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Question Paper Name :	B TECH 24th Feb 2021 Shift 1
Subject Name :	B TECH
Creation Date :	2021-02-23 19:48:09
Duration :	180
Number of Questions :	90
Total Marks :	300
Display Marks:	Yes

B TECH

Group Number :	1
Group Id :	708191162
Group Maximum Duration :	0
Group Minimum Duration :	180
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300
Is this Group for Examiner? :	No

Physics Section A

Section Id :	708191550
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 :	708191830
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 70819115154 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The workdone by a gas molecule in an isolated system is given by, $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. α and β are constants. Then the dimensions of β will be :

Options :

70819150611. $[M^2\ L\ T^2]$

70819150612. $[M^0\ L\ T^0]$

70819150613. $[M\ L\ T^{-2}]$

70819150614. $[M\ L^2\ T^{-2}]$

Question Number : 2 Question Id : 70819115155 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two stars of masses m and 2m at a distance d rotate about their common centre of mass in free space. The period of revolution is :

Options :

70819150615. $\frac{1}{2\pi}\sqrt{\frac{3Gm}{d^3}}$

70819150616. $2\pi\sqrt{\frac{d^3}{3Gm}}$

70819150617. $2\pi\sqrt{\frac{3Gm}{d^3}}$

70819150618. $\frac{1}{2\pi}\sqrt{\frac{d^3}{3Gm}}$

Question Number : 3 Question Id : 70819115156 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Four identical particles of equal masses 1 kg made to move along the circumference of a circle of radius 1 m under the action of their own mutual gravitational attraction. The speed of each particle will be :

Options :

70819150619. $\frac{\sqrt{(1+2\sqrt{2})G}}{2}$

70819150620. $\sqrt{\frac{G}{2}(1+2\sqrt{2})}$

70819150621. $\sqrt{G(1+2\sqrt{2})}$

70819150622. $\sqrt{\frac{G}{2}(2\sqrt{2}-1)}$

Question Number : 4 Question Id : 70819115157 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Moment of inertia (M.I.) of four bodies, having same mass and radius, are reported as ;
I_1 = M.I. of thin circular ring about its diameter,
I_2 = M.I. of circular disc about an axis perpendicular to disc and going through the centre,
I_3 = M.I. of solid cylinder about its axis and
I_4 = M.I. of solid sphere about its diameter.
Then :

Options :

70819150623. $I_1 + I_2 = I_3 + \frac{5}{2} I_4$

70819150624. $I_1 + I_3 < I_2 + I_4$

70819150625. $I_1 = I_2 = I_3 < I_4$

70819150626. $I_1 = I_2 = I_3 > I_4$

Question Number : 5 Question Id : 70819115158 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider two satellites S_1 and S_2 with periods of revolution 1 hr. and 8 hr. respectively revolving around a planet in circular orbits. The ratio of angular velocity of satellite S_1 to the angular velocity of satellite S_2 is :

Options :

70819150627. $8 : 1$

70819150628. $1 : 8$

70819150629. $2 : 1$

70819150630. $1 : 4$

Question Number : 6 Question Id : 70819115159 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Each side of a box made of metal sheet in cubic shape is 'a' at room temperature 'T', the coefficient of linear expansion of the metal sheet is 'α'. The metal sheet is heated uniformly, by a small temperature ΔT, so that its new temperature is $T + \Delta T$. Calculate the increase in the volume of the metal box.

Options :

70819150631. $4\pi a^3 \alpha \Delta T$

70819150632. $4a^3 \alpha \Delta T$

70819150633. $\frac{4}{3}\pi a^3 \alpha \Delta T$

70819150634. $3a^3 \alpha \Delta T$

Question Number : 7 Question Id : 70819115160 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If Y, K and η are the values of Young's modulus, bulk modulus and modulus of rigidity of any material respectively. Choose the correct relation for these parameters.

Options :

70819150635. $Y = \frac{9K\eta}{2\eta + 3K}\ N/m^2$

70819150636. $Y = \frac{9K\eta}{3K - \eta}\ N/m^2$

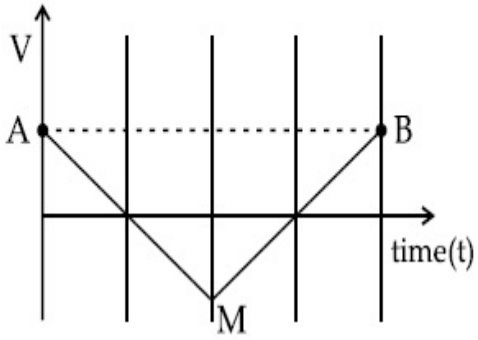
70819150637. $K = \frac{Y\eta}{9\eta - 3Y}\ N/m^2$

70819150638. $\eta = \frac{3YK}{9K+Y}\ N/m^2$

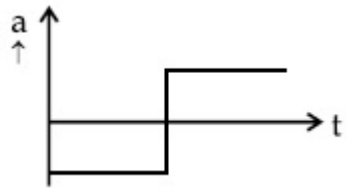
Question Number : 8 Question Id : 70819115161 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

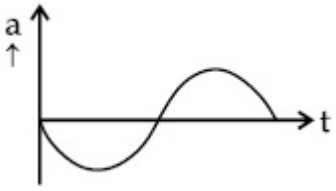
Correct Marks : 4 Wrong Marks : 1

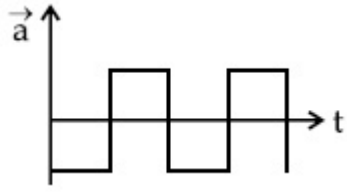
If the velocity-time graph has the shape AMB, what would be the shape of the corresponding acceleration-time graph ?



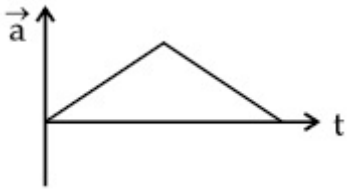
Options :

70819150639. 

70819150640. 

70819150641. 

70819150642.



Question Number : 9 Question Id : 70819115162 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

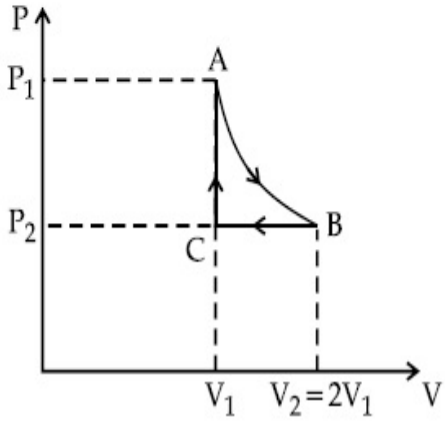
n mole of a perfect gas undergoes a cyclic process ABCA (see figure) consisting of the following processes.

$A \rightarrow B$: Isothermal expansion at temperature T so that the volume is doubled from V_1 to $V_2 = 2V_1$ and pressure changes from P_1 to P_2.

$B \rightarrow C$: Isobaric compression at pressure P_2 to initial volume V_1.

$C \rightarrow A$: Isochoric change leading to change of pressure from P_2 to P_1.

Total workdone in the complete cycle ABCA is :



Options :

70819150643. 0

70819150644. $nRT\ln 2$

70819150645. $nRT\left(\ln 2 + \frac{1}{2}\right)$

70819150646. $nRT\left(\ln 2 - \frac{1}{2}\right)$

Question Number : 10 Question Id : 70819115163 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II.

	List I		List II
(a)	Isothermal	(i)	Pressure constant
(b)	Isochoric	(ii)	Temperature constant
(c)	Adiabatic	(iii)	Volume constant
(d)	Isobaric	(iv)	Heat content is constant

Choose the correct answer from the options given below :

Options :

70819150647. (a) → (i), (b) → (iii), (c) → (ii), (d) → (iv)

70819150648. (a) → (iii), (b) → (ii), (c) → (i), (d) → (iv)

70819150649. (a) → (ii), (b) → (iv), (c) → (iii), (d) → (i)

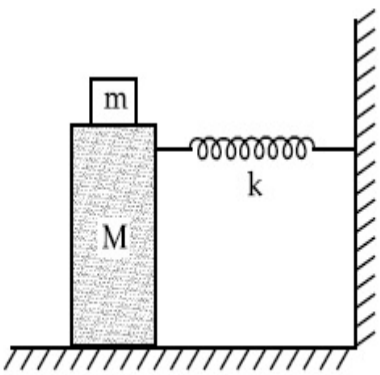
70819150650. (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

Question Number : 11 Question Id : 70819115164 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the given figure, a mass M is attached to a horizontal spring which is fixed on one side to a rigid support. The spring constant of the spring is k. The mass oscillates on a frictionless surface with time period T and amplitude A. When the mass is in equilibrium position, as shown in the figure, another mass m is gently fixed upon it. The new amplitude of oscillation will be :



Options :

70819150651. $A\sqrt{\frac{M+m}{M}}$

70819150652. $A\sqrt{\frac{M}{M+m}}$

70819150653. $A\sqrt{\frac{M-m}{M}}$

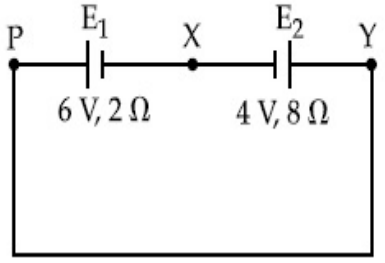
70819150654. $A\sqrt{\frac{M}{M-m}}$

Question Number : 12 Question Id : 70819115165 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A cell E_1 of emf 6 V and internal resistance 2 Ω is connected with another cell E_2 of emf 4 V and internal resistance 8 Ω (as shown in the figure). The potential difference across points X and Y is :



Options :

70819150655. 2.0 V

70819150656. 3.6 V

70819150657. 5.6 V

70819150658. 10.0 V

Question Number : 13 Question Id : 70819115166 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A current through a wire depends on time as

$$i = \alpha_0 t + \beta t^2$$

where $\alpha_0 = 20$ A/s and $\beta = 8$ As^{-2}. Find the charge crossed through a section of the wire in 15 s.

Options :

70819150659. 260 C

70819150660. 2100 C

70819150661. 11250 C

70819150662. 2250 C

Question Number : 14 Question Id : 70819115167 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two equal capacitors are first connected in series and then in parallel. The ratio of the equivalent capacities in the two cases will be :

Options :

70819150663. 1 : 2

70819150664. 2 : 1

70819150665. 4 : 1

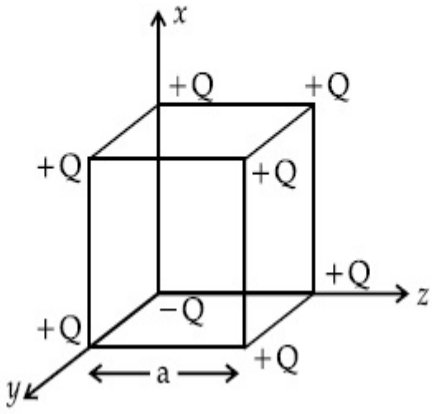
70819150666. 1 : 4

Question Number : 15 Question Id : 70819115168 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A cube of side 'a' has point charges +Q located at each of its vertices except at the origin where the charge is −Q. The electric field at the centre of cube is :



Options :

70819150667. $\frac{-Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

70819150668. $\frac{Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

70819150669. $\frac{-2Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

70819150670. $\frac{2Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

Question Number : 16 Question Id : 70819115169 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If an emitter current is changed by 4 mA, the collector current changes by 3.5 mA. The value of β will be :

Options :

70819150671. 7

70819150672. 0.875

70819150673. 0.5

70819150674. 3.5

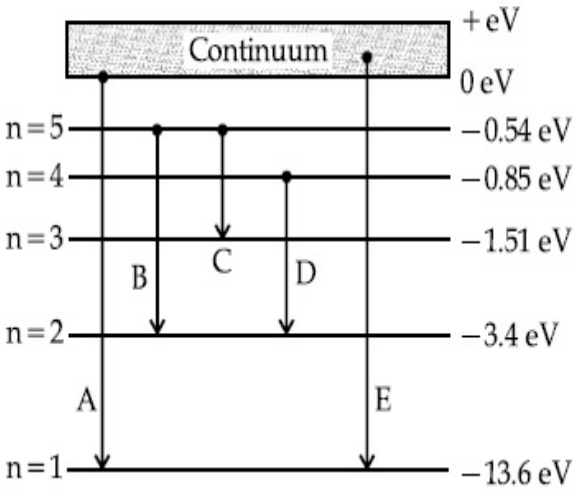
Question Number : 17 Question Id : 70819115170 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the given figure, the energy levels of hydrogen atom have been shown along with some transitions marked A, B, C, D and E.

The transitions A, B and C respectively represent :



Options :

70819150675. The first member of the Lyman series, third member of Balmer series and second member of Paschen series.

70819150676. The ionization potential of hydrogen, second member of Balmer series and third member of Paschen series.

70819150677. The series limit of Lyman series, second member of Balmer series and second member of Paschen series.

70819150678. The series limit of Lyman series, third member of Balmer series and second member of Paschen series.

Question Number : 18 Question Id : 70819115171 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : Two photons having equal linear momenta have equal wavelengths.

Statement II : If the wavelength of photon is decreased, then the momentum and energy of a photon will also decrease.

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

Options :

70819150679. Both Statement I and Statement II are true

70819150680. Both Statement I and Statement II are false

70819150681. Statement I is true but Statement II is false

70819150682. Statement I is false but Statement II is true

Question Number : 19 Question Id : 70819115172 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The focal length f is related to the radius of curvature r of the spherical convex mirror by :

Options :

70819150683. $f = \mathrm{r}$

70819150684. $f = -\mathrm{r}$

70819150685. $f = -\frac{1}{2}\mathrm{r}$

70819150686. $f = +\frac{1}{2}\mathrm{r}$

Question Number : 20 Question Id : 70819115173 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a Young's double slit experiment, the width of the one of the slit is three times the other slit. The amplitude of the light coming from a slit is proportional to the slit-width. Find the ratio of the maximum to the minimum intensity in the interference pattern.

Options :

70819150687. $4:1$

70819150688. $2:1$

70819150689. $1:4$

70819150690. $3:1$

Physics Section B

Section Id :	708191551
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 : 708191831

Question Shuffling Allowed : Yes

Question Number : 21 Question Id : 70819115174 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The coefficient of static friction between a wooden block of mass 0.5 kg and a vertical rough wall is 0.2. The magnitude of horizontal force that should be applied on the block to keep it adhere to the wall will be _____ N.

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

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 : 70819115175 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An unpolarized light beam is incident on the polarizer of a polarization experiment and the intensity of light beam emerging from the analyzer is measured as 100 Lumens. Now, if the analyzer is rotated around the horizontal axis (direction of light) by 30° in clockwise direction, the intensity of emerging light will be _____ Lumens.

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 : 70819115176 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A ball with a speed of 9 m/s collides with another identical ball at rest. After the collision, the direction of each ball makes an angle of 30° with the original direction. The ratio of velocities of the balls after collision is $x : y$, where 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 : 24 Question Id : 70819115177 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A hydraulic press can lift 100 kg when a mass 'm' is placed on the smaller piston. It can lift _____ kg when the diameter of the larger piston is increased by 4 times and that of the smaller piston is decreased by 4 times keeping the same mass 'm' on the smaller piston.

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 : 70819115178 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An inclined plane is bent in such a way that the vertical cross-section is given by $y = \frac{x^2}{4}$ where y is in vertical and x in horizontal direction. If the upper surface of this curved plane is rough with coefficient of friction $\mu = 0.5$, the maximum height in cm at which a stationary block will not slip downward is _____ cm.

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 : 70819115179 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A resonance circuit having inductance and resistance 2×10^{-4} H and 6.28 Ω respectively oscillates at 10 MHz frequency. The value of quality factor of this resonator is _____.
[$\pi = 3.14$]

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 : 70819115180 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An audio signal $v_m = 20 \sin 2\pi(1500t)$ amplitude modulates a carrier $v_c = 80 \sin 2\pi(100{,}000t)$.
The value of percent modulation is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

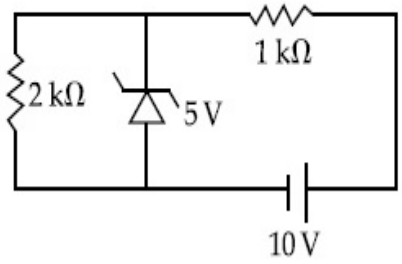
Possible Answers :

5 to 5.001

Question Number : 28 Question Id : 70819115181 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In connection with the circuit drawn below, the value of current flowing through 2 kΩ resistor is _____ $\times 10^{-4}$ A.



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 : 70819115182 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

An electromagnetic wave of frequency 5 GHz, is travelling in a medium whose relative electric permittivity and relative magnetic permeability both are 2. Its velocity in this medium is _____ $\times 10^{7}$ m/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 : 30 Question Id : 70819115183 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A common transistor radio set requires 12 V (D.C.) for its operation. The D.C. source is constructed by using a transformer and a rectifier circuit, which are operated at 220 V (A.C.) on standard domestic A.C. supply. The number of turns of secondary coil are 24, then the number of turns of primary are _____.

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 :	708191552
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 :	708191832
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 70819115184 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following are isostructural pairs ?

A. SO_4^{2-} and CrO_4^{2-}

B. $SiCl_4$ and $TiCl_4$

C. NH_3 and NO_3^-

D. BCl_3 and $BrCl_3$

Options :

70819150701. A and B only

70819150702. A and C only

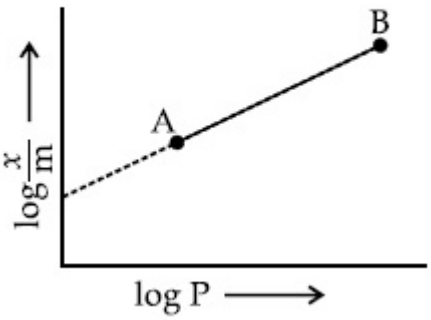
70819150703. B and C only

70819150704. C and D only

Question Number : 32 Question Id : 70819115185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In Freundlich adsorption isotherm, slope of AB line is :



Options :

70819150705. n with (n, 0.1 to 0.5)

70819150706. log n with (n > 1)

70819150707. $\log \frac{1}{n}$ with (n < 1)

70819150708. $\frac{1}{n}$ with $\left(\frac{1}{n} = 0 \text{ to } 1\right)$

Question Number : 33 Question Id : 70819115186 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the elements Mg, Al, S, P and Si, the correct increasing order of their first ionization enthalpy is :

Options :

70819150709. $Al < Mg < Si < S < P$

70819150710. $Mg < Al < Si < P < S$

70819150711. $Mg < Al < Si < S < P$

70819150712. $Al < Mg < S < Si < P$

Question Number : 34 Question Id : 70819115187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following ore is concentrated using group 1 cyanide salt ?

Options :

70819150713. Calamine

70819150714. Malachite

70819150715. Siderite

70819150716. Sphalerite

Question Number : 35 Question Id : 70819115188 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

(A) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$
(B) $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$
Choose the correct option.

Options :

70819150717. H_2O_2 acts as oxidising agent in equations (A) and (B).

70819150718. H_2O_2 acts as reducing agent in equations (A) and (B).

70819150719. H_2O_2 act as oxidizing and reducing agent respectively in equations (A) and (B).

70819150720. H_2O_2 acts as reducing and oxidising agent respectively in equations (A) and (B).

Question Number : 36 Question Id : 70819115189 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Al_2O_3 was leached with alkali to get X. The solution of X on passing of gas Y, forms Z.
X, Y and Z respectively are :

Options :

70819150721. $X = Na[Al(OH)_4],\ Y = SO_2,\ Z = Al_2O_3$

70819150722. $X = Al(OH)_3,\ Y = SO_2,\ Z = Al_2O_3.xH_2O$

70819150723. $X = Al(OH)_3,\ Y = CO_2,\ Z = Al_2O_3$

70819150724. $X = Na[Al(OH)_4],\ Y = CO_2,\ Z = Al_2O_3.xH_2O$

Question Number : 37 Question Id : 70819115190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The electrode potential of M^{2+}/M of 3d-series elements shows positive value for :

Options :

70819150725. Fe

70819150726. Co

70819150727. Zn

70819150728. Cu

Question Number : 38 Question Id : 70819115191 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The major components in "Gun Metal" are :

Options :

70819150729. Cu, Sn and Zn

70819150730. Cu, Zn and Ni

70819150731. Cu, Ni and Fe

70819150732. Al, Cu, Mg and Mn

Question Number : 39 Question Id : 70819115192 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The gas released during anaerobic degradation of vegetation may lead to :

Options :

70819150733. Acid rain

70819150734. Global warming and cancer

70819150735. Corrosion of metals

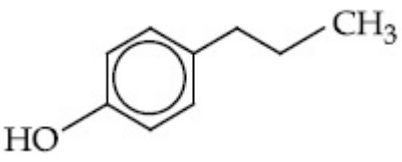
70819150736. Ozone hole

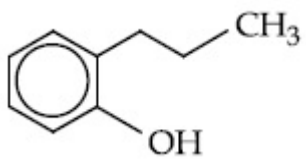
Question Number : 40 Question Id : 70819115193 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

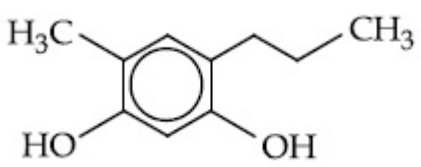
Correct Marks : 4 Wrong Marks : 1

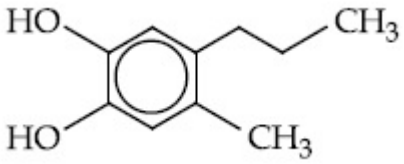
Which of the following compound gives pink colour on reaction with phthalic anhydride in conc. H_2SO_4 followed by treatment with NaOH ?

Options :

70819150737. 

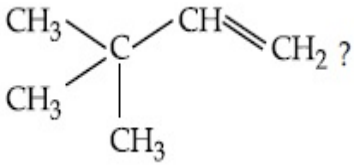
70819150738. 

70819150739. 

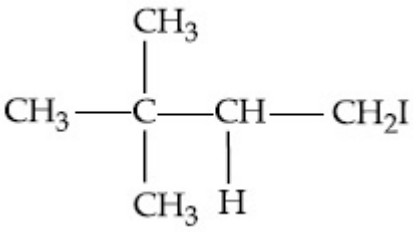
70819150740. 

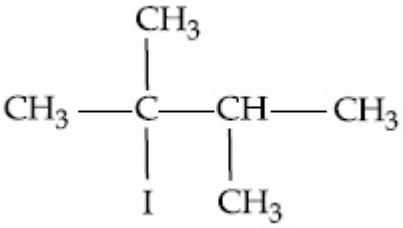
Question Number : 41 Question Id : 70819115194 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

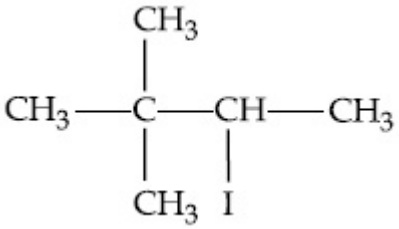
Correct Marks : 4 Wrong Marks : 1

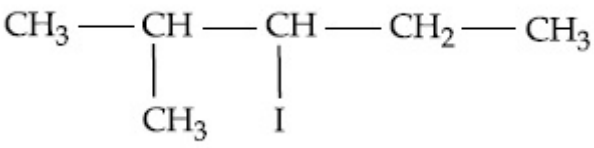
What is the major product formed by HI on reaction with  ?

Options :

70819150741. 

70819150742. 

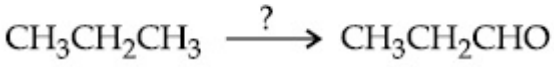
70819150743. 

70819150744. 

Question Number : 42 Question Id : 70819115195 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following reagent is used for the following reaction ?



Options :

70819150745. Copper at high temperature and pressure

70819150746. Molybdenum oxide

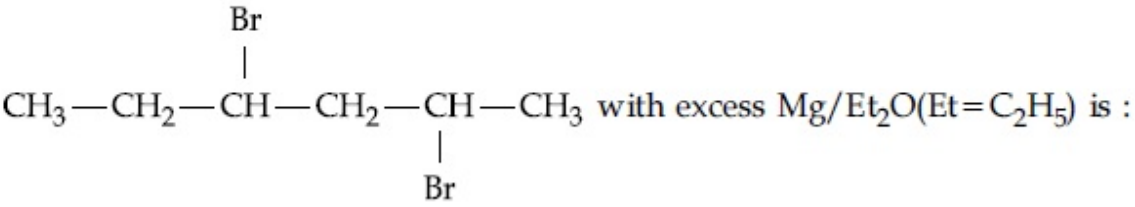
70819150747. Manganese acetate

70819150748. Potassium permanganate

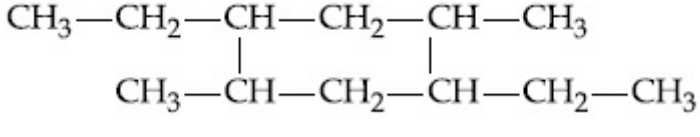
Question Number : 43 Question Id : 70819115196 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

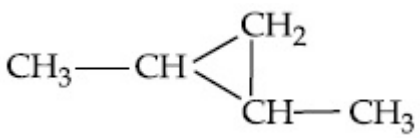
Correct Marks : 4 Wrong Marks : 1

The product formed in the first step of the reaction of

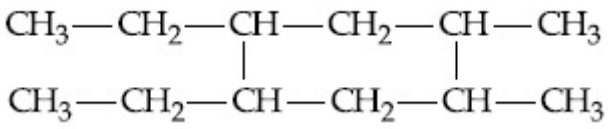


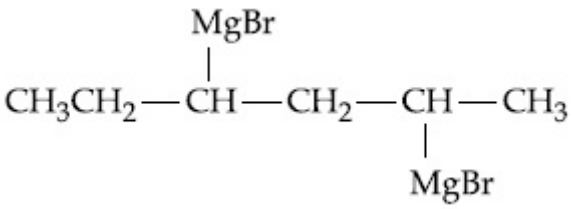
Options :

70819150749. 

70819150750. 

70819150751.



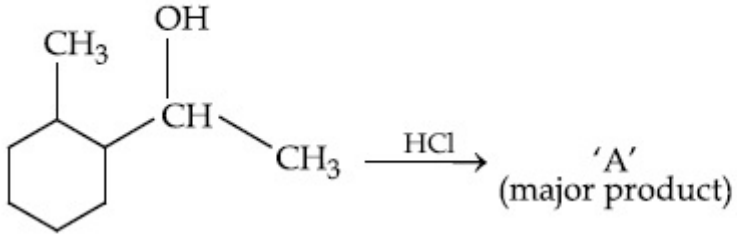


70819150752.

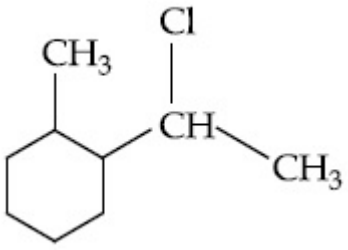
Question Number : 44 Question Id : 70819115197 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

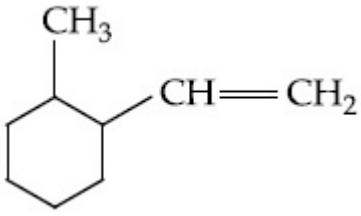
What is the final product (major) 'A' in the given reaction ?



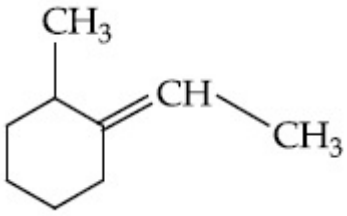
Options :



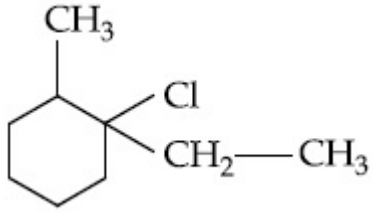
70819150753.



70819150754.



70819150755.

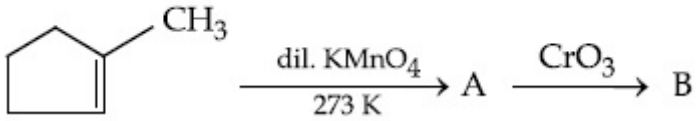
70819150756. 

Question Number : 45 Question Id : 70819115198 Question Type : MCQ Option Shuffling : Yes

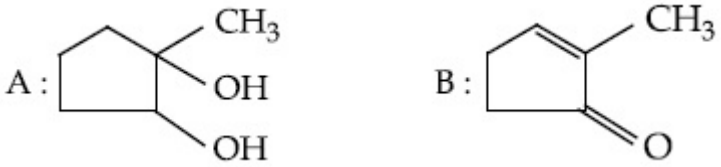
Is Question Mandatory : No

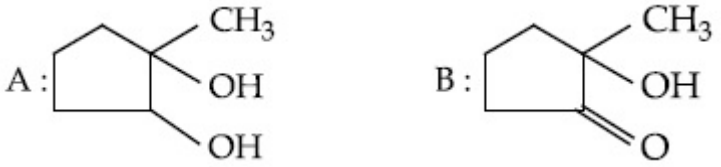
Correct Marks : 4 Wrong Marks : 1

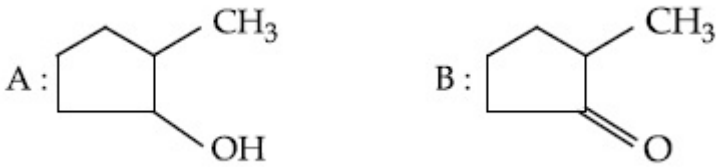
Identify products A and B.

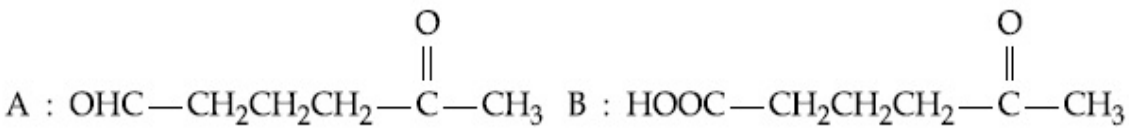


Options :

70819150757. 

70819150758. 

70819150759. 

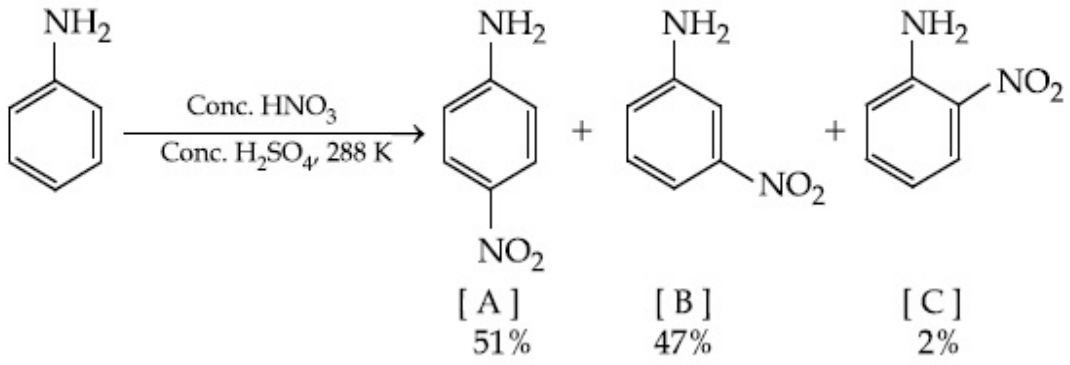
70819150760. 

Question Number : 46 Question Id : 70819115199 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the following reaction the reason why *meta*-nitro product also formed is :



[A] 51% [B] 47% [C] 2%

Options :

70819150761. $-NH_2$ group is highly *meta*-directive

70819150762. $-NO_2$ substitution always takes place at *meta*-position

70819150763. Formation of anilinium ion

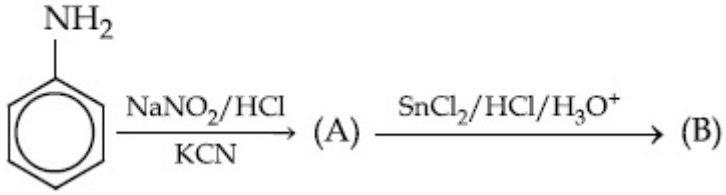
70819150764. low temperature

Question Number : 47 Question Id : 70819115200 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

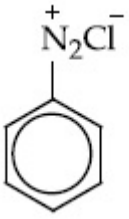
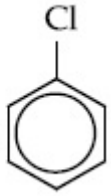
Correct Marks : 4 Wrong Marks : 1

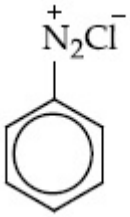
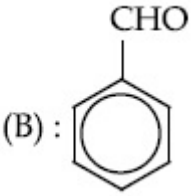
'A' and 'B' in the following reactions are :

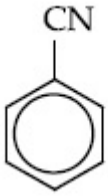
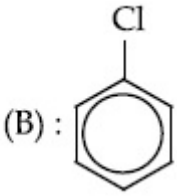


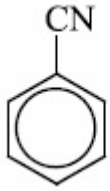
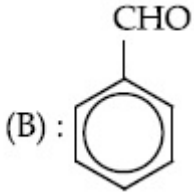
Options :

70819150765.

(A) :  (B) : 

70819150766. (A) :  (B) : 

70819150767. (A) :  (B) : 

70819150768. (A) :  (B) : 

Question Number : 48 Question Id : 70819115201 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II.

	List I (Monomer Unit)		List II (Polymer)
(a)	Caprolactum	(i)	Natural rubber
(b)	2-Chloro-1,3-butadiene	(ii)	Buna-N
(c)	Isoprene	(iii)	Nylon 6
(d)	Acrylonitrile	(iv)	Neoprene

Choose the correct answer from the options given below :

Options :

70819150769. (a) → (i), (b) → (ii), (c) → (iii), (d) → (iv)

70819150770. (a) → (iv), (b) → (iii), (c) → (ii), (d) → (i)

70819150771. (a) → (ii), (b) → (i), (c) → (iv), (d) → (iii)

70819150772. (a) → (iii), (b) → (iv), (c) → (i), (d) → (ii)

Question Number : 49 Question Id : 70819115202 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Out of the following, which type of interaction is responsible for the stabilisation of α-helix structure of proteins ?

Options :

70819150773. vander Waals forces

70819150774. Covalent bonding

70819150775. Ionic bonding

70819150776. Hydrogen bonding

Question Number : 50 Question Id : 70819115203 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : Colourless cupric metaborate is reduced to cuprous metaborate in a luminous flame.

Statement II : Cuprous metaborate is obtained by heating boric anhydride and copper sulphate in a non-luminous flame.

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

Options :

70819150777. Both Statement I and Statement II are true

70819150778. Both Statement I and Statement II are false

70819150779. Statement I is true but Statement II is false

70819150780. Statement I is false but Statement II is true

Chemistry Section B

Section Id :	708191553
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 :	708191833
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 70819115204 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

4.5 g of compound A (MW = 90) was used to make 250 mL of its aqueous solution. The molarity of the solution in M is $x \times 10^{-1}$. The value of x is _____. (Rounded 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 : 52 Question Id : 70819115205 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The coordination number of an atom in a body-centered cubic structure is _____.
[Assume that the lattice is made up of atoms.]

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 : 70819115206 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A proton and a Li^{3+} nucleus are accelerated by the same potential. If λ_{Li} and λ_p denote the de Broglie wavelengths of Li^{3+} and proton respectively, then the value of $\frac{\lambda_{Li}}{\lambda_p}$ is $x \times 10^{-1}$.

The value of x is _____. (Rounded off to the nearest integer)
[Mass of Li^{3+} = 8.3 mass of proton]

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 : 70819115207 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction $A_{(g)} \rightarrow B_{(g)}$, the value of the equilibrium constant at 300 K and 1 atm is equal to 100.0. The value of $\Delta_r G$ for the reaction at 300 K and 1 atm in J mol^{-1} is $-xR$, where x is _____. (Rounded off to the nearest integer)

[$R = 8.31$ J $mol^{-1}K^{-1}$ and ln 10 = 2.3)

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 : 70819115208 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

When 9.45 g of $ClCH_2COOH$ is added to 500 mL of water, its freezing point drops by 0.5°C. The dissociation constant of $ClCH_2COOH$ is $x \times 10^{-3}$. The value of x is _____. (Rounded off to the nearest integer)

[$K_{f(H_2O)} = 1.86$ K kg 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 : 70819115209 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

At 1990 K and 1 atm pressure, there are equal number of Cl_2 molecules and Cl atoms in the reaction mixture. The value of K_p for the reaction $Cl_{2(g)} \rightleftharpoons 2Cl_{(g)}$ under the above conditions is $x \times 10^{-1}$. The value of x is _____. (Rounded 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 : 57 Question Id : 70819115210 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The reaction of sulphur in alkaline medium is given below :

$$S_{8(s)} + a\ OH^-_{(aq)} \longrightarrow b\ S^{2-}_{(aq)} + c\ S_2O_3^{2-}{}_{(aq)} + d\ H_2O_{(l)}$$

The values of 'a' 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 : 58 Question Id : 70819115211 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Gaseous cyclobutene isomerizes to butadiene in a first order process which has a 'k' value of $3.3 \times 10^{-4}\ s^{-1}$ at 153°C. The time in minutes it takes for the isomerization to proceed 40% to completion at this temperature is _____. (Rounded 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 : 59 Question Id : 70819115212 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Number of amphoteric compounds among the following is _____.

(A) BeO (B) BaO (C) $Be(OH)_2$ (D) $Sr(OH)_2$

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 : 60 Question Id : 70819115213 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The stepwise formation of $[Cu(NH_3)_4]^{2+}$ is given below :

$$Cu^{2+} + NH_3 \xrightleftharpoons{K_1} [Cu(NH_3)]^{2+}$$

$$[Cu(NH_3)]^{2+} + NH_3 \xrightleftharpoons{K_2} [Cu(NH_3)_2]^{2+}$$

$$[Cu(NH_3)_2]^{2+} + NH_3 \xrightleftharpoons{K_3} [Cu(NH_3)_3]^{2+}$$

$$[Cu(NH_3)_3]^{2+} + NH_3 \xrightleftharpoons{K_4} [Cu(NH_3)_4]^{2+}$$

The value of stability constants K_1, K_2, K_3 and K_4 are 10^4, 1.58×10^3, 5×10^2 and 10^2 respectively. The overall equilibrium constants for dissociation of $[Cu(NH_3)_4]^{2+}$ is $x \times 10^{-12}$. The value of x is _____. (Rounded 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

Mathematics Section A

Section Id :	708191554
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 :	708191834
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 70819115214 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f : \mathrm{R} \to \mathrm{R}$ be defined as $f(x) = 2x - 1$ and $g : \mathrm{R} - \{1\} \to \mathrm{R}$ be defined as $g(x) = \dfrac{x - \frac{1}{2}}{x - 1}$.

Then the composition function $f(g(x))$ is :

Options :

70819150791. one-one but not onto

70819150792. onto but not one-one

70819150793. neither one-one nor onto

70819150794. both one-one and onto

Question Number : 62 Question Id : 70819115215 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let p and q be two positive numbers such that $p+q=2$ and $p^4+q^4=272$. Then p and q are roots of the equation :

Options :

70819150795. $x^2-2x+136=0$

70819150796. $x^2-2x+16=0$

70819150797. $x^2-2x+8=0$

70819150798. $x^2-2x+2=0$

Question Number : 63 Question Id : 70819115216 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The system of linear equations

$$3x-2y-kz=10$$
$$2x-4y-2z=6$$
$$x+2y-z=5m$$

is inconsistent if :

Options :

70819150799.

$k \neq 3, m \neq \frac{4}{5}$

70819150800. $k = 3, m = \frac{4}{5}$

70819150801. $k = 3, m \neq \frac{4}{5}$

70819150802. $k \neq 3, m \in \mathbf{R}$

Question Number : 64 Question Id : 70819115217 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of

$-{}^{15}C_1 + 2\cdot{}^{15}C_2 - 3\cdot{}^{15}C_3 + \cdots - 15\cdot{}^{15}C_{15} + {}^{14}C_1 + {}^{14}C_3 + {}^{14}C_5 + \cdots + {}^{14}C_{11}$ is :

Options :

70819150803. $2^{16} - 1$

70819150804. $2^{13} - 14$

70819150805. $2^{13} - 13$

70819150806. 2^{14}

Question Number : 65 Question Id : 70819115218 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $e^{\left(\cos^2 x+\cos^4 x+\cos^6 x+\ldots\infty\right)\log_e 2}$ satisfies the equation $t^2-9t+8=0$, then the value of $\frac{2\sin x}{\sin x+\sqrt{3}\cos x}\left(0<x<\frac{\pi}{2}\right)$ is :

Options :

70819150807. $\frac{1}{2}$

70819150808. $\sqrt{3}$

70819150809. $\frac{3}{2}$

70819150810. $2\sqrt{3}$

Question Number : 66 Question Id : 70819115219 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\lim\limits_{x\to 0}\frac{\int_0^{x^2}\left(\sin\sqrt{t}\right)dt}{x^3}$ is equal to :

Options :

70819150811. $\frac{2}{3}$

70819150812. $\frac{3}{2}$

70819150813. $\frac{1}{15}$

70819150814. 0

Question Number : 67 Question Id : 70819115220 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The function $f(x) = \frac{4x^3 - 3x^2}{6} - 2\sin x + (2x - 1)\cos x$:

Options :

70819150815. increases in $\left[\frac{1}{2}, \infty\right)$

70819150816. decreases in $\left[\frac{1}{2}, \infty\right)$

70819150817. increases in $\left(-\infty, \frac{1}{2}\right]$

70819150818. decreases in $\left(-\infty, \frac{1}{2}\right]$

Question Number : 68 Question Id : 70819115221 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A scientific committee is to be formed from 6 Indians and 8 foreigners, which includes at least 2 Indians and double the number of foreigners as Indians. Then the number of ways, the committee can be formed, is :

Options :

70819150819. 1050

70819150820. 1625

70819150821. 560

70819150822. 575

Question Number : 69 Question Id : 70819115222 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $f: R \to R$ is a function defined by $f(x) = [x-1]\cos\left(\frac{2x-1}{2}\right)\pi$, where $[\cdot]$ denotes the greatest integer function, then f is :

Options :

70819150823. discontinuous only at $x = 1$

70819150824. discontinuous at all integral values of x except at $x = 1$

70819150825. continuous only at $x = 1$

70819150826. continuous for every real x

Question Number : 70 Question Id : 70819115223 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx = a\sin^{-1}\left(\frac{\sin x + \cos x}{b}\right) + c$, where c is a constant of integration, then the ordered pair (a, b) is equal to :

Options :

70819150827. (3, 1)

70819150828. (1, 3)

70819150829. $(-1, 3)$

70819150830. $(1, -3)$

Question Number : 71 Question Id : 70819115224 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The area (in sq. units) of the part of the circle $x^2+y^2=36$, which is outside the parabola $y^2=9x$, is :

Options :

70819150831. $24\pi + 3\sqrt{3}$

70819150832. $24\pi - 3\sqrt{3}$

70819150833. $12\pi + 3\sqrt{3}$

70819150834. $12\pi - 3\sqrt{3}$

Question Number : 72 Question Id : 70819115225 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The population $P=P(t)$ at time 't' of a certain species follows the differential equation $\frac{dP}{dt} = 0.5P - 450$. If $P(0)=850$, then the time at which population becomes zero is :

Options :

70819150835. $\log_e 9$

70819150836. $\frac{1}{2}\log_e 18$

70819150837. $\log_e 18$

70819150838. $2\log_e 18$

Question Number : 73 Question Id : 70819115226 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A man is walking on a straight line. The arithmetic mean of the reciprocals of the intercepts of this line on the coordinate axes is $\frac{1}{4}$. Three stones A, B and C are placed at the points (1, 1), (2, 2) and (4, 4) respectively. Then which of these stones is/are on the path of the man ?

Options :

70819150839. A only

70819150840. B only

70819150841. C only

70819150842. All the three

Question Number : 74 Question Id : 70819115227 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The locus of the mid-point of the line segment joining the focus of the parabola $y^2 = 4ax$ to a moving point of the parabola, is another parabola whose directrix is :

Options :

70819150843. $x = a$

70819150844. $x = -\frac{a}{2}$

70819150845. $x = 0$

70819150846. $x = \frac{a}{2}$

Question Number : 75 Question Id : 70819115228 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the tangent to the curve $y = x^3$ at the point $P(t, t^3)$ meets the curve again at Q, then the ordinate of the point which divides PQ internally in the ratio 1 : 2 is :

Options :

70819150847. 0

70819150848. $2t^3$

70819150849. $-t^3$

70819150850. $-2t^3$

Question Number : 76 Question Id : 70819115229 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The equation of the plane passing through the point (1, 2, −3) and perpendicular to the planes $3x + y - 2z = 5$ and $2x - 5y - z = 7$, is :

Options :

70819150851. $6x - 5y + 2z + 10 = 0$

70819150852. $11x + y + 17z + 38 = 0$

70819150853. $6x - 5y - 2z - 2 = 0$

70819150854. $3x - 10y - 2z + 11 = 0$

Question Number : 77 Question Id : 70819115230 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The distance of the point (1, 1, 9) from the point of intersection of the line $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ and the plane $x + y + z = 17$ is :

Options :

70819150855. $2\sqrt{19}$

70819150856. $19\sqrt{2}$

70819150857. $\sqrt{38}$

70819150858. 38

Question Number : 78 Question Id : 70819115231 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An ordinary dice is rolled for a certain number of times. If the probability of getting an odd number 2 times is equal to the probability of getting an even number 3 times, then the probability of getting an odd number for odd number of times is :

Options :

70819150859. $\frac{1}{32}$

70819150860. $\frac{3}{16}$

70819150861. $\frac{5}{16}$

70819150862. $\frac{1}{2}$

Question Number : 79 Question Id : 70819115232 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two vertical poles are 150 m apart and the height of one is three times that of the other. If from the middle point of the line joining their feet, an observer finds the angles of elevation of their tops to be complementary, then the height of the shorter pole (in meters) is :

Options :

70819150863. 25

70819150864. 30

70819150865. $20\sqrt{3}$

70819150866. $25\sqrt{3}$

Question Number : 80 Question Id : 70819115233 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The statement among the following that is a tautology is :

Options :

70819150867. $A \wedge (A \vee B)$

70819150868. $A \vee (A \wedge B)$

70819150869. $[A \wedge (A \rightarrow B)] \rightarrow B$

70819150870. $B \rightarrow [A \wedge (A \rightarrow B)]$

Mathematics Section B

Section Id :	708191555
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 :	708191835
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 70819115234 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the least and the largest real values of α, for which the equation $z+\alpha|z-1|+2i=0$ ($z \in C$ and $i=\sqrt{-1}$) has a solution, are p and q respectively; then $4(p^2+q^2)$ 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 : 82 Question Id : 70819115235 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let B_i $(i=1, 2, 3)$ be three independent events in a sample space. The probability that only B_1 occur is α, only B_2 occurs is β and only B_3 occurs is γ. Let p be the probability that none of the events B_i occurs and these 4 probabilities satisfy the equations $(\alpha-2\beta)\,p=\alpha\beta$ and $(\beta-3\gamma)\,p=2\beta\gamma$ (All the probabilities are assumed to lie in the interval (0, 1)). Then $\frac{P(B_1)}{P(B_3)}$ 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 : 83 Question Id : 70819115236 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $P=\begin{bmatrix}3 & -1 & -2\\ 2 & 0 & \alpha\\ 3 & -5 & 0\end{bmatrix}$, where $\alpha\in R$. Suppose $Q=[q_{ij}]$ is a matrix satisfying $PQ=kI_3$ for some non-zero $k\in R$. If $q_{23}=-\frac{k}{8}$ and $|Q|=\frac{k^2}{2}$, then α^2+k^2 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 : 70819115237 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let M be any 3×3 matrix with entries from the set {0, 1, 2}. The maximum number of such matrices, for which the sum of diagonal elements of M^TM is seven, 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 : 70819115238 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $A = \{ n \in N : n \text{ is a 3-digit number} \}$

$B = \{ 9k + 2 : k \in N \}$

and $C = \{ 9k + l : k \in N \}$ for some l $(0 < l < 9)$

If the sum of all the elements of the set $A \cap (B \cup C)$ is 274×400, then l 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 : 86 Question Id : 70819115239 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The minimum value of α for which the equation $\frac{4}{\sin x} + \frac{1}{1 - \sin x} = \alpha$ has at least one solution 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 : 87 Question Id : 70819115240 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $\int_{-a}^{a} (|x| + |x - 2|)dx = 22$, $(a > 2)$ and $[x]$ denotes the greatest integer $\leq x$, then $\int_{a}^{-a} (x + [x])\,dx$ 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 : 88 Question Id : 70819115241 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If one of the diameters of the circle $x^2+y^2-2x-6y+6=0$ is a chord of another circle 'C', whose center is at (2, 1), then its radius 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 : 70819115242 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ be such that $\vec{c}$ is coplanar with $\vec{a}$ and $\vec{b}$, $\vec{a}\cdot\vec{c}=7$ and $\vec{b}$ is perpendicular to $\vec{c}$, where $\vec{a}=-\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=2\hat{i}+\hat{k}$, then the value of $2\left|\vec{a}+\vec{b}+\vec{c}\right|^2$ 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 : 90 Question Id : 70819115243 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$\lim_{n\to\infty} \tan\left\{\sum_{r=1}^{n} \tan^{-1}\left(\frac{1}{1+r+r^2}\right)\right\}$ 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