A spaceship in space sweeps stationary interplanetary dust. As a result, its mass increases at a rate \( \frac{dM(t)}{dt} = b v^2(t) \), where \( v(t) \) is its instantaneous velocity. The instantaneous acceleration of the satellite is:

Options

1. \(-bv^3(t)\)
2. \(-\frac{bv^3}{M(t)}\)
3. \(\frac{2bv^3}{M(t)}\)
4. \(-\frac{bv^3}{2M(t)}\)
Q.2  Ten charges are placed on the circumference of a circle of radius R with constant angular separation between successive charges. Alternate charges 1, 3, 5, 7, 9 have charge (+q) each, while 2, 4, 6, 8, 10 have charge (−q) each. The potential V and the electric field E at the centre of the circle are respectively:
(Take V = 0 at infinity)

Options:
1. \[ V = \frac{10q}{4\pi \varepsilon_0 R}; \quad E = 0 \]
2. \[ V = 0; \quad E = \frac{10q}{4\pi \varepsilon_0 R^2} \]
3. \[ V = 0; \quad E = 0 \]
4. \[ V = \frac{10q}{4\pi \varepsilon_0 R}; \quad E = \frac{10q}{4\pi \varepsilon_0 R^2} \]

Question Type: MCQ
Question ID: 40503611840
Option 1 ID: 40503642854
Option 2 ID: 40503642853
Option 3 ID: 40503642852
Option 4 ID: 40503642855
Status: Answered
Chosen Option: 1
Q.3 An infinitely long straight wire carrying current I, one side opened rectangular loop and a conductor C with a sliding connector are located in the same plane, as shown in the figure. The connector has length l and resistance R. It slides to the right with a velocity v. The resistance of the conductor and the self inductance of the loop are negligible. The induced current in the loop, as a function of separation r, between the connector and the straight wire is:

Options:
1. \( \frac{\mu_0}{4\pi} \frac{Ivl}{Rr} \)
2. \( \frac{\mu_0}{\pi} \frac{Ivl}{Rr} \)
3. \( \frac{2\mu_0}{\pi} \frac{Ivl}{Rr} \)
4. \( \frac{\mu_0}{2\pi} \frac{Ivl}{Rr} \)
Q.4 In the circuit shown, charge on the 5 μF capacitor is:

\[ \text{Options:} 
\begin{align*}
1. & \quad 18.00 \mu C \\
2. & \quad 10.90 \mu C \\
3. & \quad 16.36 \mu C \\
4. & \quad 5.45 \mu C
\end{align*}
\]

Q.5 A galvanometer is used in laboratory for detecting the null point in electrical experiments. If, on passing a current of 6 mA it produces a deflection of 2°, its figure of merit is close to:

\[ \text{Options:} 
\begin{align*}
1. & \quad 333^\circ \text{ A/ div.} \\
2. & \quad 6 \times 10^{-3} \text{ A/ div.} \\
3. & \quad 666^\circ \text{ A/ div.} \\
4. & \quad 3 \times 10^{-3} \text{ A/ div.}
\end{align*}
\]
Q.6 The correct match between the entries in column I and column II are:

<table>
<thead>
<tr>
<th>I</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation</td>
<td>Wavelength</td>
</tr>
<tr>
<td>(a) Microwave</td>
<td>(i) 100 m</td>
</tr>
<tr>
<td>(b) Gamma rays</td>
<td>(ii) 10^{-15} m</td>
</tr>
<tr>
<td>(c) A.M. radio waves</td>
<td>(iii) 10^{-10} m</td>
</tr>
<tr>
<td>(d) X-rays</td>
<td>(iv) 10^{-3} m</td>
</tr>
</tbody>
</table>

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

Question Type: MCQ
Question ID: 40503611846
Option 1 ID: 40503642879
Option 2 ID: 40503642877
Option 3 ID: 40503642878
Option 4 ID: 40503642876
Status: Answered
Chosen Option: 4
Two coherent sources of sound, $S_1$ and $S_2$, produce sound waves of the same wavelength, $\lambda = 1 \text{ m}$, in phase. $S_1$ and $S_2$ are placed 1.5 m apart (see fig). A listener, located at $L$, directly in front of $S_2$ finds that the intensity is at a minimum when he is 2 m away from $S_2$. The listener moves away from $S_1$, keeping his distance from $S_2$ fixed. The adjacent maximum of intensity is observed when the listener is at a distance $d$ from $S_1$. Then, $d$ is:

![Diagram]

Options:
1. 12 m
2. 5 m
3. 2 m
4. 3 m
Q.8 Two different wires having lengths $L_1$ and $L_2$, and respective temperature coefficient of linear expansion $\alpha_1$ and $\alpha_2$, are joined end-to-end. Then the effective temperature coefficient of linear expansion is:

Options

1. $\frac{\alpha_1 L_1 + \alpha_2 L_2}{L_1 + L_2}$

2. $2\sqrt{\alpha_1 \alpha_2}$

3. $\frac{\alpha_1 + \alpha_2}{2}$

4. $\frac{L_2 L_1}{\alpha_1 + \alpha_2} \left(\frac{L_1}{L_2 + L_1}\right)^2$

Question Type: MCQ
Question ID: 40503611836
Option 1 ID: 40503642838
Option 2 ID: 40503642839
Option 3 ID: 40503642837
Option 4 ID: 40503642836
Status: Not Answered
Chosen Option: --

Q.9 The velocity ($v$) and time ($t$) graph of a body in a straight line motion is shown in the figure. The point $S$ is at 4.333 seconds. The total distance covered by the body in 6 s is:

Options

1. $\frac{37}{3}$ m

2. 12 m

3. 11 m

4. 49 m

Question Type: MCQ
Question ID: 40503611832
Option 1 ID: 40503642820
Option 2 ID: 40503642823
Option 3 ID: 40503642821
Option 4 ID: 40503642822
Status: Not Answered
Chosen Option: --
Q.10  In an experiment to verify Stokes law, a small spherical ball of radius \( r \) and density \( \rho \) falls under gravity through a distance \( h \) in air before entering a tank of water. If the terminal velocity of the ball inside water is same as its velocity just before entering the water surface, then the value of \( h \) is proportional to:

(\text{ignore viscosity of air})

Options 1. \( r^4 \)  
2. \( r \)  
3. \( r^3 \)  
4. \( r^2 \)

Q.11  A parallel plate capacitor has plate of length ‘\( l \)’, width ‘\( w \)’ and separation of plates is ‘\( d \)’. It is connected to a battery of emf \( V \). A dielectric slab of the same thickness ‘\( d \)’ and of dielectric constant \( k=4 \) is being inserted between the plates of the capacitor. At what length of the slab inside plates, will the energy stored in the capacitor be two times the initial energy stored?

Options 1. \( 2l/3 \)  
2. \( l/3 \)  
3. \( l/4 \)  
4. \( l/2 \)
Q.12
A driver in a car, approaching a vertical wall notices that the frequency of his car horn, has changed from 440 Hz to 480 Hz, when it gets reflected from the wall. If the speed of sound in air is 345 m/s, then the speed of the car is:

Options
1. 54 km/hr
2. 36 km/hr
3. 18 km/hr
4. 24 km/hr

Question Type: MCQ
Question ID: 40503611839
Option 1 ID: 40503642848
Option 2 ID: 40503642849
Option 3 ID: 40503642851
Option 4 ID: 40503642850
Status: Not Answered
Chosen Option: --

Q.13
A ring is hung on a nail. It can oscillate, without slipping or sliding (i) in its plane with a time period $T_1$ and, (ii) back and forth in a direction perpendicular to its plane, with a period $T_2$. The ratio $\frac{T_1}{T_2}$ will be:

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

Question Type: MCQ
Question ID: 40503611834
Option 1 ID: 40503642830
Option 2 ID: 40503642828
Option 3 ID: 40503642831
Option 4 ID: 40503642829
Status: Not Answered
Chosen Option: --
Two Zener diodes (A and B) having breakdown voltages of 6 V and 4 V respectively, are connected as shown in the circuit below. The output voltage $V_o$ variation with input voltage linearly increasing with time, is given by:

$V_{\text{input}} = 0 \text{ V at } t = 0$

(figures are qualitative)

Options

1. $V_o$ - 4 V
2. $V_o$ - 4 V
3. $V_o$ - 6 V
4. $V_o$ - 6 V

Question Type: MCQ
Question ID: 40503611349
Option 1 ID: 40503642099
Option 2 ID: 40503642091
Option 3 ID: 40503642088
Option 4 ID: 40503642090
Status: Not Answered
Chosen Option: --
Q.16
A radioactive nucleus decays by two different processes. The half-life for the first process is 10 s and that for the second is 100 s. The effective half-life of the nucleus is close to:

Options
1. 9 sec.
2. 6 sec.
3. 55 sec.
4. 12 sec.

Question Type: MCQ
Question ID: 40503611848
Option 1 ID: 4050364287
Option 2 ID: 40503642886
Option 3 ID: 40503642885
Option 4 ID: 40503642884
Status: Not Answered
Chosen Option: --

Q.16
The quantities \( x = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} \), \( y = \frac{E}{B} \) and \( z = \frac{1}{CR} \) are defined where \( \varepsilon \) capacitance, \( R \) Resistance, \( l \) length, \( E \) Electric field, \( B \) magnetic field and \( \varepsilon_0, \mu_0 \) - free space permittivity and permeability respectively. Then:

Options
1. \( x, y \) and \( z \) have the same dimension.
2. Only \( x \) and \( z \) have the same dimension.
3. Only \( x \) and \( y \) have the same dimension.
4. Only \( y \) and \( z \) have the same dimension.

Question Type: MCQ
Question ID: 40503611831
Option 1 ID: 40503642819
Option 2 ID: 40503642818
Option 3 ID: 40503642816
Option 4 ID: 40503642817
Status: Not Answered
Chosen Option: --
Q. 17
In an adiabatic process, the density of a diatomic gas becomes 32 times its initial value. The final pressure of the gas is found to be n times the initial pressure. The value of n is:

Options
1. 32
2. 326
3. 128
4. \( \frac{1}{32} \)

Question Type: MCQ
Question ID: 40503611838
Option 1 ID: 40503642846
Option 2 ID: 40503642847
Option 3 ID: 40503642844
Option 4 ID: 40503642845
Status: Not Answered
Chosen Option: --

Q. 18
The acceleration due to gravity on the earth’s surface at the poles is \( g \) and angular velocity of the earth about the axis passing through the pole is \( \omega \). An object is weighed at the equator and at a height \( h \) above the poles by using a spring balance. If the weights are found to be same, then \( h \) is: (\( h<<R \), where \( R \) is the radius of the earth)

Options
1. \( \frac{R^2 \omega^2}{2g} \)
2. \( \frac{R^2 \omega^2}{g} \)
3. \( \frac{R^2 \omega^2}{4g} \)
4. \( \frac{R^2 \omega^2}{8g} \)

Question Type: MCQ
Question ID: 40503611835
Option 1 ID: 40503642835
Option 2 ID: 40503642832
Option 3 ID: 40503642833
Option 4 ID: 40503642834
Status: Not Answered
Chosen Option: --
Q.19 In the circuit, given in the figure currents in different branches and value of one resistor are shown. Then potential at point B with respect to the point A is:

Options 1. +2 V
2. -2 V
3. -1 V
4. +1 V

Question Type: MCQ
Question ID: 40503611842
Option 1 ID: 40503642262
Option 2 ID: 40503642863
Option 3 ID: 40503642861
Option 4 ID: 40503642860
Status: Not Answered
Chosen Option: --

Q.20 An iron rod of volume $10^{-3}$ m$^3$ and relative permeability 1000 is placed as core in a solenoid with 10 turns/cm. If a current of 0.5 A is passed through the solenoid, then the magnetic moment of the rod will be:

Options 1. $50 \times 10^2$ Am$^2$
2. $5 \times 10^2$ Am$^2$
3. $500 \times 10^2$ Am$^2$
4. $0.5 \times 10^2$ Am$^2$

Question Type: MCQ
Question ID: 40503611845
Option 1 ID: 40503642273
Option 2 ID: 40503642872
Option 3 ID: 40503642874
Option 4 ID: 40503642875
Status: Not Answered
Chosen Option: --
Q.21 A body of mass 2 kg is driven by an engine delivering a constant power of 1 J/s. The body starts from rest and moves in a straight line. After 9 seconds, the body has moved a distance (in m) __________.

Given --
Answer:

Question Type : SA
Question ID : 40503611851
Status : Not Answered

Q.22 Nitrogen gas is at 300°C temperature. The temperature (in K) at which the rms speed of a H₂ molecule would be equal to the rms speed of a nitrogen molecule, is __________.
(Molar mass of N₂ gas 28 g).

Given --
Answer:

Question Type : SA
Question ID : 40503611853
Status : Not Answered

Q.23 A prism of angle A = 1° has a refractive index μ = 1.5. A good estimate for the minimum angle of deviation (in degrees) is close to N/10. Value of N is __________.

Given --
Answer:

Question Type : SA
Question ID : 40503611854
Status : Not Answered

Q.24 The surface of a metal is illuminated alternately with photons of energies \( E_1 = 4 \text{ eV} \) and \( E_2 = 2.5 \text{ eV} \) respectively. The ratio of maximum speeds of the photoelectrons emitted in the two cases is 2. The work function of the metal in (eV) is __________.

Given 45
Answer:

Question Type : SA
Question ID : 40503611855
Status : Answered
Q.25
A thin rod of mass 0.9 kg and length 1 m is suspended, at rest, from one end so that it can freely oscillate in the vertical plane. A particle of move 0.1 kg moving in a straight line with velocity 80 m/s hits the rod at its bottom most point and sticks to it (see figure). The angular speed (in rad/s) of the rod immediately after the collision will be __________.

Given --
Answer:

Question Type : SA
Question ID : 40503611852
Status : Not Answered

Section : Chemistry
The final major product of the following reaction is:

\[ \text{Me} \quad \text{NH}_2 \]

(i) \( \text{Ac}_2\text{O} / \text{Pyridine} \)
(ii) \( \text{Br}_2, \text{FeCl}_3 \)
(iii) \( \text{OH}^- / \Delta \)

Options

1. 

2. 

3. 

4. 

Question Type: MCQ
Question ID: 40503611857
Option 1 ID: 40503642907
Option 2 ID: 40503642906
Option 3 ID: 40503642908
Option 4 ID: 40503642905
Status: Answered
Chosen Option: 4
Q.2 Among the following compounds, geometrical isomerism is exhibited by:

Options

1.

2.

3.

4.

Question Type: MCQ
Question ID: 40503611856
Option 1 ID: 40503642902
Option 2 ID: 40503642903
Option 3 ID: 40503642904
Option 4 ID: 40503642901
Status: Answered
Chosen Option: 2
Q.3 Adsorption of a gas follows Freundlich adsorption isotherm. If \( x \) is the mass of the gas adsorbed on mass \( m \) of the adsorbent, the correct plot of \( \frac{x}{m} \) versus \( p \) is:

Options

1. \( \frac{x}{m} \)
   - 200 K
   - 250 K
   - 270 K

2. \( \frac{x}{m} \)
   - 270 K
   - 250 K
   - 200 K

3. \( \frac{x}{m} \)
   - 270 K
   - 250 K
   - 200 K

4. \( \frac{x}{m} \)
   - 200 K
   - 250 K
   - 270 K
Q.4 An element crystallises in a face-centred cubic (fcc) unit cell with cell edge $a$. The distance between the centres of two nearest octahedral voids in the crystal lattice is:

Options
1. $\frac{a}{\sqrt{2}}$
2. $a$
3. $\sqrt{2}a$
4. $\frac{a}{2}$

Question Type: MCQ
Question ID: 40503611870
Option 1 ID: 40503642959
Option 2 ID: 40503642958
Option 3 ID: 40503642957
Option 4 ID: 40503642960
Status: Not Answered
Chosen Option: --

Q.5 Consider the complex ions, $\text{trans}-[\text{Co(en)}_2\text{Cl}_2]^+$ (A) and $\text{cis}-[\text{Co(en)}_2\text{Cl}_2]^+$ (B). The correct statement regarding them is:

Options
1. both (A) and (B) cannot be optically active.
2. (A) can be optically active, but (B) cannot be optically active.
3. both (A) and (B) can be optically active.
4. (A) cannot be optically active, but (B) can be optically active.

Question Type: MCQ
Question ID: 40503611869
Option 1 ID: 40503642954
Option 2 ID: 40503642955
Option 3 ID: 40503642953
Option 4 ID: 40503642956
Status: Answered
Chosen Option: 2
Q.6 The increasing order of boiling points of the following compounds is:

I. II. III. IV.

Options:
1. I < III < IV < II
2. I < IV < III < II
3. IV < I < II < III
4. III < I < II < IV

Q.7 The correct order of the ionic radii of $O^{2-}$, $N^{3-}$, $F^-$, $Mg^{2+}$, $Na^+$ and $Al^{3+}$ is:

Options:
1. $N^{3-} < O^{2-} < F^- < Na^+ < Mg^{2+} < Al^{3+}$
2. $Al^{3+} < Na^+ < Mg^{2+} < O^{2-} < F^- < N^{3-}$
3. $Al^{3+} < Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$
4. $N^{3-} < F^- < O^{2-} < Mg^{2+} < Na^+ < Al^{3+}$
Q.3 Which one of the following polymers is not obtained by condensation polymerisation?

Options:
1. Nylon 6, 6
2. Buna - N
3. Bakelite
4. Nylon 6

Question Type: MCQ
Question ID: 40503611858
Option 1 ID: 40503642909
Option 2 ID: 40503642912
Option 3 ID: 40503642911
Option 4 ID: 40503642910
Status: Not Answered
Chosen Option: --
Q.9 The major product of the following reaction is:

\[ \text{HO} \quad \text{CH}_2\text{CH}_3 \quad \xrightarrow{\text{H}_2\text{SO}_4} \quad \text{O} \]

Options

1. \[ \text{CH}_2\text{CH}_3 \quad \text{O} \quad \text{CH}_2\text{CH}_3 \]
2. \[ \text{CH}_2\text{CH}_3 \quad \text{O} \quad \text{CH} = \text{CH}_2 \]
3. \[ \text{CH}_2\text{CH}_3 \quad \text{O} \quad \text{CHCH}_3 \]
4. \[ \text{CH}_2\text{CH}_3 \quad \text{O} \]

Question Type: MCQ
Question ID: 40503611360
Option 1 ID: 40503642918
Option 2 ID: 40503642919
Option 3 ID: 40503642920
Option 4 ID: 40503642917
Status: Answered
Choose Option: 1
G.10 Hydrogen peroxide, in the pure state, is:

Options
1. non-planar and almost colorless
2. linear and blue in color
3. linear and almost colorless
4. planar and blue in color

Question Type: MCQ
Question ID: 40503611865
Option 1 ID: 40503642939
Option 2 ID: 40503642940
Option 3 ID: 40503642937
Option 4 ID: 40503642938
Status: Answered
Chosen Option: 1

G.11 The rate constant (k) of a reaction is measured at different temperatures (T), and the data are plotted in the given figure. The activation energy of the reaction in kJ mol⁻¹ is: (R is gas constant)

![Graph showing ln(k) vs. 1/T]

Options
1. 2/R
2. 1/R
3. R
4. 2R

Question Type: MCQ
Question ID: 40503611874
Option 1 ID: 40503642975
Option 2 ID: 40503642974
Option 3 ID: 40503642973
Option 4 ID: 40503642976
Status: Not Answered
Chosen Option: --
Q.12 Lattice enthalpy and enthalpy of solution of NaCl are 788 kJ mol\(^{-1}\) and 4 kJ mol\(^{-1}\), respectively. The hydration enthalpy of NaCl is:

Options
1. \(-780 \text{ kJ mol}^{-1}\)
2. 780 kJ mol\(^{-1}\)
3. \(-784 \text{ kJ mol}^{-1}\)
4. 784 kJ mol\(^{-1}\)

Question Type: MCQ
Question ID: 405036111872
Option 1 ID: 40503642967
Option 2 ID: 40503642965
Option 3 ID: 40503642968
Option 4 ID: 40503642966
Status: Not Answered
Chosen Option: --

Q.13 The one that is NOT suitable for the removal of permanent hardness of water is:

Options
1. Clark’s method
2. Ion-exchange method
3. Calgon’s method
4. Treatment with sodium carbonate

Question Type: MCQ
Question ID: 40503611966
Option 1 ID: 40503642944
Option 2 ID: 40503642941
Option 3 ID: 40503642943
Option 4 ID: 40503642942
Status: Not Answered
Chosen Option: --
Q.14 The compound that has the largest H–M–H bond angle (M = N, O, S, C), is:

Options
1. H₂O
2. NH₃
3. H₂S
4. CH₄

Question Type: MCQ
Question ID: 40503611368
Option 1 ID: 40503642960
Option 2 ID: 40503642949
Option 3 ID: 40503642951
Option 4 ID: 40503642952
Status: Answered
Chosen Option: 1

Q.15 Boron and silicon of very high purity can be obtained through:

Options
1. liqation
2. zone refining
3. vapour phase refining
4. electrolytic refining

Question Type: MCQ
Question ID: 40503611364
Option 1 ID: 40503642934
Option 2 ID: 40503642936
Option 3 ID: 40503642935
Option 4 ID: 40503642933
Status: Not Answered
Chosen Option: --

Q.16 The correct statement about probability density (except at infinite distance from nucleus) is:

Options
1. It can be zero for 1s orbital
2. It can be negative for 2p orbital
3. It can be zero for 3p orbital
4. It can never be zero for 2s orbital

Question Type: MCQ
Question ID: 40503611371
Option 1 ID: 40503642962
Option 2 ID: 40503642963
Option 3 ID: 40503642964
Option 4 ID: 40503642961
Status: Not Answered
Chosen Option: --
Q.17 The major product formed in the following reaction is:

\[ \text{CH}_3\text{CH} = \text{CHCH(CH}_3\text{)}_2 \xrightarrow{\text{HBr}} \]

Options:
1. \( \text{CH}_3\text{CH(Br)}\text{CH}_2\text{CH(CH}_3\text{)}_2 \)
2. \( \text{CH}_3\text{CH}_2\text{CH(Br)}\text{CH(CH}_3\text{)}_2 \)
3. \( \text{Br(CH}_2\text{)}_3\text{CH(CH}_3\text{)}_2 \)
4. \( \text{CH}_3\text{CH}_2\text{CH}_2\text{C(Br)}\text{(CH}_3\text{)}_2 \)

Question Type: MCQ
Question ID: 40503611361
Option 1 ID: 40503642921
Option 2 ID: 40503642922
Option 3 ID: 40503642924
Option 4 ID: 40503642923
Status: Answered
Chosen Option: 1

Q.18 The variation of molar conductivity with concentration of an electrolyte (X) in aqueous solution is shown in the given figure.

![Molar Conductivity vs Concentration Graph]

The electrolyte X is:

Options:
1. HCl
2. NaCl
3. KNO_3
4. CH_3COOH

Question Type: MCQ
Question ID: 40503611373
Option 1 ID: 40503642969
Option 2 ID: 40503642970
Option 3 ID: 40503642971
Option 4 ID: 40503642972
Status: Not Answered
Chosen Option: --
Q.19  The following molecule acts as an:

(Brompheniramine)

Options:
1. Antiseptic
2. Anti-depressant
3. Anti-bacterial
4. Anti-histamine

Question Type: MCQ
Question ID: 40503611859
Option 1 ID: 40503642315
Option 2 ID: 40503642313
Option 3 ID: 40503642314
Option 4 ID: 40503642316
Status: Answered
Chosen Option: 4

Q.20  Reaction of ammonia with excess Cl₂ gives:

Options:
1. NH₄Cl and N₂
2. NH₄Cl and HCl
3. NCl₃ and NH₄Cl
4. NCl₃ and HCl

Question Type: MCQ
Question ID: 40503611867
Option 1 ID: 40503642346
Option 2 ID: 40503642346
Option 3 ID: 40503642348
Option 4 ID: 40503642347
Status: Answered
Chosen Option: 4

Q.21  The volume, in mL, of 0.02 M K₂Cr₂O₇ solution required to react with 0.288 g of ferrous oxalate in acidic medium is _______. (Molar mass of Fe = 56 g mol⁻¹)

Given: 0.064
Answer:

Question Type: SA
Question ID: 40503611877
Status: Answered
Q.22  For a dimerization reaction,
\[ 2 \text{A}(g) \rightarrow \text{A}_2(g), \]
\[ \Delta U^\circ = -20 \text{kJ mol}^{-1}, \Delta S^\circ = -30 \text{J K}^{-1} \text{mol}^{-1}, \]
then the \(\Delta G^\circ\) will be _________ J.

Given --
Answer :

Question Type : SA
Question ID : 40503611878
Status : Not Answered

Q.23  Considering that \(\Delta_0 > P\), the magnetic moment (in BM) of \([\text{Ru(H}_2\text{O})_6]^2^+\) would be _________.

Given --
Answer :

Question Type : SA
Question ID : 40503611876
Status : Not Answered

Q.24  For a reaction \(X + Y = 2Z\), 1.0 mol of \(X\), 1.5 mol of \(Y\) and 0.5 mol of \(Z\) were taken in a 1 L vessel and allowed to react. At equilibrium, the concentration of \(Z\) was 1.0 mol L\(^{-1}\). The equilibrium constant of the reaction is _________ \(\frac{x}{15}\). The value of \(x\) is ________.

Given --
Answer :

Question Type : SA
Question ID : 40503611879
Status : Not Answered

Q.25  The number of chiral carbons present in sucrose is _________.

Given --
Answer :

Question Type : SA
Question ID : 40503611880
Status : Not Answered

Section : Mathematics
q.1 If the system of linear equations
\[ \begin{align*}
  x + y + 3z &= 0 \\
  x + 3y + k^2z &= 0 \\
  3x + y + 3z &= 0 \\
\end{align*} \]
has a non-zero solution \((x, y, z)\) for some 
\(k \in \mathbb{R}\), then \(x + \left(\frac{y}{z}\right)\) is equal to:

Options:
1. \(-3\)
2. \(9\)
3. \(3\)
4. \(-9\)

q.2 If \(\alpha\) and \(\beta\) are the roots of the equation, 
\[ 7x^2 - 3x - 2 = 0, \]
then the value of
\[ \frac{\alpha}{1-\alpha^2} + \frac{\beta}{1-\beta^2} \]
is equal to:

Options:
1. \(\frac{27}{32}\)
2. \(\frac{1}{24}\)
3. \(\frac{3}{8}\)
4. \(\frac{27}{16}\)
Q.3 If \( x = 1 \) is a critical point of the function 
\( f(x) = (3x^2 + ax - 2 - a) e^x \), then:

Options

1. \( x = 1 \) and \( x = -\frac{2}{3} \) are local minima of \( f \).
2. \( x = 1 \) and \( x = -\frac{2}{3} \) are local maxima of \( f \).
3. \( x = 1 \) is a local maxima and \( x = -\frac{2}{3} \) is a local minima of \( f \).
4. \( x = 1 \) is a local minima and \( x = -\frac{2}{3} \) is a local maxima of \( f \).

Q.4 The area (in sq. units) of the region 
\( A = \{(x, y): (x-1)[x] \leq y \leq 2\sqrt{x}, 0 \leq x \leq 2\} \), 
where \([x]\) denotes the greatest integer function, is:

Options

1. \( \frac{8}{3} \sqrt{2} - \frac{1}{2} \)
2. \( \frac{4}{3} \sqrt{2} + 1 \)
3. \( \frac{8}{3} \sqrt{2} - 1 \)
4. \( \frac{4}{3} \sqrt{2} - \frac{1}{2} \)
Q.5 If the sum of the second, third and fourth terms of a positive term G.P. is 3 and the sum of its sixth, seventh and eighth terms is 243, then the sum of the first 50 terms of this G.P. is:

Options
1. \(\frac{1}{26}(3^{49} - 1)\)
2. \(\frac{1}{26}(3^{50} - 1)\)
3. \(\frac{2}{13}(3^{50} - 1)\)
4. \(\frac{1}{13}(3^{50} - 1)\)

Question Type: MCQ
Question ID: 40603611986
Option 1 ID: 40603643069
Option 2 ID: 40603643066
Option 3 ID: 40603643008
Option 4 ID: 40603643007
Status: Not Answered
Chosen Option: --

Q.6 The value of \(\left(\frac{-1+i\sqrt{3}}{1-i}\right)^{20}\) is:

Options
1. \(-2^{15}\)
2. \(2^{15}i\)
3. \(-2^{15}i\)
4. \(6^5\)

Question Type: MCQ
Question ID: 40503611881
Option 1 ID: 40503642987
Option 2 ID: 40503642988
Option 3 ID: 40503642989
Option 4 ID: 40503642986
Status: Not Answered
Chosen Option: --
Q.7

If \( L = \sin^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right) \) and

\[ M = \cos^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right), \]

then:

Options

1. \( L = \frac{1}{2\sqrt{2}} + \frac{1}{2} \cos\frac{\pi}{8} \)
2. \( L = \frac{1}{4\sqrt{2}} - \frac{1}{4} \cos\frac{\pi}{8} \)
3. \( M = \frac{1}{4\sqrt{2}} + \frac{1}{4} \cos\frac{\pi}{8} \)
4. \( M = \frac{1}{2\sqrt{2}} + \frac{1}{2} \cos\frac{\pi}{8} \)

Question Type: MCQ
Question ID: 40503611399
Option 1 ID: 40503643058
Option 2 ID: 40503643069
Option 3 ID: 40503643061
Option 4 ID: 40503643060
Status: Not Answered
Chosen Option: --

Q.8

If \( a + x = b + y = c + z + 1 \), where \( a, b, c, x, y, z \) are non-zero distinct real numbers,

\[
\begin{vmatrix}
  x & a+y & x+a \\
  y & b+y & y+b \\
  z & c+y & z+c \\
\end{vmatrix}
\]

is equal to:

Options

1. \( y(b-a) \)
2. \( y(a-b) \)
3. \( 0 \)
4. \( y(a-c) \)

Question Type: MCQ
Question ID: 40503611383
Option 1 ID: 40503642994
Option 2 ID: 40503642995
Option 3 ID: 40503642996
Option 4 ID: 40503642997
Status: Not Answered
Chosen Option: --
Q.9 If the line \( y = mx + c \) is a common tangent to the hyperbola \( \frac{x^2}{100} - \frac{y^2}{64} = 1 \) and the circle \( x^2 + y^2 = 36 \), then which one of the following is true?

Options:
1. \( c^2 = 369 \)
2. \( 5m = 4 \)
3. \( 4c^2 = 369 \)
4. \( 8m + 5 = 0 \)

Q.10 Which of the following points lies on the tangent to the curve \( x^4e^y + 2\sqrt{y} + 1 = 3 \) at the point (1, 0)?

Options:
1. (2, 2)
2. (2, 6)
3. (-2, 6)
4. (-2, 4)
Q.11 The statement 

\[(p \rightarrow (q \rightarrow p)) \rightarrow (p \rightarrow (p \lor q))\]

is:

Options:
1. equivalent to \((p \land q) \lor \neg q\)
2. a contradiction
3. equivalent to \((p \lor q) \land \neg p\)
4. a tautology

Question Type: MCQ
Question ID: 40503611960
Option 1 ID: 40503643065
Option 2 ID: 40503643062
Option 3 ID: 40503643064
Option 4 ID: 40503643063
Status: Answered
Chosen Option: 4

Q.12 

\[
\lim_{{x \to 0}} \frac{x \left(\sqrt{1+x^2 + x^4} - 1\right)}{x - 1}
\]

Options:
1. is equal to \(\sqrt{e}\).
2. is equal to 1.
3. is equal to 0.
4. does not exist.

Question Type: MCQ
Question ID: 40503611868
Option 1 ID: 40503643017
Option 2 ID: 40503643015
Option 3 ID: 40503643016
Option 4 ID: 40503643014
Status: Not Answered
Chosen Option: --
Q.13 If the sum of the first 20 terms of the series
\[ \log_{\sqrt{2}} x + \log_{\sqrt{3}} x + \log_{\sqrt{4}} x + \ldots \] is 460, then \( x \) is equal to:

Options:
1. 72
2. 71/2
3. 72
4. 716/21

Q.14 The derivative of \( \tan^{-1}\left( \frac{\sqrt{1+x^2} - 1}{x} \right) \) with respect to \( \tan^{-1}\left( \frac{2x\sqrt{1-x^2}}{1-2x^2} \right) \) at \( x = \frac{1}{2} \) is:

Options:
1. \( \frac{2\sqrt{3}}{5} \)
2. \( \frac{\sqrt{3}}{12} \)
3. \( \frac{2\sqrt{3}}{3} \)
4. \( \frac{\sqrt{3}}{10} \)
Q.16

If \[ \int \frac{\cos \theta}{5 + 7 \sin \theta - 2 \cos^2 \theta} d\theta = A \log_e \left| B(\theta) \right| + C, \]
where \( C \) is a constant of integration, then \( \frac{B(\theta)}{A} \) can be:

Options
1. \( \frac{2 \sin \theta + 1}{\sin \theta + 3} \)
2. \( \frac{2 \sin \theta + 1}{5(\sin \theta + 3)} \)
3. \( \frac{5(\sin \theta + 3)}{2 \sin \theta + 1} \)
4. \( \frac{5(2 \sin \theta + 1)}{\sin \theta + 3} \)

Question Type: MCQ
Question ID: 40503611382
Option 1 ID: 40503643032
Option 2 ID: 40503643030
Option 3 ID: 40503643033
Option 4 ID: 40503643031
Status: Not Answered
Chosen Option: --

Q.16

Let \( y = y(x) \) be the solution of the differential equation
\[ \cos x \frac{dy}{dx} + 2y \sin x = \sin 2x, \ x \in \left( 0, \frac{\pi}{2} \right). \]
If \( y(\pi/3) = 0 \), then \( y(\pi/4) \) is equal to:

Options
1. \( 2 - \sqrt{2} \)
2. \( 2 + \sqrt{2} \)
3. \( \sqrt{2} - 2 \)
4. \( \frac{1}{\sqrt{2}} - 1 \)

Question Type: MCQ
Question ID: 40503611384
Option 1 ID: 40503643038
Option 2 ID: 40503643040
Option 3 ID: 40503643039
Option 4 ID: 40503643041
Status: Answered
Chosen Option: 2
Q.17 If the length of the chord of the circle, 
\[ x^2 + y^2 = r^2 \] (r > 0) along the line, y – 2x = 3
is r, then \( r^2 \) is equal to:

Options
1. \( \frac{9}{5} \)
2. 12
3. \( \frac{24}{5} \)
4. \( \frac{12}{5} \)

Q.18 If the mean and the standard deviation of the data 3, 5, 7, a, b are 5 and 2 respectively, then a and b are the roots of the equation:

Options
1. \( x^2 - 10x + 18 = 0 \)
2. \( 2x^2 - 20x + 19 = 0 \)
3. \( x^2 - 10x + 19 = 0 \)
4. \( x^2 - 20x + 18 = 0 \)
Q. 19

If for some $\alpha \in \mathbb{R}$, the lines
\[ L_1 : \frac{x + 1}{2} = \frac{y - 2}{1} = z - 1 \quad \text{and} \quad L_2 : \frac{x + 2}{\alpha} = \frac{y + 1}{5 - \alpha} = \frac{z + 1}{1} \]
are coplanar,
then the line $L_2$ passes through the point:

Options:
1. $(10, 2, 2)$
2. $(2, -10, -2)$
3. $(10, -2, -2)$
4. $(-2, 10, 2)$

Q. 20

There are 3 sections in a question paper and each section contains 5 questions. A candidate has to answer a total of 5 questions, choosing at least one question from each section. Then the number of ways, in which the candidate can choose the questions, is:

Options:
1. 3000
2. 1500
3. 2255
4. 2250
Q.21 The coefficient of $x^4$ in the expansion of $$(1 + x + x^2 + x^3)^6$$ in powers of $x$ is __________.

Given: 
Answer: 

Q.22 In a bombing attack, there is 50% chance that a bomb will hit the target. At least two independent hits are required to destroy the target completely. Then the minimum number of bombs, that must be dropped to ensure that there is at least 99% chance of completely destroying the target, is __________.

Given: 
Answer: 

Q.23 If the lines $x + y = a$ and $x - y = b$ touch the curve $y = x^2 - 3x + 2$ at the points where the curve intersects the x-axis, then $\frac{a}{b}$ is equal to __________.

Given: 
Answer: 

Question Type: SA
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Question Type: SA
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Status: Not Answered

Question Type: SA
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Status: Not Answered
Q.24

Let the vectors \( \vec{a}, \vec{b}, \vec{c} \) be such that 
\[ |\vec{a}| = 2, \quad |\vec{b}| = 4 \quad \text{and} \quad |\vec{c}| = 4. \]
If the projection of \( \vec{b} \) on \( \vec{a} \) is equal to the projection of \( \vec{c} \) on \( \vec{a} \) and \( \vec{b} \) is perpendicular to \( \vec{c} \), then the value of 
\[ |\vec{a} + \vec{b} - \vec{c}| \]
is _______.

Given --
Answer:

Question Type : SA
Question ID : 40503611964
Status : Not Answered

Q.25

Let \( A = \{a, b, c\} \) and \( B = \{1, 2, 3, 4\} \). Then the number of elements in the set 
\[ C = \{ f : A \rightarrow B \mid \exists e f(A) \text{ and } f \text{ is not one-one} \} \]
is _______.

Given --
Answer:

Question Type : SA
Question ID : 40503611961
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