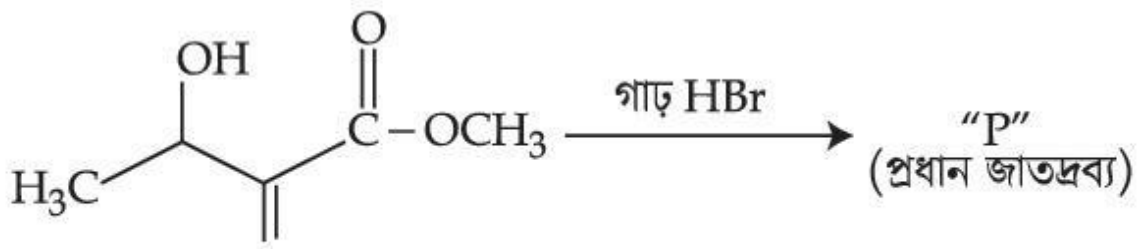
Options :



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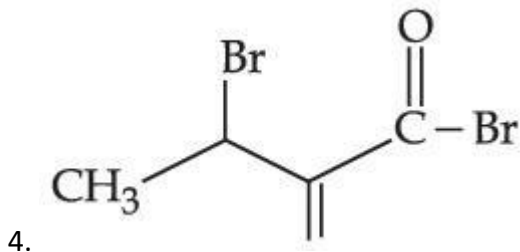
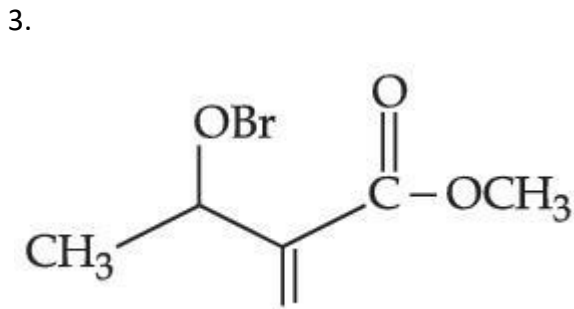
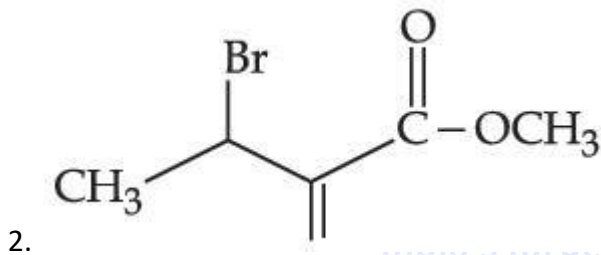
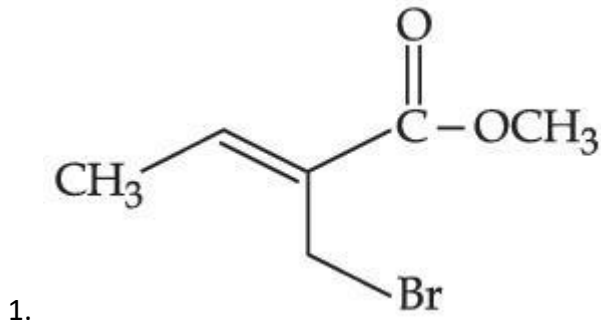
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



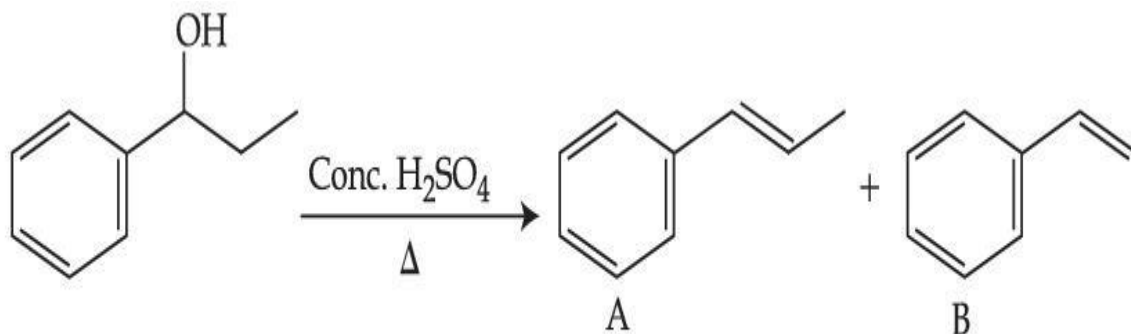
ওপৰৰ বিক্ৰিয়াটো লোৱা, প্রধান জাতদ্রব্য "P" হ'ল :

Options :



Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



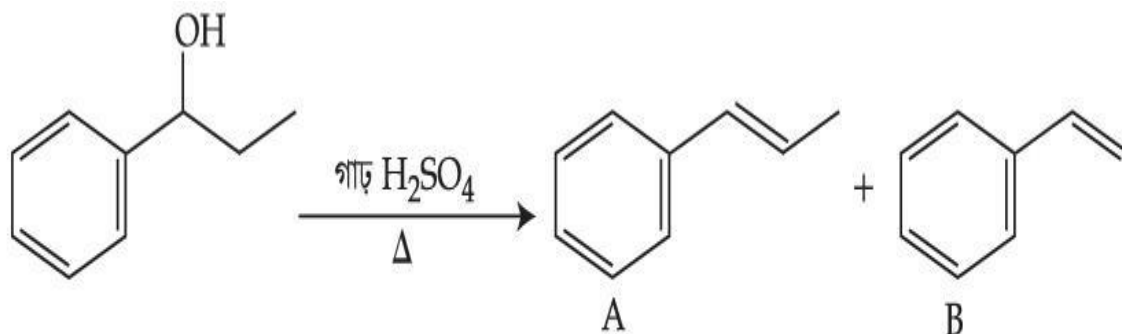
Consider the above reaction, and choose the correct statement :

Options :

1. Compound A will be the major product
2. Compound B will be the major product
3. Both compounds A and B are formed equally
4. The reaction is not possible in acidic medium

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



ওপৰৰ বিক্ৰিয়াটো লোৱা, আৰু শুদ্ধ উক্তিটো বাছি উলিওৱা :

Options :

1. যৌগ A হ'ব প্রধান জাতদ্রব্য
2. যৌগ B হ'ব প্রধান জাতদ্রব্য
3. A আৰু B দুয়োটা যৌগ সমপৰিমাণত উৎপন্ন হ'ব
4. বিক্রিয়াটো অম্লীয় মাধ্যমত সম্ভৱ নহয়

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



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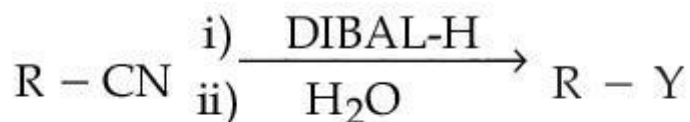
Consider the above reaction and identify "Y".

Options :

1. $-\text{COOH}$
2. $-\text{CH}_2\text{NH}_2$
3. $-\text{CHO}$
4. $-\text{CONH}_2$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



ওপৰৰ বিক্ৰিয়াটো লোৱা আৰু “Y” চিনাক্ত কৰা :

Options :

1. $-\text{COOH}$
2. $-\text{CH}_2\text{NH}_2$
3. $-\text{CHO}$
4. $-\text{CONH}_2$

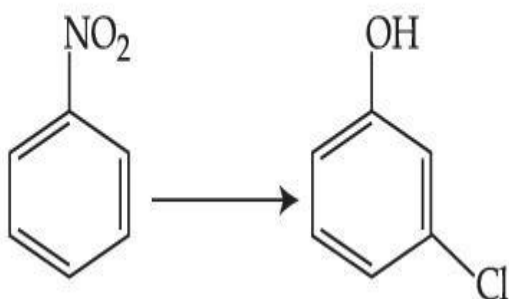


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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The correct sequence of correct reagents for the following transformation is :



Options :

1. (i) $\text{Cl}_2, \text{FeCl}_3$ (ii) Fe, HCl (iii) $\text{NaNO}_2, \text{HCl}, 0^\circ\text{C}$ (iv) $\text{H}_2\text{O}/\text{H}^+$

2. (i) Fe, HCl (ii) NaNO_2 , HCl, 0°C (iii) $\text{H}_2\text{O}/\text{H}^+$ (iv) Cl_2 , FeCl_3

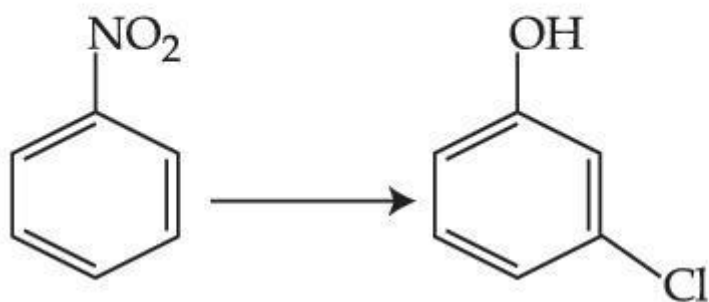
3. (i) Fe, HCl (ii) Cl_2 , HCl (iii) NaNO_2 , HCl, 0°C (iv) $\text{H}_2\text{O}/\text{H}^+$

4. (i) Cl_2 , FeCl_3 (ii) NaNO_2 , HCl, 0°C (iii) Fe, HCl (iv) $\text{H}_2\text{O}/\text{H}^+$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

নিম্নলিখিত পৰিবৰ্তনত শুদ্ধ বিকাৰকৰ শুদ্ধ ক্ৰম হ'ল :



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Options :

1. (i) Cl_2 , FeCl_3 (ii) Fe, HCl (iii) NaNO_2 , HCl, 0°C (iv) $\text{H}_2\text{O}/\text{H}^+$

2. (i) Fe, HCl (ii) NaNO_2 , HCl, 0°C (iii) $\text{H}_2\text{O}/\text{H}^+$ (iv) Cl_2 , FeCl_3

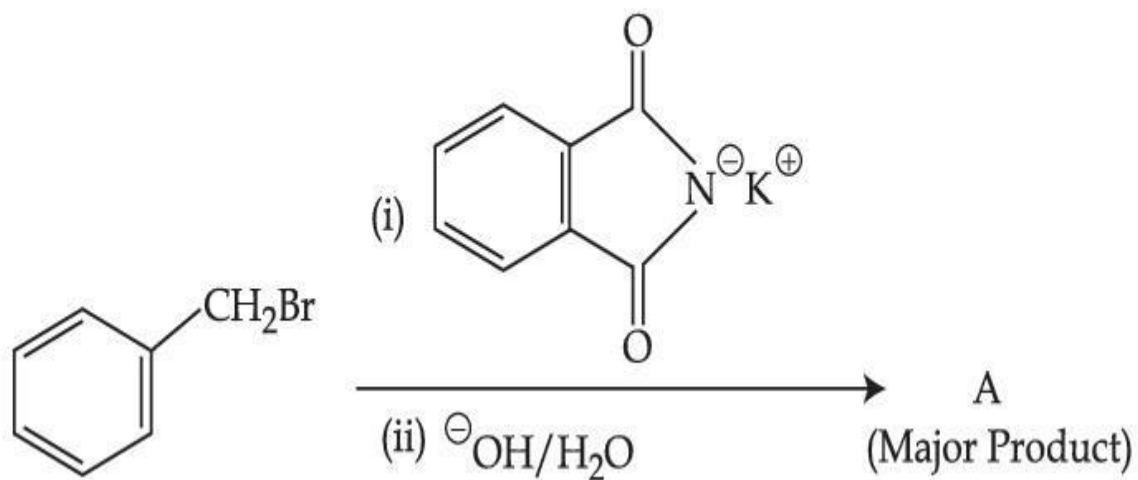
3. (i) Fe, HCl (ii) Cl_2 , HCl (iii) NaNO_2 , HCl, 0°C (iv) $\text{H}_2\text{O}/\text{H}^+$

4. (i) Cl_2 , FeCl_3 (ii) NaNO_2 , HCl, 0°C (iii) Fe, HCl (iv) $\text{H}_2\text{O}/\text{H}^+$

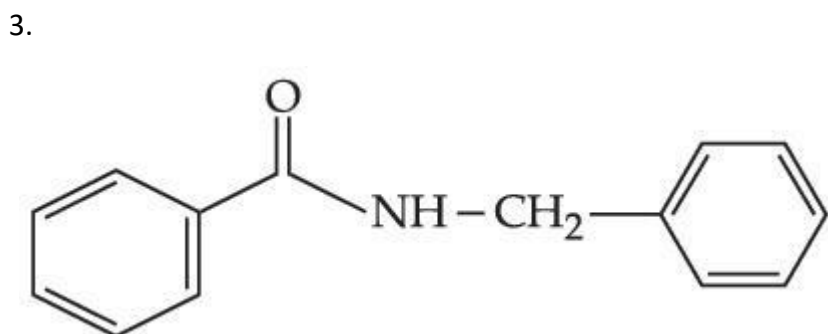
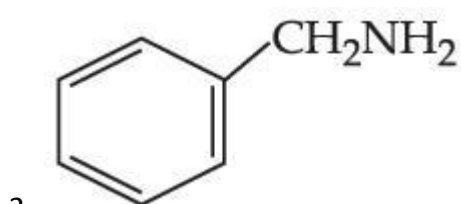
Question Type : MCQ Is Question Mandatory : No

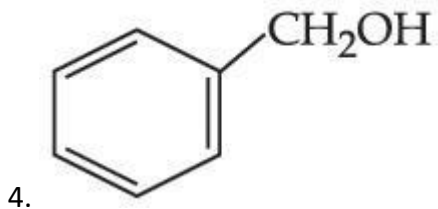
Correct Marks : 4 Wrong Marks : 1

What is A in the following reaction ?



Options :

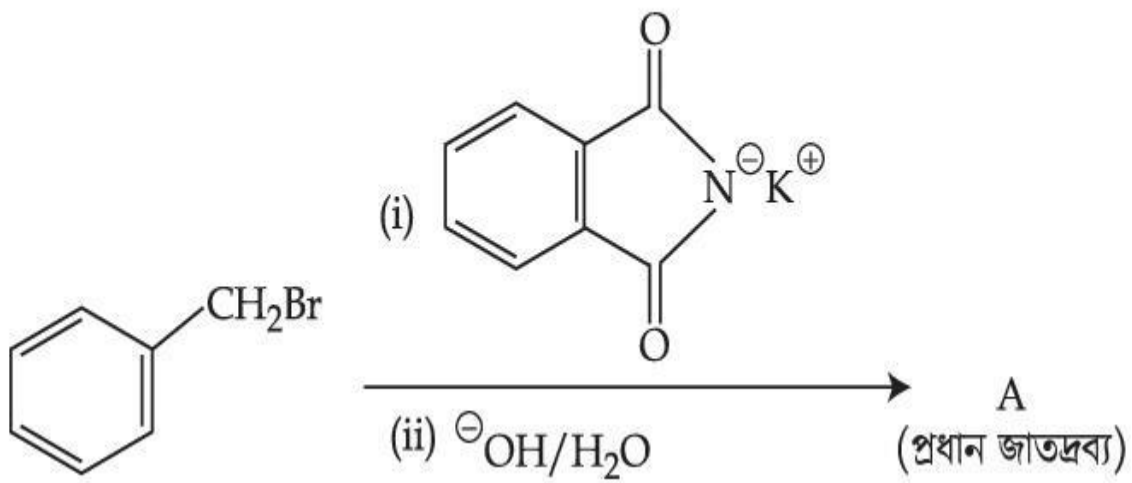




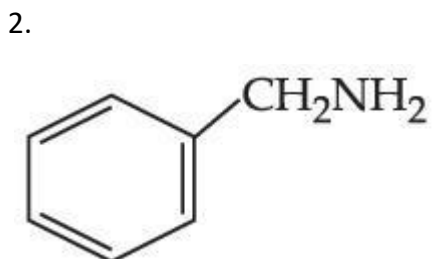
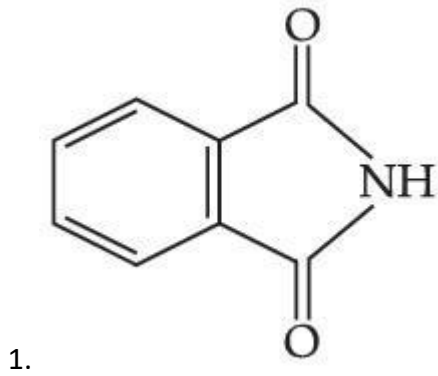
Question Type : MCQ Is Question Mandatory : No

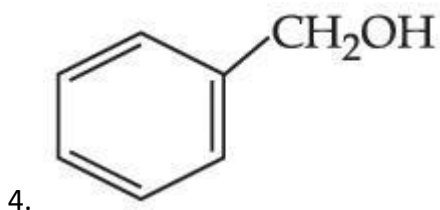
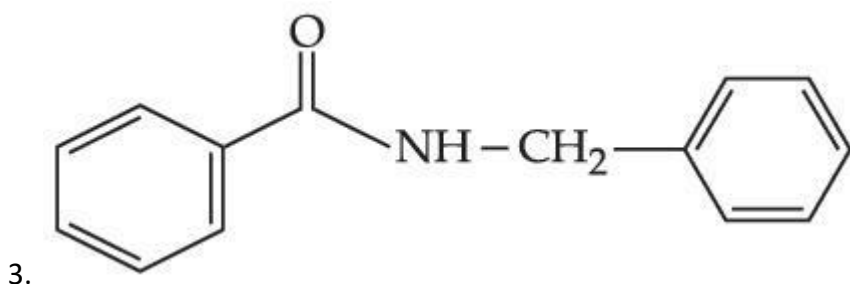
Correct Marks : 4 Wrong Marks : 1

নিম্নলিখিত বিক্রিয়াত A কি ?



Options :





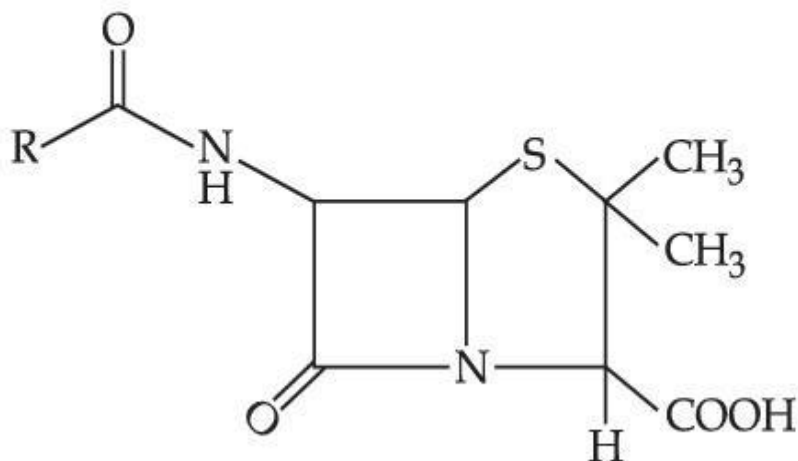
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : Penicillin is a bacteriostatic type antibiotic.

Statement II : The general structure of Penicillin is :



Choose the **correct** option :

Options :

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

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

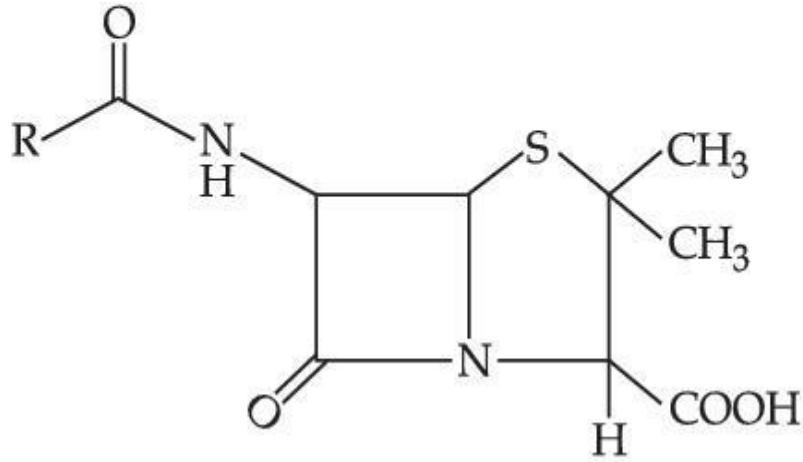
Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

তলত দুটা উক্তি দিয়া হ'ল :

উক্তি I : পেনিচিলিন এটা বেঞ্চেৰিয়াবাক ধৰণৰ প্ৰতিজৈৱিক।

উক্তি II : পেনিচিলিনৰ গঠন হ'ল :



শুদ্ধ বিকল্প বাছি উলিওৱা :

Options :

1. উক্তি I আৰু উক্তি II দুয়োটা সত্য।
2. উক্তি I আৰু উক্তি II দুয়োটা অসত্য।

3. উক্তি I সত্য কিন্তু উক্তি II অসত্য।

4. উক্তি I অসত্য কিন্তু উক্তি II সত্য।

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Compound A gives D-Galactose and D-Glucose on hydrolysis. The compound A is :

Options :

1. Maltose

2. Lactose

3. Sucrose

4. Amylose



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যৌগ A এ জলবিশ্লেষণত দিয়ে D-গেলেক্ট'জ আৰু D-গ্লুক'জ। যৌগ A হ'ল :

Options :

1. মাল্ট'জ

2. লেক্ট'জ

3. ছুফ্র'জ

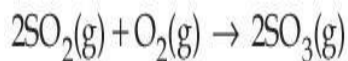
4. এমাইল'জ

Chemistry Section B

Section Id :	864351851
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511078
Question Shuffling Allowed :	Yes

Question Type : SA

Correct Marks : 4 Wrong Marks : 0



The above reaction is carried out in a vessel starting with partial pressures $P_{\text{SO}_2} = 250$ m bar, $P_{\text{O}_2} = 750$ m bar and $P_{\text{SO}_3} = 0$ bar. When the reaction is complete, the total pressure in the reaction vessel is _____ m bar. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

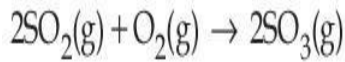
Text Areas : PlainText

Possible Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0



ওপৰৰ বিক্ৰিয়াটো, প্ৰাৰম্ভিক আংশিক চাপ $P_{\text{SO}_2} = 250 \text{ m bar}$, $P_{\text{O}_2} = 750 \text{ m bar}$ আৰু $P_{\text{SO}_3} = 0$ ত এটা পাত্ৰত আৰম্ভ কৰা হয়। যেতিয়া বিক্ৰিয়াটো সম্পূৰ্ণ হয়, তেতিয়া পাত্ৰটোৰ মুঠ চাপ হ'ল _____ m bar। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The total number of electrons in all bonding molecular orbitals of O_2^{2-} is _____.

(Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

O_2^{2-} ত থকা বান্ধনি যুক্ত সকলোবোৰ আনৱিক অৰবিটেলৰ মুঠ ইলেক্ট্ৰনৰ সংখ্যা হ'ল _____। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

When 400 mL of 0.2 M H_2SO_4 solution is mixed with 600 mL of 0.1 M NaOH solution, the increase in temperature of the final solution is _____ $\times 10^{-2}$ K. (Round off to the Nearest Integer).

[Use : $H^+(aq) + OH^-(aq) \rightarrow H_2O$: $\Delta_r H = -57.1 \text{ kJ mol}^{-1}$

Specific heat of $H_2O = 4.18 \text{ J K}^{-1} \text{ g}^{-1}$

density of $H_2O = 1.0 \text{ g cm}^{-3}$

Assume no change in volume of solution on mixing.]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

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

যেতিয়া 0.2 M H_2SO_4 দ্ৰৱ 400 mL, 0.1 M NaOH দ্ৰৱ 600 mL ৰ লগত মিহলি কৰা হয়, অন্তিম দ্ৰৱৰ উষ্ণতাৰ বৃদ্ধি হ'ল _____ $\times 10^{-2}$ K। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

[ব্যৱহাৰ কৰা : $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O} : \Delta_r H = - 57.1 \text{ kJ mol}^{-1}$

H_2O ৰ আপেক্ষিক তাপ = $4.18 \text{ J K}^{-1} \text{ g}^{-1}$

H_2O ৰ ঘনত্ব = 1.0 g cm^{-3}

[ধৰিলোৱা, মিহলি কৰোতে দ্ৰৱটোৰ কোনো ধৰণৰ আয়তনৰ সলনি নহয়।]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In a solvent 50% of an acid HA dimerizes and the rest dissociates. The van't Hoff factor of the acid is _____ $\times 10^{-2}$. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

এটা দ্রাবকত এটা এছিড HA ৰ 50% দ্ব্যণুকীকৰণ (ডাইমেৰাইজ) হয় আৰু বৈ যোৱা খিনিৰ বিয়োজন। এছিডটোৰ ভান্ট হ'ফ ফেক্টৰ হ'ল _____ $\times 10^{-2}$ । (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

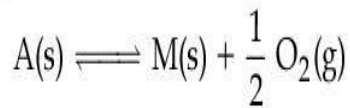
Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The equilibrium constant for the reaction



is $K_p = 4$. At equilibrium, the partial pressure of O_2 is _____ atm. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1



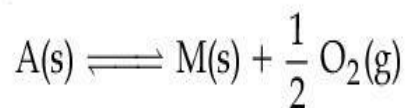
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Question Type : SA

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

বিক্রিয়াটোৰ বাবে সাম্য ধ্ৰুৱক



হ'ল $K_p = 4$ । সাম্যত, O_2 ৰ আংশিক চাপ হ'ল _____ atm। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the cell $\text{Cu(s)}|\text{Cu}^{2+}(\text{aq}) (0.1\text{M})||\text{Ag}^+(\text{aq}) (0.01\text{M})|\text{Ag(s)}$

the cell potential $E_1 = 0.3095\text{ V}$

For the cell $\text{Cu(s)}|\text{Cu}^{2+}(\text{aq}) (0.01\text{M})||\text{Ag}^+(\text{aq}) (0.001\text{M})|\text{Ag(s)}$

the cell potential = _____ $\times 10^{-2}\text{ V}$. (Round off to the Nearest Integer).

[Use : $\frac{2.303 RT}{F} = 0.059$]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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কোষটোৰ বাবে, $\text{Cu(s)}|\text{Cu}^{2+}(\text{aq}) (0.1 \text{ M})||\text{Ag}^{+}(\text{aq}) (0.01 \text{ M})|\text{Ag(s)}$

কোষ বিভৱ, $E_1 = 0.3095 \text{ V}$

কোষটোৰ বাবে, $\text{Cu(s)}|\text{Cu}^{2+}(\text{aq}) (0.01 \text{ M})||\text{Ag}^{+}(\text{aq}) (0.001 \text{ M})|\text{Ag(s)}$

কোষ বিভৱ, = _____ $\times 10^{-2} \text{ V}$. (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

[ব্যৱহাৰ কৰা : $\frac{2.303 RT}{F} = 0.059$]

Response Type : Numeric

Evaluation Required For SA : Yes

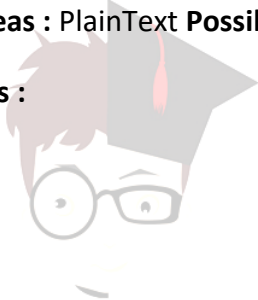
Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1



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Question Type : SA

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

For the first order reaction $A \rightarrow 2B$, 1 mole of reactant A gives 0.2 moles of B after 100 minutes. The half life of the reaction is _____ min. (Round off to the Nearest Integer).

[Use : $\ln 2 = 0.69$, $\ln 10 = 2.3$

Properties of logarithms : $\ln x^y = y \ln x$;

$$\ln\left(\frac{x}{y}\right) = \ln x - \ln y]$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

প্রথম ক্রমৰ বিক্রিয়া $A \rightarrow 2B$ ৰ বাবে, বিক্রিয়ক A ৰ 1 ম'লে 100 মিনিটৰ পিছত দিয়ে 0.2 ম'ল B। বিক্রিয়াটোৰ অৰ্ধজীৱনকাল _____ min। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

[ব্যৱহাৰ কৰা : $\ln 2 = 0.69$, $\ln 10 = 2.3$

লগাৰিথমৰ গুণ : $\ln x^y = y \ln x$;

$$\ln\left(\frac{x}{y}\right) = \ln x - \ln y]$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

3 moles of metal complex with formula $\text{Co(en)}_2\text{Cl}_3$ gives 3 moles of silver chloride on treatment with excess of silver nitrate. The secondary valency of Co in the complex 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 :

1

Question Type : SA

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

$\text{Co(en)}_2\text{Cl}_3$ সূত্রৰ 3 ম'ল ধাতুৰ জটিলে অতিৰিক্ত ছিলভাৰ নাইটেটৰ লগত বিক্ৰিয়া কৰিলে দিয়ে 3 ম'ল ছিলভাৰ ক্লৰাইড। জটিলটোত Co ৰ ছেকেণ্ডাৰী যোজ্যতা হ'ল _____. (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

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

The dihedral angle in staggered form of Newman projection of 1,1,1-Trichloro ethane is _____ degree. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

1,1,1 - টাইট্র'ব'ইথেনৰ নিউমেন অভিক্ষেপণৰ অনাগ্ৰস্ত ৰূপৰ সমতলী কোণ _____ ডিগ্ৰী। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

10.0 mL of 0.05 M KMnO_4 solution was consumed in a titration with 10.0 mL of given oxalic acid dihydrate solution. The strength of given oxalic acid solution is _____ $\times 10^{-2}$ g/L. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal Text

Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

প্রদত্ত 10.0 mL ব অক্সালিক এছিড ডাইহাইড্রেট দ্রব এটাৰ অনুমাপনত 10.0 mL 0.05 M KMnO_4 খৰচ হয়। প্রদত্ত

অক্সালিক এছিড দ্রবটোৰ সামৰ্থ্য হ'ল _____ $\times 10^{-2}$ g/L। (নিকটবৰ্তী অখণ্ড সংখ্যাত)।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal Text

Areas : PlainText Possible

Answers :

1

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Mathematics Section A

Section Id :	864351852
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80

Enable Mark as Answered Mark for Review and

Yes Clear

Response :

Sub-Section Number :

1

Sub-Section Id :

8643511079

Question Shuffling Allowed :

Yes

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

$f(x+y) + f(x-y) = 2f(x)f(y)$, $f\left(\frac{1}{2}\right) = -1$. Then, the value of

$\sum_{k=1}^{20} \frac{1}{\sin(k) \sin(k+f(k))}$ is equal to :

Options :

1. $\sec^2(1) \sec(21) \cos(20)$

2. $\operatorname{cosec}^2(21) \cos(20) \cos(2)$

3. $\operatorname{cosec}^2(1) \operatorname{cosec}(21) \sin(20)$

4. $\sec^2(21) \sin(20) \sin(2)$

Question Type : MCQ Is Question Mandatory : No

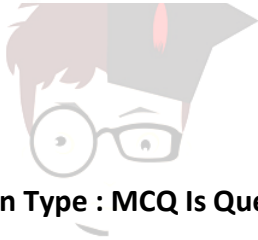
Correct Marks : 4 Wrong Marks : 1

ধরা হ'ল $f: \mathbf{R} \rightarrow \mathbf{R}$ যাতে $f(x+y) + f(x-y) = 2f(x)f(y)$, $f\left(\frac{1}{2}\right) = -1$ । তেন্তে $\sum_{k=1}^{20} \frac{1}{\sin(k) \sin(k + f(k))}$

ব মান সমান হ'ব :

Options :

1. $\sec^2(1) \sec(21) \cos(20)$
2. $\operatorname{cosec}^2(21) \cos(20) \cos(2)$
3. $\operatorname{cosec}^2(1) \operatorname{cosec}(21) \sin(20)$
4. $\sec^2(21) \sin(20) \sin(2)$



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let the mean and variance of the frequency distribution

$x:$	$x_1=2$	$x_2=6$	$x_3=8$	$x_4=9$
$f:$	4	4	α	β

be 6 and 6.8 respectively. If x_3 is changed from 8 to 7, then the mean for the new data will be :

Options :

1. $\frac{17}{3}$
2. 5

3.

$$\frac{16}{3}$$

4. 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল

$$x: x_1=2 \quad x_2=6 \quad x_3=8 \quad x_4=9$$

$$f: 4 \quad 4 \quad \alpha \quad \beta$$

বাৰংবাৰতা বণ্টনৰ মাধ্য আৰু প্ৰসৰণ ক্ৰমে 6 আৰু 6.8। যদি x_3 8 ৰ পৰা 7 লৈ পৰিবৰ্তন হয়, তেন্তে নতুন তথ্যটোৰ

মাধ্য হ'ব :

Options :

1. $\frac{17}{3}$

2. 5

3. $\frac{16}{3}$

4. 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider a circle C which touches the y -axis at $(0, 6)$ and cuts off an intercept $6\sqrt{5}$ on the x -axis. Then the radius of the circle C is equal to :

Options :

1. 8
2. $\sqrt{53}$
3. 9
4. $\sqrt{82}$



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Question Type : MCQ Is Question Mandatory : No Student Review Platform

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল C এটা বৃত্ত যি y -অক্ষৰ $(0, 6)$ বিন্দুত স্পৰ্শ কৰে আৰু x -অক্ষত $6\sqrt{5}$ ছেদাংশ কাটে। তেন্তে C বৃত্তৰ ব্যাসার্ধ

সমান হ'ব :

Options :

1. 8
2. $\sqrt{53}$
3. 9
4. $\sqrt{82}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two sides of a parallelogram are along the lines $4x + 5y = 0$ and $7x + 2y = 0$. If the equation of one of the diagonals of the parallelogram is $11x + 7y = 9$, then other diagonal passes through the point :

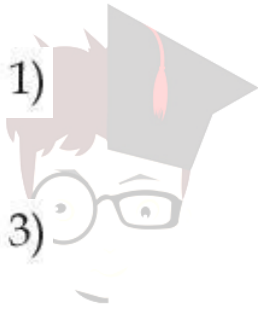
Options :

1. (1, 2)

2. (2, 2)

3. (2, 1)

4. (1, 3)



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এটা সামান্তৰিকৰ দুটা বাহু হ'ল $4x + 5y = 0$ আৰু $7x + 2y = 0$ ৰেখাৰ কালে। যদি সামান্তৰিকটোৰ যিকোনো এটা কৰ্ণৰ সমীকৰণ $11x + 7y = 9$ হয়, তেন্তে অন্য কৰ্ণটো পাৰহৈ যোৱা বিন্দুটো হ'ব :

Options :

1. (1, 2)

2. (2, 2)

3. $(2, 1)$

4. $(1, 3)$

Question Type : MCQ Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let $f: [0, \infty) \rightarrow [0, 3]$ be a function defined by

$$f(x) = \begin{cases} \max \{ \sin t : 0 \leq t \leq x \}, & 0 \leq x \leq \pi \\ 2 + \cos x, & x > \pi \end{cases}$$

Then which of the following is true ?

Options :

1. f is not continuous exactly at two points in $(0, \infty)$

2. f is continuous everywhere but not differentiable exactly at two points in $(0, \infty)$

3. f is continuous everywhere but not differentiable exactly at one point in $(0, \infty)$

4. f is differentiable everywhere in $(0, \infty)$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

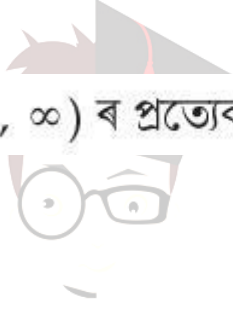
ধৰা হ'ল $f: [0, \infty) \rightarrow [0, 3]$ এটা ফলন যাতে

$$f(x) = \begin{cases} \max \{ \sin t : 0 \leq t \leq x \}, & 0 \leq x \leq \pi \\ 2 + \cos x, & x > \pi \end{cases}$$

তেস্তে তলৰ কোনটো সত্য ?

Options :

1. f কেৱল $(0, \infty)$ ৰ দুটা বিন্দুত অবিচ্ছিন্ন নহয়।
2. f সদায় অবিচ্ছিন্ন কিন্তু $(0, \infty)$ ৰ কেৱল দুটা বিন্দুত অৱকলনীয় নহয়।
3. f সদায় অবিচ্ছিন্ন কিন্তু $(0, \infty)$ ৰ কেৱল এটা বিন্দুত অৱকলনীয় নহয়।
4. $f(0, \infty)$ ৰ প্ৰত্যেক স্থানত অৱকলনীয়।



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following is the negation of the statement "for all $M > 0$, there exists $x \in S$ such that $x \geq M$ " ?

Options :

1. there exists $M > 0$, there exists $x \in S$ such that $x < M$
2. there exists $M > 0$, there exists $x \in S$ such that $x \geq M$
3. there exists $M > 0$, such that $x < M$ for all $x \in S$

4. there exists $M > 0$, such that $x \geq M$ for all $x \in S$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

“সকলো $M > 0$ ৰ বাবে তাত $x \in S$, আছে যাতে $x \geq M$ ” উক্তিটোৰ বাবে তলৰ কোনটো নিষেধক ?

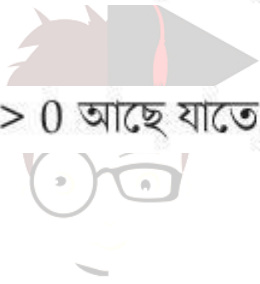
Options :

1. $M > 0$ আছে যাতে, $x \in S$ যাতে $x < M$

2. $M > 0$ আছে যাতে, $x \in S$, যাতে $x \geq M$

3. $M > 0$ আছে যাতে, $x < M$ সকলো $x \in S$ ৰ বাবে

4. $M > 0$ আছে যাতে, $x \geq M$ সকলো $x \in S$ ৰ বাবে



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The area of the region bounded by $y - x = 2$ and $x^2 = y$ is equal to :

Options :

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

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

3. $\frac{9}{2}$

4. $\frac{16}{3}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$y-x=2$ আৰু $x^2=y$ বক্ৰৰ দ্বাৰা আবদ্ধ ক্ষেত্ৰৰ কালি সমান হ'ব :

Options :

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

2.

$\frac{4}{3}$

3. $\frac{9}{2}$

4. $\frac{16}{3}$



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $y=y(x)$ be the solution of the differential equation $(x-x^3)dy=(y+yx^2-3x^4)dx$, $x > 2$.

If $y(3)=3$, then $y(4)$ is equal to :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$(x-x^3)dy=(y+yx^2-3x^4)dx$, $x > 2$ অৱকলন সমীকৰণটোৰ $y=y(x)$ এটা সমাধান বুলি ধৰা হ'ল। যদি $y(3)=3$,

তেন্তে $y(4)$ সমান হ'ব :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The point P (a, b) undergoes the following three transformations successively :

- (a) reflection about the line $y=x$.
- (b) translation through 2 units along the positive direction of x -axis.
- (c) rotation through angle $\frac{\pi}{4}$ about the origin in the anti-clockwise direction.

If the co-ordinates of the final position of the point P are $\left(-\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$, then the value of

$2a + b$ is equal to :

Options :

- 1. 5
- 2. 7
- 3. 9
- 4. 13



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

P (a, b) বিন্দুটো তলৰ তিনিটা ৰূপান্তৰ লয়।

(a) $y=x$ ৰেখা সাপেক্ষে প্রতিফলন।

(b) x অক্ষৰ ধনাত্মক দিশত 2 একক পক্ষান্তৰ।

(c) ঘড়ীৰ কাঁটাৰ বিপৰীত দিশত মূলবিন্দু সাপেক্ষে $\frac{\pi}{4}$ কোণত ঘূৰ্ণন।

যদি P বিন্দুৰ চূড়ান্ত স্থানাংক $\left(-\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$ হয়, তেন্তে $2a+b$ ৰ মান সমান হ'ব :

Options :

1. 5
2. 7
3. 9
4. 13



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A possible value of 'x', for which the ninth term in the expansion of

$\left\{3^{\log_3 \sqrt{25^x - 1} + 7} + 3^{\left(-\frac{1}{8}\right) \log_3 (5^{x-1} + 1)}\right\}^{10}$ in the increasing powers of $3^{\left(-\frac{1}{8}\right) \log_3 (5^{x-1} + 1)}$

is equal to 180, is :

Options :

1. 0
2. 1
3. -1
4. 2

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\left\{ 3^{\log_3 \sqrt{25^{x-1} + 7}} + 3^{\left(-\frac{1}{8}\right) \log_3 (5^{x-1} + 1)} \right\}^{10}$ ব প্রসাৰণত, $3^{\left(-\frac{1}{8}\right) \log_3 (5^{x-1} + 1)}$ বাঢ়ি অহা ঘাটত, নৰমতম

পদৰ মান 180 ৰ সমান হলে 'x' ৰ সম্ভাৰ্য মান হ'ব :

Options :

1. 0
2. 1
3. -1
4. 2

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



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Let \mathbb{C} be the set of all complex numbers. Let

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

$$S_2 = \{z \in \mathbb{C} : z(1+i) + \bar{z}(1-i) \geq 4\}.$$

Then, the maximum value of $\left|z - \frac{5}{2}\right|^2$ for $z \in S_1 \cap S_2$ is equal to :

Options :

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

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

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

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

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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল সকলো জটিল সংখ্যাৰ সংহতি \mathbb{C} । ধৰা হ'ল

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

$$S_2 = \{z \in \mathbb{C} : z(1+i) + \bar{z}(1-i) \geq 4\}.$$

তেন্তে $z \in S_1 \cap S_2$ ৰ বাবে, $\left|z - \frac{5}{2}\right|^2$ ৰ গৰিষ্ঠ মান সমান হ'ব :

Options :

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

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

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

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

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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f: (a, b) \rightarrow \mathbb{R}$ be twice differentiable function such that $f(x) = \int_a^x g(t)dt$ for a differentiable function $g(x)$. If $f(x)=0$ has exactly five distinct roots in (a, b) , then $g(x)g'(x)=0$ has at least :

Options :

1. three roots in (a, b)
2. five roots in (a, b)
3. seven roots in (a, b)
4. twelve roots in (a, b)

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল $f: (a, b) \rightarrow \mathbb{R}$ ফলনটো দ্বি-অৱকলনীয় যাতে $f(x) = \int_a^x g(t)dt$, $g(x)$ এটা অৱকলনীয় ফলন। যদি (a, b)

ত $f(x)=0$ ৰ পাঁচটা ভিন্ন মূল থাকে তেন্তে $g(x)g'(x)=0$ ফলনটোৰ কমেও

Options :



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1. (a, b) ত তিনিটা মূল আছে।
2. (a, b) ত পাঁচটা মূল আছে।
3. (a, b) ত সাতটা মূল আছে।
4. (a, b) ত বাৰটা মূল আছে।

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let A and B be two 3×3 real matrices such that $(A^2 - B^2)$ is invertible matrix. If $A^5 = B^5$ and $A^3B^2 = A^2B^3$, then the value of the determinant of the matrix $A^3 + B^3$ is equal to :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল A আৰু B দুটা 3×3 আকাৰ বাস্তৱ মৌলকক্ষ যাতে $(A^2 - B^2)$ প্ৰতিলোমনীয়। যদি $A^5 = B^5$ আৰু $A^3B^2 = A^2B^3$, তেন্তে $A^3 + B^3$ মৌলকক্ষটোৰ নিৰ্ণায়কৰ মান সমান হ'ব :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let \mathbf{N} be the set of natural numbers and a relation R on \mathbf{N} be defined by

$R = \{(x, y) \in \mathbf{N} \times \mathbf{N} : x^3 - 3x^2y - xy^2 + 3y^3 = 0\}$. Then the relation R is :

Options :

1. reflexive and symmetric, but not transitive
2. reflexive but neither symmetric nor transitive
3. symmetric but neither reflexive nor transitive
4. an equivalence relation

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধৰা হ'ল \mathbf{N} স্বাভাৱিক সংখ্যাৰ সংহতি আৰু \mathbf{N} ত R এটা সম্বন্ধ বৰ্ণিত আছে যাতে

$R = \{(x, y) \in \mathbf{N} \times \mathbf{N} : x^3 - 3x^2y - xy^2 + 3y^3 = 0\}$ তেন্তে R সম্বন্ধটো হ'ব :

Options :

1. প্রতিফলনীয় আৰু প্রতিসম কিন্তু সংক্রামক নহয়
2. প্রতিফলনীয়, কিন্তু প্রতিসম নহয় আৰু সংক্রামক নহয়
3. প্রতিসম কিন্তু প্রতিফলনীয় নহয় আৰু সংক্রামক নহয়
4. এটা সমতুল্যতা সম্পর্ক

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\text{Let } \alpha = \max_{x \in \mathbb{R}} \{8^{2\sin 3x} \cdot 4^{4\cos 3x}\} \text{ and } \beta = \min_{x \in \mathbb{R}} \{8^{2\sin 3x} \cdot 4^{4\cos 3x}\}.$$

If $8x^2 + bx + c = 0$ is a quadratic equation whose roots are $\alpha^{1/5}$ and $\beta^{1/5}$, then the value of $c - b$ is equal to :

Options :

1. 42
2. 43
3. 47
4. 50



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\text{ধরা হ'ল } \alpha = \max_{x \in \mathbb{R}} \{8^{2\sin 3x} \cdot 4^{4\cos 3x}\} \text{ আৰু } \beta = \min_{x \in \mathbb{R}} \{8^{2\sin 3x} \cdot 4^{4\cos 3x}\}$$

যদি $8x^2 + bx + c = 0$ এটা দ্বিঘাত সমীকৰণ যাৰ মূলবোৰ $\alpha^{1/5}$ আৰু $\beta^{1/5}$ হয়, তেন্তে $c - b$ ৰ মান সমান হ'ব :

Options :

1. 42
2. 43

3. 47

4. 50

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\lim_{x \rightarrow 0} \left(\frac{x}{\sqrt[8]{1 - \sin x} - \sqrt[8]{1 + \sin x}} \right)$ is equal to :

Options :

1. 0

2. -1

3. -4

4. 4



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\lim_{x \rightarrow 0} \left(\frac{x}{\sqrt[8]{1 - \sin x} - \sqrt[8]{1 + \sin x}} \right)$ ৰ মান সমান হ'ব :

Options :

1. 0

2. -1

3. -4

4. 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A student appeared in an examination consisting of 8 true - false type questions. The student guesses the answers with equal probability. The smallest value of n , so that the probability of guessing at least 'n' correct answers is less than $\frac{1}{2}$, is :

Options :

1. 3

2. 4

3. 5

4. 6



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Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

এজন ছাত্ৰই ৪ টা সঁচা-মিছা ধৰণৰ প্ৰশ্নৰে গঠিত পৰীক্ষাত অৱতীৰ্ণ হৈছিল। ছাত্ৰজনে সমান সম্ভাৱিতা হোৱাকৈ উত্তৰবোৰ অনুমান কৰিছিল। কমেও 'n' শুদ্ধ উত্তৰ অনুমান কৰাৰ সম্ভাৱিতা $\frac{1}{2}$ তকৈ কম হোৱাকৈ n ৰ ক্ষুদ্ৰতম মান হ'ব :

Options :

1. 3

2. 4

3. 5

4. 6

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For real numbers α and $\beta \neq 0$, if the point of intersection of the straight lines

$$\frac{x - \alpha}{1} = \frac{y - 1}{2} = \frac{z - 1}{3} \text{ and } \frac{x - 4}{\beta} = \frac{y - 6}{3} = \frac{z - 7}{3},$$

lies on the plane $x + 2y - z = 8$, then $\alpha - \beta$ is equal to :

Options :

1. 3

2. 5

3. 7

4. 9

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

α আৰু $\beta \neq 0$ বাস্তৱ সংখ্যাৰ বাবে, যদি $\frac{x-\alpha}{1} = \frac{y-1}{2} = \frac{z-1}{3}$ আৰু $\frac{x-4}{\beta} = \frac{y-6}{3} = \frac{z-7}{3}$

সৰলৰেখাদুডালৰ ছেদবিন্দু $x+2y-z=8$ সমতলৰ ওপৰত থাকে, তেন্তে $\alpha-\beta$ সমান হ'ব :

Options :

1. 3
2. 5
3. 7
4. 9

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $\tan\left(\frac{\pi}{9}\right), x, \tan\left(\frac{7\pi}{18}\right)$ are in arithmetic progression and $\tan\left(\frac{\pi}{9}\right), y, \tan\left(\frac{5\pi}{18}\right)$ are also in

arithmetic progression, then $|x-2y|$ is equal to :

Options :

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

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

যদি $\tan\left(\frac{\pi}{9}\right), x, \tan\left(\frac{7\pi}{18}\right)$ আৰু $\tan\left(\frac{\pi}{9}\right), y, \tan\left(\frac{5\pi}{18}\right)$ সমান্তৰ প্রগতিত থাকে, তেন্তে $|x - 2y|$ সমান হ'ব :

Options :

- 0
- 1
- 3
- 4

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let \vec{a}, \vec{b} and \vec{c} be three vectors such that $\vec{a} = \vec{b} \times (\vec{b} \times \vec{c})$. If magnitudes of the vectors

\vec{a}, \vec{b} and \vec{c} are $\sqrt{2}, 1$ and 2 respectively and the angle between \vec{b} and \vec{c} is θ $\left(0 < \theta < \frac{\pi}{2}\right)$,

then the value of $1 + \tan \theta$ is equal to :

Options :

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

4. $\frac{\sqrt{3} + 1}{\sqrt{3}}$

Question Type : MCQ Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ধরা হ'ল \vec{a} , \vec{b} আৰু \vec{c} তিনিটা ভেক্টৰ যাতে $\vec{a} = \vec{b} \times (\vec{b} \times \vec{c})$ । যদি \vec{a} , \vec{b} আৰু \vec{c} ভেক্টৰ মান ক্ৰমে

$\sqrt{2}$, 1 আৰু 2 আৰু \vec{b} আৰু \vec{c} ৰ মাজৰ কোণ θ ($0 < \theta < \frac{\pi}{2}$), তেন্তে $1 + \tan \theta$ ৰ মান সমান হ'ব :

Options :

1. 1

2. 2

3. $\sqrt{3} + 1$

4. $\frac{\sqrt{3} + 1}{\sqrt{3}}$



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Mathematics Section B

Section Id :

864351853

Section Number :

6

Section type :

Online

Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511080
Question Shuffling Allowed :	Yes

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the real part of the complex number $z = \frac{3 + 2i \cos\theta}{1 - 3i \cos\theta}$, $\theta \in \left(0, \frac{\pi}{2}\right)$ is zero, then the value of

$\sin^2 3\theta + \cos^2 \theta$ is equal to _____.

Response Type : Numeric

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Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

যদি $z = \frac{3 + 2i \cos \theta}{1 - 3i \cos \theta}$, $\theta \in \left(0, \frac{\pi}{2}\right)$ জটিল সংখ্যাটোৰ বাস্তৱ অংশ শূন্য হয়, তেন্তে $\sin^2 3\theta + \cos^2 \theta$ ৰ মান সমান

হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

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

If $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ and $M = A + A^2 + A^3 + \dots + A^{20}$, then the sum of all the elements of the

matrix M is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

যদি $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ আৰু $M = A + A^2 + A^3 + \dots + A^{20}$ তেন্তে M ৰ আটাইবোৰ মৌলৰ যোগফল সমান হ'ব

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1



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Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let n be a non-negative integer. Then the number of divisors of the form " $4n+1$ " of the number $(10)^{10} \cdot (11)^{11} \cdot (13)^{13}$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল n এটা অঋণাত্মক অখণ্ড সংখ্যা। তেন্তে $(10)^{10} \cdot (11)^{11} \cdot (13)^{13}$ ৰ সংখ্যাৰ " $4n + 1$ " ধৰণৰ ভাজকৰ সংখ্যা
সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The distance of the point $P(3, 4, 4)$ from the point of intersection of the line joining the points $Q(3, -4, -5)$ and $R(2, -3, 1)$ and the plane $2x + y + z = 7$, is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$Q(3, -4, -5)$ আৰু $R(2, -3, 1)$ সংযোগী ৰেখা আৰু $2x + y + z = 7$ সমতলৰ ছেদবিন্দুৰ পৰা $P(3, 4, 4)$
বিন্দুৰ দূৰত্ব সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $y=y(x)$ be the solution of the differential equation $dy=e^{\alpha x+y}dx$; $\alpha \in \mathbf{N}$.

If $y(\log_e 2)=\log_e 2$ and $y(0)=\log_e\left(\frac{1}{2}\right)$, then the value of α is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল $y=y(x)$, $dy=e^{\alpha x+y}dx$; $\alpha \in \mathbf{N}$; অৱকলন সমীকৰণৰ এটা সমাধান। যদি

$y(\log_e 2)=\log_e 2$ আৰু $y(0)=\log_e\left(\frac{1}{2}\right)$, তেন্তে α ৰ মান সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $\int_0^\pi (\sin^3 x) e^{-\sin^2 x} dx = \alpha - \frac{\beta}{e} \int_0^1 \sqrt{t} e^t dt$, then $\alpha + \beta$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

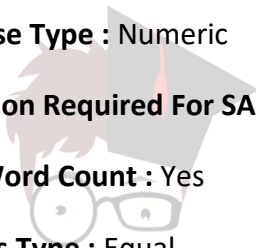
Correct Marks : 4 Wrong Marks : 0

যদি $\int_0^\pi (\sin^3 x) e^{-\sin^2 x} dx = \alpha - \frac{\beta}{e} \int_0^1 \sqrt{t} e^t dt$, তেন্তে $\alpha + \beta$ সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes



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Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $\vec{a} = \hat{i} - \alpha\hat{j} + \beta\hat{k}$, $\vec{b} = 3\hat{i} + \beta\hat{j} - \alpha\hat{k}$ and $\vec{c} = -\alpha\hat{i} - 2\hat{j} + \hat{k}$, where α and β are

integers. If $\vec{a} \cdot \vec{b} = -1$ and $\vec{b} \cdot \vec{c} = 10$, then $(\vec{a} \times \vec{b}) \cdot \vec{c}$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধরা হ'ল $\vec{a} = \hat{i} - \alpha\hat{j} + \beta\hat{k}$, $\vec{b} = 3\hat{i} + \beta\hat{j} - \alpha\hat{k}$ আৰু $\vec{c} = -\alpha\hat{i} - 2\hat{j} + \hat{k}$, যত α আৰু β অখণ্ড

সংখ্যা। যদি $\vec{a} \cdot \vec{b} = -1$ আৰু $\vec{b} \cdot \vec{c} = 10$, তেন্তে $(\vec{a} \times \vec{b}) \cdot \vec{c}$ সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let E be an ellipse whose axes are parallel to the co-ordinates axes, having its center at $(3, -4)$, one focus at $(4, -4)$ and one vertex at $(5, -4)$. If $mx - y = 4$, $m > 0$ is a tangent to the ellipse E, then the value of $5m^2$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

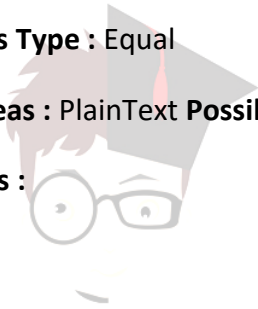
Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1



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Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল E এটা উপবৃত্ত যাৰ অক্ষবোৰ জ্ঞানাংক অক্ষদ্বয়ৰ সমান্তৰাল, কেন্দ্ৰ $(3, -4)$ ত নাভি $(4, -4)$ ত আৰু এটা শীৰ্ষবিন্দু $(5, -4)$ ত। যদি $mx - y = 4$, $m > 0$ E উপবৃত্তৰ এটা স্পৰ্শক হয়, তেন্তে $5m^2$ 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 :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $A = \{n \in \mathbb{N} \mid n^2 \leq n + 10,000\}$, $B = \{3k + 1 \mid k \in \mathbb{N}\}$ and $C = \{2k \mid k \in \mathbb{N}\}$, then the sum of all the elements of the set $A \cap (B - C)$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

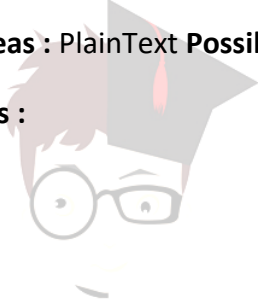
Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1



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Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ধৰা হ'ল $A = \{n \in \mathbb{N} \mid n^2 \leq n + 10,000\}$, $B = \{3k + 1 \mid k \in \mathbb{N}\}$ আৰু $C = \{2k \mid k \in \mathbb{N}\}$, তেন্তে $A \cap (B - C)$

সংহতিটোৰ আটাইবোৰ মৌলৰ যোগফল সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of real roots of the equation

$e^{4x} - e^{3x} - 4e^{2x} - e^x + 1 = 0$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1

Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$e^{4x} - e^{3x} - 4e^{2x} - e^x + 1 = 0$ সমীকরণটোৰ বাস্তৱ মূলৰ সংখ্যা সমান হ'ব _____।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText Possible

Answers :

1