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B TECH EM

Group Number :	1
Group Id :	708191221
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Show Attended Group? :	No
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Group Marks :	300
Is this Group for Examiner? :	No

Physics Section A

Section Id :	708191904
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 :	7081911184
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 70819120464 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a typical combustion engine the workdone by a gas molecule is given by

$W = \alpha^2 \beta e^{\frac{-\beta x^2}{kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. If α and β are constants, dimensions of α will be :

Options :

70819166541. $[M L T^{-2}]$

70819166542. $[M^0 L T^0]$

70819166543. $[M L T^{-1}]$

70819166544. $[M^2 L T^{-2}]$

Question Number : 1 Question Id : 70819120464 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

एका ठराविक जळणाऱ्या अभियंत्रात वायूच्या रेणूने केलेले कार्य $W = \alpha^2 \beta e^{\frac{-\beta x^2}{kT}}$ असे दिले आहे जेथे x हे विस्थापन, k हा बोल्टझमनचा स्थिरांक व T तापमान आहे. जर α व β हे स्थिरांक आहेत, α ची मिती _____ असेल.

Options :

70819166541. $[M L T^{-2}]$

70819166542. $[M^0 L T^0]$

70819166543. $[M L T^{-1}]$

70819166544. $[M^2 L T^{-2}]$

Question Number : 2 Question Id : 70819120465 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 :

70819166545. Both A and R are correct and R is the correct explanation of A.

70819166546. Both A and R are correct but R is NOT the correct explanation of A.

70819166547. A is correct but R is not correct.

70819166548. A is not correct but R is correct.

Question Number : 2 Question Id : 70819120465 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दोन विधाने दिलेली आहेत. निश्चित विधान A आणि कारण R असे दिलेले आहे.

विधान A : M वस्तुमानाची 'P' वस्तू 'u' वेगाने गतिमान असून ती 'm' वस्तुमानाच्या स्थिर असलेल्या 'Q' ह्या दूसऱ्या वस्तुवर समोरासमोर प्रत्यास्थी आपटते. जर $m \ll M$ आहे तर आपटल्यानंतर वस्तू 'Q' चा वेग '2u' एवढा महत्तम असेल.

कारण R : प्रत्यास्थी आघातामध्ये, संवेग व गतिज ऊर्जा दोन्ही अक्षय्यी आहेत.

वरील विधानांसंदर्भात, खाली दिलेल्या पर्यायातून योग्य उत्तर निवडा.

Options :

70819166545. A व R दोन्ही बरोबर आहेत व R हे A चे योग्य स्पष्टीकरण आहे.

70819166546. A व R दोन्ही बरोबर आहेत पण R हे A चे योग्य स्पष्टीकरण नाही.

70819166547. A बरोबर आहे पण R बरोबर नाही.

70819166548. A बरोबर नाही पण R बरोबर आहे.

Question Number : 3 Question Id : 70819120466 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 :

70819166549. A only

70819166550. C only

70819166551. D only

70819166552. E only

Question Number : 3 Question Id : 70819120466 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

विवृत्तीय दृष्ट्या घूर्णन करणाऱ्या ग्रहास :

- A. घूर्णनाचा वेग स्थिर आहे.
 - B. जेव्हा तो सूर्याच्या सर्वात जवळ असतो तेव्हा त्याचा वेग कमीत कमी असतो.
 - C. त्याचा क्षेत्रीय वेग हा त्याच्या वेगास समानुपाती आहे.
 - D. क्षेत्रीय वेग हा त्याच्या वेगास व्यस्त प्रमाणात असतो.
 - E. विक्षेप्याचे अनुकरण करण्यासाठी क्षेत्रीय वेग स्थिर असतो.
- खाली दिलेल्या पर्यायातून योग्य उत्तर निवडा.

Options :

70819166549. फक्त A

70819166550. फक्त C

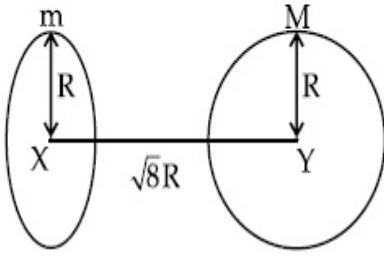
70819166551. फक्त D

70819166552. फक्त E

Question Number : 4 Question Id : 70819120467 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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'.



Options :

70819166553. $\frac{\sqrt{8}}{27} \cdot \frac{GmM}{R^2}$

70819166554. $\frac{\sqrt{8}}{9} \cdot \frac{GmM}{R}$

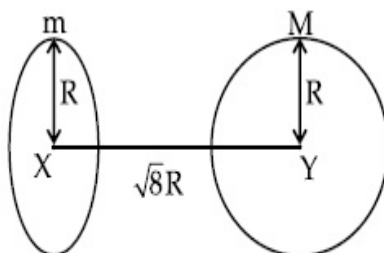
70819166555. $\frac{1}{3\sqrt{8}} \cdot \frac{GMm}{R^2}$

70819166556. $\frac{2\sqrt{2}}{3} \cdot \frac{GMm}{R^2}$

Question Number : 4 Question Id : 70819120467 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

आकृतीत दाखविल्याप्रमाणे, कडे व गोळा यामधील आकर्षण बल काढा जर दोघांची त्रिज्या 'R' असताना कड्याच्या ('m' वस्तुमान) व गोळ्याच्या ('M' वस्तुमान) मध्यातील अंतर $\sqrt{8}R$ आहे.



Options :

70819166553. $\frac{\sqrt{8}}{27} \cdot \frac{GmM}{R^2}$

70819166554. $\frac{\sqrt{8}}{9} \cdot \frac{GmM}{R}$

70819166555. $\frac{1}{3\sqrt{8}} \cdot \frac{GMm}{R^2}$

70819166556. $\frac{2\sqrt{2}}{3} \cdot \frac{GMm}{R^2}$

Question Number : 5 Question Id : 70819120468 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166557. $\frac{4}{5}ma^2 + 2mb^2$

70819166558. $\frac{8}{5}ma^2 + 2mb^2$

70819166559. $\frac{8}{5}ma^2 + mb^2$

70819166560. $\frac{4}{5}ma^2$

Question Number : 5 Question Id : 70819120468 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

प्रत्येकी 'm' वस्तुमानाचे व 'a' त्रिज्येचे चार एकसारखे भरीव गोळे असे ठेवले की त्यांचे मध्य 'b' बाजू असलेल्या चौकोनाच्या टोकांवर आहेत. चौकोनाच्या एका बाजूभोवती संहतीचे जडत्व आघूर्ण _____ आहे.

Options :

70819166557. $\frac{4}{5}ma^2 + 2mb^2$

70819166558. $\frac{8}{5}ma^2 + 2mb^2$

70819166559. $\frac{8}{5}ma^2 + mb^2$

70819166560. $\frac{4}{5}ma^2$

Question Number : 6 Question Id : 70819120469 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166561. $\frac{2T}{J} \left(\frac{1}{r} - \frac{1}{R} \right)$

70819166562. $\frac{3T}{J} \left(\frac{1}{r} - \frac{1}{R} \right)$

70819166563. $\frac{3T}{rJ}$

70819166564. $\frac{2T}{rJ}$

Question Number : 6 Question Id : 70819120469 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

प्रत्येकी r त्रिज्येचे असंख्य पाण्याचे थेंब एकत्रित होऊन R त्रिज्येचा थेंब होतो. जर पृष्ठताण T आहे व उष्णतेचे यांत्रिक समतुल्य J आहे, एकक आकारमानासाठी उष्मा ऊर्जेतील वाढ _____ असेल.

Options :

70819166561. $\frac{2T}{J} \left(\frac{1}{r} - \frac{1}{R} \right)$

70819166562. $\frac{3T}{J} \left(\frac{1}{r} - \frac{1}{R} \right)$

70819166563. $\frac{3T}{rJ}$

70819166564. $\frac{2T}{rJ}$

Question Number : 7 Question Id : 70819120470 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The normal density of a material is ρ 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 :

70819166565. $\frac{\rho P}{K}$

70819166566. $\frac{K}{\rho P}$

70819166567. $\frac{\rho K}{P}$

70819166568. $\frac{PK}{\rho}$

Question Number : 7 Question Id : 70819120470 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

पदार्थाची सामान्य घनता ρ आहे व त्याचा आयतन प्रत्यावस्था मापांक K आहे. जेव्हा सर्व बाजूंवर P एवढा एकसमान दाब दिला तेव्हा पदार्थाच्या घनतेतील वाढ _____ असेल.

Options :

70819166565. $\frac{\rho P}{K}$

70819166566. $\frac{K}{\rho P}$

70819166567. $\frac{\rho K}{P}$

70819166568. $\frac{PK}{\rho}$

Question Number : 8 Question Id : 70819120471 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 :

70819166569. $\frac{2\pi R}{g}$

70819166570. $2\pi \sqrt{\frac{R}{g}}$

70819166571. $\frac{1}{2\pi} \sqrt{\frac{g}{R}}$

70819166572. $\frac{g}{2\pi R}$

Question Number : 8 Question Id : 70819120471 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जर 'R' ही पृथ्वीची त्रिज्या आहे तर पृथ्वीच्या मध्य बिंदूतून ($R/2$) अंतरातून लंबरूप जाणाऱ्या जिवेवर एक बोगदा खणला असे माना. बोगद्याची भिंत घर्षणविरहीत आहे. जर त्या बोगद्यात कण सोडला तर तो कण सरल आवर्त गतीत जातो व त्याचा कालखंड काल _____ आहे.

Options :

70819166569. $\frac{2\pi R}{g}$

70819166570. $2\pi \sqrt{\frac{R}{g}}$

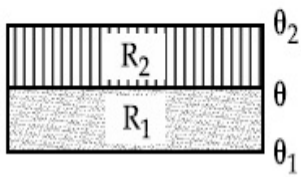
70819166571. $\frac{1}{2\pi} \sqrt{\frac{g}{R}}$

70819166572. $\frac{g}{2\pi R}$

Question Number : 9 Question Id : 70819120472 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The temperature θ at the junction of two insulating sheets, having thermal resistances R_1 and R_2 as well as top and bottom temperatures θ_1 and θ_2 (as shown in figure) is given by :



Options :

70819166573. $\frac{\theta_1 R_2 + \theta_2 R_1}{R_1 + R_2}$

70819166574. $\frac{\theta_1 R_1 + \theta_2 R_2}{R_1 + R_2}$

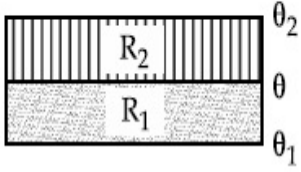
70819166575. $\frac{\theta_1 R_2 - \theta_2 R_1}{R_2 - R_1}$

70819166576. $\frac{\theta_2 R_2 - \theta_1 R_1}{R_2 - R_1}$

Question Number : 9 Question Id : 70819120472 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

दोन रोधीत पत्रे ज्याचे औष्णिक रोध R_1 व R_2 आहेत तसेच वरील व खालील तापमान θ_1 व θ_2 आहे त्यांच्या संधीचे तापमान $\theta =$ _____ असे दिले आहे. (आकृतीत दाखविल्याप्रमाणे)



Options :

70819166573. $\frac{\theta_1 R_2 + \theta_2 R_1}{R_1 + R_2}$

70819166574. $\frac{\theta_1 R_1 + \theta_2 R_2}{R_1 + R_2}$

70819166575. $\frac{\theta_1 R_2 - \theta_2 R_1}{R_2 - R_1}$

70819166576. $\frac{\theta_2 R_2 - \theta_1 R_1}{R_2 - R_1}$

Question Number : 10 Question Id : 70819120473 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166577. $T \propto R^{\frac{3}{2}}$

70819166578. $T \propto R^{\frac{4}{3}}$

70819166579. $T \propto R^2$

70819166580. $T \propto R^{\frac{5}{2}}$

Question Number : 10 Question Id : 70819120473 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

R त्रिज्येच्या वर्तुळाच्या परिघावर एकसमान वेगाने एक कण गतिमान आहे तर त्यावर होणारे मध्यबल F हे R^3 च्या व्यस्त प्रमाणात आहे. त्याच्या घूर्णनाचा कालखंड काल _____ असा दिला जाईल.

Options :

70819166577. $T \propto R^{\frac{3}{2}}$

70819166578. $T \propto R^{\frac{4}{3}}$

70819166579. $T \propto R^2$

70819166580. $T \propto R^{\frac{5}{2}}$

Question Number : 11 Question Id : 70819120474 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166581. $\frac{1}{2}, \sqrt{2}$

70819166582. $\frac{1}{4}, 2\sqrt{2}$

70819166583. $\frac{1}{2}, 2\sqrt{2}$

70819166584. $\frac{1}{4}, \sqrt{2}$

Question Number : 11 Question Id : 70819120474 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

प्रत्येकी स्प्रिंग स्थिरांक K_1 असलेल्या दोन एकसारख्या स्प्रिंग एकसरीत जोडल्या. नवीन स्प्रिंगचा स्थिरांक व कालखंड काल _____ असेल.

Options :

70819166581. $\frac{1}{2}, \sqrt{2}$

70819166582. $\frac{1}{4}, 2\sqrt{2}$

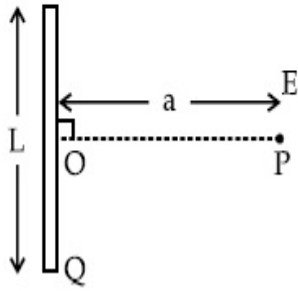
70819166583. $\frac{1}{2}, 2\sqrt{2}$

70819166584. $\frac{1}{4}, \sqrt{2}$

Question Number : 12 Question Id : 70819120475 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 $a = \frac{\sqrt{3}}{2} L$.



Options :

70819166585. $\frac{Q}{3\pi\epsilon_0 L^2}$

70819166586. $\frac{Q}{4\pi\epsilon_0 L^2}$

70819166587. $\frac{\sqrt{3}Q}{4\pi\epsilon_0 L^2}$

70819166588. $\frac{Q}{2\sqrt{3}\pi\epsilon_0 L^2}$

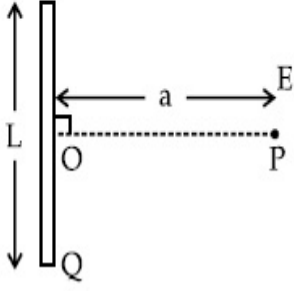
Question Number : 12 Question Id : 70819120475 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Q प्रभार वाहणाऱ्या L लांबीच्या एकसमान प्रभारित बारीक तारेच्या लंबरूप दूभाजकावर (आकृतीत दाखविल्याप्रमाणे)

P बिंदूवर विद्युत क्षेत्र काढा. P बिंदूचे दांड्याच्या मध्यापासूनचे अंतर $a = \frac{\sqrt{3}}{2} L$ आहे.



Options :

70819166585. $\frac{Q}{3\pi\epsilon_0 L^2}$

70819166586. $\frac{Q}{4\pi\epsilon_0 L^2}$

70819166587. $\frac{\sqrt{3}Q}{4\pi\epsilon_0 L^2}$

70819166588. $\frac{Q}{2\sqrt{3}\pi\epsilon_0 L^2}$

Question Number : 13 Question Id : 70819120476 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166589. $\frac{29}{15}$

70819166590. $\frac{15}{11}$

70819166591. $\frac{15}{4}$

70819166592. $\frac{111}{80}$

Question Number : 13 Question Id : 70819120476 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

C_1 व C_2 दोन संधारित्रे विचारात घ्या $C_2 > C_1$. जेव्हा ती समांतर जोडली तेव्हा समतुल्य धारकता ती एकसरीत जोडल्यानंतरच्या समतुल्य धारकतेच्या $\frac{15}{4}$ पट आहे. धारकतेचे गुणोत्तर $\frac{C_2}{C_1}$ काढा.

Options :

70819166589. $\frac{29}{15}$

70819166590. $\frac{15}{11}$

70819166591. $\frac{15}{4}$

70819166592. $\frac{111}{80}$

Question Number : 14 Question Id : 70819120477 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An alternating current is given by the equation $i = i_1 \sin \omega t + i_2 \cos \omega t$. The rms current will be :

Options :

70819166593. $\frac{1}{\sqrt{2}} (i_1 + i_2)$

70819166594. $\frac{1}{\sqrt{2}} (i_1 + i_2)^2$

70819166595. $\frac{1}{\sqrt{2}} (i_1^2 + i_2^2)^{\frac{1}{2}}$

70819166596. $\frac{1}{2} (i_1^2 + i_2^2)^{\frac{1}{2}}$

Question Number : 14 Question Id : 70819120477 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

प्रत्यावर्ती धारेचे समीकरण $i = i_1 \sin \omega t + i_2 \cos \omega t$ असे दिले आहे. वर्गमाध्य वर्गमूल धारा _____ असेल.

Options :

70819166593. $\frac{1}{\sqrt{2}} (i_1 + i_2)$

70819166594. $\frac{1}{\sqrt{2}} (i_1 + i_2)^2$

70819166595. $\frac{1}{\sqrt{2}} (i_1^2 + i_2^2)^{\frac{1}{2}}$

70819166596.

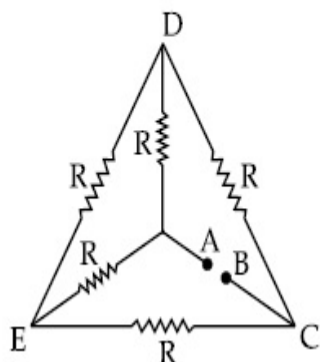
$$\frac{1}{2} (i_1^2 + i_2^2)^{\frac{1}{2}}$$

Question Number : 15 Question Id : 70819120478 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 :



Options :

70819166597. $2R$

70819166598. $\frac{R}{2}$

70819166599. R

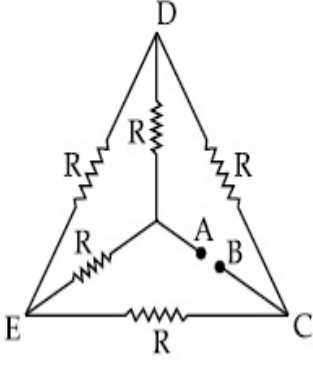
70819166600. $\frac{3R}{2}$

Question Number : 15 Question Id : 70819120478 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

आकृतीत दाखविल्याप्रमाणे पाच सारखे रोध जाळ्यात जोडलेले आहे. A व B बिंदूंमधील निव्वळ रोध _____ आहे.



Options :

70819166597. $2R$

70819166598. $\frac{R}{2}$

70819166599. R

70819166600. $\frac{3R}{2}$

Question Number : 16 Question Id : 70819120479 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166601. Image is virtual, opposite side of concave mirror.

70819166602. Image is real, same side of concave mirror.

70819166603. Image is virtual, opposite side of convex mirror.

70819166604. Image is real, same side of convex mirror.

Question Number : 16 Question Id : 70819120479 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

100 cm उंचीची एक लहान वस्तू गोलाकार आरशाच्या मध्य अक्षासमोर आहे व नाभीय लांबीचे निरपेक्ष मूल्य $|f| = 40$ cm आहे. आरशाने तयार केलेल्या वस्तुच्या प्रतिमेची उंची 25 cm व वस्तुसारखीच दिशाभिमुखता आहे. माहितीवरून एखादा असे ठरवेल की :

Options :

70819166601. प्रतिमा आभासी व अंतर्गोल आरशाच्या विरुद्ध बाजूस आहे.

70819166602. प्रतिमा खरी व अंतर्गोल आरशाच्या त्याच बाजूस आहे.

70819166603. प्रतिमा आभासी व बहिर्गोल आरशाच्या विरुद्ध बाजूस आहे.

70819166604. प्रतिमा खरी व बहिर्गोल आरशाच्या त्याच बाजूस आहे.

Question Number : 17 Question Id : 70819120480 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166605. 1 mm

70819166606. 0.75 mm

70819166607. 0.50 mm

70819166608. 0.25 mm

Question Number : 17 Question Id : 70819120480 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

यंगच्या दोन फटींच्या प्रयोगात, दोन फटी एकमेकांपासून 2 mm अंतरावर आहेत व पडदा 1 मीटर अंतरावर आहे. जेव्हा 500 nm तरंगलांबीचा प्रकाश वापरला तेव्हा फटींमधील अंतर _____ असेल.

Options :

70819166605. 1 mm

70819166606. 0.75 mm

70819166607. 0.50 mm

70819166608. 0.25 mm

Question Number : 18 Question Id : 70819120481 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 : 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 :

70819166609. Both A and R are true and R is the correct explanation of A.

70819166610. Both A and R are true but R is NOT the correct explanation of A.

70819166611. A is true but R is false.

70819166612. A is false but R is true.

Question Number : 18 Question Id : 70819120481 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दोन विधाने दिलेली आहेत. निश्चित विधान A आणि कारण R असे दिलेले आहे.

विधान A : इलेक्ट्रॉन सूक्ष्मदर्शीची प्रकाशीय सूक्ष्मदर्शी पेक्षा वियोजन शक्ती चांगली आहे.

कारण R : इलेक्ट्रॉन बंदूकीतून बाहेर पडलेल्या इलेक्ट्रॉनची डी-ब्रोगीली तरंगलांबी दिसणाऱ्या प्रकाशाच्या तरंगलांबी पेक्षा खूप कमी आहे.

वरील विधानांसंदर्भात, खाली दिलेल्या पर्यायातून योग्य उत्तर निवडा.

Options :

70819166609. A व R दोन्ही बरोबर आहेत व R हे A चे योग्य स्पष्टीकरण आहे.

70819166610. A व R दोन्ही बरोबर आहेत पण R हे A चे योग्य स्पष्टीकरण नाही.

70819166611. A बरोबर आहे पण R बरोबर नाही.

70819166612. A बरोबर नाही पण R बरोबर आहे.

Question Number : 19 Question Id : 70819120482 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If λ_1 and λ_2 are the wavelengths of the third member of Lyman and first member of the Paschen series respectively, then the value of $\lambda_1 : \lambda_2$ is :

Options :

70819166613. 7 : 108

70819166614. 7 : 135

70819166615. 1 : 3

70819166616. 1 : 9

Question Number : 19 Question Id : 70819120482 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जर λ_1 व λ_2 ह्या अनुक्रमे लायमन श्रेणीतील तिसऱ्या घटकाची व पाशन् श्रेणीतील पहिल्या घटकाची तरंगलांबी आहे तर $\lambda_1 : \lambda_2$ याचे मूल्य _____ आहे.

Options :

70819166613. 7 : 108

70819166614. 7 : 135

70819166615. 1 : 3

70819166616. 1 : 9

Question Number : 20 Question Id : 70819120483 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.

[$h = 6.63 \times 10^{-34}$ Js and $c = 3 \times 10^8$ ms⁻¹]

Options :

70819166617. 654 nm and red colour

70819166618. 654 nm and orange colour

70819166619. 1046 nm and blue colour

70819166620. 1046 nm and red colour

Question Number : 20 Question Id : 70819120483 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Ga-As-P पदार्थाच्या अर्धवाहकापासून एक LED तयार केला. त्या LED ची ऊर्जा अंतराल 1.9 eV आहे.
बाहेर पडलेल्या प्रकाशाची तरंगलांबी व रंग काढा.

[$h=6.63 \times 10^{-34}$ Js व $c=3 \times 10^8$ ms⁻¹]

Options :

70819166617. 654 nm व लाल रंग

70819166618. 654 nm व नारिंगी रंग

70819166619. 1046 nm व निळा रंग

70819166620. 1046 nm व लाल रंग

Physics Section B

Section Id : 708191905

Section Number : 2

Section type : Online

Mandatory or Optional : Mandatory

Number of Questions : 10

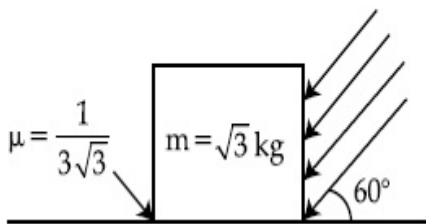
Number of Questions to be attempted :	5
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	7081911185
Question Shuffling Allowed :	Yes

Question Number : 21 Question Id : 70819120484 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 _____.

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



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

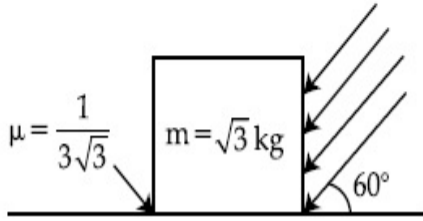
Question Number : 21 Question Id : 70819120484 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

आकृतीत दाखविल्याप्रमाणे, $\frac{1}{3\sqrt{3}}$ घर्षण गुणांक असलेल्या क्षितिजसमांतर खडबडीत पृष्ठभागावर $\sqrt{3}$ kg

वस्तुमानाचा एक ठोकळा ठेवला आहे तो हलू नये यासाठी क्षितिजसमांतरशी 60° कोन केलेल्या उभ्या पृष्ठभागास दाखविल्याप्रमाणे $3x$ क्रांतिक बल लावावे लागेल तर x चे मूल्य काढा.

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



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 22 **Question Id :** 70819120485 **Question Type :** SA

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

A boy pushes a box of mass 2 kg with a force $\vec{F} = (20\hat{i} + 10\hat{j})$ N on a frictionless surface.

If the box was initially at rest, then _____ m is displacement along the x-axis after 10 s.

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 : 22 Question Id : 70819120485 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

घर्षणविरहीत पृष्ठभागावर 2 kg वस्तुमानाचे खोके $\vec{F} = (20\hat{i} + 10\hat{j})\text{N}$ बलाने एक मुलगा ढकलत आहे. जर खोके सुरुवातीस स्थिर आहे, x -दिशेत $t = 10$ सेकंद वेळात त्याचे विस्थापन किती असू शकेल ते काढा _____ m.

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 : 23 Question Id : 70819120486 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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/s^2 will be _____ 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

Question Number : 23 Question Id : 70819120486 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

एक माणूस स्प्रिंग तराजुवर उभा असून तो स्थिर विजेरी पाळण्यात 60 kg मोजतो. जर विजेरी पाळणा 1.8 m/s^2 एकसमान त्वरणाने खाली येत असेल तर त्या माणसाचे वजन काढा _____ 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

Question Number : 24 Question Id : 70819120487 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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 $x \times 10^{-2} \text{ N}$. 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 : 24 Question Id : 70819120487 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

एका एकसमान तारेचे एकक लांबीसाठी वस्तुमान 0.135 g/cm आहे. त्यात अवतरंग तयार केला जो $y = -0.21 \sin(x + 30t)$ असा वर्णन केला आहे. जेथे x हा मीटरमध्ये व t सेकंदात आहे. तारेतील अपेक्षित ताणाचे मूल्य $x \times 10^{-2} \text{ N}$ आहे. x चे मूल्य _____ असेल. (योग्य सिग्निफिकंट अंक वापरावे)

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 : 70819120488 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 _____.

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 : 70819120488 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

एका भांड्याचे दोन कक्षात विभाजन केले आहे. पहिल्या कक्षाचे आकारमान 4.5 लिटर आहे व दूसऱ्या कक्षाचे 5.5 लिटर आहे. पहिल्या कक्षात 2.0 वातावरणाच्या दाबास 3.0 मोल वायू भरलेला आहे व दूसऱ्या कक्षात 3.0 वातावरणाच्या दाबास 4.0 मोल वायू भरलेला आहे. विभाजन काढल्यानंतर मिश्रण समतोल झाले. मिश्रणात असलेला सामान्य समतोल दाब $x \times 10^{-1}$ वातावरण आहे. x चे मूल्य _____ असेल.

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 : 26 Question Id : 70819120489 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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 _____. (Rounded-off to the nearest integer)

[Take $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$, $c = 3 \times 10^8 \text{ ms}^{-1}$]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 26 Question Id : 70819120489 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

1000 W फुग्याने प्रारण उत्सर्जित केले व ते 2 m अंतरावर ठेवलेल्या P बिंदूवर विद्युत क्षेत्र व चुंबकीय क्षेत्र तयार करते. फुग्याची कार्यक्षमता 1.25% आहे. P येथे शिखर विद्युत क्षेत्राचे मूल्य $x \times 10^{-1}$ V/m आहे. x चे मूल्य _____ असेल. (योग्य सिग्निफिकंट अंक वापरावे)

[ध्या $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$, $c = 3 \times 10^8 \text{ ms}^{-1}$]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 27 Question Id : 70819120490 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 workdone by the battery is _____ 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 : 70819120490 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

विद्युत परिपथात, बॅटरी जोडून त्यातून दिलेल्या विशिष्ट वेळात 20 C प्रभार पाठविला. बॅटरीच्या दोन पट्ट्यांमधील विभवांतर 15 V ठेवले. बॅटरीने केलेले कार्य _____ J आहे.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

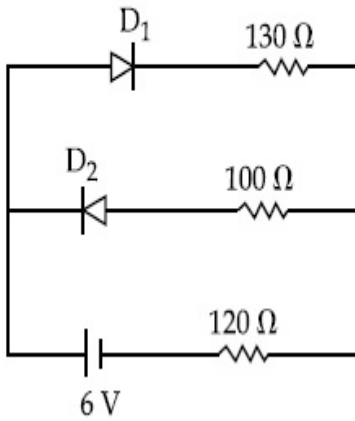
Possible Answers :

5 to 5.001

Question Number : 28 Question Id : 70819120491 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The circuit contains two diodes each with a forward resistance of $50\ \Omega$ and with infinite reverse resistance. If the battery voltage is 6 V , the current through the $120\ \Omega$ resistance is _____ mA.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

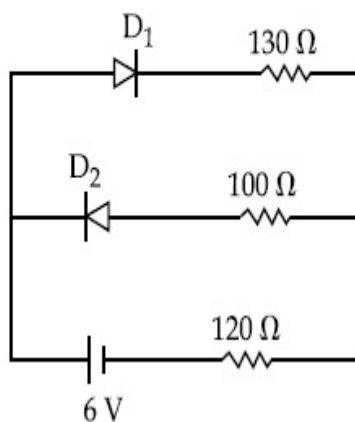
Possible Answers :

5 to 5.001

Question Number : 28 **Question Id :** 70819120491 **Question Type :** SA

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

दाखविलेल्या परिपथात दोन डायोड प्रत्येकी $50\ \Omega$ चा पुरोगामी रोध व अनंत व्युत्क्रम रोध आहेत. जर बॅटरीची व्होल्टता 6 V आहे तर $120\ \Omega$ रोधातून जाणारी धारा _____ mA आहे.



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 : 29 Question Id : 70819120492 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

Question Number : 29 Question Id : 70819120492 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

आयाम आपरिवर्तीत तरंगासाठी महत्तम व लघुत्तम आयाम 16 V व 8 V अनुक्रमे आहेत त्या आयाम आपरिवर्तीत तरंगासाठी आपरिवर्तन निर्देशांक $x \times 10^{-2}$ आहे. x चे मूल्य _____ असेल.

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 : 30 Question Id : 70819120493 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

Question Number : 30 Question Id : 70819120493 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

LCR एकसरीतील संस्पंदीत परिपथात, गुण अवयव 100 असा मोजला जर प्रेरितता दोन पट वाढविली व रोध दोन पट कमी केला तर तो बदल केल्यानंतर गुण अवयव _____ असेल.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Chemistry Section A

Section Id :	708191906
Section Number :	3
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 :	7081911186
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 70819120494 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 :

70819166631. 3p

70819166632. 4d

70819166633. 4f

70819166634. 5d

Question Number : 31 Question Id : 70819120494 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

दोन अरीय तसेच दोन कोनीय निस्पंद असलेली कक्षिका _____ आहे.

Options :

70819166631. 3p

70819166632. 4d

70819166633. 4f

70819166634. 5d

Question Number : 32 Question Id : 70819120495 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 :

70819166635. Both A and R are true and R is the correct explanation of A

70819166636. Both A and R are true but R is NOT the correct explanation of A

70819166637. A is true but R is false

70819166638. A is false but R is true

Question Number : 32 Question Id : 70819120495 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दोन विधाने दिलेली आहेत. एक विधान A व दुसरे कारण R असे आहे.

विधान A : हायड्रोजन बंधाच्या निर्मितीमध्ये फक्त द्विध्रुव-द्विध्रुव अन्योन्यक्रिया हिच फक्त असहसंयुज अन्योन्यक्रिया असते.

कारण R : फ्लुरिन हे सगळ्यात जास्त विद्युतऋण मूलद्रव्य आणि HF मध्ये हायड्रोजनचे बंध सममिति आहेत. वरील विधानांनुसार खालील पर्यायांमधून बरोबर उत्तर शोधा.

Options :

70819166635. दोन्ही A आणि R बरोबर आहेत आणि R हे A चे बरोबर स्पष्टीकरण आहे.

70819166636. दोन्ही A आणि R बरोबर आहेत परंतु R हे A चे स्पष्टीकरण नाही.

70819166637. A बरोबर आहे परंतु R चुकीचे आहे.

70819166638. A चुकीचे आहे परंतु R बरोबर आहे.

Question Number : 33 Question Id : 70819120496 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List-I with List-II.

List-I	List-II
Electronic configuration of elements	$\Delta_f H$ in kJ mol^{-1}
(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 :

Options :

70819166639. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (iii), (d) $\rightarrow$ (ii)

70819166640. (a) $\rightarrow$ (iv), (b) $\rightarrow$ (i), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (iii)

70819166641. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i)

70819166642. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (ii)

Question Number : 33 Question Id : 70819120496 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

यादी I च्या यादी II बरोबर जोड्या जुळवा.

यादी I (मूलद्रव्यांचे इलेक्ट्रॉनी संरूपण)	यादी II ($\Delta_f H$ kJ mol ⁻¹ मध्ये)
(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

खालील पर्यायांमधून बरोबर उत्तर शोधा.

Options :

70819166639. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (iii), (d) $\rightarrow$ (ii)

70819166640. (a) $\rightarrow$ (iv), (b) $\rightarrow$ (i), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (iii)

70819166641. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i)

70819166642. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (ii)

Question Number : 34 Question Id : 70819120497 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List-I with List-II.

List-I (Ore)	List-II (Element Present)
(a) Kernite	(i) Tin
(b) Cassiterite	(ii) Boron
(c) Calamine	(iii) Fluorine
(d) Cryolite	(iv) Zinc

Choose the most appropriate answer from the options given below :

Options :

70819166643. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (i), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (iii)

70819166644. (a) $\rightarrow$ (iii), (b) $\rightarrow$ (i), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (iv)

70819166645. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (i), (d) $\rightarrow$ (iii)

70819166646. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (ii)

Question Number : 34 Question Id : 70819120497 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

यादी I बरोबर यादी II च्या जोड्या जुळवा.

यादी I (धातुक)	यादी II (असलेले मूलद्रव्य)
(a) केरनाइट	(i) टिन
(b) कॅसिटराइट	(ii) बोरॉन
(c) कॅलामाइन	(iii) फ्लुरिन
(d) क्रायोलाइट	(iv) झिंक

खालील पर्यायांमधून बरोबर उत्तर शोधा.

Options :

70819166643. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (i), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (iii)

70819166644. (a) $\rightarrow$ (iii), (b) $\rightarrow$ (i), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (iv)

70819166645. (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (i), (d) $\rightarrow$ (iii)

70819166646. (a) $\rightarrow$ (i), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (ii)

Question Number : 35 Question Id : 70819120498 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_2O is greater than D_2O .

Choose the most appropriate answer from the options given below :

Options :

70819166647. A and B only

70819166648. A and C only

70819166649. A and D only

70819166650. A, B and C only

Question Number : 35 Question Id : 70819120498 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जड पाण्याविषयी खाली विधाने दिली आहेत.

- A. अभिक्रियेच्या यंत्रणेच्या अभ्यासात जड पाण्याचा उपयोग बदलाच्या अभिक्रियेत करतात.
- B. पाण्याच्या निःशेष विद्युत अपघटनापासून जड पाणी तयार करतात.
- C. जड पाण्याचा उत्कलनांक साध्या पाण्यापेक्षा जास्त असतो.
- D. H_2O ची विष्यंदिता D_2O पेक्षा जास्त आहे.

वरील दिलेल्यांपैकी बरोबर पर्याय निवडा.

Options :

70819166647. A आणि B फक्त

70819166648. A आणि C फक्त

70819166649. A आणि D फक्त

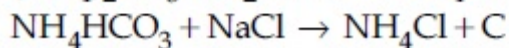
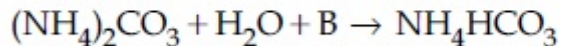
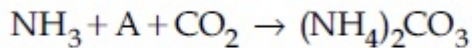
70819166650. A, B आणि C फक्त

Question Number : 36 Question Id : 70819120499 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Find A, B and C in the following reactions :



Options :

70819166651. A – H₂O ; B – O₂ ; C – Na₂CO₃

70819166652. A – H₂O ; B – O₂ ; C – NaHCO₃

70819166653. A – H₂O ; B – CO₂ ; C – NaHCO₃

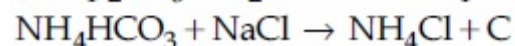
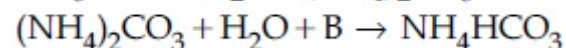
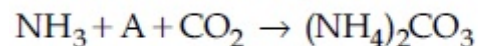
70819166654. A – O₂ ; B – CO₂ ; C – Na₂CO₃

Question Number : 36 Question Id : 70819120499 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खालील अभिक्रियेत A, B आणि C शोधा.



Options :

70819166651. A – H₂O ; B – O₂ ; C – Na₂CO₃

70819166652. A – H₂O ; B – O₂ ; C – NaHCO₃

70819166653. A – H₂O ; B – CO₂ ; C – NaHCO₃

70819166654. $A - O_2 ; B - CO_2 ; C - Na_2CO_3$

Question Number : 37 Question Id : 70819120500 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 :

70819166655. PbO

70819166656. PbO_2

70819166657. Pb_3O_4

70819166658. $PbSO_4$

Question Number : 37 Question Id : 70819120500 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

संयुग A हे एक उभयधर्मी ऑक्साइड ऑक्सिडीकारक म्हणून वापरतात. ते शिसे संचायकाचा एक भाग आहे तर A _____ आहे.

Options :

70819166655. PbO

70819166656. PbO_2

70819166657. Pb_3O_4

70819166658. PbSO_4

Question Number : 38 Question Id : 70819120501 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 MO_2 ?
[M is lanthanoid metal]

Options :

70819166659. Nd

70819166660. Dy

70819166661. Pr

70819166662. Yb

Question Number : 38 Question Id : 70819120501 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खालीलपैकी कोणता लॅन्थानाइड MO_2 तयार करत नाही ? (M लॅन्थानाइड धातू आहे)

Options :

70819166659. Nd

70819166660. Dy

70819166661. Pr

70819166662. Yb

Question Number : 39 Question Id : 70819120502 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The presence of ozone in troposphere :

Options :

- 70819166663. protects us from the UV radiation
- 70819166664. protects us from the X-ray radiation
- 70819166665. generates photochemical smog
- 70819166666. protects us from greenhouse effect

Question Number : 39 Question Id : 70819120502 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ट्रोपोस्फिअर मधील ओझोनच्या अस्तित्वामुळे

Options :

- 70819166663. आपले अतिनील किरणांपासून रक्षण होते.
- 70819166664. आपले X-किरणांपासून रक्षण होते.
- 70819166665. प्रकाशरासायनिक धूहार तयार होतो.
- 70819166666. ग्रीनहाऊस परिणामांपासून आपले रक्षण होते.

Question Number : 40 Question Id : 70819120503 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 :

70819166667. Both Statement I and Statement II are true

70819166668. Both Statement I and Statement II are false

70819166669. Statement I is true but Statement II is false

70819166670. Statement I is false but Statement II is true

Question Number : 40 Question Id : 70819120503 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दोन विधाने दिलेली आहेत :

विधान I : अँनिलिन आणि क्लोरोफॉर्म चे मिश्रण साध्या ऊर्ध्वपातनाने वेगळे करता येते.

विधान II : अँनिलिन आणि पाण्याच्या मिश्रणातून वाफ ऊर्ध्वपातनाने अँनिलिन वेगळे करताना अँनिलिन त्याच्या उत्कलनांकाच्या खाली उकळू लागते.

वरील विधानांनुसार खालील पर्यायांमधून योग्य उत्तर शोधा.

Options :

70819166667. दोन्ही विधाने I आणि II बरोबर आहेत.

70819166668. दोन्ही विधाने I आणि II चुकीचे आहेत.

70819166669. विधान I बरोबर आहे परंतु विधान II चुकीचे आहे.

70819166670. विधान I चुकीचे आहे परंतु विधान II बरोबर आहे.

Question Number : 41 Question Id : 70819120504 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 :

70819166671. Carius tube is used in the estimation of sulphur in an organic compound.

70819166672. Carius method is used for the estimation of nitrogen in an organic compound.

70819166673. Kjeldahl's method is used for the estimation of nitrogen in an organic compound.

70819166674. Phosphoric acid produced on oxidation of phosphorus present in an organic compound is precipitated as $Mg_2P_2O_7$ by adding magnesia mixture.

Question Number : 41 Question Id : 70819120504 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खालीलपैकी कोणते विधान खोटे आहे ?

Options :

70819166671. कार्बनी संयुगातील सल्फरच्या निर्धारणासाठी कॅरिअस ट्युबचा उपयोग होतो.

70819166672. कार्बनी संयुगातील नायट्रोजनच्या निर्धारणासाठी कॅरिअस पद्धतीचा उपयोग होतो.

70819166673. कार्बनी संयुगातील नायट्रोजनच्या निर्धारणासाठी जेलडाल पद्धतीचा उपयोग होतो.

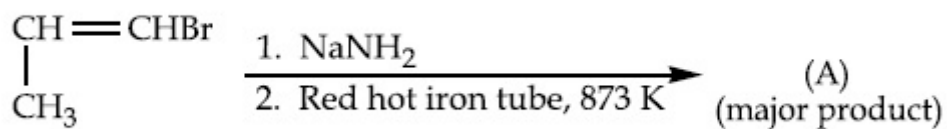
70819166674. फॉस्फरस असलेल्या कार्बनी संयुगाच्या ऑक्सिडीकरणातून फॉस्फोरिक आम्ल तयार होऊन त्यात मॅग्नेसिया मिश्रण टाकले असता $Mg_2P_2O_7$ अवक्षेपित होते.

Question Number : 42 Question Id : 70819120505 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

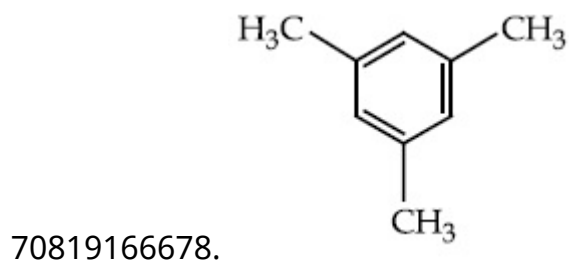
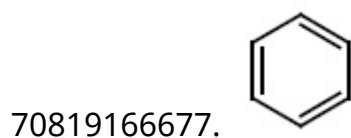
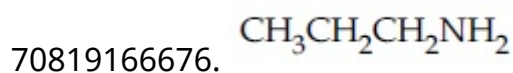
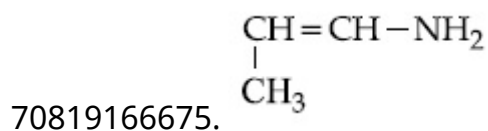
Correct Marks : 4 Wrong Marks : 1

For the given reaction :



What is 'A' ?

Options :

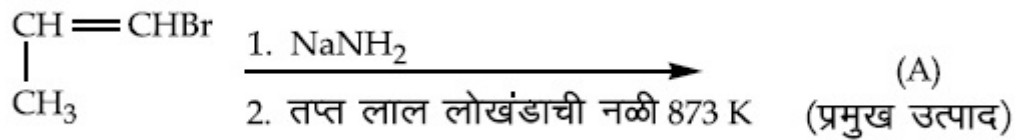


Question Number : 42 Question Id : 70819120505 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

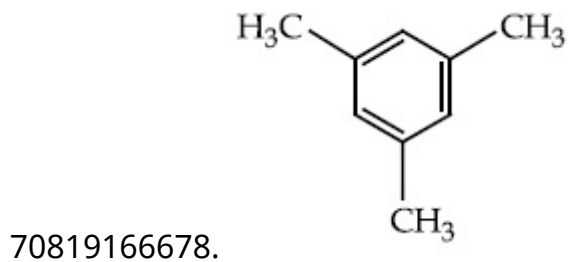
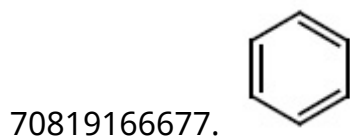
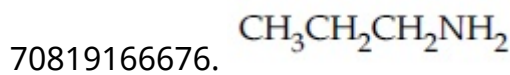
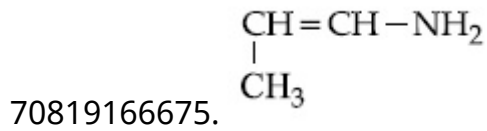
Correct Marks : 4 Wrong Marks : 1

दिलेल्या अभिक्रियेसाठी



यात प्रमुख उत्पाद 'A' काय आहे ?

Options :

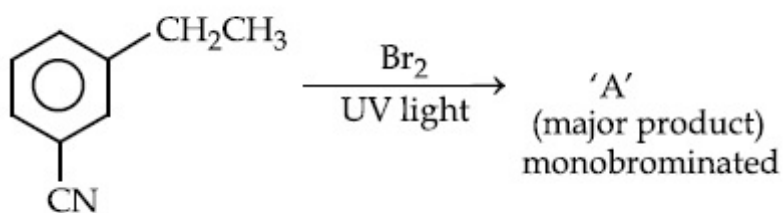


Question Number : 43 Question Id : 70819120506 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

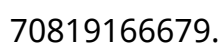
Correct Marks : 4 Wrong Marks : 1

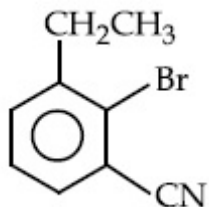
For the given reaction :



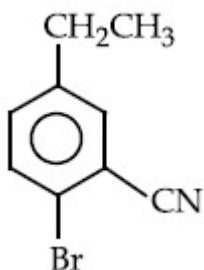
What is 'A'?

Options :

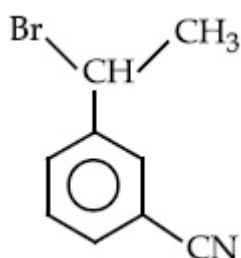




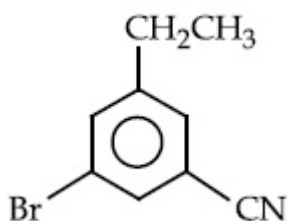
70819166680.



70819166681.



70819166682.

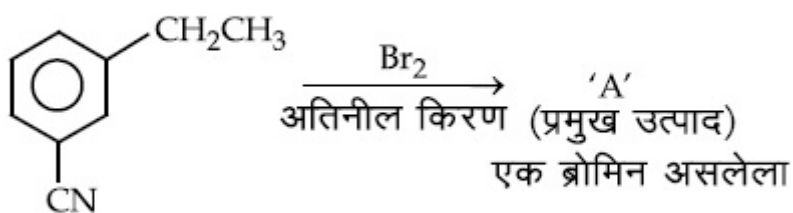


Question Number : 43 Question Id : 70819120506 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

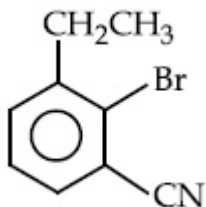
Correct Marks : 4 Wrong Marks : 1

खाली दिलेल्या अभिक्रियेसाठी

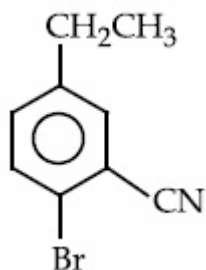


यात 'A' काय आहे ?

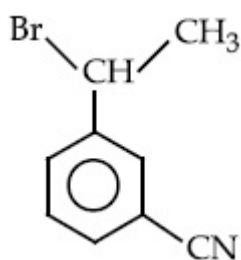
Options :



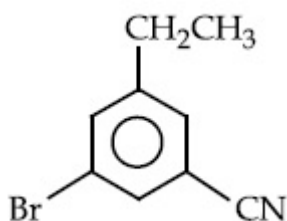
70819166679.



70819166680.



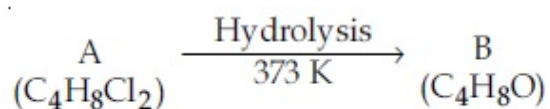
70819166681.



70819166682.

Question Number : 44 Question Id : 70819120507 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



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

Options :

70819166683. 1,1-Dichlorobutane and Butanal

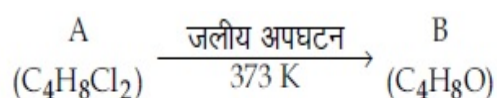
70819166684. 2,2-Dichlorobutane and Butanal

70819166685. 1,1-Dichlorobutane and 2-Butanone

70819166686. 2,2-Dichlorobutane and Butan-2-one

Question Number : 44 Question Id : 70819120507 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



B हा हायड्रॉक्सिल अमाइन बरोबर अभिक्रिया करतो परंतु टोलन्सची चाचणी देत नाही. तर A व B ओळखा.

Options :

70819166683. 1,1-डायक्लोरोब्युटेन आणि ब्युटेनाल

70819166684. 2,2-डायक्लोरोब्युटेन आणि ब्युटेनाल

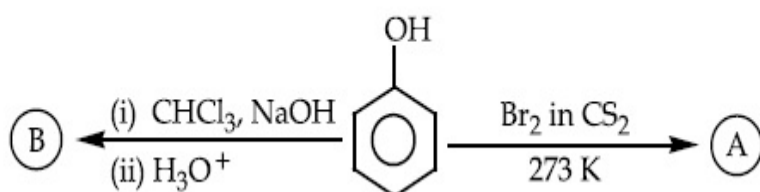
70819166685. 1,1-डायक्लोरोब्युटेन आणि 2-ब्युटानोन

70819166686. 2,2-डायक्लोरोब्युटेन आणि ब्युटेन-2-ओन

Question Number : 45 Question Id : 70819120508 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

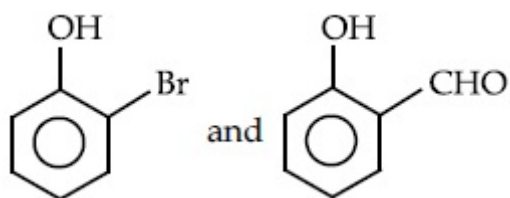
Correct Marks : 4 Wrong Marks : 1

Identify the major products A and B respectively in the following reactions of phenol :

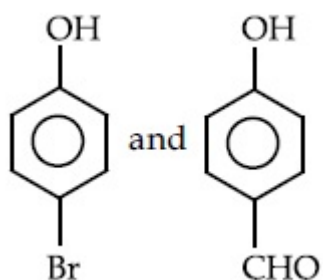


Options :

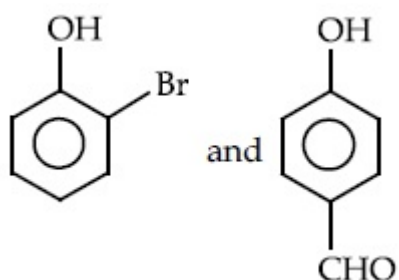
70819166687.



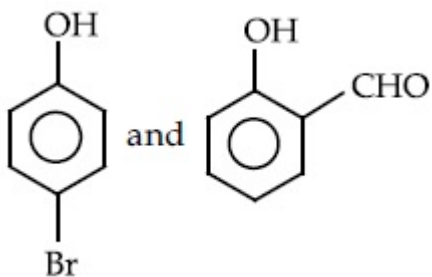
70819166688.



70819166689.



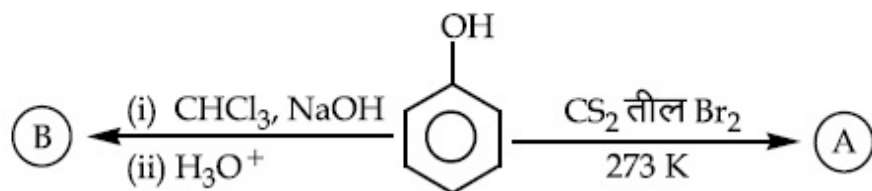
70819166690.



Question Number : 45 Question Id : 70819120508 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

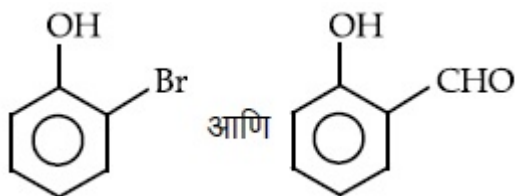
Correct Marks : 4 Wrong Marks : 1

फिनॉलच्या खालील अभिक्रियांतून तयार होणारे प्रमुख उत्पाद अनुक्रमे A आणि B ओळखा.

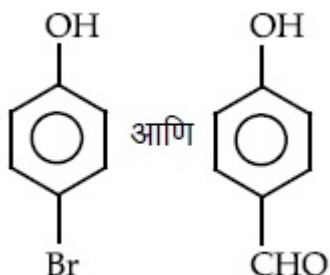


Options :

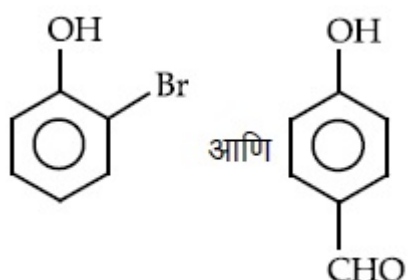
70819166687.



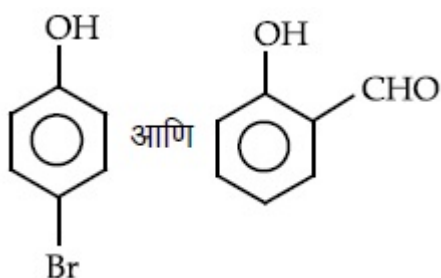
70819166688.



70819166689.



70819166690.



Question Number : 46 Question Id : 70819120509 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 :

70819166691. Both Statement I and Statement II are true

70819166692. Both Statement I and Statement II are false

70819166693. Statement I is true but Statement II is false

70819166694. Statement I is false but Statement II is true

Question Number : 46 Question Id : 70819120509 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दोन विधाने दिलेली आहेत :

विधान I : अंतर्रेणू हायड्रोजन बंधनांमुळे *o*-नायट्रोफीनॉल वाफ बाष्पनशील आहे.

विधान II : हायड्रोजन बंधनांमुळे *o*-नायट्रोफीनॉलचा द्रवणांक खूप उच्च आहे.

वरील विधानांना अनुसरून खालील पर्यायांमधून जास्तीत जास्त योग्य उत्तर निवडा.

Options :

70819166691. दोन्ही विधाने I आणि II बरोबर आहेत.

70819166692. दोन्ही विधाने I आणि II चुकीची आहेत.

70819166693. विधान I बरोबर आहे परंतु विधान II चुकीचे आहे.

70819166694. विधान I चुकीचे आहे परंतु विधान II बरोबर आहे.

Question Number : 47 Question Id : 70819120510 Question Type : MCQ Option Shuffling : Yes

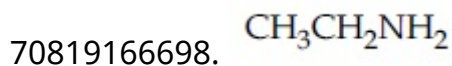
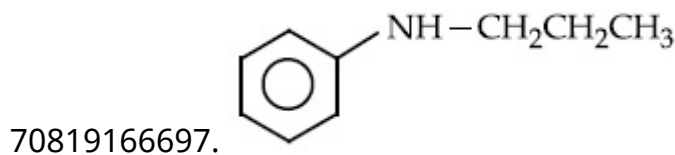
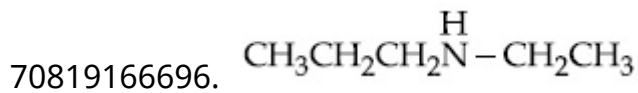
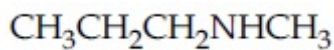
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166695.

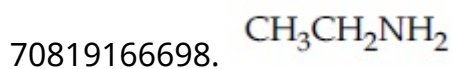
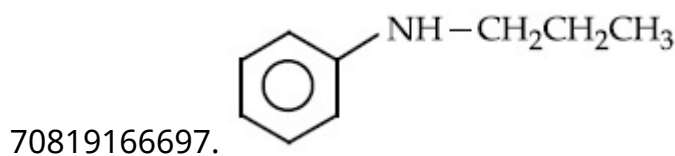
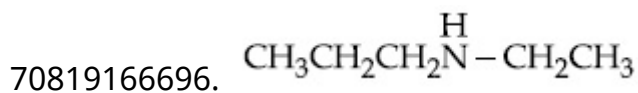
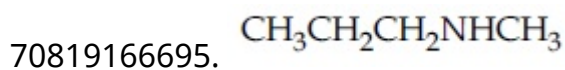


Question Number : 47 Question Id : 70819120510 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

बेंझिन सल्फोनील क्लोराइडच्या एका अमाइनबरोबर केलेल्या अभिक्रियेतून तयार झालेले संयुग आम्लारि द्रावणात विरघळत नाही. हे अमाइन इथाईल क्लोराइडच्या अमोनोलाइसिस ने बनवता येते ह्या अमाइनची बरोबर संरचना _____ आहे.

Options :



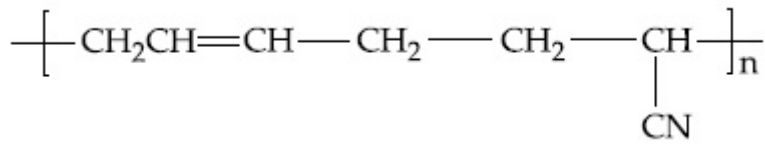
Question Number : 48 Question Id : 70819120511 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

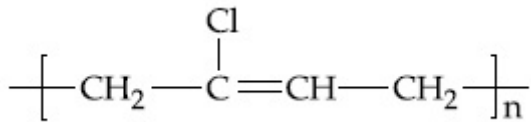
Correct Marks : 4 Wrong Marks : 1

The structure of Neoprene is :

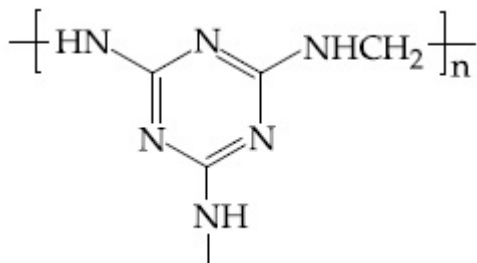
Options :



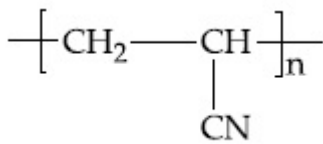
70819166699.



70819166700.



70819166701.



70819166702.

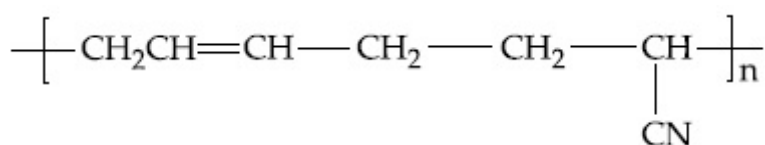
Question Number : 48 Question Id : 70819120511 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

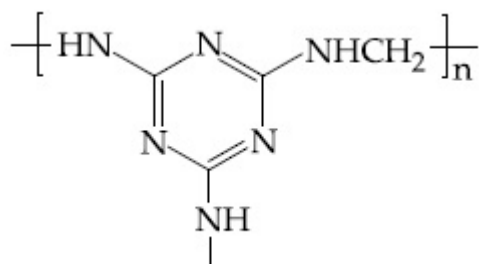
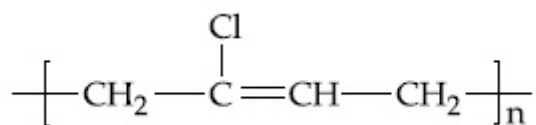
निओप्रीनची संरचना _____ आहे.

Options :

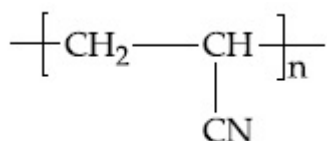


70819166699.

70819166700.



70819166701.



70819166702.

Question Number : 49 Question Id : 70819120512 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following vitamin is helpful in delaying the blood clotting ?

Options :

70819166703. Vitamin B

70819166704. Vitamin C

70819166705. Vitamin E

70819166706. Vitamin K

Question Number : 49 Question Id : 70819120512 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खालीलपैकी कोणत्या जीवनसत्वामुळे रक्त गोठण्याची प्रक्रिया लांबते ?

Options :

70819166703. जीवनसत्व B

70819166704. जीवनसत्व C

70819166705. जीवनसत्व E

70819166706. जीवनसत्व K

Question Number : 50 Question Id : 70819120513 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

On treating a compound with warm dil. H_2SO_4 , gas X is evolved which turns $\text{K}_2\text{Cr}_2\text{O}_7$ paper acidified with dil. H_2SO_4 to a green compound Y. X and Y respectively are :

Options :

70819166707. $\text{X} = \text{SO}_3$, $\text{Y} = \text{Cr}_2(\text{SO}_4)_3$

70819166708. $\text{X} = \text{SO}_2$, $\text{Y} = \text{Cr}_2\text{O}_3$

70819166709. $\text{X} = \text{SO}_3$, $\text{Y} = \text{Cr}_2\text{O}_3$

70819166710. $\text{X} = \text{SO}_2$, $\text{Y} = \text{Cr}_2(\text{SO}_4)_3$

Question Number : 50 Question Id : 70819120513 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

एका संयुगाच्या उष्ण विरल H_2SO_4 सोबत अभिक्रियेतून X वायु निर्माण होतो जो $\text{K}_2\text{Cr}_2\text{O}_7$ चा विरल H_2SO_4 बरोबर केलेल्या आम्लधर्मी कागदाला हिरव्या Y संयुगात बदलतो. X आणि Y अनुक्रमे _____ आहेत.

Options :

70819166707. $X = \text{SO}_3, Y = \text{Cr}_2(\text{SO}_4)_3$

70819166708. $X = \text{SO}_2, Y = \text{Cr}_2\text{O}_3$

70819166709. $X = \text{SO}_3, Y = \text{Cr}_2\text{O}_3$

70819166710. $X = \text{SO}_2, Y = \text{Cr}_2(\text{SO}_4)_3$

Chemistry Section B

Section Id :	708191907
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 :	7081911187
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 70819120514 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of significant figures in 50000.020×10^{-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 : 51 Question Id : 70819120514 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

50000.020×10^{-3} ह्या संख्येत सिग्निफिकंट अंकांची संख्या _____ आहे.

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 : 70819120515 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

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 : 70819120515 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

एक वायु $P(V_m - b) = RT$ पाळतो. $\left(\frac{\partial Z}{\partial P}\right)_T$ ह्याची किंमत $\frac{xb}{RT}$ आहे तर x ची किंमत _____ आहे.
(उत्तर पूर्णांकत) (या ठिकाणी Z हा कॉम्प्रेसिबिलिटी घटक आहे)

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 : 70819120516 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For a chemical reaction $A + B \rightleftharpoons C + D$
($\Delta_r H^\ominus = 80 \text{ kJ mol}^{-1}$) the entropy change $\Delta_r S^\ominus$ depends on the temperature T (in K) as
 $\Delta_r S^\ominus = 2T \text{ (J K}^{-1}\text{mol}^{-1}\text{)}$.
Minimum temperature at which it will become spontaneous is _____ K. (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 : 53 Question Id : 70819120516 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$A + B \rightleftharpoons C + D$ ($\Delta_r H^\ominus = 80 \text{ kJ mol}^{-1}$) ह्या अभिक्रियेसाठी एन्ट्रॉपीतील बदल $\Delta_r S^\ominus$ तापमानावर $T(K)$ $\Delta_r S^\ominus = 2T$ असा अवलंबून आहे ($\text{J K}^{-1}\text{mol}^{-1}$)

ज्या कमीत कमी तापमानाला ती उत्स्फूर्त होईल असे तापमान _____ K आहे. (पूर्णांकात उत्तर)

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 : 54 Question Id : 70819120517 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

224 mL of $\text{SO}_{2(g)}$ 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) ($P_{(\text{H}_2\text{O})}^\circ = 24 \text{ mm of Hg}$) 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

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 54 Question Id : 70819120517 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

224 mL SO_2 वायु 298 K व 1 atm ला 100 mL 0.1 M NaOH च्या द्रावणातून सोडला. तयार झालेल्या अबाष्पनशील पदार्थाला 36 g पाण्यात विरघळवले तयार झालेले द्रावण विरल आहे असे समजून बाष्प दाबातील mm मधील कमी होणे $x \times 10^{-2} \text{ mm Hg}$ आहे. तर x ची किंमत _____ आहे. ($P_{(\text{H}_2\text{O})}^\circ = 24 \text{ mm Hg}$ साठी) (पूर्णांकात उत्तर)

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 : 70819120518 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A homogeneous ideal gaseous reaction $AB_{2(g)} \rightleftharpoons A_{(g)} + 2B_{(g)}$ 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 _____. (Integer answer)
[$R = 0.08206 \text{ dm}^3\text{atm K}^{-1} \text{ mol}^{-1}$]

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 : 70819120518 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$AB_{2(\text{वा})} \rightleftharpoons A_{(\text{वा})} + 2B_{(\text{वा})}$ ह्या एकविध आदर्श वायुंची अभिक्रिया 27°C तापमानाला 25 L च्या चंबुमध्ये केली सुरवातीला AB_2 चा एक मोल होता. समतोलाचा दाब 1.9 atm होता. K_p ची किंमत $x \times 10^{-2}$ आहे. तर x ची किंमत _____ आहे. (जवळच्या पूर्णांकात)
[$R = 0.08206 \text{ dm}^3\text{atm K}^{-1} \text{ mol}^{-1}$]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

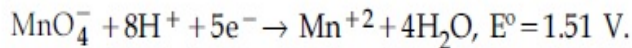
Possible Answers :

5 to 5.001

Question Number : 56 Question Id : 70819120519 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the following reaction



The quantity of electricity required in Faraday to reduce five moles of MnO_4^- 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 : 56 Question Id : 70819120519 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

खालील अभिक्रिया लक्षात घ्या



यावरून 5 मोल MnO_4^- च्या क्षपणासाठी लागणारी फॅरेडेमधील वीज _____ एवढी असेल. (जवळच्या पूर्णांकात)

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 : 70819120520 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An exothermic reaction $X \rightarrow Y$ 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 : 70819120520 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$X \rightarrow Y$ ह्या उष्मादायी अभिक्रियेसाठी संक्रियण ऊर्जा 30 kJ mol^{-1} आहे. जर ह्या अभिक्रियेचा ऊर्जा बदल $\Delta E -20 \text{ kJ}$ असेल तर व्युत्क्रमी अभिक्रियेसाठी kJ मधील संक्रियण ऊर्जा _____ आहे. (जवळच्या पूर्णांकात)

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 : 58 Question Id : 70819120521 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 58 Question Id : 70819120521 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

3.12 ग्रॅम ऑक्सिजन 1.2 ग्रॅम प्लॅटिनम धातूवर अधिशोषित झाला आहे तर 1 atm दाबाला आणि 300 K तापमानाला प्रति ग्रॅम अधिशोषकावर ऑक्सिजनचे _____ L. आकारमान अधिशोषित झाले आहे.

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

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 : 59 Question Id : 70819120522 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Dichromate ion is treated with base, the oxidation number of Cr in the product formed 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 : 59 Question Id : 70819120522 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

डायक्रोमेट आयनाची आम्लारीबरोबर क्रिया केली असता तयार झालेल्या उत्पादातील Cr चा ऑक्सिडनांक _____ आहे.

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 : 60 Question Id : 70819120523 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Number of bridging CO ligands in $[\text{Mn}_2(\text{CO})_{10}]$ 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 : 60 Question Id : 70819120523 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

[Mn₂(CO)₁₀] या संयूगांत _____ जोडणारे CO सेतु बंध (लिगँड) आहे.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Mathematics Section A

Section Id :	708191908
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	7081911188
Question Shuffling Allowed :	Yes

Question Number : 61 **Question Id :** 70819120524 **Question Type :** MCQ **Option Shuffling :** Yes

Is Question Mandatory : No

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

If $\vec{a}$ and $\vec{b}$ are perpendicular, then $\vec{a} \times \left(\vec{a} \times \left(\vec{a} \times \left(\vec{a} \times \vec{b} \right) \right) \right)$ is equal to :

Options :

70819166721. $\vec{0}$

70819166722. $\frac{1}{2} |\vec{a}|^4 \vec{b}$

70819166723. $|\vec{a}|^4 \vec{b}$

70819166724. $\vec{a} \times \vec{b}$

Question Number : 61 Question Id : 70819120524 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जर $\vec{a}$ आणि $\vec{b}$ लंब (perpendicular) असतील, तर $\vec{a} \times (\vec{a} \times (\vec{a} \times (\vec{a} \times \vec{b})))$ बरोबर _____ आहे.

Options :

70819166721. $\vec{0}$

70819166722. $\frac{1}{2} |\vec{a}|^4 \vec{b}$

70819166723. $|\vec{a}|^4 \vec{b}$

70819166724. $\vec{a} \times \vec{b}$

Question Number : 62 Question Id : 70819120525 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 λ is :

Options :

70819166725. $\frac{39}{5}$

70819166726. $-\frac{39}{5}$

70819166727. $-\frac{44}{5}$

70819166728. $\frac{44}{5}$

Question Number : 62 Question Id : 70819120525 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जर $(1, 5, 35)$, $(7, 5, 5)$, $(1, \lambda, 7)$ आणि $(2\lambda, 1, 2)$ हे एक प्रतलीय (coplanar) असतील, तर λ च्या सर्व शक्य मूल्यांची (all possible values) बेरीज _____ आहे.

Options :

70819166725. $\frac{39}{5}$

70819166726. $-\frac{39}{5}$

70819166727. $-\frac{44}{5}$

70819166728. $\frac{44}{5}$

Question Number : 63 Question Id : 70819120526 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The intersection of three lines $x - y = 0$, $x + 2y = 3$ and $2x + y = 6$ is a :

Options :

70819166729. Right angled triangle

70819166730. Isosceles triangle

70819166731. Equilateral triangle

70819166732. None of the above

Question Number : 63 Question Id : 70819120526 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$x - y = 0$, $x + 2y = 3$ आणि $2x + y = 6$ या तीन रेषांचा छेद (intersection) _____ आहे.

Options :

70819166729. काटकोन त्रिकोण

70819166730. समद्विभुज त्रिकोण

70819166731. समभुज त्रिकोण

70819166732. वरीलपैकी कोणतेही नाही

Question Number : 64 Question Id : 70819120527 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix}$ is :

Options :

70819166733. $(a+1)(a+2)(a+3)$

70819166734. $(a+2)(a+3)(a+4)$

70819166735. -2

70819166736. 0

Question Number : 64 Question Id : 70819120527 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix}$ चे मूल्य _____ आहे.

Options :

70819166733. $(a+1)(a+2)(a+3)$

70819166734. $(a+2)(a+3)(a+4)$

70819166735. -2

70819166736. 0

Question Number : 65 Question Id : 70819120528 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166737. 2

70819166738. 4

70819166739. 8

70819166740. 16

Question Number : 65 Question Id : 70819120528 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

एका जीवाणूसंवर्धना (culture) मध्ये जीवाणूंची (bacteria) वाढ होण्याचा दर हा तेथे असणाऱ्या जीवाणूंच्या संख्येच्या प्रमाणात (proportional) आहे आणि सुरुवातीला वेळ $t=0$ असताना जीवाणूंची संख्या 1000 आहे. 2 तासामध्ये

जीवाणूंची संख्या 20% ने वाढते. जर $\frac{k}{\log_e\left(\frac{6}{5}\right)}$ तासानंतर जीवाणूंची संख्या (population) 2000 होते, तर

$\left(\frac{k}{\log_e 2}\right)^2$ बरोबर _____ आहे.

Options :

70819166737. 2

70819166738. 4

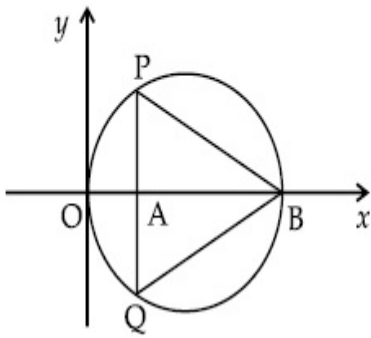
70819166739. 8

70819166740. 16

Question Number : 66 Question Id : 70819120529 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166741. $24\sqrt{2}$

70819166742. $24\sqrt{3}$

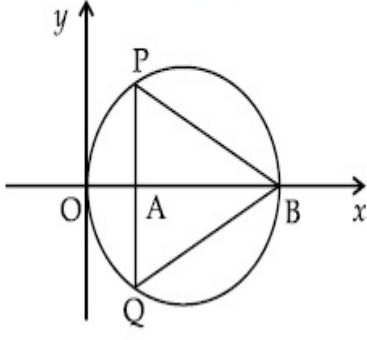
70819166743. $26\sqrt{2}$

70819166744. $26\sqrt{3}$

Question Number : 66 Question Id : 70819120529 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

खाली दिलेल्या वर्तुळामध्ये, समजा OA = 1 एकक, OB = 13 एकक आणि $PQ \perp OB$. तर त्रिकोण PQB चे क्षेत्रफळ (चौ. एकक मध्ये) _____ आहे.



Options :

70819166741. $24\sqrt{2}$

70819166742. $24\sqrt{3}$

70819166743. $26\sqrt{2}$

70819166744. $26\sqrt{3}$

Question Number : 67 Question Id : 70819120530 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\lim_{h \rightarrow 0} 2 \left\{ \frac{\sqrt{3} \sin\left(\frac{\pi}{6} + h\right) - \cos\left(\frac{\pi}{6} + h\right)}{\sqrt{3}h(\sqrt{3}\cos h - \sin h)} \right\}$ is :

Options :

70819166745. $\frac{2}{3}$

70819166746. $\frac{4}{3}$

70819166747. $\frac{2}{\sqrt{3}}$

70819166748. $\frac{3}{4}$

Question Number : 67 Question Id : 70819120530 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\lim_{h \rightarrow 0} 2 \left\{ \frac{\sqrt{3} \sin\left(\frac{\pi}{6} + h\right) - \cos\left(\frac{\pi}{6} + h\right)}{\sqrt{3}h(\sqrt{3}\cos h - \sin h)} \right\}$ चे मूल्य _____ आहे.

Options :

70819166745. $\frac{2}{3}$

70819166746. $\frac{4}{3}$

70819166747. $\frac{2}{\sqrt{3}}$

70819166748. $\frac{3}{4}$

Question Number : 68 Question Id : 70819120531 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The maximum slope of the curve $y = \frac{1}{2}x^4 - 5x^3 + 18x^2 - 19x$ occurs at the point :

Options :

70819166749. (0, 0)

70819166750. (2, 2)

70819166751. $\left(3, \frac{21}{2}\right)$

70819166752. $(2, 9)$

Question Number : 68 Question Id : 70819120531 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$y = \frac{1}{2}x^4 - 5x^3 + 18x^2 - 19x$ या वक्राचा जास्तीत जास्त चढ (maximum slope) _____ या बिंदूत आढळतो.

Options :

70819166749. $(0, 0)$

70819166750. $(2, 2)$

70819166751. $\left(3, \frac{21}{2}\right)$

70819166752. $(2, 9)$

Question Number : 69 Question Id : 70819120532 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\int_{-\pi/2}^{\pi/2} \frac{\cos^2 x}{1 + 3^x} dx$ is :

Options :

70819166753. $\frac{\pi}{2}$

70819166754. 2π

70819166755. $\frac{\pi}{4}$

70819166756. 4π

Question Number : 69 Question Id : 70819120532 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\int_{-\pi/2}^{\pi/2} \frac{\cos^2 x}{1 + 3^x} dx$ चे मूल्य _____ आहे.

Options :

70819166753. $\frac{\pi}{2}$

70819166754. 2π

70819166755. $\frac{\pi}{4}$

70819166756. 4π

Question Number : 70 Question Id : 70819120533 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166757. 42

70819166758. 35

70819166759. 77

70819166760. 82

Question Number : 70 Question Id : 70819120533 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

7 अंकी पूर्णांकां (integers) ची संख्या, ज्याच्या अंकांची बेरीज बरोबर 10 आहे आणि फक्त 1, 2 आणि 3 हे अंक वापरून तयार झालेली आहे, _____ आहे.

Options :

70819166757. 42

70819166758. 35

70819166759. 77

70819166760. 82

Question Number : 71 Question Id : 70819120534 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The maximum value of the term independent of 't' in the expansion of $\left(tx^{\frac{1}{5}} + \frac{(1-x)^{\frac{1}{10}}}{t} \right)^{10}$

where $x \in (0, 1)$ is :

Options :

70819166761.

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

$$70819166762. \frac{2 \cdot 10!}{3\sqrt{3}(5!)^2}$$

$$70819166763. \frac{2 \cdot 10!}{3(5!)^2}$$

$$70819166764. \frac{10!}{3(5!)^2}$$

Question Number : 71 Question Id : 70819120534 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\left(tx^{\frac{1}{5}} + \frac{(1-x)^{\frac{1}{10}}}{t} \right)^{10} \text{ जेव्हा } x \in (0, 1) \text{ या विस्तारा (expansion) मध्ये } t \text{ च्या अनधीन (independent) पदाचे}$$

महत्तम मूल्य (maximum value) _____ आहे.

Options :

$$70819166761. \frac{10!}{\sqrt{3}(5!)^2}$$

$$70819166762. \frac{2 \cdot 10!}{3\sqrt{3}(5!)^2}$$

$$70819166763. \frac{2 \cdot 10!}{3(5!)^2}$$

$$70819166764. \frac{10!}{3(5!)^2}$$

Question Number : 72 Question Id : 70819120535 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

Options :

70819166765. $S = \{(x, y) \mid x^2 + y^2 = 4\}$

70819166766. $S = \{(x, y) \mid x^2 + y^2 = 2\}$

70819166767. $S = \{(x, y) \mid x^2 + y^2 = 1\}$

70819166768. $S = \{(x, y) \mid x^2 + y^2 = \sqrt{2}\}$

Question Number : 72 Question Id : 70819120535 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

समजा $R = \{(P, Q) \mid P \text{ आणि } Q \text{ हे आरंभ बिंदूपासून समान अंतरावर आहेत.}\}$ हे एक संबंध (relation) आहे, तर $(1, -1)$ च्या, सममूल्यता वर्ग (equivalence class) याचा संच _____ आहे.

Options :

70819166765. $S = \{(x, y) \mid x^2 + y^2 = 4\}$

70819166766. $S = \{(x, y) \mid x^2 + y^2 = 2\}$

70819166767. $S = \{(x, y) \mid x^2 + y^2 = 1\}$

70819166768. $S = \{(x, y) \mid x^2 + y^2 = \sqrt{2}\}$

Question Number : 73 Question Id : 70819120536 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 :

70819166769. 1

70819166770. 4

70819166771. 6

70819166772. 12

Question Number : 73 Question Id : 70819120536 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

समजा A हा पूर्णांक घटकांची (integer entries) 2 आकाराची सममित सारणी (symmetric matrix) आहे. जर A^2 च्या विकर्ण घटकांची (diagonal elements) बेरीज 1 असेल तर अशा शक्य असणाऱ्या सारणींची संख्या _____ आहे.

Options :

70819166769. 1

70819166770. 4

70819166771. 6

70819166772. 12

Question Number : 74 Question Id : 70819120537 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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 :

70819166773. $f(x) > 0, \forall x \in \mathbb{R}$

70819166774. $f(x) < 0, \forall x \in \mathbb{R}$

70819166775. $f(x) = 0, \forall x \in \mathbb{R}$

70819166776. $f(x)$ can take any value in $\mathbb{R}$

Question Number : 74 Question Id : 70819120537 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

समजा f हे $\mathbb{R}$ वर निश्चित करणारे कोणतेही फल आहे. आणि समजा ते

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

या अटीची पूर्तता करते, जर $f(0) = 1$, तर :

Options :

70819166773. $f(x) > 0, \forall x \in \mathbb{R}$

70819166774. $f(x) < 0, \forall x \in \mathbb{R}$

70819166775. $f(x) = 0, \forall x \in \mathbb{R}$

70819166776. $f(x)$ चे $\mathbb{R}$ मध्ये कोणतेही मूल्य घेवू शकतात

Question Number : 75 Question Id : 70819120538 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 :

70819166777. $\frac{15}{2^8}$

70819166778. $\frac{15}{2^{12}}$

70819166779. $\frac{15}{2^{13}}$

70819166780. $\frac{15}{2^{14}}$

Question Number : 75 Question Id : 70819120538 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

एक नाणे (fair coin) विशिष्ट वेळा (fixed number of times) फेकले गेले आहे. जर 7 छापा (heads) मिळण्याची संभाव्यता (probability) ही 9 छापा मिळण्याच्या संभाव्यता बरोबर आहे, तर 2 छापा मिळण्याची संभाव्यता _____ आहे.

Options :

70819166777. $\frac{15}{2^8}$

70819166778. $\frac{15}{2^{12}}$

70819166779. $\frac{15}{2^{13}}$

70819166780. $\frac{15}{2^{14}}$

Question Number : 76 Question Id : 70819120539 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 :

70819166781. $1 - y^2$

70819166782. $\frac{1 - y^2}{y\sqrt{y}}$

70819166783. $\frac{1 - y^2}{1 + y^2}$

70819166784. $\frac{1 - y^2}{2y}$

Question Number : 76 Question Id : 70819120539 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

जर $\frac{\sin^{-1} x}{a} = \frac{\cos^{-1} x}{b} = \frac{\tan^{-1} y}{c}$; $0 < x < 1$ तर $\cos\left(\frac{\pi c}{a+b}\right)$ चे मूल्य _____ आहे.

Options :

70819166781. $1 - y^2$

70819166782. $\frac{1 - y^2}{y\sqrt{y}}$

70819166783. $\frac{1 - y^2}{1 + y^2}$

70819166784. $\frac{1 - y^2}{2y}$

Question Number : 77 Question Id : 70819120540 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 4th, 6th and 8th terms is equal to :

Options :

70819166785. 26

70819166786. 30

70819166787. 32

70819166788. 35

Question Number : 77 Question Id : 70819120540 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

एका वाढत जाणाऱ्या भूमिती श्रेणी (increasing geometric series) मध्ये, दुसऱ्या आणि सहाव्या पदांची बेरीज $\frac{25}{2}$ आहे आणि तीसऱ्या आणि पाचव्या पदांचा गुणाकार 25 आहे. तर चौथ्या, सहाव्या आणि आठव्या पदांची बेरीज बरोबर _____ आहे.

Options :

70819166785. $\frac{26}{4}$

70819166786. $\frac{30}{4}$

70819166787. $\frac{32}{4}$

70819166788. $\frac{35}{4}$

Question Number : 78 Question Id : 70819120541 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

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

Options :

70819166789. $\frac{9}{4}$

70819166790. $\frac{11}{4}$

70819166791. $\frac{13}{4}$

70819166792. $\frac{15}{4}$

Question Number : 78 Question Id : 70819120541 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$1 + \frac{2}{3} + \frac{7}{3^2} + \frac{12}{3^3} + \frac{17}{3^4} + \frac{22}{3^5} + \dots$ या अनंत श्रेणी (infinite series) ची बेरीज बरोबर _____ आहे.

Options :

70819166789. $\frac{9}{4}$

70819166790. $\frac{11}{4}$

70819166791. $\frac{13}{4}$

70819166792. $\frac{15}{4}$

Question Number : 79 Question Id : 70819120542 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the three planes

$$P_1 : 3x + 15y + 21z = 9,$$

$$P_2 : x - 3y - z = 5, \text{ and}$$

$$P_3 : 2x + 10y + 14z = 5$$

Then, which one of the following is true ?

Options :

70819166793. P_1 and P_2 are parallel.

70819166794. P_1 and P_3 are parallel.

70819166795. P_1, P_2 and P_3 all are parallel.

70819166796. P_2 and P_3 are parallel.

Question Number : 79 Question Id : 70819120542 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

दिलेल्या तीन प्रतलांचा विचार करा

$$P_1 : 3x + 15y + 21z = 9,$$

$$P_2 : x - 3y - z = 5 \quad \text{आणि}$$

$$P_3 : 2x + 10y + 14z = 5$$

तर खालीलपैकी एक सत्य आहे :

Options :

70819166793. P_1 आणि P_2 समांतर (parallel) आहेत.

70819166794. P_1 आणि P_3 समांतर आहेत.

70819166795. P_1, P_2 आणि P_3 सगळे (all) समांतर आहेत.

70819166796. P_2 आणि P_3 समांतर आहेत.

Question Number : 80 Question Id : 70819120543 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 :

70819166797. $100(1 - e)$

70819166798. $100(1 + e)$

70819166799. $100e$

70819166800. $100(e - 1)$

Question Number : 80 Question Id : 70819120543 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\sum_{n=1}^{100} \int_{n-1}^n e^{x-[x]} dx$ चे मूल्य _____ आहे. जेव्हा $[x]$ हा महत्तम पूर्णांक फल (greatest integer function) $\leq x$ आहे.

Options :

70819166797. $100(1 - e)$

70819166798. $100(1 + e)$

70819166799. $100e$

70819166800. $100(e - 1)$

Mathematics Section B

Section Id : 708191909

Section Number : 6

Section type : Online

Mandatory or Optional : Mandatory

Number of Questions : 10

Number of Questions to be attempted : 5

Section Marks : 20

Mark As Answered Required? : Yes

Sub-Section Number : 1

Sub-Section Id :

7081911189

Question Shuffling Allowed :

Yes

Question Number : 81 Question Id : 70819120544 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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 : 70819120544 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

वक्राचे कुल (family of curves) $y^2 = a \left(x + \frac{\sqrt{a}}{2} \right)$, $a > 0$ या समीकरणाने दिलेले आहे. या समीकरणाचे विकलक समीकरण (differential equation) याची कोटी (degree) आणि क्रम (order) यांच्यामधील फरक _____ आहे.

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 : 82 Question Id : 70819120545 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The sum of 162th 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

Question Number : 82 Question Id : 70819120545 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$x^3 - 2x^2 + 2x - 1 = 0$ या समीकरणाच्या मूळांचा 162 वा घाता (power) ची बेरीज _____ आहे.

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 : 83 Question Id : 70819120546 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

Question Number : 83 Question Id : 70819120546 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$y = ||x - 1| - 2|$ या रेषांनी परिबद्ध (bounded) केलेले क्षेत्रफळ _____ आहे.

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 : 84 Question Id : 70819120547 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 84 Question Id : 70819120547 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

जर $e^{\sin y} \cos y \frac{dy}{dx} + e^{\sin y} \cos x = \cos x$, $y(0) = 0$ या समीकरणाची $y = y(x)$ ही उकल आहे, तर

$1 + y\left(\frac{\pi}{6}\right) + \frac{\sqrt{3}}{2}y\left(\frac{\pi}{3}\right) + \frac{1}{\sqrt{2}}y\left(\frac{\pi}{4}\right)$ बरोबर _____ आहे.

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 :** 70819120548 **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 _____.

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 :** 70819120548 **Question Type :** SA

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

$\log_4(x-1) = \log_2(x-3)$ या समीकरणाच्या उकलींची संख्या (number of solutions) _____ आहे.

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 : 86 Question Id : 70819120549 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

Question Number : 86 Question Id : 70819120549 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

'k' च्या पूर्णांकी मूल्यांची (integral values) संख्या ज्या साठी $3\sin x + 4\cos x = k + 1$ या समीकरणाची उकल आहे, $k \in \mathbb{R}$, _____ आहे.

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 : 87 Question Id : 70819120550 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

$$\left(\frac{\lambda}{11}\right)^2 - \frac{4\lambda}{11} - 4 \text{ is equal to } \underline{\hspace{2cm}}.$$

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 : 87 **Question Id :** 70819120550 **Question Type :** SA

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

समजा $(\lambda, 2, 1)$ हा एक बिंदू प्रतलावर आहे आणि ते प्रतल $(4, -2, 2)$ या बिंदूमधून जाते. तर ते प्रतल $(-2, -21, 29)$ आणि $(-1, -16, 23)$ या बिंदूंना जोडणाऱ्या रेषेचा लंब (perpendicular) असेल, तर

$$\left(\frac{\lambda}{11}\right)^2 - \frac{4\lambda}{11} - 4 \text{ बरोबर } \underline{\hspace{2cm}} \text{ आहे.}$$

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 : 88 **Question Id :** 70819120551 **Question Type :** SA

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

The value of the integral $\int_0^{\pi} |\sin 2x| dx$ is $\underline{\hspace{2cm}}$.

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 : 88 **Question Id :** 70819120551 **Question Type :** SA

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

$\int_0^{\pi} |\sin 2x| dx$ या पूर्णांकी (integral) चे मूल्य _____ आहे.

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 : 89 **Question Id :** 70819120552 **Question Type :** SA

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

If $\sqrt{3}(\cos^2 x) = (\sqrt{3} - 1)\cos x + 1$, 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

Question Number : 89 Question Id : 70819120552 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

जर $\sqrt{3}(\cos^2 x) = (\sqrt{3} - 1)\cos x + 1$, तर दिलेल्या समीकरणाच्या उकलींची संख्या जेव्हा $x \in \left[0, \frac{\pi}{2}\right]$ आहे.

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 : 70819120553 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

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

(Here $\binom{n}{k} = {}^nC_k$)

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 : 70819120553 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

समजा $m, n \in \mathbb{N}$ आणि $\gcd(2, n) = 1$ जर $30 \binom{30}{0} + 29 \binom{30}{1} + \dots + 2 \binom{30}{28} + 1 \binom{30}{29} = n \cdot 2^m$, तर

$n + m$ बरोबर _____ आहे.

$$\left(\text{येथे } \binom{n}{k} = {}^nC_k \right)$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001