Question Paper Name : B TECH EMA 26th Feb 2021 Shift 1
Subject Name : B TECH EMA
Creation Date : 2021-02-25 11:49:27
Duration : 180
Number of Questions : 90
Total Marks : 300
Display Marks: Yes

B TECH EMA

Group Number : 1
Group Id : 708191222
Group Maximum Duration : 0
Group Minimum Duration : 180
Show Attended Group? : No
Edit Attended Group? : No
Break time : 0
Group Marks : 300
Is this Group for Examiner? : No

Physics Section A

Section Id : 708191910
Section Number : 1
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 20
Number of Questions to be attempted : 20
Section Marks : 80
Mark As Answered Required? : Yes
Sub-Section Number : 1
Sub-Section Id : 7081911190
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 70819120554 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

In a typical combustion engine the work done by a gas molecule is given by
\[ W = \alpha^2 \beta e^{-\frac{bx^2}{kT}} \], where \( x \) is the displacement, \( k \) is the Boltzmann constant and \( T \) is the temperature. If \( \alpha \) and \( \beta \) are constants, dimensions of \( \alpha \) will be :

Options :
70819166811. \([\text{M} \text{L} \text{T}^{-2}]\)
70819166812. \([\text{M}^0 \text{L} \text{T}^0]\)
70819166813. \([\text{M} \text{L} \text{T}^{-1}]\)
70819166814. \([\text{M}^2 \text{L} \text{T}^{-2}]\)

Question Number : 1 Question Id : 70819120554 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
\[ W = \frac{1}{2} \beta x^2 \]

\[ k = \frac{\beta}{x} \]

\[ \mu = \frac{\beta}{x^2} \]

\[ \Delta t = \frac{1}{\beta} \]

\[ \text{Options:} \]

70819166811. \[ MLT^{-2} \]

70819166812. \[ M^0 LT^0 \]

70819166813. \[ MLT^{-1} \]

70819166814. \[ M^2 LT^{-2} \]

**Question Number : 2 Question Id : 70819120555 Question Type : MCQ Option Shuffling : Yes 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:** Body 'P' having mass M moving with speed 'u' has head-on collision elastically with another body 'Q' having mass 'm' initially at rest. If \( m \ll M \), body 'Q' will have a maximum speed equal to 2u after collision.

**Reason R:** During elastic collision, the momentum and kinetic energy are both conserved.

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

**Options:**

70819166815. Both A and R are correct and R is the correct explanation of A.

70819166816. Both A and R are correct but R is NOT the correct explanation of A.

70819166817. A is correct but R is not correct.
70819166818. A is not correct but R is correct.

Question Number : 2 Question Id : 70819120555 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options:


70819166817. A விளைவே பலது R தோற்றம்.

70819166818. A விளைவே பலது R தோற்றம்.

Question Number : 3 Question Id : 70819120556 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
A planet revolving in elliptical orbit has:
A. a constant velocity of revolution.
B. has the least velocity when it is nearest to the sun.
C. its areal velocity is directly proportional to its velocity.
D. areal velocity is inversely proportional to its velocity.
E. to follow a trajectory such that the areal velocity is constant.

Choose the correct answer from the options given below:

Options:

70819166819. A only

70819166820. C only

70819166821. D only

70819166822. E only
Find the gravitational force of attraction between the ring and sphere as shown in the diagram, where the plane of the ring is perpendicular to the line joining the centres. If \( \sqrt{8}R \) is the distance between the centres of a ring (of mass ‘m’) and a sphere (mass ‘M’) where both have equal radius ‘R’.

\[
\frac{\sqrt{8}}{27} \cdot \frac{GmM}{R^2}
\]

\[
\frac{\sqrt{8}}{9} \cdot \frac{GmM}{R}
\]

\[
\frac{1}{3\sqrt{8}} \cdot \frac{GMm}{R^2}
\]

\[
\frac{2\sqrt{2}}{3} \cdot \frac{GMm}{R^2}
\]
Four identical solid spheres each of mass ‘m’ and radius ‘a’ are placed with their centres on the four corners of a square of side ‘b’. The moment of inertia of the system about one side of square where the axis of rotation is parallel to the plane of the square is:

Options:

\[ \frac{4}{5} ma^2 + 2mb^2 \]
Question Number : 5 Question Id : 70819120558 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
\frac{8}{5}ma^2 + 2mb^2
\]

\[
\frac{8}{5}ma^2 + mb^2
\]

\[
\frac{4}{5}ma^2
\]

Question Number : 6 Question Id : 70819120559 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
\frac{4}{5}ma^2 + 2mb^2
\]

\[
\frac{8}{5}ma^2 + 2mb^2
\]

\[
\frac{8}{5}ma^2 + mb^2
\]

\[
\frac{4}{5}ma^2
\]
A large number of water drops, each of radius \( r \), combine to have a drop of radius \( R \). If the surface tension is \( T \) and mechanical equivalent of heat is \( J \), the rise in heat energy per unit volume will be:

Options:

\[
\frac{2T}{J} \left( \frac{1}{r} - \frac{1}{R} \right)
\]

70819166831.

\[
\frac{3T}{J} \left( \frac{1}{r} - \frac{1}{R} \right)
\]

70819166832.

\[
\frac{3T}{rJ}
\]

70819166833.

\[
\frac{2T}{rJ}
\]

70819166834.
The normal density of a material is \( \rho \) and its bulk modulus of elasticity is \( K \). The magnitude of increase in density of material, when a pressure \( P \) is applied uniformly on all sides, will be:

Options:

\[
\frac{\rho P}{K}
\]

70819166835.

\[
\frac{K}{\rho P}
\]

70819166836.

\[
\frac{\rho K}{P}
\]

70819166837.

\[
\frac{PK}{\rho}
\]

70819166838.
\[
\frac{K}{\rho p}
\]

\[
\frac{\rho K}{p}
\]

\[
\frac{PK}{\rho}
\]

Question Number : 8 Question Id : 70819120561 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Assume that a tunnel is dug along a chord of the earth, at a perpendicular distance (R/2) from the earth's centre, where 'R' is the radius of the Earth. The wall of the tunnel is frictionless. If a particle is released in this tunnel, it will execute a simple harmonic motion with a time period:

Options:

\[
\frac{2\pi R}{g}
\]

\[
\frac{2\pi \sqrt{\frac{R}{g}}}{g}
\]

\[
\frac{1}{2\pi} \sqrt{\frac{g}{R}}
\]

\[
\frac{g}{2\pi R}
\]
Correct Marks : 4 Wrong Marks : 1

The temperature $\theta$ at the junction of two insulating sheets, having thermal resistances $R_1$ and $R_2$ as well as top and bottom temperatures $\theta_1$ and $\theta_2$ (as shown in figure) is given by:

\[ \frac{\theta_1 R_2 + \theta_2 R_1}{R_1 + R_2} \]

Options :

70819166843.

70819166844.
\[ \frac{R_2 - R_1}{R_1} \cdot 0_2 \]

\[ \frac{R_2 - R_1}{R_1} \cdot 0_1 \]

**Question Number : 9 Question Id : 70819120562 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

\[ \frac{0_1 R_2 + 0_2 R_1}{R_1 + R_2} \]

\[ \frac{0_1 R_2 + 0_2 R_1}{R_1 + R_2} \]

\[ \frac{0_1 R_1 + 0_2 R_2}{R_1 + R_2} \]

\[ \frac{0_1 R_2 - 0_2 R_1}{R_2 - R_1} \]

\[ \frac{0_2 R_2 - 0_1 R_1}{R_2 - R_1} \]

**Question Number : 10 Question Id : 70819120563 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**
A particle is moving with uniform speed along the circumference of a circle of radius \( R \) under the action of a central fictitious force \( F \) which is inversely proportional to \( R^3 \). Its time period of revolution will be given by:

**Options:**

\[ T \propto R^\frac{3}{2} \]

70819166847.

\[ T \propto R^\frac{4}{3} \]

70819166848.

\[ T \propto R^2 \]

70819166849.

\[ T \propto R^\frac{5}{2} \]

70819166850.
If two similar springs each of spring constant $K_1$ are joined in series, the new spring constant and time period would be changed by a factor:

Options:

- $\frac{1}{2}, \sqrt{2}$
- $\frac{1}{4}, 2\sqrt{2}$

Question Number : 11 Question Id : 70819120564 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
Question Number: 12  Question Id: 70819120565  Question Type: MCQ  Option Shuffling: Yes  Is Question Mandatory: No  Correct Marks: 4  Wrong Marks: 1

Find the electric field at point P (as shown in figure) on the perpendicular bisector of a uniformly charged thin wire of length L carrying a charge Q. The distance of the point P from the centre of the rod is \( a = \frac{\sqrt{3}}{2} L \).

\[ \frac{Q}{3\pi \varepsilon_0 L^2} \]

\[ \frac{Q}{4\pi \varepsilon_0 L^2} \]

\[ \frac{\sqrt{3}Q}{4\pi \varepsilon_0 L^2} \]

\[ \frac{Q}{2\sqrt{3}\pi \varepsilon_0 L^2} \]
Question Number : 12 Question Id : 70819120565 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
\frac{Q}{2 \pi \varepsilon_0 L^2}
\]

Options:

70819166855.

70819166856.

70819166857.

70819166858.

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Question Number : 13 Question Id : 70819120566 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
\frac{\sqrt{3} Q}{4 \pi \varepsilon_0 L^2}
\]

Option:

70819166857.
Consider the combination of 2 capacitors $C_1$ and $C_2$ with $C_2 > C_1$, when connected in parallel, the equivalent capacitance is $\frac{15}{4}$ times the equivalent capacitance of the same connected in series. Calculate the ratio of capacitors, $\frac{C_2}{C_1}$.

Options:

\[
\frac{29}{15} \\
70819166859.
\]

\[
\frac{15}{11} \\
70819166860.
\]

\[
\frac{15}{4} \\
70819166861.
\]

\[
\frac{111}{80} \\
70819166862.
\]
An alternating current is given by the equation \(i = i_1 \sin \omega t + i_2 \cos \omega t\). The rms current will be:

\[\frac{1}{\sqrt{2}} \left( i_1 + i_2 \right)\]

\[\frac{1}{\sqrt{2}} \left( i_1 + i_2 \right)^2\]

\[\frac{1}{\sqrt{2}} \left( i_1^2 + i_2^2 \right)^{\frac{1}{2}}\]

\[\frac{1}{2} \left( \frac{i_1^2}{i_2^2} + \frac{i_2^2}{i_1^2} \right)^{\frac{1}{2}}\]
\[ \frac{1}{\sqrt{2}} (i_1 + i_2) \]

\[ \frac{1}{\sqrt{2}} (i_1 + i_2)^2 \]

\[ \frac{1}{\sqrt{2}} (i_1^2 + i_2^2)^{\frac{1}{2}} \]

\[ \frac{1}{2} (i_1^2 + i_2^2)^{\frac{1}{2}} \]

**Question Number : 15  Question Id : 70819120568  Question Type : MCQ  Option Shuffling : Yes  Is Question Mandatory : No**

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

Five equal resistances are connected in a network as shown in figure. The net resistance between the points A and B is:

![Diagram](image)

**Options :**

7081916687. \( 2R \)

7081916688. \( \frac{R}{2} \)

7081916689. \( R \)
Question Number : 15 Question Id : 70819120568 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options:

\[ \frac{3R}{2} \]

\[ \frac{R}{2} \]

\[ R \]

\[ \frac{3R}{2} \]

Question Number : 16 Question Id : 70819120569 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[ \frac{3R}{2} \]
A short straight object of height 100 cm lies before the central axis of a spherical mirror whose focal length has absolute value $|f| = 40$ cm. The image of object produced by the mirror is of height 25 cm and has the same orientation of the object. One may conclude from the information:

**Options:**

70819166871. Image is virtual, opposite side of concave mirror.

70819166872. Image is real, same side of concave mirror.

70819166873. Image is virtual, opposite side of convex mirror.

70819166874. Image is real, same side of convex mirror.

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**Question Number : 16**  
**Question Id : 70819120569**  
**Question Type : MCQ**  
**Option Shuffling : Yes**  
**Is Question Mandatory : No**  
**Correct Marks : 4**  
**Wrong Marks : 1**

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**Options :**

70819166871. 

70819166872. 

70819166873. 

70819166874. 

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**Question Number : 17**  
**Question Id : 70819120570**  
**Question Type : MCQ**  
**Option Shuffling : Yes**
In a Young's double slit experiment two slits are separated by 2 mm and the screen is placed one meter away. When a light of wavelength 500 nm is used, the fringe separation will be:

Options:

70819166875. 1 mm

70819166876. 0.75 mm

70819166877. 0.50 mm

70819166878. 0.25 mm

In a Young's double slit experiment two slits are separated by 2 mm and the screen is placed one meter away. When a light of wavelength 500 nm is used, the fringe separation will be:

Options:

70819166875. 1 mm

70819166876. 0.75 mm

70819166877. 0.50 mm

70819166878. 0.25 mm

In a Young's double slit experiment two slits are separated by 2 mm and the screen is placed one meter away. When a light of wavelength 500 nm is used, the fringe separation will be:

Options:

70819166875. 1 mm

70819166876. 0.75 mm

70819166877. 0.50 mm

70819166878. 0.25 mm
Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

**Assertion A:** An electron microscope can achieve better resolving power than an optical microscope.

**Reason R:** The de Broglie’s wavelength of the electrons emitted from an electron gun is much less than wavelength of visible light.

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

**Options:**

70819166879. Both A and R are true and R is the correct explanation of A.

70819166880. Both A and R are true but R is NOT the correct explanation of A.

70819166881. A is true but R is false.

70819166882. A is false but R is true.

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**Question Number:** 18  
**Question Id:** 70819120571  
**Question Type:** MCQ  
**Option Shuffling:** Yes  
**Is Question Mandatory:** No

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

**Assertion A:** An electron microscope can achieve better resolving power than an optical microscope.

**Reason R:** The de Broglie’s wavelength of the electrons emitted from an electron gun is much less than wavelength of visible light.

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

**Options:**

70819166879. A, R दुसःराष्ट्रीय विविधतात् अस्तित्वात्, A अस्तित्वात् R, A अस्तित्वात् विविधतात्

70819166880. A, R दुसःराष्ट्रीय विविधतात्, A अस्तित्वात् R, A अस्तित्वात् विविधतात्
Question Number : 19 Question Id : 70819120572 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
If $\lambda_1$ and $\lambda_2$ are the wavelengths of the third member of Lyman and first member of the Paschen series respectively, then the value of $\frac{\lambda_1}{\lambda_2}$ is :

Options :

70819166883. $\frac{7}{108}$

70819166884. $\frac{7}{135}$

70819166885. $1:3$

70819166886. $1:9$

Question Number : 19 Question Id : 70819120572 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
$\lambda_1, \lambda_2$ are the wavelengths of the third member of Lyman and first member of the Paschen series respectively, then the value of $\frac{\lambda_1}{\lambda_2}$ is :

Options :

70819166883. $\frac{7}{108}$

70819166884. $\frac{7}{135}$
Question Number : 20  Question Id : 70819120573  Question Type : MCQ  Option Shuffling : Yes  
Is Question Mandatory : No  
Correct Marks : 4  Wrong Marks : 1  
LED is constructed from Ga–As–P semiconducting material. The energy gap of this LED is 1.9 eV. Calculate the wavelength of light emitted and its colour. 
\[ h = 6.63 \times 10^{-34} \text{ Js and } c = 3 \times 10^8 \text{ ms}^{-1} \]  
Options : 
70819166887. 654 nm and red colour  
70819166888. 654 nm and orange colour  
70819166889. 1046 nm and blue colour  
70819166890. 1046 nm and red colour

Question Number : 20  Question Id : 70819120573  Question Type : MCQ  Option Shuffling : Yes  
Is Question Mandatory : No  
CorrectMarks : 4  Wrong Marks : 1  
Ga–As–P LED is constructed from Ga–As–P semiconducting material. The energy gap of this LED is 1.9 eV. Calculate the wavelength of light emitted and its colour. 
\[ h = 6.63 \times 10^{-34} \text{ Js, } c = 3 \times 10^8 \text{ ms}^{-1} \]  
Options : 
70819166887. 654 nm, പുളി നിറം  
70819166888. 654 nm, ഹോളുഷ് നിറം
Physics Section B

Section Id : 708191911
Section Number : 2
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 10
Number of Questions to be attempted : 5
Section Marks : 20
Mark As Answered Required? : Yes
Sub-Section Number : 1
Sub-Section Id : 7081911191
Question Shuffling Allowed : Yes

Question Number : 21 Question Id : 70819120574 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
As shown in the figure, a block of mass \( \sqrt{3} \) kg is kept on a horizontal rough surface of coefficient of friction \( \frac{1}{3\sqrt{3}} \). The critical force to be applied on the vertical surface as shown at an angle 60° with horizontal such that it does not move, will be 3x. The value of x will be \_\_\_\_\_\_\_\_\_.

\[ g = 10 \text{ m/s}^2; \sin 60° = \frac{\sqrt{3}}{2}; \cos 60° = \frac{1}{2} \]

\( \mu = \frac{1}{3\sqrt{3}} \)

\[ m = \sqrt{3} \text{ kg} \]

\[ 60° \]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Show Word Count**: Yes

**Answers Type**: Range

**Text Areas**: PlainText

**Possible Answers**:

5 to 5.001
A boy pushes a box of mass 2 kg with a force \( \vec{F} = \left( 20 \hat{i} + 10 \hat{j} \right) \text{N} \) on a frictionless surface. If the box was initially at rest, then \( \text{__________ m} \) is displacement along the \( x \)-axis after 10 s.

**Question Number : 22**  
**Question Id : 70819120575**  
**Question Type : SA**  
**Correct Marks : 4**  
**Wrong Marks : 0**

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

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A boy pushes a box of mass 2 kg with a force \( \vec{F} = \left( 20 \hat{i} + 10 \hat{j} \right) \text{N} \) on a frictionless surface. If the box was initially at rest, then \( \text{__________ m} \) is displacement along the \( x \)-axis after 10 s.

**Question Number : 22**  
**Question Id : 70819120575**  
**Question Type : SA**  
**Correct Marks : 4**  
**Wrong Marks : 0**

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

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A boy pushes a box of mass 2 kg with a force \( \vec{F} = \left( 20 \hat{i} + 10 \hat{j} \right) \text{N} \) on a frictionless surface. If the box was initially at rest, then \( \text{__________ m} \) is displacement along the \( x \)-axis after 10 s.

**Question Number : 22**  
**Question Id : 70819120575**  
**Question Type : SA**  
**Correct Marks : 4**  
**Wrong Marks : 0**

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**
A person standing on a spring balance inside a stationary lift measures 60 kg. The weight of that person if the lift descends with uniform downward acceleration of 1.8 m/s² will be \[ \text{__________} \, \text{N}. \] \[ g = 10 \, \text{m/s}^2 \]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Show Word Count**: Yes

**Answers Type**: Range

**Text Areas**: PlainText

**Possible Answers**:

5 to 5.001
The mass per unit length of a uniform wire is 0.135 g/cm. A transverse wave of the form
\[ y = -0.21 \sin (x+30t) \] is produced in it, where \( x \) is in meter and \( t \) is in second. Then, the
expected value of tension in the wire is \( x \times 10^{-2} \) N. Value of \( x \) is _________.
(Round-off to the nearest integer)

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

The mass per unit length of a uniform wire is 0.135 g/cm. A transverse wave of the form
\[ y = -0.21 \sin (x+30t) \] is produced in it, where \( x \) is in meter and \( t \) is in second. Then, the
expected value of tension in the wire is \( x \times 10^{-2} \) N. Value of \( x \) is _________.
(Round-off to the nearest integer)

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

Question Number: 25 Question Id: 70819120578 Question Type: SA

Correct Marks: 4 Wrong Marks: 0
A container is divided into two chambers by a partition. The volume of first chamber is 4.5 litre and second chamber is 5.5 litre. The first chamber contain 3.0 moles of gas at pressure 2.0 atm and second chamber contain 4.0 moles of gas at pressure 3.0 atm. After the partition is removed and the mixture attains equilibrium, then, the common equilibrium pressure existing in the mixture is $x \times 10^{-1}$ atm. Value of $x$ is __________.

**Question Number** : 25 **Question Id** : 70819120578 **Question Type** : SA

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

**Response Type** : Numeric

**Evaluation Required For SA** : Yes

**Show Word Count** : Yes

**Answers Type** : Range

**Text Areas** : PlainText

**Possible Answers** :

5 to 5.001

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**Question Number** : 26 **Question Id** : 70819120579 **Question Type** : SA

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

**Response Type** : Numeric

**Evaluation Required For SA** : Yes

**Show Word Count** : Yes

**Answers Type** : Range

**Text Areas** : PlainText

**Possible Answers** :

5 to 5.001
A radiation is emitted by 1000 W bulb and it generates an electric field and magnetic field at P, placed at a distance of 2 m. The efficiency of the bulb is 1.25%. The value of peak electric field at P is \( x \times 10^{-1} \) V/m. Value of \( x \) is \( \square \). (Rounded-off to the nearest integer)

\[ e_0 = 8.85 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2}, \; c = 3 \times 10^8 \, \text{ms}^{-1} \]

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

5 to 5.001

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**Question Number**: 26  
**Question Id**: 70819120579  
**Question Type**: SA  
**Correct Marks**: 4  
**Wrong Marks**: 0  

1000 W \( \text{\textit{நேர்வான}} \) வைத்து விளக்கம் பெற்று 2 m \( \text{\textit{வரையறுக்கப்பட்ட}} \) P புல்லில் அதிகம் என்று கொண்டு விளக்கம் பெற்று, \( \text{\textit{வரையறுக்கப்பட்ட}} \)\% \( 1.25\) என்று. P ஒன்று விளக்கம் வாய்ந்து விளக்கம் பெற்று \( x \times 10^{-1} \) V/m \( \text{\textit{வரையறுக்கப்பட்ட}} \); \( x \) என்று பெறும் \( \square \). (\( \text{\textit{வரையறுக்கப்பட்ட}} \)\% \( 1.25\) \( \text{\textit{வரையறுக்கப்பட்ட}} \) \( 8.85 \times 10^{-12} \) \( \text{\textit{வரையறுக்கப்பட்ட}} \) \( 3 \times 10^8 \) \( \text{\textit{வரையறுக்கப்பட்ட}} \)  

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

5 to 5.001

---

**Question Number**: 27  
**Question Id**: 70819120580  
**Question Type**: SA  
**Correct Marks**: 4  
**Wrong Marks**: 0  

In an electrical circuit, a battery is connected to pass 20 C of charge through it in a certain given time. The potential difference between two plates of the battery is maintained at 15 V. The work done by the battery is \( \square \) J.

**Response Type**: Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
5 to 5.001

Question Number : 27 Question Id : 70819120580 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
5 to 5.001

Question Number : 28 Question Id : 70819120581 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
The circuit contains two diodes each with a forward resistance of 50 Ω and with infinite reverse resistance. If the battery voltage is 6 V, the current through the 120 Ω resistance is ________ mA.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001
The maximum and minimum amplitude of an amplitude modulated wave is 16 V and 8 V respectively. The modulation index for this amplitude modulated wave is \( x \times 10^{-2} \). The value of \( x \) is \__________\.

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Show Word Count**: Yes

**Answers Type**: Range

**Text Areas**: PlainText

**Possible Answers**:

5 to 5.001
In a series LCR resonant circuit, the quality factor is measured as 100. If the inductance is increased by two fold and resistance is decreased by two fold, then the quality factor after this change will be ________.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

5 to 5.001

Chemistry Section A
Question Number : 31 Question Id : 70819120584 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
The orbital having two radial as well as two angular nodes is :

Options :
70819166901. \(3p\)
70819166902. \(4d\)
70819166903. \(4f\)
70819166904. \(5d\)

Question Number : 31 Question Id : 70819120584 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options :
70819166901. \(3p\)
70819166902. \(4d\)
Question Number : 32 Question Id : 70819120585 Question Type : MCQ Option Shuffling : Yes
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: Dipole-dipole interactions are the only non-covalent interactions, resulting in hydrogen bond formation.

Reason R: Fluorine is the most electronegative element and hydrogen bonds in HF are symmetrical.

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

Options:

70819166905. Both A and R are true and R is the correct explanation of A

70819166906. Both A and R are true but R is NOT the correct explanation of A

70819166907. A is true but R is false

70819166908. A is false but R is true

Question Number : 32 Question Id : 70819120585 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
Options:

- (a) $1s^2 2s^2$  
  - (i) $801$
- (b) $1s^2 2s^2 2p^4$  
  - (ii) $899$
- (c) $1s^2 2s^2 2p^3$  
  - (iii) $1314$
- (d) $1s^2 2s^2 2p^1$  
  - (iv) $1402$

Choose the most appropriate answer from the options given below:
(a) → (i), (b) → (iii), (c) → (iv), (d) → (ii)

<table>
<thead>
<tr>
<th>Molecule</th>
<th>Δ_H in kJ mol⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 1s² 2s²</td>
<td>801</td>
</tr>
<tr>
<td>(b) 1s² 2s² 2p⁴</td>
<td>899</td>
</tr>
<tr>
<td>(c) 1s² 2s² 2p³</td>
<td>1314</td>
</tr>
<tr>
<td>(d) 1s² 2s² 2p¹</td>
<td>1402</td>
</tr>
</tbody>
</table>

Options:

(a) → (i), (b) → (iv), (c) → (iii), (d) → (ii)

(a) → (iv), (b) → (i), (c) → (ii), (d) → (iii)

(a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

(a) → (i), (b) → (iii), (c) → (iv), (d) → (ii)
Match List-I with List-II.

<table>
<thead>
<tr>
<th>List-I (Ore)</th>
<th>List-II (Element Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Kermit</td>
<td>(i) Tin</td>
</tr>
<tr>
<td>(b) Cassiterite</td>
<td>(ii) Boron</td>
</tr>
<tr>
<td>(c) Calamine</td>
<td>(iii) Fluorine</td>
</tr>
<tr>
<td>(d) Cryolite</td>
<td>(iv) Zinc</td>
</tr>
</tbody>
</table>

Choose the most appropriate answer from the options given below:

Options:

70819166913. (a) → (ii), (b) → (i), (c) → (iv), (d) → (iii)
70819166914. (a) → (iii), (b) → (i), (c) → (ii), (d) → (iv)
70819166915. (a) → (ii), (b) → (iv), (c) → (i), (d) → (iii)
70819166916. (a) → (i), (b) → (iii), (c) → (iv), (d) → (ii)
(a) \rightarrow (i), (b) \rightarrow (iii), (c) \rightarrow (iv), (d) \rightarrow (ii)

Question Number: 35  Question Id: 70819120588  Question Type: MCQ  Option Shuffling: Yes
Is Question Mandatory: No
Correct Marks: 4  Wrong Marks: 1

Statements about heavy water are given below.
A. Heavy water is used in exchange reactions for the study of reaction mechanisms.
B. Heavy water is prepared by exhaustive electrolysis of water.
C. Heavy water has higher boiling point than ordinary water.
D. Viscosity of H$_2$O is greater than D$_2$O.
Choose the most appropriate answer from the options given below:

Options:
70819166917. A and B only
70819166918. A and C only
70819166919. A and D only
70819166920. A, B and C only
Find A, B and C in the following reactions:

\[ \text{NH}_3 + A + \text{CO}_2 \rightarrow (\text{NH}_4)_2\text{CO}_3 \]

\[ (\text{NH}_4)_2\text{CO}_3 + \text{H}_2\text{O} + \text{B} \rightarrow \text{NH}_4\text{HCO}_3 \]

\[ \text{NH}_4\text{HCO}_3 + \text{NaCl} \rightarrow \text{NH}_4\text{Cl} + \text{C} \]

Options:

70819166917. A \(\text{H}_2\text{O}\); B \(\text{O}_2\); C \(\text{Na}_2\text{CO}_3\)

70819166918. A \(\text{H}_2\text{O}\); B \(\text{O}_2\); C \(\text{NaHCO}_3\)

70819166919. A \(\text{H}_2\text{O}\); B \(\text{CO}_2\); C \(\text{NaHCO}_3\)

70819166920. A \(\text{O}_2\); B \(\text{CO}_2\); C \(\text{Na}_2\text{CO}_3\)
Διορθώστε την παραπάνω σχέση αποδημίου 
\[ \text{NH}_3 + A + \text{CO}_2 \rightarrow (\text{NH}_4)_2\text{CO}_3 \]
\[(\text{NH}_4)_2\text{CO}_3 + \text{H}_2\text{O} + B \rightarrow \text{NH}_4\text{HCO}_3 \]
\[\text{NH}_4\text{HCO}_3 + \text{NaCl} \rightarrow \text{NH}_4\text{Cl} + C \]

**Options:**

70819166921. \(A - \text{H}_2\text{O}; B - \text{O}_2; C - \text{Na}_2\text{CO}_3\)

70819166922. \(A - \text{H}_2\text{O}; B - \text{O}_2; C - \text{NaHCO}_3\)

70819166923. \(A - \text{H}_2\text{O}; B - \text{CO}_2; C - \text{NaHCO}_3\)

70819166924. \(A - \text{O}_2; B - \text{CO}_2; C - \text{Na}_2\text{CO}_3\)

---

**Question Number : 37 Question Id : 70819120590 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

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

Compound A used as a strong oxidizing agent is amphoteric in nature. It is the part of lead storage batteries. Compound A is:

**Options :**

70819166925. \(\text{PbO}\)

70819166926. \(\text{PbO}_2\)

70819166927. \(\text{Pb}_3\text{O}_4\)

70819166928. \(\text{PtSO}_4\)

---

**Question Number : 37 Question Id : 70819120590 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**
Correct Marks : 4 Wrong Marks : 1

Which one of the following lanthanoids does not form MO₂ ?
[M is lanthanoid metal]

Options :
70819166929. Nd
70819166930. Dy
70819166931. Pr
70819166932. Yb
തന്നെ ഏതൊരു മിനുസംഖ്യകാരായെന്നും അതെയാണ് MO_2 എന്നാണെന്ന്? 
[M നാണ് മുകളിലാണ് എന്നാണെന്ന്]

Options:
70819166929. Nd
70819166930. Dy
70819166931. Pr
70819166932. Yb

Question Number : 39 Question Id : 70819120592 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
The presence of ozone in troposphere:

Options:
70819166933. protects us from the UV radiation
70819166934. protects us from the X-ray radiation
70819166935. generates photochemical smog
70819166936. protects us from greenhouse effect

Question Number : 39 Question Id : 70819120592 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
ഭൂപ്രകാശകാലാന്തില്‍ എന്തും നടക്കുന്നു. 

Options:
Question Number : 40 Question Id : 70819120593 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Given below are two statements:

Statement I: A mixture of chloroform and aniline can be separated by simple distillation.
Statement II: When separating aniline from a mixture of aniline and water by steam distillation aniline boils below its boiling point.

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

Options:

70819166937. Both Statement I and Statement II are true

70819166938. Both Statement I and Statement II are false

70819166939. Statement I is true but Statement II is false

70819166940. Statement I is false but Statement II is true

Question Number : 40 Question Id : 70819120593 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
Which of the following is ‘a’ FALSE statement?

Options:

70819166941. Carius tube is used in the estimation of sulphur in an organic compound.

70819166942. Carius method is used for the estimation of nitrogen in an organic compound.

70819166943. Kjeldahl’s method is used for the estimation of nitrogen in an organic compound.

Phosphoric acid produced on oxidation of phosphorus present in an organic compound is precipitated as Mg₃P₂O₇ by adding magnesia mixture.

70819166944.
Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the given reaction:

\[
\begin{align*}
&\text{CH} = \text{CHBr} \\
&\text{CH}_3 \\
\end{align*}
\]

1. NaNH\_2 \\
2. Red hot iron tube, 873 K \\
(A) major product

What is ‘A’?

Options:

\[
\begin{align*}
&\text{CH} = \text{CH} - \text{NH}_2 \\
&\text{CH}_3 \\
&\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2 \\
\end{align*}
\]

70819166945.

70819166946.

70819166947.
Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.

Question Number : 42 Question Id : 70819120595 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Correct Marks : 4 Wrong Marks : 1

70819166948.
For the given reaction:

\[
\begin{array}{ccc}
\text{CH}_2\text{CH}_3 & \text{Br}_2 & \xrightarrow{\text{UV light}} \\
\text{CN} & \text{CN} & \text{‘A'} \\
\end{array}
\]

(major product) monobrominated

What is ‘A’?

Options:

- 70819166949.

- 70819166950.

- 70819166951.

- 70819166952.
Correct Marks : 4 Wrong Marks : 1

The compound A is prepared by the reaction below. What is the product of this reaction?

\[
\text{\[
\begin{array}{c}
\text{CH}_2\text{CH}_3 \\
\text{CN}
\end{array}
\text{Br}_2\xrightarrow{\text{UV light}} \text{C}_{6}\text{H}_5\text{CN} \text{ (major product) monobrominated}
\end{array}
\text{A}
\]
\]

Options:

70819166949.

70819166950.

70819166951.

70819166952.
B reacts with Hydroxyl amine but does not give Tollen's test. Identify A and B.

Options:

70819166953. 1,1-Dichlorobutane and Butanal

70819166954. 2,2-Dichlorobutane and Butanal

70819166955. 1,1-Dichlorobutane and 2-Butanone

70819166956. 2,2-Dichlorobutane and Butan-2-one
Identify the major products A and B respectively in the following reactions of phenol:

\[ \text{B} \xrightarrow{\text{(i) CHCl}_3, \text{NaOH}} \xrightarrow{\text{(ii) H}_3\text{O}^+} \text{Br}_2 \text{ in CS}_2 \xrightarrow{273 \text{ K}} \text{A} \]

Options:

1. \( \text{OH} \quad \text{Br} \quad \text{and} \quad \text{OH} \quad \text{CHO} \)
2. \( \text{OH} \quad \text{Br} \quad \text{and} \quad \text{OH} \quad \text{CHO} \)
3. \( \text{OH} \quad \text{Br} \quad \text{and} \quad \text{OH} \quad \text{CHO} \)
4. \( \text{OH} \quad \text{Br} \quad \text{and} \quad \text{OH} \quad \text{CHO} \)

Question Number: 45 Question Id: 70819120598 Question Type: MCQ Option Shuffling: Yes Is Question Mandatory: No
Correct Marks : 4 Wrong Marks : 1

Options:

70819166957.

70819166958.

70819166959.

70819166960.

Question Number : 46 Question Id : 70819120599 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Given below are two statements:

Statement I : o-Nitrophenol is steam volatile due to intramolecular hydrogen bonding.
Statement II : o-Nitrophenol has high melting due to hydrogen bonding.

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

Options :

70819166961. Both Statement I and Statement II are true

70819166962. Both Statement I and Statement II are false

70819166963. Statement I is true but Statement II is false

70819166964. Statement I is false but Statement II is true

Question Number : 46 Question Id : 70819120599 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

 Malayalam:

(പ്രസ്തुതഭാഗം I : ഒ-ഓണർഫിയൽ ഒമ്പ്(ബ്ലുഡിൽ ബാബാൻ കോസ്, ഒ-ഓണർഫിയൽ നദിപ്രകാരം ബാബാൻ കോസ്)

(പ്രസ്തുതഭാഗം II : ഒ-ഓണർഫിയൽ നദിപ്രകാരം കോസ്, ഒ-ഓണർഫിയൽ നദിപ്രകാരം ബാബാൻ കോസ്)

(പ്രസ്തുതഭാഗം പ്രാഥമിക നല്ലതു ഉദ്ദേശിക്കുന്നതു നാമത്താലുള്ള പരാമാർശം എന്നു ?

Options :

70819166961. (പ്രസ്തുതഭാഗം I, II സമാനം വെളിപ്പെട്ടി)

70819166962. (പ്രസ്തുതഭാഗം I, II സമാനം വലിപ്പെട്ടി)

70819166963. (പ്രസ്തുതഭാഗം I വളബ്ല, II വലിപ്പെട്ടി)

70819166964. (പ്രസ്തുതഭാഗം I വളബ്ല, II വലിപ്പെട്ടി)
An amine on reaction with benzenesulphonyl chloride produces a compound insoluble in alkaline solution. This amine can be prepared by ammonolysis of ethyl chloride. The correct structure of amine is:

Options:
1. CH₃CH₂CH₂NHCH₃
2. CH₃CH₂CH₂NH – CH₂CH₃
3. NH – CH₂CH₂CH₃
4. CH₃CH₂NH₂

Question Number : 47 Question Id : 70819120600 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Question Number : 47 Question Id : 70819120600 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options:
1. CH₃CH₂CH₂NHCH₃
2. CH₃CH₂CH₂N – CH₂CH₃
3. 
4. CH₃CH₂NH₂

Question Number : 47 Question Id : 70819120600 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Question Number : 47 Question Id : 70819120600 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options:
1. CH₃CH₂CH₂NHCH₃
2. CH₃CH₂CH₂N – CH₂CH₃
3. 
4. CH₃CH₂NH₂
The structure of Neoprene is:

Options:

\[
\begin{align*}
\text{Option 1:} & \quad \text{CH}_2\text{CH} &= \text{CH} \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{CH} \quad \text{CN} \\
\text{Option 2:} & \quad \text{Cl} \quad \text{CH}_2 \quad \text{C} &= \text{CH} \quad \text{CH}_2 \quad \text{n} \\
\text{Option 3:} & \quad \text{HN} \quad \text{N} \quad \text{NHCH}_2 \quad \text{n} \\
\text{Option 4:} & \quad \text{CH}_2 \quad \text{CH} \quad \text{CN} \quad \text{n}
\end{align*}
\]
Which of the following vitamin is helpful in delaying the blood clotting?

Options:

70819166969. Vitamin B

70819166970. Vitamin C

70819166971. Vitamin E
Vitamin K

Question Number : 49 Question Id : 70819120602 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options :
70819166973. బ్రేకాడ్ B

70819166974. బ్రేకాడ్ C

70819166975. బ్రేకాడ్ E

70819166976. బ్రేకాడ్ K

Question Number : 50 Question Id : 70819120603 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options :
70819166977. \( X = SO_3, \ Y = Cr_2(SO_4)_3 \)

70819166978. \( X = SO_2, \ Y = Cr_2O_3 \)

70819166979. \( X = SO_3, \ Y = Cr_2O_3 \)

70819166980. \( X = SO_2, \ Y = Cr_2(SO_4)_3 \)
Question Number : 50 Question Id : 70819120603 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options :
70819166977. $X = \text{SO}_3$, $Y = \text{Cr}_2(\text{SO}_4)_3$

70819166978. $X = \text{SO}_2$, $Y = \text{Cr}_2\text{O}_3$

70819166979. $X = \text{SO}_3$, $Y = \text{Cr}_2\text{O}_3$

70819166980. $X = \text{SO}_2$, $Y = \text{Cr}_2(\text{SO}_4)_3$

Chemistry Section B

Section Id : 708191913
Section Number : 4
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 10
Number of Questions to be attempted : 5
Section Marks : 20
Mark As Answered Required? : Yes
Sub-Section Number : 1
Sub-Section Id : 7081911193
Question Number : 51 Question Id : 70819120604 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
The number of significant figures in $50000.020 \times 10^{-3}$ is __________.
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
5 to 5.001

Question Number : 52 Question Id : 70819120605 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
$50000.020 \times 10^{-3}$ および $t$ の読み方で、数値は __________ である。
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
5 to 5.001

Question Number : 52 Question Id : 70819120605 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
A certain gas obeys $P(V_m - b) = RT$. The value of $\left( \frac{\partial Z}{\partial P} \right)_T$ is $\frac{xb}{RT}$. The value of $x$ is __________.
(Integer answer) ($Z$ : compressibility factor)
Response Type : Numeric
Question Number : 52 Question Id : 70819120605 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

\[ P(V_m - b) = RT \]  

\[ \left( \frac{\partial Z}{\partial P} \right) \]  

Evaluate the above expression and use the relation \( \frac{xb}{RT} \). The expression is in the form \( \frac{Z}{\text{constant}} \). (Hint: Use the relationship) 

\( Z \) : \( \text{constant} \) 

Response Type : Numeric 

Evaluation Required For SA : Yes 

Show Word Count : Yes 

Answers Type : Range 

Text Areas : PlainText 

Possible Answers : 

5 to 5.001

Question Number : 53 Question Id : 70819120606 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For a chemical reaction \( A + B = C + D \) \( (\Delta H^\circ = 80 \text{ kJ mol}^{-1}) \) the entropy change \( \Delta S^\circ \) depends on the temperature \( T \) (in K) as \( \Delta S^\circ = 2T \) \( (\text{J K}^{-1}\text{mol}^{-1}) \). 

Minimum temperature at which it will become spontaneous is \( \boxed{\text{_______ K}} \). (Integer)

Response Type : Numeric 

Evaluation Required For SA : Yes 

Show Word Count : Yes 

Answers Type : Range 

Possible Answers : 

5 to 5.001
5 to 5.001

Question Number : 53 Question Id : 70819120606 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

\[ A + B = C + D \text{ असाइन तापुपस्वार्थातः} \]
\[ (\Delta H^\circ = 80 \text{ kJ mol}^{-1}), \quad \Delta S^\circ \text{ -सु साइन तापुपस्वार्थातः} \quad T \text{(in K)} \cdot \text{ -सु साइन तापुपस्वार्थातः} \quad \text{रासायनिक} \]
\[ \Delta S^\circ = 2T (\text{JK}^{-1}\text{mol}^{-1}) \text{ रासायनिक तापुपस्वार्थातः} \quad \Delta S^\circ \text{ -सु साइन तापुपस्वार्थातः} \quad K \text{ रासायनिक} \quad \text{रासायनिक} \]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Possible Answers :

5 to 5.001

Question Number : 54 Question Id : 70819120607 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

224 mL of SO₂(\text{g}) at 298 K and 1 atm is passed through 100 mL of 0.1 M NaOH solution. The non-volatile solute produced is dissolved in 36 g of water. The lowering of vapour pressure of solution (assuming the solution is dilute) \( P_{H_2O}^* = 24 \text{ mm of Hg} \) is \( x \times 10^{-2} \text{ mm of Hg} \), the value of \( x \) is __________. (Integer answer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Possible Answers :

5 to 5.001
Question Number : 54 Question Id : 70819120607 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

298 K ലാണ് രാജ ; 1 atm നിലയിൽ 224 mL സോഡിയം ഒക്സിഡ് 298 K ലാണ് രാജം ; 1 atm നിലയിൽ 100 mL 0.1 M NaOH നിലയിൽ കാണും. രാജാ ഗണിതശാസ്ത്ര പോലെ, 36 g അമ്ഫി വെസിൽ നിലയിൽ ഇതിന്റെ എണ്ണാനം, അമ്ഫി കൊണ്ട് മഞ്ഞക്കിടയിൽ കാണും $x \times 10^{-2}$ mm Hg നിലയിൽ. അമ്ഫി 2 ഏത് പെടുത്തി $_________ \text{ mm Hg}$. (റോയിലോ പ്ലെയ്‌ലോസ്)

$
\left( P_{(H_2O)} = 24 \text{ mm of Hg} \right)
$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 55 Question Id : 70819120608 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A homogeneous ideal gaseous reaction $AB_2(g) = A(g) + 2B(g)$ is carried out in a 25 litre flask at 27° C. The initial amount of $AB_2$ was 1 mole and the equilibrium pressure was 1.9 atm. The value of $K_p$ is $x \times 10^{-2}$. The value of $x$ is $_________$. (Integral answer)

$[R = 0.08206 \text{ dm}^3 \text{ atm} \text{ K}^{-1} \text{ mol}^{-1}]$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 55 Question Id : 70819120608 Question Type : SA

Correct Marks : 4 Wrong Marks : 0
Consider the following reaction

$$\text{MnO}_4^- + 8H^+ + 5e^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}, \ E^\circ = 1.51 \, \text{V.}$$

The quantity of electricity required in Faraday to reduce five moles of $\text{MnO}_4^-$ is $\text{_______}.\ (\text{Integer answer})$
Response Type: Numeric
Evaluation Required For SA: Yes
Show Word Count: Yes
Answers Type: Range
Text Areas: PlainText
Possible Answers:
5 to 5.001

Question Number: 57 Question Id: 70819120610 Question Type: SA
Correct Marks: 4 Wrong Marks: 0
An exothermic reaction X → Y has an activation energy 30 kJ mol⁻¹. If energy change ΔE during the reaction is −20 kJ, then the activation energy for the reverse reaction in kJ is _______. (Integer answer)

Response Type: Numeric
Evaluation Required For SA: Yes
Show Word Count: Yes
Answers Type: Range
Text Areas: PlainText
Possible Answers:
5 to 5.001

Question Number: 57 Question Id: 70819120610 Question Type: SA
Correct Marks: 4 Wrong Marks: 0
X → Y അന്തര പ്രവർത്തനത്തിൽ അക്ടിവേഷൻ എന്നാണ് 30 kJ mol⁻¹ എന്നാണ്. ഇതിന്റെ പ്രതിപക്ഷ പ്രവർത്തനത്തിൽ ΔE = −20 kJ കാണപ്പെടുന്നു, അതിന്റെ അക്ടിവേഷൻ എന്നാണ് _______ kJ ആണ്? (Integer പ്രതിവിധി)

Response Type: Numeric
Evaluation Required For SA: Yes
3.12 g of oxygen is adsorbed on 1.2 g of platinum metal. The volume of oxygen adsorbed per gram of the adsorbent at 1 atm and 300 K in L is __________.

\[ R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1} \]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Possible Answers**: 5 to 5.001
Dichromate ion is treated with base, the oxidation number of Cr in the product formed is __________.

Possible Answers:
5 to 5.001

5 to 5.001

Number of bridging CO ligands in $[\text{Mn}_2(\text{CO})_{10}]$ is __________.
**Mathematics Section A**

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**Question 60**

**Question Id**: 70819120613  
**Question Type**: SA  
Correct Marks: 4  
Wrong Marks: 0

\[ \text{[Mn}_2(\text{CO})_{10}] \text{ の分子構造 } \text{ CO と考えると, どのように} \text{ 定義されるか?} \]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Text Areas**: PlainText

**Possible Answers**: 5 to 5.001
If \( \vec{a} \) and \( \vec{b} \) are perpendicular, then \( \vec{a} \times (\vec{a} \times (\vec{a} \times (\vec{a} \times \vec{b}))) \) is equal to:

Options:

70819166991. \( \vec{0} \)

\[ \frac{1}{2} |\vec{a}|^4 \vec{b} \]

70819166992.

\[ |\vec{a}|^4 \vec{b} \]

70819166993.

\( \vec{a} \times \vec{b} \)

70819166994.
If \((1, 5, 35)\), \((7, 5, 5)\), \((1, \lambda, 7)\) and \((2\lambda, 1, 2)\) are coplanar, then the sum of all possible values of \(\lambda\) is:

Options:

\[
\begin{align*}
\frac{39}{5} \\
\frac{-39}{5} \\
\frac{-44}{5} \\
\frac{44}{5}
\end{align*}
\]
The intersection of three lines \( x - y = 0, x + 2y = 3 \) and \( 2x + y = 6 \) is a:

Options:
- \( 70819166999. \) Right angled triangle
- \( 70819167000. \) Isosceles triangle
- \( 70819167001. \) Equilateral triangle
- \( 70819167002. \) None of the above
Question Number: 64  Question Id: 70819120617  Question Type: MCQ  Option Shuffling: Yes  
Is Question Mandatory: No  
Correct Marks: 4  Wrong Marks: 1  

\[
\begin{vmatrix}
(a + 1)(a + 2) & a + 2 & 1 \\
(a + 2)(a + 3) & a + 3 & 1 \\
(a + 3)(a + 4) & a + 4 & 1 \\
\end{vmatrix}
\]

The value of is:

Options:  
70819167003. \((a + 1)(a + 2)(a + 3)\)  
70819167004. \((a + 2)(a + 3)(a + 4)\)  
70819167005. \(-2\)  
70819167006. \(0\)
The rate of growth of bacteria in a culture is proportional to the number of bacteria present and the bacteria count is 1000 at initial time \( t = 0 \). The number of bacteria is increased by 20\% in 2 hours. If the population of bacteria is 2000 after \( \frac{k}{\log_e \left( \frac{6}{5} \right)} \) hours, then \( \left( \frac{k}{\log_e 2} \right)^2 \) is equal to:

Options:

70819167007. 2

70819167008. 4

70819167009. 8

70819167010. 16
In the circle given below, let OA = 1 unit, OB = 13 unit and PQ \perp OB. Then, the area of the triangle PQB (in square units) is:

Options:

70819167011. \(24\sqrt{2}\)

70819167012. \(24\sqrt{3}\)
70819167013. \(26\sqrt{2}\)

70819167014. \(26\sqrt{3}\)

**Question Number : 66 Question Id : 70819120619 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The value of \(L = \lim_{h \to 0} \frac{\sqrt{3} \sin \left( \frac{\pi}{6} + h \right) - \cos \left( \frac{\pi}{6} + h \right)}{\sqrt{3} h \left( \sqrt{3} \cos h - \sin h \right)}\) is:
Question Number : 67

\[
\lim_{{h \to 0}} \left( \frac{\sqrt{3} \sin \left( \frac{\pi}{6} + h \right) - \cos \left( \frac{\pi}{6} + h \right)}{\sqrt{3}h(\sqrt{3}\cos h - \sin h)} \right)
\]

Options :

\[
\begin{align*}
\frac{2}{3} \\
\frac{4}{3} \\
\frac{2}{\sqrt{3}} \\
\frac{3}{4}
\end{align*}
\]
The maximum slope of the curve \( y = \frac{1}{2} x^4 - 5x^3 + 18x^2 - 19x \) occurs at the point:

Options:
70819167019. \((0, 0)\)
70819167020. \((2, 2)\)
70819167021. \((3, \frac{21}{2})\)
70819167022. \((2, 9)\)
The value of \[ \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos^2 x}{1 + 3^x} \, dx \] is:

Options:

\[ \frac{\pi}{2} \]

70819167023.

\[ 2\pi \]

70819167024.

\[ \frac{\pi}{4} \]

70819167025.

\[ 4\pi \]

70819167026.
The number of seven digit integers with sum of the digits equal to 10 and formed by using the digits 1, 2 and 3 only is:

**Options:**

70819167027. 42

70819167028. 35

70819167029. 77

70819167030. 82

1, 2, 3 എണ്ണ തമ്മിലാണ് ഉപയോഗിക്കുന്നത് ആണ് എന്നതാണ് ചാരുവുകൾക്ക് 10 എണ്ണാളാണ് ഉപയോഗിക്കുന്നത് എണ്ണം:

**Options:**

70819167027. 42

70819167028. 35

70819167029. 77

70819167030. 82
The maximum value of the term independent of ‘t’ in the expansion of \( \left( tx^{\frac{1}{3}} + \frac{(1-x)^{\frac{1}{3}}}{t} \right)^{10} \) where \( x \in (0, 1) \) is:

Options:

1. \( \frac{10!}{\sqrt{3}(5!)^2} \)

2. \( \frac{2.10!}{3\sqrt{3}(5!)^2} \)

3. \( \frac{2.10!}{3(5!)^2} \)

4. \( \frac{10!}{3(5!)^2} \)
\[
\frac{2.10!}{3\sqrt{3}(5!)^2}
\]

\[
\frac{2.10!}{3(5!)^2}
\]

\[
\frac{10!}{3(5!)^2}
\]

---

**Question Number : 72 Question Id : 70819120625 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

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

Let \( R = \{(P, Q) : \text{P and Q are at the same distance from the origin}\} \) be a relation, then the equivalence class of \((1, -1)\) is the set:

**Options :**

70819167035. \( S = \{(x, y) : x^2 + y^2 = 4\} \)

70819167036. \( S = \{(x, y) : x^2 + y^2 = 2\} \)

70819167037. \( S = \{(x, y) : x^2 + y^2 = 1\} \)

70819167038. \( S = \{(x, y) : x^2 + y^2 = \sqrt{2} \} \)

---

**Question Number : 72 Question Id : 70819120625 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

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

Let \( \text{'\text{P}\text{Q}'} = \{(P, Q) : P, Q \text{\ are\ both\ points\ in\ the\ complex\ plane}\} \) be a relation, then \((1, -1)\) are related to \('\text{X}\text{Y}'}\) under \(\text{P}\text{Q}'\) if:

**Options :**
Question Number : 73 Question Id : 70819120626 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Let $A$ be a symmetric matrix of order 2 with integer entries. If the sum of the diagonal elements of $A^2$ is 1, then the possible number of such matrices is:

Options :

1. 70819167039
2. 70819167040
3. 70819167041
4. 70819167042

Question Number : 73 Question Id : 70819120626 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

 số hệ số của hệ phương trình $x^2 + y^2 = 4, 2$, và $x^2 + y^2 = 1$.

Options :
Let $f$ be any function defined on $\mathbb{R}$ and let it satisfy the condition:

$$|f(x) - f(y)| \leq |(x - y)^2|, \forall (x, y) \in \mathbb{R}$$

If $f(0) = 1$, then:

Options:

70819167043. $f(x) > 0, \forall x \in \mathbb{R}$

70819167044. $f(x) < 0, \forall x \in \mathbb{R}$

70819167045. $f(x) = 0, \forall x \in \mathbb{R}$

70819167046. $f(x)$ can take any value in $\mathbb{R}$
Question Number : 75 Question Id : 70819120628 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A fair coin is tossed a fixed number of times. If the probability of getting 7 heads is equal to probability of getting 9 heads, then the probability of getting 2 heads is :

Options :

\[
\frac{15}{2^8}
\]

\[
\frac{15}{2^{12}}
\]

\[
\frac{15}{2^{13}}
\]

\[
\frac{15}{2^{14}}
\]
Question Number : 76 Question Id : 70819120629 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

If \( \frac{\sin^{-1} x}{a} = \frac{\cos^{-1} x}{b} = \frac{\tan^{-1} y}{c} ; 0 < x < 1 \), then the value of \( \cos\left(\frac{\pi c}{a + b}\right) \) is:

Options :

70819167051. \( 1 - y^2 \)

70819167052. \( \frac{1 - y^2}{y\sqrt{y}} \)

70819167053. \( \frac{1 - y^2}{1 + y^2} \)

70819167054. \( \frac{1 - y^2}{2y} \)
Question Number : 76 Question Id : 70819120629 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
\sin^{-1} x = \cos^{-1} x = \tan^{-1} \frac{y}{c}; \quad 0 < x < 1, \quad \cos \left( \frac{\pi c}{a + b} \right) \text{ is some angle.}
\]

Options :

70819167051. \( 1 - y^2 \)

70819167052. \( \frac{1 - y^2}{y\sqrt{y}} \)

70819167053. \( \frac{1 - y^2}{1 + y^2} \)

70819167054. \( \frac{1 - y^2}{2y} \)

Question Number : 77 Question Id : 70819120630 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

In an increasing geometric series, the sum of the second and the sixth term is \( \frac{25}{2} \) and the product of the third and fifth term is 25. Then, the sum of 4\(^{th}\), 6\(^{th}\) and 8\(^{th}\) terms is equal to :

Options :

70819167055. \( 26 \)

70819167056. \( 30 \)

70819167057. \( 32 \)
Question Number : 77 Question Id : 70819120630 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The sum of the infinite series $1 + \frac{2}{3} + \frac{7}{3^2} + \frac{12}{3^3} + \frac{17}{3^4} + \frac{22}{3^5} + \ldots$ is equal to:

Options :

\[
\begin{align*}
70819167055. & \quad 26 \\
70819167056. & \quad 30 \\
70819167057. & \quad 32 \\
70819167058. & \quad 35
\end{align*}
\]

Question Number : 78 Question Id : 70819120631 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options :

\[
\begin{align*}
\frac{9}{4} \\
70819167059. & \quad \frac{11}{4} \\
70819167060.
\end{align*}
\]
Question Number : 78 Question Id : 70819120631 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

\[
1 + \frac{2}{3} + \frac{7}{3^2} + \frac{12}{3^3} + \frac{17}{3^4} + \frac{22}{3^5} + \ldots. \quad \text{Find the sum of the series.}
\]

Options :

- \(\frac{13}{4}\)

Question Number : 79 Question Id : 70819120632 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Consider the three planes

- \(P_1 : 3x + 15y + 21z = 9,\)
- \(P_2 : x - 3y - z = 5,\) and
- \(P_3 : 2x + 10y + 14z = 5\)

Then, which one of the following is true?
Options:
70819167063. $P_1$ and $P_2$ are parallel.

70819167064. $P_1$ and $P_3$ are parallel.

70819167065. $P_1$, $P_2$ and $P_3$ all are parallel.

70819167066. $P_2$ and $P_3$ are parallel.

Question Number : 79 Question Id : 70819120632 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Options:
70819167063. $P_1$, $P_2$ എന്നീ തുല്യക്ഷേത്രങ്ങൾ തമ്മില്‍നില്കിയാണ്

70819167064. $P_1$, $P_3$ എന്നീ തുല്യക്ഷേത്രങ്ങൾ

708167065. $P_1$, $P_2$, $P_3$ എന്നീ തുല്യക്ഷേത്രങ്ങൾ

70819167066. $P_2$, $P_3$ എന്നീ തുല്യക്ഷേത്രങ്ങൾ

Question Number : 80 Question Id : 70819120633 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
The value of \( \sum_{n=1}^{100} \int_{n-1}^{n} e^{x-[x]} \, dx \), where \([x]\) is the greatest integer \(\leq x\), is:

**Options:**

70819167067. 100(1 - e)

70819167068. 100(1 + e)

70819167069. 100e

70819167070. 100(e - 1)

---

**Mathematics Section B**

**Section Id:** 708191915
The difference between degree and order of a differential equation that represents the family of curves given by \( y^2 = a \left( x + \frac{\sqrt{a}}{2} \right) \), \( a > 0 \) is ________.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

Question Number: 81 Question Id: 70819120634 Question Type: SA

Correct Marks: 4 Wrong Marks: 0

‘അതാല്‍ത്തെ രേഖ കെട്ടില്‍’ - അത് പരിഹാരാവകാശം \( y^2 = a \left( x + \frac{\sqrt{a}}{2} \right) \), \( a > 0 \) അടയാളം പാദാന്തെ ഷൂന്യ വിലയില്‍ അടയ്ക്കാം സ്ഥാനം പോലെ അവര്‍ക്ക്

_______ എന്നു കെട്ടില്‍.

Response Type: Numeric
Question Number: 82  Question Id: 70819120635  Question Type: SA

Correct Marks: 4  Wrong Marks: 0

The sum of $162^{th}$ power of the roots of the equation $x^3 - 2x^2 + 2x - 1 = 0$ is __________.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001
The area bounded by the lines $y = |x - 1| - 2$ is ________.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

If $y = y(x)$ is the solution of the equation $e^{\sin y} \cos y \frac{dy}{dx} + e^{\sin y} \cos x = \cos x$, $y(0) = 0$; then

$1 + y\left(\frac{\pi}{6}\right) + \frac{\sqrt{3}}{2} y\left(\frac{\pi}{3}\right) + \frac{1}{\sqrt{2}} y\left(\frac{\pi}{4}\right)$ is equal to ________.

Response Type: Numeric

Evaluation Required For SA: Yes
Question Number: 84 Question Id: 70819120637 Question Type: SA

Correct Marks: 4 Wrong Marks: 0

\[ y = y(x) \quad \text{and} \quad e^{\sin y} \cos y \frac{dy}{dx} + e^{\sin y} \cos x = \cos x, \quad y(0) = 0 \]

\[ \text{Differentiate,} \quad 1 + y \left( \frac{\pi}{6} \right) + \frac{\sqrt{3}}{2} y \left( \frac{\pi}{3} \right) + \frac{1}{\sqrt{2}} y \left( \frac{\pi}{4} \right) \] \quad \text{is} \quad \text{the} \text{domain}. \]

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

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Question Number: 85 Question Id: 70819120638 Question Type: SA

Correct Marks: 4 Wrong Marks: 0

The number of solutions of the equation \( \log_4(x-1) = \log_2(x-3) \) is \( \text{__________} \).

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001
Question Number : 85 Question Id : 70819120638 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

\[ \log_4(x-1) = \log_2(x-3) \]  
Waar mənsuyųnyųñą ọdduṣas bawọọnọ ọduụ ọchụ ọeọe na ọkụta.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

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Question Number : 86 Question Id : 70819120639 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of integral values of \( k \) for which the equation \( 3 \sin x + 4 \cos x = k + 1 \) has a solution, \( k \in \mathbb{R} \) is ________.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

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Question Number : 86 Question Id : 70819120639 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

\( k \in \mathbb{R} \), \( 3 \sin x + 4 \cos x = k + 1 \)  
Waar mənsuyųnyųñą ọdduṣas bawọọnọ ọduụọ ndọọọ ọchụ ọeọe na ọkụta, \( k \)  
ọchụ ọeọe wa kwụọ nụkwọ ugwu onye ndọọọ ọchụ ọeọe na ọkụta ọwọ na ọkụta" ________ ọeọe.

Response Type : Numeric

Evaluation Required For SA : Yes
Let \((\lambda, 2, 1)\) be a point on the plane which passes through the point \((4, -2, 2)\). If the plane is perpendicular to the line joining the points \((-2, -21, 29)\) and \((-1, -16, 23)\), then 

\[
\left(\frac{\lambda}{11}\right)^2 - \frac{4\lambda}{11} - 4 \quad \text{is equal to} \quad \underline{\phantom{0000}} \ .
\]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

---

Let \((4, -2, 2)\) be a point on the plane which passes through the point \((4, -2, 2)\). If the plane is perpendicular to the line joining the points \((-2, -21, 29)\) and \((-1, -16, 23)\), then 

\[
\left(\frac{\lambda}{11}\right)^2 - \frac{4\lambda}{11} - 4 \quad \text{is equal to} \quad \underline{\phantom{0000}} \ .
\]

**Response Type**: Numeric

**Evaluation Required For SA**: Yes
The value of the integral \( \int_{0}^{\pi} \sin 2x \, dx \) is \(\underline{\quad}\).
If $\sqrt[3]{\cos^2 x} = (\sqrt[3]{3} - 1)\cos x + 1$, the number of solutions of the given equation when $x \in \left[0, \frac{\pi}{2}\right]$ is ________.

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Show Word Count**: Yes

**Answers Type**: Range

**Text Areas**: PlainText

**Possible Answers**:

5 to 5.001

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Question Number: 89 Question Id: 70819120642 Question Type: SA

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

$\sqrt[3]{\cos^2 x} = (\sqrt[3]{3} - 1)\cos x + 1$, $x \in \left[0, \frac{\pi}{2}\right]$  

$\text{provide expression}$

**Response Type**: Numeric

**Evaluation Required For SA**: Yes

**Show Word Count**: Yes

**Answers Type**: Range

**Text Areas**: PlainText

**Possible Answers**:

5 to 5.001

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Question Number: 90 Question Id: 70819120643 Question Type: SA

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

Let $m, n \in \mathbb{N}$ and $\gcd (2, n) = 1$. If $30 \binom{30}{0} + 29 \binom{30}{1} + \ldots + 2 \binom{30}{28} + 1 \binom{30}{29} = n \cdot 2^m$, then $n + m$ is equal to ________.

**Here**: $\binom{n}{k} = \binom{n}{n-k}$
Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001

Question Number: 90 Question Id: 70819120643 Question Type: SA

Correct Marks: 4 Wrong Marks: 0

\[ m, n \in \mathbb{N}, \gcd(2, n) = 1 \Rightarrow 30^{30 \choose 0} + 29^{30 \choose 1} + \ldots + 2^{30 \choose 28} + 1^{30 \choose 29} = n \cdot 2^m \]

\[ \binom{n}{k} = \binom{n}{k} \]

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

5 to 5.001