nta

Question Paper Name :	B TECH 25th Feb 2021 Shift 1
Subject Name :	B TECH
Creation Date :	2021-02-24 14:08:00
Duration :	180
Number of Questions :	90
Total Marks :	300
Display Marks:	Yes

B TECH

Group Number :	1
Group Id :	708191189
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 :	708191712
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 :   708191992

Question Shuffling Allowed :   Yes

Question Number : 1 Question Id : 70819117584 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 : The escape velocities of planet A and B are same. But A and B are of unequal mass.

Reason R : The product of their mass and radius must be same. $M_1R_1 = M_2R_2$

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

Options :

70819157901. Both A and R are correct and R is the correct explanation of A

70819157902. Both A and R are correct but R is NOT the correct explanation of A

70819157903. A is correct but R is not correct

70819157904. A is not correct but R is correct

Question Number : 2 Question Id : 70819117585 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)	h (Planck's constant)	(i)	$[M\,L\,T^{-1}]$
(b)	E (kinetic energy)	(ii)	$[M\,L^2\,T^{-1}]$
(c)	V (electric potential)	(iii)	$[M\,L^2\,T^{-2}]$
(d)	P (linear momentum)	(iv)	$[M\,L^2\,I^{-1}\,T^{-3}]$

Choose the correct answer from the options given below :

Options :

70819157905. (a) → (i), (b) → (ii), (c) → (iv), (d) → (iii)

70819157906. (a) → (iii), (b) → (iv), (c) → (ii), (d) → (i)

70819157907. (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

70819157908. (a) → (iii), (b) → (ii), (c) → (iv), (d) → (i)

Question Number : 3 Question Id : 70819117586 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the time period of a two meter long simple pendulum is 2 s, the acceleration due to gravity at the place where pendulum is executing S.H.M. is :

Options :

70819157909. 16 m/s^2

70819157910. $\pi^2 \text{ ms}^{-2}$

70819157911. 9.8 ms^{-2}

70819157912. $2\pi^2 \text{ ms}^{-2}$

Question Number : 4 Question Id : 70819117587 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A student is performing the experiment of resonance column. The diameter of the column tube is 6 cm. The frequency of the tuning fork is 504 Hz. Speed of the sound at the given temperature is 336 m/s. The zero of the metre scale coincides with the top end of the resonance column tube. The reading of the water level in the column when the first resonance occurs is :

Options :

70819157913. 16.6 cm

70819157914. 18.4 cm

70819157915. 14.8 cm

70819157916. 13 cm

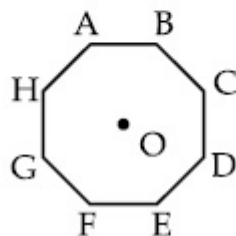**Question Number : 5 Question Id : 70819117588 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

In an octagon ABCDEFGH of equal side, what is the sum of

$$\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF} + \overrightarrow{AG} + \overrightarrow{AH},$$

if, $\overrightarrow{AO} = 2\hat{i} + 3\hat{j} - 4\hat{k}$

Options :

70819157917. $16\hat{i} + 24\hat{j} + 32\hat{k}$

70819157918.

$-16\hat{i} - 24\hat{j} + 32\hat{k}$
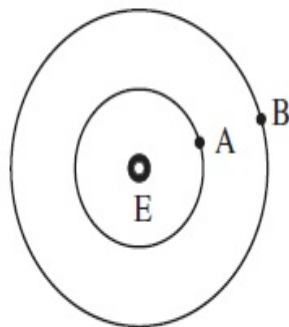
70819157919. $16\hat{i} - 24\hat{j} + 32\hat{k}$

70819157920. $16\hat{i} + 24\hat{j} - 32\hat{k}$

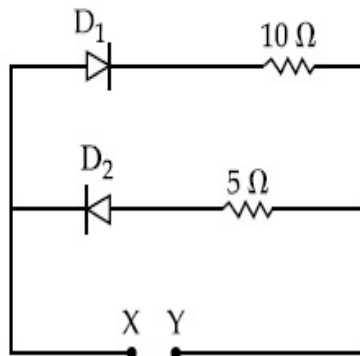**Question Number : 6 Question Id : 70819117589 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

Two satellites A and B of masses 200 kg and 400 kg are revolving round the earth at height of 600 km and 1600 km respectively.

If T_A and T_B are the time periods of A and B respectively then the value of $T_B - T_A$:

[Given : radius of earth = 6400 km, mass of earth = 6×10^{24} kg]

Options :

70819157921. 1.33×10^3 s

70819157922. 4.24×10^3 s

70819157923. 4.24×10^2 s

70819157924. 3.33×10^2 s

Question Number : 7 Question Id : 70819117590 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A 5 V battery is connected across the points X and Y. Assume D_1 and D_2 to be normal silicon diodes. Find the current supplied by the battery if the +ve terminal of the battery is connected to point X.

Options :

70819157925. ~0.5 A

70819157926. ~0.43 A

70819157927. ~0.86 A

70819157928. ~1.5 A

Question Number : 8 Question Id : 70819117591 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : A speech signal of 2 kHz is used to modulate a carrier signal of 1 MHz. The bandwidth requirement for the signal is 4 kHz.

Statement II : The side band frequencies are 1002 kHz and 998 kHz.

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

Options :

70819157929. Both Statement I and Statement II are true

70819157930. Both Statement I and Statement II are false

70819157931. Statement I is true but Statement II is false

70819157932. Statement I is false but Statement II is true

Question Number : 9 Question Id : 70819117592 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 : When a rod lying freely is heated, no thermal stress is developed in it.

Reason R : On heating, the length of the rod increases.

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

Options :

70819157933. Both A and R are true and R is the correct explanation of A

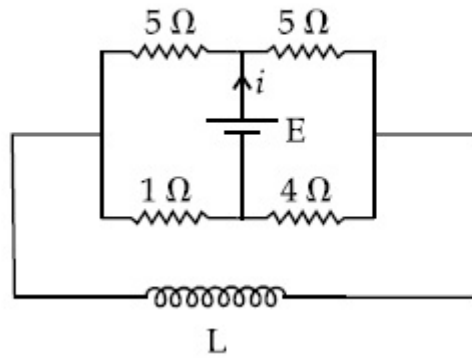70819157934. Both A and R are true but R is NOT the correct explanation of A

70819157935. A is true but R is false

70819157936. A is false but R is true

Question Number : 10 Question Id : 70819117593 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The current (*i*) at time t=0 and t= ∞ respectively for the given circuit is :

Options :

70819157937. $\dfrac{18E}{55}, \dfrac{5E}{18}$

70819157938. $\dfrac{5E}{18}, \dfrac{18E}{55}$

70819157939. $\dfrac{10E}{33}, \dfrac{5E}{18}$

70819157940. $\dfrac{5E}{18}, \dfrac{10E}{33}$

Question Number : 11 Question Id : 70819117594 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The pitch of the screw gauge is 1 mm and there are 100 divisions on the circular scale. When nothing is put in between the jaws, the zero of the circular scale lies 8 divisions below the reference line. When a wire is placed between the jaws, the first linear scale division is clearly visible while 72nd division on circular scale coincides with the reference line. The radius of the wire is :

Options :

70819157941. 1.64 mm

70819157942. 0.90 mm

70819157943. 0.82 mm

70819157944. 1.80 mm

Question Number : 12 Question Id : 70819117595 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An α particle and a proton are accelerated from rest by a potential difference of 200 V. After this, their de Broglie wavelengths are λ_α and λ_p respectively. The ratio $\dfrac{\lambda_p}{\lambda_\alpha}$ is :

Options :

70819157945. 2.8

70819157946. 8

70819157947. 7.8

70819157948. 3.8

Question Number : 13 Question Id : 70819117596 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two coherent light sources having intensity in the ratio $2x$ produce an interference pattern.

The ratio $\dfrac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be :

Options :

70819157949. $\dfrac{\sqrt{2x}}{2x+1}$

70819157950.

$$\frac{2\sqrt{2x}}{2x+1}$$

70819157951. $\frac{\sqrt{2x}}{x+1}$

70819157952. $\frac{2\sqrt{2x}}{x+1}$

Question Number : 14 Question Id : 70819117597 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An engine of a train, moving with uniform acceleration, passes the signal-post with velocity u and the last compartment with velocity v. The velocity with which middle point of the train passes the signal post is :

Options :

70819157953. $\frac{u+v}{2}$

70819157954. $\frac{v-u}{2}$

70819157955. $\sqrt{\frac{v^2+u^2}{2}}$

70819157956. $\sqrt{\frac{v^2-u^2}{2}}$

Question Number : 15 Question Id : 70819117598 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A proton, a deuteron and an α particle are moving with same momentum in a uniform magnetic field. The ratio of magnetic forces acting on them is _____ and their speed is _____, in the ratio.

Options :

70819157957. 4 : 2 : 1 and 2 : 1 : 1

70819157958. 2 : 1 : 1 and 4 : 2 : 1

70819157959. 1 : 2 : 4 and 1 : 1 : 2

70819157960. 1 : 2 : 4 and 2 : 1 : 1

Question Number : 16 Question Id : 70819117599 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Magnetic fields at two points on the axis of a circular coil at a distance of 0.05 m and 0.2 m from the centre are in the ratio 8 : 1. The radius of coil is _____.

Options :

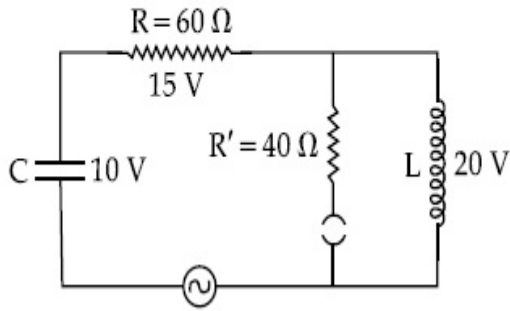70819157961. 0.1 m

70819157962. 0.15 m

70819157963. 0.2 m

70819157964. 1.0 m

Question Number : 17 Question Id : 70819117600 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The angular frequency of alternating current in a L-C-R circuit is 100 rad/s. The components connected are shown in the figure. Find the value of inductance of the coil and capacity of condenser.

R = 60 Ω
15 V
R' = 40 Ω
C = 10 V
L 20 V

Options :

70819157965. 1.33 H and 250 μF

70819157966. 1.33 H and 150 μF

70819157967. 0.8 H and 150 μF

70819157968. 0.8 H and 250 μF

Question Number : 18 Question Id : 70819117601 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A diatomic gas, having $C_P = \frac{7}{2}R$ and $C_V = \frac{5}{2}R$, is heated at constant pressure. The ratio $dU : dQ : dW$:

Options :

70819157969. $5 : 7 : 2$

70819157970. $3 : 7 : 2$

70819157971. $3 : 5 : 2$

70819157972. $5 : 7 : 3$

Question Number : 19 Question Id : 70819117602 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two radioactive substances X and Y originally have N_1 and N_2 nuclei respectively. Half life of X is half of the half life of Y. After three half lives of Y, number of nuclei of both are equal.

The ratio $\dfrac{N_1}{N_2}$ will be equal to :

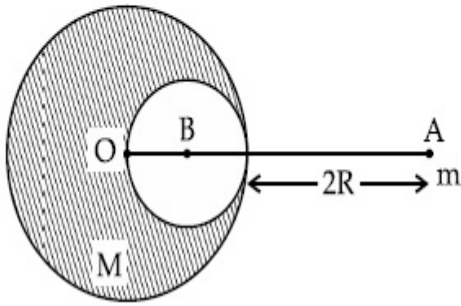**Options :**

70819157973. $\dfrac{3}{1}$

70819157974. $\dfrac{1}{3}$

70819157975. $\dfrac{8}{1}$

70819157976. $\dfrac{1}{8}$

Question Number : 20 Question Id : 70819117603 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A solid sphere of radius R gravitationally attracts a particle placed at 3R from its centre with a force F_1. Now a spherical cavity of radius $\left(\dfrac{R}{2}\right)$ is made in the sphere (as shown in figure) and the force becomes F_2. The value of $F_1 : F_2$ is :

Options :

70819157977. 41 : 50

70819157978. 50 : 41

70819157979. 36 : 25

70819157980. 25 : 36

Physics Section B

Section Id :	708191713
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 :	708191993

Question Number : 21 Question Id : 70819117604 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A monoatomic gas of mass 4.0 u is kept in an insulated container. Container is moving with velocity 30 m/s. If container is suddenly stopped then change in temperature of the gas (R = gas constant) is $\frac{x}{3R}$. 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 : 22 Question Id : 70819117605 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

512 identical drops of mercury are charged to a potential of 2 V each. The drops are joined to form a single drop. The potential of this drop is _____ V.

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 : 70819117606 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A coil of inductance 2 H having negligible resistance is connected to a source of supply whose voltage is given by V=3t volt. (where t is in second). If the voltage is applied when t=0, then the energy stored in the coil after 4 s 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 : 24 Question Id : 70819117607 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A small bob tied at one end of a thin string of length 1 m is describing a vertical circle so that the maximum and minimum tension in the string are in the ratio 5 : 1. The velocity of the bob at the highest position is _____ m/s. (Take g=10 m/s²)

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 : 70819117608 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The potential energy (U) of a diatomic molecule is a function dependent on r (interatomic distance) as

$$U = \frac{\alpha}{r^{10}} - \frac{\beta}{r^5} - 3$$

where, α and β are positive constants. The equilibrium distance between two atoms will be $\left(\frac{2\alpha}{\beta}\right)^{\frac{a}{b}}$, where 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 : 26 Question Id : 70819117609 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The electric field in a region is given by $\vec{E} = \left(\frac{3}{5}E_0\hat{i} + \frac{4}{5}E_0\hat{j}\right)\frac{N}{C}$. The ratio of flux of reported field through the rectangular surface of area 0.2 m² (parallel to $y-z$ plane) to that of the surface of area 0.3 m² (parallel to $x-z$ plane) is a : b, where a = _____ .

[Here $\hat{i}$, $\hat{j}$ and $\hat{k}$ are unit vectors along x, y and z-axes respectively]

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 : 70819117610 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A transmitting station releases waves of wavelength 960 m. A capacitor of 2.56 μF is used in the resonant circuit. The self inductance of coil necessary for resonance is _____ $\times 10^{-8}$ H.

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 : 70819117611 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The same size images are formed by a convex lens when the object is placed at 20 cm or at 10 cm from the lens. The focal length of convex lens 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 : 29 Question Id : 70819117612 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In a certain thermodynamical process, the pressure of a gas depends on its volume as kV^3. The work done when the temperature changes from 100°C to 300°C will be _____ nR, where n denotes number of moles of a gas.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes
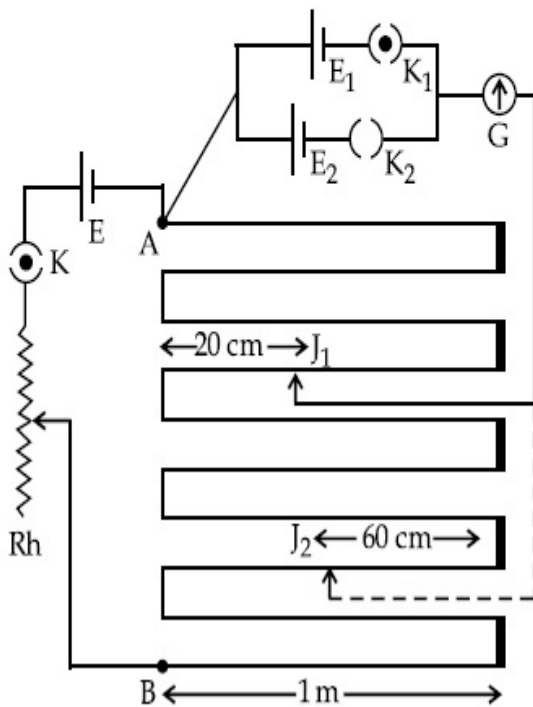
Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 30 Question Id : 70819117613 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In the given circuit of potentiometer, the potential difference E across AB (10 m length) is larger than E_1 and E_2 as well. For key K_1 (closed), the jockey is adjusted to touch the wire at point J_1 so that there is no deflection in the galvanometer. Now the first battery (E_1) is replaced by second battery (E_2) for working by making K_1 open and K_2 closed. The galvanometer gives then null deflection at J_2. The value of $\dfrac{E_1}{E_2}$ is $\dfrac{a}{b}$, where 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

Chemistry Section A

Section Id :	708191714
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 :	708191994
Question Shuffling Allowed :	Yes

Question Number : 31 Question Id : 70819117614 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The plots of radial distribution functions for various orbitals of hydrogen atom against 'r' are given below :

(A)

(B)

(C)

(D)
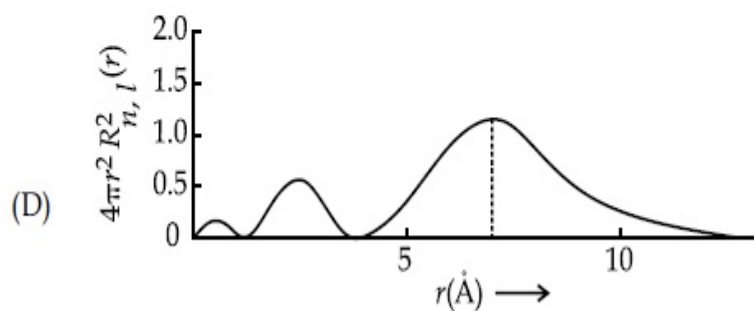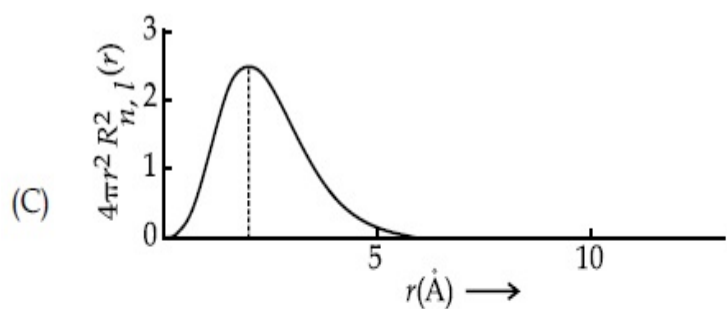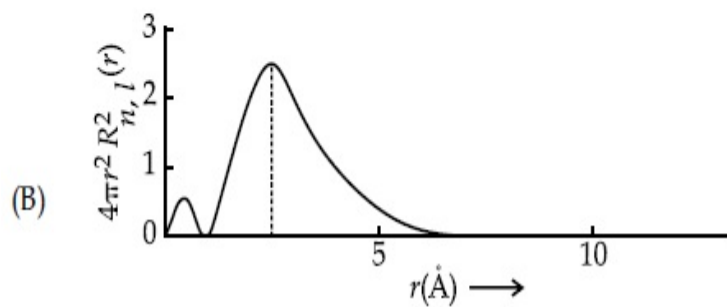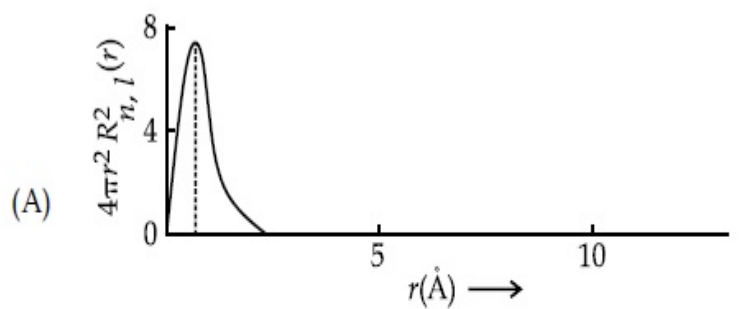
The correct plot for 3s orbital is :

Options :

70819157991. (A)

70819157992. (B)

70819157993. (C)

70819157994. (D)

Question Number : 32 Question Id : 70819117615 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

According to molecular orbital theory, the species among the following that does not exist is :

Options :

70819157995. O_2^{2-}

70819157996. He_2^-

70819157997. Be_2

70819157998. He_2^+

Question Number : 33 Question Id : 70819117616 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The solubility of AgCN in a buffer solution of pH = 3 is x. The value of x is :
[Assume : No cyano complex is formed ; $K_{sp}(AgCN) = 2.2 \times 10^{-16}$ and $K_a(HCN) = 6.2 \times 10^{-10}$]

Options :

70819157999. 0.625×10^{-6}

70819158000. 1.6×10^{-6}

70819158001. 2.2×10^{-16}
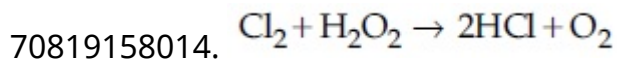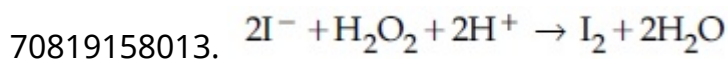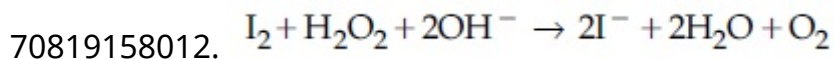
70819158002. 1.9×10^{-5}

Question Number : 34 Question Id : 70819117617 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In Freundlich adsorption isotherm at moderate pressure, the extent of adsorption $\left(\frac{x}{m}\right)$ is

directly proportional to P^x. The value of x is :

Options :

70819158003. 1

70819158004. zero
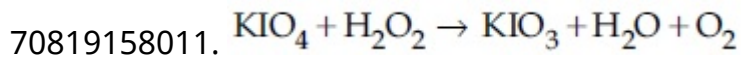
70819158005. ∞

70819158006. $\frac{1}{n}$

Question Number : 35 Question Id : 70819117618 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Ellingham diagram is a graphical representation of :

Options :

70819158007. ΔG vs T

70819158008. ΔH vs T

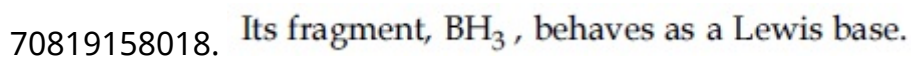70819158009. ΔG vs P

70819158010. $(\Delta G - T\Delta S)$ vs T

Question Number : 36 Question Id : 70819117619 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

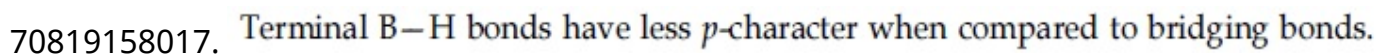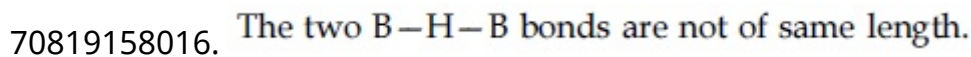Which of the following equation depicts the oxidizing nature of H_2O_2 ?

Options :

70819158011. $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

70819158012. $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

70819158013. $2I^- + H_2O_2 + 2H^+ \rightarrow I_2 + 2H_2O$

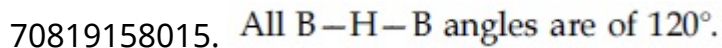70819158014. $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$

Question Number : 37 Question Id : 70819117620 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The correct statement about B_2H_6 is :

Options :

70819158015. All $B-H-B$ angles are of 120°.

70819158016. The two $B-H-B$ bonds are not of same length.

70819158017. Terminal $B-H$ bonds have less p-character when compared to bridging bonds.

70819158018. Its fragment, BH_3, behaves as a Lewis base.

Question Number : 38 Question Id : 70819117621 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I   : CeO_2 can be used for oxidation of aldehydes and ketones.

Statement II   :   Aqueous solution of $EuSO_4$ is a strong reducing agent.

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

Options :

70819158019.   Both Statement I and Statement II are true

70819158020.   Both Statement I and Statement II are false

70819158021.   Statement I is true but Statement II is false

70819158022.   Statement I is false but Statement II is true

Question Number : 39 Question Id : 70819117622 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In which of the following pairs, the outer most electronic configuration will be the same ?

Options :

70819158023. V^{2+} and Cr^+

70819158024. Cr^+ and Mn^{2+}

70819158025. Ni^{2+} and Cu^+

70819158026. Fe^{2+} and Co^+

Question Number : 40 Question Id : 70819117623 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The hybridization and magnetic nature of $[Mn(CN)_6]^{4-}$ and $[Fe(CN)_6]^{3-}$, respectively are :

Options :

70819158027. d^2sp^3 and paramagnetic

70819158028. sp^3d^2 and diamagnetic

70819158029. d^2sp^3 and diamagnetic

70819158030. sp^3d^2 and paramagnetic

Question Number : 41 Question Id : 70819117624 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Given below are two statements :

Statement I : An allotrope of oxygen is an important intermediate in the formation of reducing smog.

Statement II : Gases such as oxides of nitrogen and sulphur present in troposphere contribute to the formation of photochemical smog.

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

Options :

70819158031. Both Statement I and Statement II are true

70819158032. Both Statement I and Statement II are false

70819158033. Statement I is true but Statement II is false

70819158034. Statement I is false but Statement II is true

Question Number : 42 Question Id : 70819117625 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Complete combustion of 1.80 g of an oxygen containing compound ($C_xH_yO_z$) gave 2.64 g of CO_2 and 1.08 g of H_2O. The percentage of oxygen in the organic compound is :
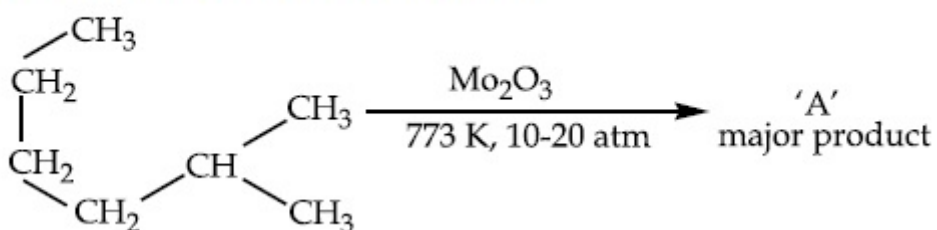
Options :

70819158035. 50.33

70819158036. 53.33

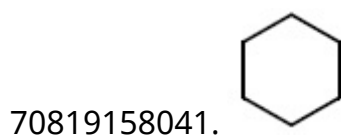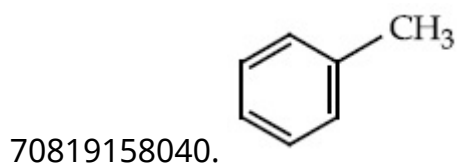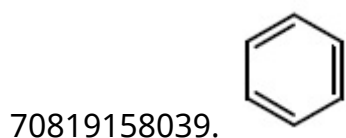70819158037. 63.53

70819158038. 51.63

Question Number : 43 Question Id : 70819117626 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Identify A in the given chemical reaction.

Options :

70819158039.

70819158040.

70819158041.

70819158042.

Question Number : 44 Question Id : 70819117627 Question Type : MCQ Option Shuffling : Yes

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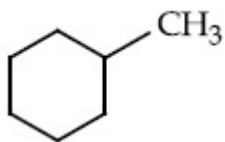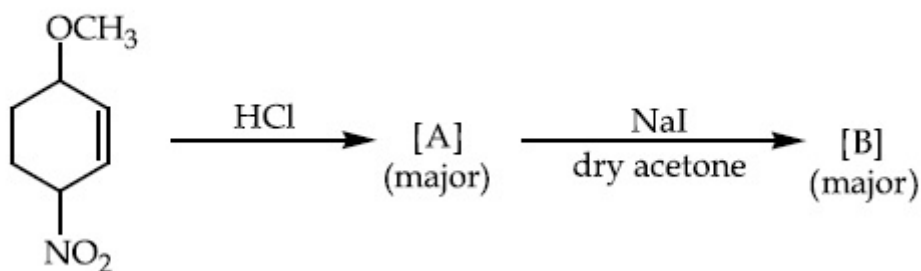
Correct Marks : 4 Wrong Marks : 1

Identify A and B in the chemical reaction.

Options :

70819158043.

70819158044.
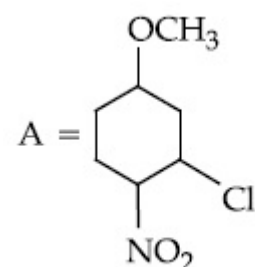
70819158045.

70819158046.

A = (structure: cyclohexane ring with OCH_3 at top, Cl adjacent, NO_2 at bottom)

B = (structure: cyclohexane ring with OCH_3 at top, Cl adjacent lower, NO_2 at bottom)
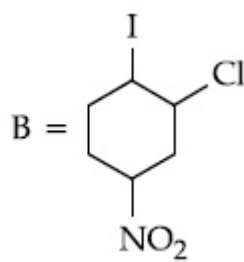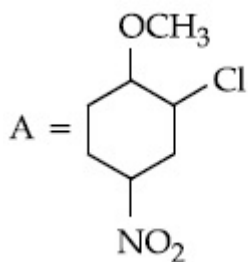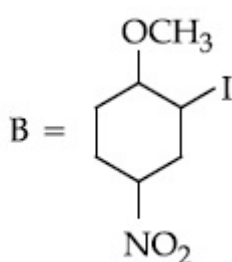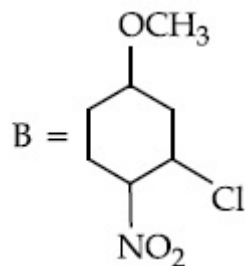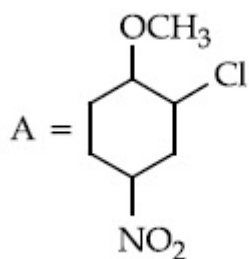
Question Number : 45 Question Id : 70819117628 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The major product of the following chemical reaction is :

$$CH_3CH_2CN \xrightarrow[\text{3) Pd/BaSO}_4, \text{ H}_2]{\substack{\text{1) H}_3\text{O}^+, \Delta \\ \text{2) SOCl}_2}} ?$$

Options :

70819158047. $CH_3CH_2CH_2OH$

70819158048. $(CH_3CH_2CO)_2O$

70819158049. $CH_3CH_2CH_3$

70819158050. CH_3CH_2CHO
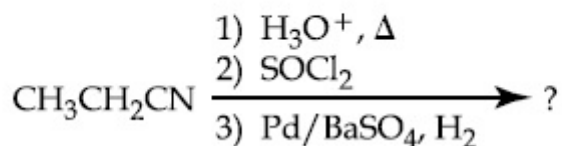
Question Number : 46 Question Id : 70819117629 Question Type : MCQ Option Shuffling : Yes

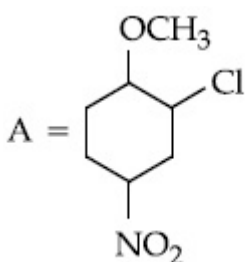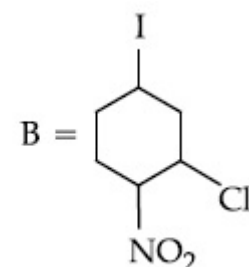**Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

Which one of the following reactions will not form acetaldehyde ?

Options :

70819158051. $CH_2=CH_2 + O_2 \xrightarrow[\text{H}_2\text{O}]{\text{Pd(II)/Cu(II)}}$

70819158052. $CH_3CH_2OH \xrightarrow{CrO_3-H_2SO_4}$

70819158053. $CH_3CN \xrightarrow[\text{ii) } H_2O]{\text{i) DIBAL-H}}$

70819158054. $CH_3CH_2OH \xrightarrow[573 \text{ K}]{Cu}$

Question Number : 47 Question Id : 70819117630 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Compound(s) which will liberate carbon dioxide with sodium bicarbonate solution is/are :

Options :

70819158055.   A and B only

70819158056.   C only

70819158057.   B and C only

70819158058.   B only

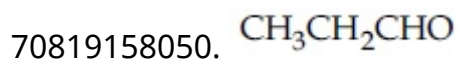**Question Number : 48 Question Id : 70819117631 Question Type : MCQ Option Shuffling : Yes**

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following reaction/s will not give p-aminoazobenzene ?

A – (benzene ring with NO_2) $\xrightarrow{\substack{\text{i) Sn/HCl} \\ \text{ii) HNO}_2 \\ \text{iii) Aniline}}}$

B – (benzene ring with NO_2) $\xrightarrow{\substack{\text{i) NaBH}_4 \\ \text{ii) NaOH} \\ \text{iii) Aniline}}}$

C – (benzene ring with NH_2) $\xrightarrow{\substack{\text{i) HNO}_2 \\ \text{ii) Aniline, HCl}}}$
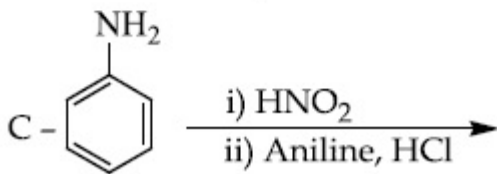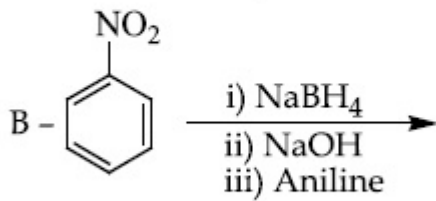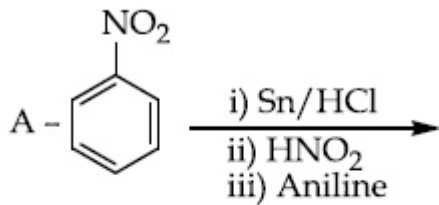
Options :

70819158059. A only

70819158060. C only

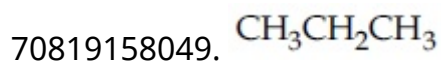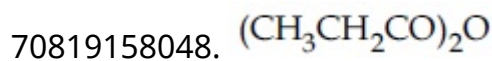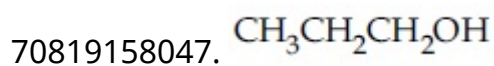70819158061. B only

70819158062. A and B

Question Number : 49 Question Id : 70819117632 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which statement is correct ?

Options :

70819158063. Buna-N is a natural polymer.

70819158064. Buna-S is a synthetic and linear thermosetting polymer.

70819158065. Neoprene is an addition copolymer used in plastic bucket manufacturing.

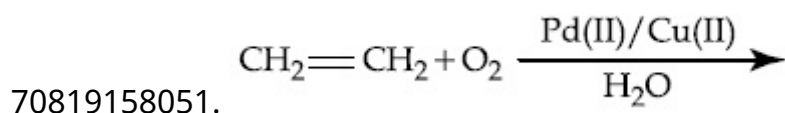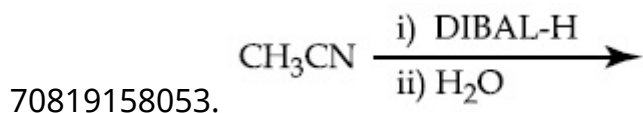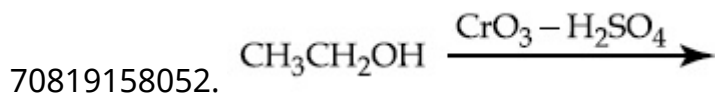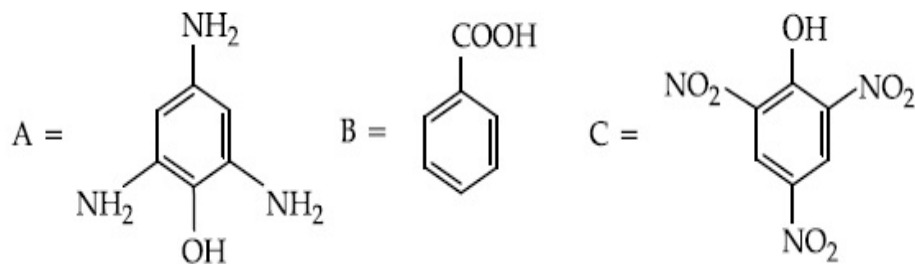70819158066. Synthesis of Buna-S needs nascent oxygen.

Question Number : 50 Question Id : 70819117633 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the glycosidic linkage between galactose and glucose is present in lactose ?

Options :

70819158067. C–1 of galactose and C–4 of glucose

70819158068. C–1 of galactose and C–6 of glucose

70819158069. C–1 of glucose and C–4 of galactose

70819158070. C–1 of glucose and C–6 of galactose

Chemistry Section B

Section Id :	708191715
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 :	708191995

Question Number : 51 Question Id : 70819117634 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

0.4 g mixture of NaOH, Na_2CO_3 and some inert impurities was first titrated with $\dfrac{N}{10}$ HCl using phenolphthalein as an indicator, 17.5 mL of HCl was required at the end point. After this methyl orange was added and titrated. 1.5 mL of same HCl was required for the next end point. The weight percentage of Na_2CO_3 in the mixture 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 : 70819117635 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A car tyre is filled with nitrogen gas at 35 psi at 27°C. It will burst if pressure exceeds 40 psi. The temperature in °C at which the car tyre will burst 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 : 53 Question Id : 70819117636 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The reaction of cyanamide, $NH_2CN_{(s)}$ with oxygen was run in a bomb calorimeter and ΔU was found to be -742.24 kJ mol^{-1}. The magnitude of ΔH_{298} for the reaction

$$NH_2CN_{(s)} + \frac{3}{2}O_{2(g)} \rightarrow N_{2(g)} + O_{2(g)} + H_2O_{(l)}$$

is _____ kJ. (Rounded off to the nearest integer)
[Assume ideal gases and R=8.314 J mol^{-1} K^{-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 : 54 Question Id : 70819117637 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

1 molal aqueous solution of an electrolyte A_2B_3 is 60% ionised. The boiling point of the solution at 1 atm is _____ K. (Rounded-off to the nearest integer)
[Given K_b for (H_2O)=0.52 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 : 55 Question Id : 70819117638 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In basic medium CrO_4^{2-} oxidises $S_2O_3^{2-}$ to form SO_4^{2-} and itself changes into $Cr(OH)_4^{-}$.

The volume of 0.154 M CrO_4^{2-} required to react with 40 mL of 0.25 M $S_2O_3^{2-}$ is _____ mL. (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 : 56 Question Id : 70819117639 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction, $aA + bB \rightarrow cC + dD$, the plot of log k vs $\dfrac{1}{T}$ is given below :

The temperature at which the rate constant of the reaction is 10^{-4} s^{-1} is _____ K. (Rounded-off to the nearest integer)

[Given : The rate constant of the reaction is 10^{-5} s^{-1} at 500 K.]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

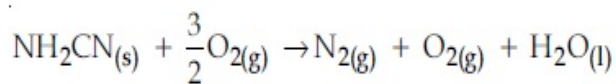**Answers Type :** Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 57 Question Id : 70819117640 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The ionization enthalpy of Na^+ formation from $Na_{(g)}$ is 495.8 kJ mol^{-1}, while the electron gain enthalpy of Br is -325.0 kJ mol^{-1}. Given the lattice enthalpy of NaBr is -728.4 kJ mol^{-1}. The energy for the formation of NaBr ionic solid is $(-)$_____$\times 10^{-1}$ kJ 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 : 70819117641 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Among the following, the number of halide(s) which is/are inert to hydrolysis is _____.
(A) BF_3 (B) $SiCl_4$ (C) PCl_5 (D) SF_6

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 : 70819117642 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the following chemical reaction.

$$CH \equiv CH \xrightarrow[\text{2) CO, HCl, AlCl}_3]{\text{1) Red hot Fe tube, 873 K}} \text{Product}$$
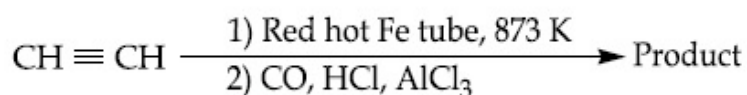
The number of sp^2 hybridized carbon atom(s) present in the product is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes
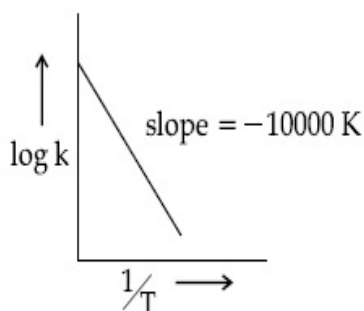
Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 60 Question Id : 70819117643 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Using the provided information in the following paper chromatogram :
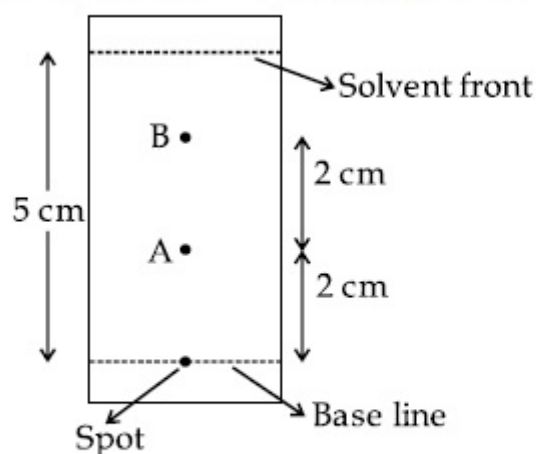
Fig : Paper chromatography for compounds A and B.

the calculated R_f value of A _____ $\times 10^{-1}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Mathematics Section A

Section Id : 708191716

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 :	708191996
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 70819117644 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $f, g : N \to N$ such that $f(n+1) = f(n) + f(1) \ \forall \ n \in N$ and g be any arbitrary function. Which of the following statements is NOT true ?

Options :

70819158081. If f is onto, then $f(n) = n \ \forall \ n \in N$

70819158082. f is one-one

70819158083. If g is onto, then fog is one-one

70819158084. If fog is one-one, then g is one-one

Question Number : 62 Question Id : 70819117645 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let the lines $(2 - i)z = (2 + i)\bar{z}$ and $(2 + i)z + (i - 2)\bar{z} - 4i = 0$, (here $i^2 = -1$) be normal to a circle C. If the line $iz + \bar{z} + 1 + i = 0$ is tangent to this circle C, then its radius is :

Options :

70819158085. $3\sqrt{2}$

70819158086. $\dfrac{1}{2\sqrt{2}}$

70819158087. $\dfrac{3}{2\sqrt{2}}$

70819158088. $\dfrac{3}{\sqrt{2}}$

Question Number : 63 Question Id : 70819117646 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The integer 'k', for which the inequality $x^2 - 2(3k-1)x + 8k^2 - 7 > 0$ is valid for every x in $\mathbf{R}$, is :

Options :

70819158089. 2

70819158090. 3

70819158091. 4

70819158092. 0

Question Number : 64 Question Id : 70819117647 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $0 < \theta, \phi < \dfrac{\pi}{2}$, $x = \displaystyle\sum_{n=0}^{\infty} \cos^{2n}\theta$, $y = \displaystyle\sum_{n=0}^{\infty} \sin^{2n}\phi$ and $z = \displaystyle\sum_{n=0}^{\infty} \cos^{2n}\theta \cdot \sin^{2n}\phi$ then :

Options :

70819158093. $xy - z = (x + y)z$

70819158094. $xy + z = (x + y)z$

70819158095. $xy + yz + zx = z$

70819158096. $xyz = 4$

Question Number : 65 Question Id : 70819117648 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If Rolle's theorem holds for the function $f(x) = x^3 - ax^2 + bx - 4$, $x \in [1, 2]$ with $f'\left(\dfrac{4}{3}\right) = 0$,

then ordered pair (a, b) is equal to :

Options :

70819158097. $(5, 8)$

70819158098. $(5, -8)$

70819158099. $(-5, 8)$

70819158100. $(-5, -8)$

Question Number : 66 Question Id : 70819117649 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$$\lim_{n \to \infty} \left(1 + \frac{1 + \frac{1}{2} + \cdots + \frac{1}{n}}{n^2} \right)^n \text{ is equal to :}$$

Options :

70819158101. 0

70819158102. $\dfrac{1}{2}$

70819158103. $\dfrac{1}{e}$

70819158104. 1

Question Number : 67 Question Id : 70819117650 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of the integral

$$\int \frac{\sin\theta . \sin 2\theta \, (\sin^6\theta + \sin^4\theta + \sin^2\theta) \sqrt{2\sin^4\theta + 3\sin^2\theta + 6}}{1 - \cos 2\theta} \, d\theta \text{ is :}$$

(where c is a constant of integration)

Options :

70819158105. $\dfrac{1}{18} \left[9 - 2\sin^6\theta - 3\sin^4\theta - 6\sin^2\theta \right]^{\frac{3}{2}} + c$

70819158106. $\dfrac{1}{18} \left[9 - 2\cos^6\theta - 3\cos^4\theta - 6\cos^2\theta \right]^{\frac{3}{2}} + c$

70819158107. $\dfrac{1}{18} \left[11 - 18\sin^2\theta + 9\sin^4\theta - 2\sin^6\theta \right]^{\frac{3}{2}} + c$

70819158108. $\dfrac{1}{18}\left[11 - 18\cos^2\theta + 9\cos^4\theta - 2\cos^6\theta\right]^{\frac{3}{2}} + c$

Question Number : 68 Question Id : 70819117651 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\displaystyle\int_{-1}^{1} x^2 e^{[x^3]} dx$, where [t] denotes the greatest integer $\leq$ t, is :

Options :

70819158109. $\dfrac{e + 1}{3}$

70819158110. $\dfrac{1}{3e}$

70819158111. $\dfrac{e - 1}{3e}$

70819158112. $\dfrac{e + 1}{3e}$

Question Number : 69 Question Id : 70819117652 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If a curve passes through the origin and the slope of the tangent to it at any point (x, y) is

$\dfrac{x^2 - 4x + y + 8}{x - 2}$, then this curve also passes through the point :

Options :

70819158113. (4, 5)

70819158114. $(5, 5)$

70819158115. $(5, 4)$

70819158116. $(4, 4)$

Question Number : 70 Question Id : 70819117653 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The image of the point (3, 5) in the line $x - y + 1 = 0$, lies on :

Options :

70819158117. $(x - 4)^2 + (y + 2)^2 = 16$

70819158118. $(x - 2)^2 + (y - 4)^2 = 4$

70819158119. $(x - 4)^2 + (y - 4)^2 = 8$

70819158120. $(x - 2)^2 + (y - 2)^2 = 12$

Question Number : 71 Question Id : 70819117654 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A tangent is drawn to the parabola $y^2 = 6x$ which is perpendicular to the line $2x + y = 1$.
Which of the following points does NOT lie on it ?

Options :

70819158121. $(0, 3)$

70819158122. $(-6, 0)$

70819158123.   (5, 4)

70819158124.   (4, 5)

Question Number : 72 Question Id : 70819117655 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the curves, $\dfrac{x^2}{a} + \dfrac{y^2}{b} = 1$ and $\dfrac{x^2}{c} + \dfrac{y^2}{d} = 1$ intersect each other at an angle of 90°, then which of the following relations is TRUE ?

Options :

70819158125. $a + b = c + d$

70819158126. $a - b = c - d$

70819158127. $ab = \dfrac{c + d}{a + b}$

70819158128. $a - c = b + d$

Question Number : 73 Question Id : 70819117656 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let α be the angle between the lines whose direction cosines satisfy the equations $l + m - n = 0$ and $l^2 + m^2 - n^2 = 0$. Then the value of $\sin^4\alpha + \cos^4\alpha$ is :

Options :

70819158129. $\dfrac{5}{8}$

70819158130. $\dfrac{3}{8}$

70819158131. $\dfrac{1}{2}$

70819158132. $\dfrac{3}{4}$

Question Number : 74 Question Id : 70819117657 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The equation of the line through the point (0, 1, 2) and perpendicular to the line

$\dfrac{x-1}{2} = \dfrac{y+1}{3} = \dfrac{z-1}{-2}$ is :

Options :

70819158133. $\dfrac{x}{3} = \dfrac{y-1}{4} = \dfrac{z-2}{-3}$

70819158134. $\dfrac{x}{-3} = \dfrac{y-1}{4} = \dfrac{z-2}{3}$

70819158135. $\dfrac{x}{3} = \dfrac{y-1}{-4} = \dfrac{z-2}{3}$

70819158136. $\dfrac{x}{3} = \dfrac{y-1}{4} = \dfrac{z-2}{3}$

Question Number : 75 Question Id : 70819117658 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

When a missile is fired from a ship, the probability that it is intercepted is $\frac{1}{3}$ and the probability

that the missile hits the target, given that it is not intercepted, is $\frac{3}{4}$. If three missiles are fired

independently from the ship, then the probability that all three hit the target, is :

Options :

70819158137. $\frac{1}{27}$

70819158138. $\frac{1}{8}$

70819158139. $\frac{3}{8}$

70819158140. $\frac{3}{4}$

Question Number : 76 Question Id : 70819117659 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The coefficients a, b and c of the quadratic equation, $ax^2 + bx + c = 0$ are obtained by throwing
a dice three times. The probability that this equation has equal roots is :

Options :

70819158141. $\frac{1}{36}$

70819158142. $\frac{1}{54}$

70819158143. $\frac{1}{72}$

70819158144. $\dfrac{5}{216}$

Question Number : 77 Question Id : 70819117660 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

All possible values of $\theta \in [0, 2\pi]$ for which $\sin 2\theta + \tan 2\theta > 0$ lie in :

Options :

70819158145. $\left(0, \dfrac{\pi}{2}\right) \cup \left(\pi, \dfrac{3\pi}{2}\right)$

70819158146. $\left(0, \dfrac{\pi}{4}\right) \cup \left(\dfrac{\pi}{2}, \dfrac{3\pi}{4}\right) \cup \left(\dfrac{3\pi}{2}, \dfrac{11\pi}{6}\right)$

70819158147. $\left(0, \dfrac{\pi}{2}\right) \cup \left(\dfrac{\pi}{2}, \dfrac{3\pi}{4}\right) \cup \left(\pi, \dfrac{7\pi}{6}\right)$

70819158148. $\left(0, \dfrac{\pi}{4}\right) \cup \left(\dfrac{\pi}{2}, \dfrac{3\pi}{4}\right) \cup \left(\pi, \dfrac{5\pi}{4}\right) \cup \left(\dfrac{3\pi}{2}, \dfrac{7\pi}{4}\right)$

Question Number : 78 Question Id : 70819117661 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The total number of positive integral solutions (x, y, z) such that $xyz = 24$ is :

Options :

70819158149. 24

70819158150. 30

70819158151. 36

70819158152. ^{45}

Question Number : 79 Question Id : 70819117662 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A man is observing, from the top of a tower, a boat speeding towards the tower from a certain point A, with uniform speed. At that point, angle of depression of the boat with the man's eye is 30° (Ignore man's height). After sailing for 20 seconds, towards the base of the tower (which is at the level of water), the boat has reached a point B, where the angle of depression is 45°. Then the time taken (in seconds) by the boat from B to reach the base of the tower is :

Options :

70819158153. 10

70819158154. $10(\sqrt{3} + 1)$

70819158155. $10\sqrt{3}$

70819158156. $10(\sqrt{3} - 1)$

Question Number : 80 Question Id : 70819117663 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The statement $A \rightarrow (B \rightarrow A)$ is equivalent to :

Options :

70819158157. $A \rightarrow (A \rightarrow B)$

70819158158. $A \rightarrow (A \vee B)$

70819158159. $A \rightarrow (A \wedge B)$

70819158160. $A \rightarrow (A \leftrightarrow B)$

Mathematics Section B

Section Id :	708191717
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 :	708191997
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 70819117664 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $A = \begin{bmatrix} 0 & -\tan\left(\frac{\theta}{2}\right) \\ \tan\left(\frac{\theta}{2}\right) & 0 \end{bmatrix}$ and $(I_2 + A)(I_2 - A)^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then $13(a^2 + b^2)$ 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 : 70819117665 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $A = \begin{bmatrix} x & y & z \\ y & z & x \\ z & x & y \end{bmatrix}$, where x, y and z are real numbers such that $x+y+z > 0$ and $xyz = 2$.

If $A^2 = I_3$, then the value of $x^3 + y^3 + z^3$ 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 : 83 Question Id : 70819117666 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the system of equations

$$kx + y + 2z = 1$$
$$3x - y - 2z = 2$$
$$-2x - 2y - 4z = 3$$

has infinitely many solutions, then k 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 : 70819117667 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The total number of numbers, lying between 100 and 1000 that can be formed with the digits 1, 2, 3, 4, 5, if the repetition of digits is not allowed and numbers are divisible by either 3 or 5, 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 : 70819117668 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $A_1, A_2, A_3, ...$ be squares such that for each $n \geqslant 1$, the length of the side of A_n equals the length of diagonal of A_{n+1}. If the length of A_1 is 12 cm, then the smallest value of n for which area of A_n is less than one, 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 : 70819117669 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of points, at which the function $f(x) = |2x+1| - 3|x+2| + |x^2 + x - 2|$, $x \in R$ is not differentiable, 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 : 70819117670 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $f(x)$ be a polynomial of degree 6 in x, in which the coefficient of x^6 is unity and it has extrema at $x=-1$ and $x=1$. If $\lim\limits_{x \to 0} \dfrac{f(x)}{x^3} = 1$, then $5 \cdot f(2)$ 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 : 88 Question Id : 70819117671 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The graphs of sine and cosine functions, intersect each other at a number of points and between two consecutive points of intersection, the two graphs enclose the same area A. Then A^4 is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

Question Number : 89 Question Id : 70819117672 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The locus of the point of intersection of the lines $(\sqrt{3})kx + ky - 4\sqrt{3} = 0$ and $\sqrt{3}x - y - 4(\sqrt{3})k = 0$ is a conic, whose eccentricity is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

Question Number : 90 Question Id : 70819117673 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = \hat{i} - \hat{j}$ and $\vec{c} = \hat{i} - \hat{j} - \hat{k}$ be three given vectors. If $\vec{r}$ is a vector such that $\vec{r} \times \vec{a} = \vec{c} \times \vec{a}$ and $\vec{r} \cdot \vec{b} = 0$, then $\vec{r} \cdot \vec{a}$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :