Q.1  According to law of equipartition of energy the molar specific heat of a diatomic gas at constant
volume where the molecule has one additional vibrational mode is:-

| Options | 1. \( \frac{3}{2}R \) | 2. \( \frac{9}{2}R \) | 3. \( \frac{5}{2}R \) | 4. \( \frac{7}{2}R \) |

Question Type : MCQ  
Question ID : 7155051623  
Option 1 ID : 7155054872  
Option 2 ID : 7155054869  
Option 3 ID : 7155054871  
Option 4 ID : 7155054870  
Status : Answered  
Chosen Option : 4

Q.2  The light rays from an object have been reflected towards an observer from a standard flat mirror,
the image observed by the observer are:-

A. Real  
B. Erect  
C. Smaller in size than object  
D. Laterally inverted

Choose the most appropriate answer from the options given below:


Question Type : MCQ  
Question ID : 7155051629  
Option 1 ID : 7155054896  
Option 2 ID : 7155054894  
Option 3 ID : 7155054893  
Option 4 ID : 7155054895  
Status : Not Attempted and Marked For Review  
Chosen Option : --
Q.3 A particle executes simple harmonic motion between $x = -A$ and $x = +A$. If time taken by particle to go from $x = 0$ to $\frac{A}{2}$ is 2 s; then time taken by particle in going from $x = \frac{A}{2}$ to $A$ is

Options
1. 3 s
2. 1.5 s
3. 2 s
4. 4 s

Question Type: MCQ  
Question ID: 7155051624  
Option 1 ID: 7155054874  
Option 2 ID: 7155054873  
Option 3 ID: 7155054876  
Option 4 ID: 7155054875  
Status: Not Attempted and Marked For Review  
Chosen Option: --

Q.4 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Isothermal Process</td>
<td>I. Work done by the gas decreases internal energy</td>
</tr>
<tr>
<td>B. Adiabatic Process</td>
<td>II. No change in internal energy</td>
</tr>
<tr>
<td>C. Isochoric Process</td>
<td>III. The heat absorbed goes partly to increase internal energy and partly to do work</td>
</tr>
<tr>
<td>D. Isoboric Process</td>
<td>IV. No work is done on or by the gas</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options
1. A-II, B-I, C-IV, D-III
2. A-I, B-II, C-IV, D-III
3. A-II, B-I, C-III, D-IV
4. A-I, B-II, C-III, D-IV

Question Type: MCQ  
Question ID: 7155051622  
Option 1 ID: 7155054867  
Option 2 ID: 7155054868  
Option 3 ID: 7155054865  
Option 4 ID: 7155054866  
Status: Answered  
Chosen Option: 2

Q.5 The resistance of a wire is 5 Ω. It's new resistance in ohm if stretched to 5 times of it's original length will be:

Options
1. 5
2. 625
3. 125
4. 25

Question Type: MCQ  
Question ID: 7155051633  
Option 1 ID: 7155054911  
Option 2 ID: 7155054912  
Option 3 ID: 7155054910  
Option 4 ID: 7155054909  
Status: Answered  
Chosen Option: 2
Q.6 Consider a block kept on an inclined plane (inclined at 45°) as shown in the figure. If the force required to just push it up the incline is 2 times the force required to just prevent it from sliding down, the coefficient of friction between the block and inclined plane (µ) is equal to:

Options:
1. 0.50
2. 0.33
3. 0.60
4. 0.25

Question Type: MCQ  
Question ID: 7155051638  
Option 1 ID: 7155054931  
Option 2 ID: 7155054930  
Option 3 ID: 7155054932  
Option 4 ID: 7155054929  
Status: Not Answered  
Chosen Option: --

Q.7 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Young’s Modulus (¥)</td>
<td>I. ([M L^{-1} T^{-1}])</td>
</tr>
<tr>
<td>B. Co-efficient of Viscosity (η)</td>
<td>II. ([M L^2 T^{-1}])</td>
</tr>
<tr>
<td>C. Planck’s Constant (h)</td>
<td>III. ([M L^{-1} T^{-2}])</td>
</tr>
<tr>
<td>D. Work Function (φ)</td>
<td>IV. ([M L^2 T^{-2}])</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options:
1. A-II, B-III, C-IV, D-I
2. A-I, B-III, C-IV, D-II
3. A-III, B-I, C-II, D-IV
4. A-I, B-II, C-III, D-IV

Question Type: MCQ  
Question ID: 7155051621  
Option 1 ID: 7155054861  
Option 2 ID: 7155054863  
Option 3 ID: 7155054864  
Option 4 ID: 7155054862  
Status: Answered  
Chosen Option: 3
Q.8  The energy levels of an atom is shown in figure.

Which one of these transitions will result in the emission of a photon of wavelength 124.1 nm?

Given \( h = 6.62 \times 10^{-34} \text{ Js} \)

Options 1. C  
2. B  
3. A  
4. D

Q.9  Given below are two statements:

Statement I: Stopping potential in photoelectric effect does not depend on the power of the light source.

Statement II: For a given metal, the maximum kinetic energy of the photoelectron depends on the wavelength of the incident light.

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

Options 1. Both Statement I and Statement II are incorrect  
2. Statement I is incorrect but statement II is correct  
3. Both Statement I and statement II are correct  
4. Statement I is correct but statement II is incorrect

Q.10  A wire of length 1 m moving with velocity 8 m/s at right angles to a magnetic field of 2 T. The magnitude of induced emf, between the ends of wire will be ________

Options 1. 16 V  
2. 8 V  
3. 12 V  
4. 20 V
Q.11 The graph between two temperature scales P and Q is shown in the figure. Between upper fixed point and lower fixed point there are 150 equal divisions of scale P and 100 divisions on scale Q. The relationship for conversion between the two scales is given by:-

![Temperature Conversion Graph]

Options
1. \( \frac{t_Q}{100} = \frac{t_P - 30}{150} \)
2. \( \frac{t_Q}{150} = \frac{t_P - 180}{100} \)
3. \( \frac{t_P}{100} = \frac{t_Q - 180}{150} \)
4. \( \frac{t_P}{180} = \frac{t_Q - 40}{100} \)

Q.12 Every planet revolves around the sun in an elliptical orbit:-

A. The force acting on a planet is inversely proportional to square of distance from sun.
B. Force acting on planet is inversely proportional to product of the masses of the planet and the Sun.
C. The Centripetal force acting on the planet is directed away from the sun.
D. The square of time period of revolution of planet around sun is directly proportional to cube of semi-major axis of elliptical orbit.

Choose the correct answer from the options given below:

Options
1. B and C only
2. A and C Only
3. A and D only
4. C and D only

Q.13 The graph between two temperature scales P and Q is shown in the figure. Between upper fixed point and lower fixed point there are 150 equal divisions of scale P and 100 divisions on scale Q. The relationship for conversion between the two scales is given by:-

![Temperature Conversion Graph]

Options
1. \( \frac{t_Q}{100} = \frac{t_P - 30}{150} \)
2. \( \frac{t_Q}{150} = \frac{t_P - 180}{100} \)
3. \( \frac{t_P}{100} = \frac{t_Q - 180}{150} \)
4. \( \frac{t_P}{180} = \frac{t_Q - 40}{100} \)
Q.13  Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Troposphere</td>
<td>I. Approximate 65-75 km over Earth's surface</td>
</tr>
<tr>
<td>B. F- Part of Stratosphere</td>
<td>II. Approximate 300 km over Earth's surface</td>
</tr>
<tr>
<td>C. F2 Part of Thermosphere</td>
<td>III. Approximate 10 km over Earth's surface</td>
</tr>
<tr>
<td>D. D- Part of Stratosphere</td>
<td>IV. Approximate 100 km over Earth's surface</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options
1. A-I, B-IV, C-III, D-II
2. A-III, B-IV, C-II, D-I
3. A-III, B-II, C-I, D-IV
4. A-I, B-II, C-IV, D-III

Q.14  A body of mass is taken from earth surface to the height h equal to twice the radius of earth (Rₑ), the increase in potential energy will be:

\( (g = \text{acceleration due to gravity on the surface of Earth})\)

Options
1. \( 3mgRₑ\)
2. \( \frac{1}{3}mgRₑ\)
3. \( \frac{1}{2}mgRₑ\)
4. \( \frac{2}{3}mgRₑ\)
Q.15 For a moving coil galvanometer, the deflection in the coil is 0.05 rad when a current of 10 mA is passed through it. If the torsional constant of suspension wire is \(4.0 \times 10^{-5}\) N m rad\(^{-1}\), the magnetic field is 0.01T and the number of turns in the coil is 200, the area of each turn (in cm\(^2\)) is:

Options

1. 1.0
2. 2.0
3. 1.5
4. 0.5

Question Type: MCQ
Question ID: 7155051632
Option 1 ID: 7155054906
Option 2 ID: 7155054908
Option 3 ID: 7155054907
Option 4 ID: 7155054905
Status: Answered
Chosen Option: 1

Q.16 Statement I: When a Si sample is doped with Boron, it becomes P type and when doped by Arsenic it becomes N-type semiconductor such that P-type has excess holes and N-type has excess electrons.

Statement II: When such P-type and N-type semi-conductors, are fused to make a junction, a current will automatically flow which can be detected with an externally connected ammeter.

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

Options

1. Both Statement I and Statement II are incorrect
2. Both Statement I and statement II are correct
3. Statement I is incorrect but statement II is correct
4. Statement I is correct but statement II is incorrect

Question Type: MCQ
Question ID: 7155051626
Option 1 ID: 7155054882
Option 2 ID: 7155054881
Option 3 ID: 7155054884
Option 4 ID: 7155054883
Status: Answered
Chosen Option: 2

Q.17 A point charge of 10 \(\mu\)C is placed at the origin. At what location on the X-axis should a point charge of 40 \(\mu\)C be placed so that the net electric field is zero at \(x = 2\) cm on the X-axis?

Options

1. \(x = -4\) cm
2. \(x = 8\) cm
3. \(x = 6\) cm
4. \(x = 4\) cm

Question Type: MCQ
Question ID: 7155051634
Option 1 ID: 7155054916
Option 2 ID: 7155054915
Option 3 ID: 7155054914
Option 4 ID: 7155054913
Status: Answered
Chosen Option: 3
Q.18 The distance travelled by a particle is related to time \( t \) as \( x = 4t^2 \). The velocity of the particle at \( t=5s \) is:-

Options:
1. 20ms\(^{-1}\)
2. 40ms\(^{-1}\)
3. 8ms\(^{-1}\)
4. 25ms\(^{-1}\)

Q.19 Two objects are projected with same velocity '\( v \)' however at different angles \( \alpha \) and \( \beta \) with the horizontal. If \( \alpha = \beta = 90^\circ \), the ratio of horizontal range of the first object to the 2nd object will be:

Options:
1. 1:1
2. 1:2
3. 2:1
4. 4:1
Q.20 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Gauss’s Law in Electrostatics</td>
<td>I. $\oint E \cdot dl = -\frac{d\phi_B}{dt}$</td>
</tr>
<tr>
<td>B. Faraday’s Law</td>
<td>II. $\oint B \cdot dA = 0$</td>
</tr>
<tr>
<td>C. Gauss’s Law in Magnetism</td>
<td>III. $\oint B \cdot dl = \mu_0 j_0 + \mu_0 \frac{d\phi_F}{dt}$</td>
</tr>
<tr>
<td>D. Ampere-Maxwell Law</td>
<td>IV. $\oint E \cdot ds = \frac{q}{\varepsilon_0}$</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options 1: A-II, B-III, C-IV, D-I
2. A-I, B-II, C-III, D-IV
3. A-III, B-IV, C-I, D-II
4. A-IV, B-I, C-II, D-III

Section: Physics Section B

Q.21 A series LCR circuit is connected to an AC source of 220 V, 50 Hz. The circuit contains a resistance $R = 80\Omega$, an inductor of inductive reactance $X_L = 70\Omega$, and a capacitor of capacitive reactance $X_C = 130\Omega$. The power factor of circuit is $\frac{3}{10}$. The value of x is:

Given:
Answer:

Q.22 Two long parallel wires carrying currents 8A and 15A in opposite directions are placed at a distance of 7cm from each other. A point P is at equidistant from both the wires such that the lines joining the point P to the wires are perpendicular to each other. The magnitude of magnetic field at P is $10^{-5}$ T.

Given:
Answer:

Question Type: MCQ
Question ID: 7155051630
Option 1 ID: 7155054898
Option 2 ID: 7155054897
Option 3 ID: 7155054899
Option 4 ID: 7155054900
Status: Answered
Chosen Option: 4

Question Type: SA
Question ID: 7155051643
Status: Not Answered

Question Type: SA
Question ID: 7155051644
Status: Not Answered
<table>
<thead>
<tr>
<th>Q.23</th>
<th>A body of mass 1 kg collides head on elastically with a stationary body of mass 3 kg. After collision, the smaller body reverses its direction of motion and moves with a speed of 2 m/s. The initial speed of the smaller body before collision is _________ ms⁻¹.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given--</strong></td>
<td><strong>Answer :</strong></td>
</tr>
<tr>
<td><strong>Question Type :</strong> SA</td>
<td><strong>Question ID :</strong> 7155051647</td>
</tr>
<tr>
<td><strong>Status :</strong> Not Answered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q.24</th>
<th>A nucleus disintegrates into two smaller parts, which have their velocities in the ratio 3:2. The ratio of their nuclear sizes will be ( \left( \frac{v_1}{v_2} \right)^{\frac{1}{3}} ). The value of 'x' is:-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given--</strong></td>
<td><strong>Answer :</strong></td>
</tr>
<tr>
<td><strong>Question Type :</strong> SA</td>
<td><strong>Question ID :</strong> 7155051641</td>
</tr>
<tr>
<td><strong>Status :</strong> Not Answered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q.25</th>
<th>If a solid sphere of mass 5 kg and a disc of mass 4 kg have the same radius. Then the ratio of moment of inertia of the disc about a tangent in its plane to the moment of inertia of the sphere about its tangent will be ( \frac{x}{7} ). The value of x is _________</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given--</strong></td>
<td><strong>Answer :</strong></td>
</tr>
<tr>
<td><strong>Question Type :</strong> SA</td>
<td><strong>Question ID :</strong> 7155051648</td>
</tr>
<tr>
<td><strong>Status :</strong> Not Answered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q.26</th>
<th>A capacitor has capacitance 5 ( \mu )F when it's parallel plates are separated by air medium of thickness d. A slab of material of dielectric constant 1.5 having area equal to that of plates but thickness ( \frac{d}{2} ) is inserted between the plates. Capacitance of the capacitor in the presence of slab will be _________ ( \mu )F.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given--</strong></td>
<td><strong>Answer :</strong></td>
</tr>
<tr>
<td><strong>Question Type :</strong> SA</td>
<td><strong>Question ID :</strong> 7155051646</td>
</tr>
<tr>
<td><strong>Status :</strong> Not Answered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q.27</th>
<th>A train blowing a whistle of frequency 320 Hz approaches an observer standing on the platform at a speed of 66 m/s. The frequency observed by the observer will be (given speed of sound = 330 ms⁻¹) _________ Hz.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given--</strong></td>
<td><strong>Answer :</strong></td>
</tr>
<tr>
<td><strong>Question Type :</strong> SA</td>
<td><strong>Question ID :</strong> 7155051650</td>
</tr>
<tr>
<td><strong>Status :</strong> Not Answered</td>
<td></td>
</tr>
</tbody>
</table>
Q.28 Two cells are connected between points A and B as shown. Cell 1 has emf of 12 V and internal resistance of 3 Ω. Cell 2 has emf of 6 V and internal resistance of 6 Ω. An external resistor R of 4 Ω is connected across A and B. The current flowing through R will be ________ A.

Given--
Answer:

Question Type: SA
Question ID: 7155051645
Status: Not Answered

Q.29 An object is placed on the principal axis of convex lens of focal length 10 cm as shown. A plane mirror is placed on the other side of lens at a distance of 20 cm. The image produced by the plane mirror is 5 cm inside the mirror. The distance of the object from the lens is ________ cm.

Given--
Answer:

Question Type: SA
Question ID: 7155051642
Status: Not Answered

Q.30 A spherical drop of liquid splits into 1000 identical spherical drops. If $u_1$ is the surface energy of the original drop and $u_2$ is the total surface energy of the resulting drops, the (ignoring evaporation),

$$\frac{u_1}{u_2} = \left(\frac{10}{x}\right).$$

Then value of $x$ is ________ :

Given--
Answer:

Question Type: SA
Question ID: 7155051649
Status: Not Answered

Section: Chemistry Section A

Q.31 Potassium dichromate acts as a strong oxidizing agent in acidic solution. During this process, the oxidation state changes from

Options 1. +6 to +3
2. +6 to +2
3. +3 to +1
4. +2 to +1

Question Type: MCQ
Question ID: 7155051659
Option 1 ID: 7155054985
Option 2 ID: 7155054986
Option 3 ID: 7155054983
Option 4 ID: 7155054984
Status: Not Attempted and Marked For Review
Chosen Option: --
Q.32 Find out the major product from the following reaction.

\[ \text{H}_2\text{SO}_4 \ (\text{Concentrated}) \xrightarrow{\Delta} \]

Options

1. 
2. 
3. 
4. 

Question Type: MCQ
Question ID: 7155051665
Option 1 ID: 7155055009
Option 2 ID: 7155055008
Option 3 ID: 7155055010
Option 4 ID: 7155055007
Status: Not Answered
Chosen Option: --
### Q.33 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination entity</td>
<td>Wavelength of light absorbed in nm</td>
</tr>
<tr>
<td>A. [CoCl(NH₃)₃]²⁻</td>
<td>I. 310</td>
</tr>
<tr>
<td>B. [Co(NH₃)₆]³⁻</td>
<td>II. 475</td>
</tr>
<tr>
<td>C. [Co(CN)₆]³⁻</td>
<td>III. 535</td>
</tr>
<tr>
<td>D. [Cu(H₂O)₄]²⁺</td>
<td>IV. 600</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

1. A-II, B-III, C-IV, D-I
2. A-IV, B-I, C-III, D-II
3. A-III, B-I, C-II, D-IV
4. A-III, B-II, C-I, D-IV

### Q.34 Statement I: Dipole moment is a vector quantity and by convention it is depicted by a small arrow with tail on the negative centre and head pointing towards the positive centre.

**Statement II:** The crossed arrow of the dipole moment symbolizes the direction of the shift of charges in the molecules.

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

1. Both Statement I and Statement II are correct
2. Statement I is correct but Statement II is incorrect
3. Both Statement I and Statement II are incorrect
4. Statement I is incorrect but Statement II is correct

---

**Question Type:** MCQ  
**Question ID:** 7155051660  
**Option 1 ID:** 7155054988  
**Option 2 ID:** 7155054989  
**Option 3 ID:** 7155054990  
**Option 4 ID:** 7155054987  
**Status:** Answered  
**Chosen Option:** 4

---

**Question Type:** MCQ  
**Question ID:** 7155051652  
**Option 1 ID:** 7155054955  
**Option 2 ID:** 7155054957  
**Option 3 ID:** 7155054956  
**Option 4 ID:** 7155054958  
**Status:** Not Attempted and Marked For Review  
**Chosen Option:** --
Q.35 Which one among the following metals is the weakest reducing agent?

Options 1. Rb  
2. Li  
3. K  
4. Na

Q.36 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cobalt catalyst</td>
</tr>
<tr>
<td>B</td>
<td>Syngas</td>
</tr>
<tr>
<td>C</td>
<td>Nickel catalyst</td>
</tr>
<tr>
<td>D</td>
<td>Brine solution</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options 1. A-IV, B-III, C-II, D-I  
2. A-II, B-III, C-IV, D-I  
3. A-IV, B-III, C-I, D-II  
4. A-IV, B-I, C-II, D-III

Q.37 Which of the following represents the correct order of metallic character of the given elements?

Options 1. Be < Si < K < Mg  
2. K < Mg < Be < Si  
3. Be < Si < Mg < K  
4. Si < Be < Mg < K

Question Type: MCQ
Question ID: 7155051654
Option 1 ID: 7155054966
Option 2 ID: 7155054964
Option 3 ID: 7155054965
Option 4 ID: 7155054963
Status: Not Answered
Chosen Option: --
Q.38 Given below are two statements:

Statement I: In froth flotation method a rotating paddle agitates the mixture to drive air out of it.

Statement II: Iron pyrites are generally avoided for extraction of iron due to environmental reasons.

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

Options 1. Both Statement I and Statement II are false
   2. Statement I is true but Statement II is false
   3. Both Statement I and Statement II are true
   4. Statement I is false but Statement II is true

Question Type: MCQ
Question ID: 7155051655
Option 1 ID: 7155054968
Option 2 ID: 7155054969
Option 3 ID: 7155054967
Option 4 ID: 7155054970
Status: Not Attempted and Marked For Review
Chosen Option: --

Q.39 Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: The alkali metals and their salts impart characteristic colour to reducing flame.

Reason R: Alkali metals can be detected using flame tests.

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

Options 1. A is not correct but R is correct
   2. Both A and R are correct and R is the correct explanation of A
   3. Both A and R are correct but R is NOT the correct explanation of A
   4. A is correct but R is not correct

Question Type: MCQ
Question ID: 7155051662
Option 1 ID: 7155054998
Option 2 ID: 7155054995
Option 3 ID: 7155054996
Option 4 ID: 7155054997
Status: Answered
Chosen Option: 2
Q.40 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I (Name of polymer)</th>
<th>LIST II (Uses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Glyptal</td>
<td>I. Flexible pipes</td>
</tr>
<tr>
<td>B. Neoprene</td>
<td>II. Synthetic wool</td>
</tr>
<tr>
<td>C. Acrylan</td>
<td>III. Paints and Lacquers</td>
</tr>
<tr>
<td>D. LDP</td>
<td>IV. Gaskets</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

1. A-III, B-II, C-IV, D-I
2. A-III, B-IV, C-II, D-I
3. A-III, B-I, C-IV, D-II
4. A-III, B-IV, C-I, D-II

Q.41 What is the mass ratio of ethylene glycol (C₂H₄O₂, molar mass = 62 g/mol) required for making 500 g of 0.25 molal aqueous solution and 250 mL of 0.25 molal aqueous solution?

Options 1. 3:1
2. 1:2
3. 2:1
4. 1:1
Q.42 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I (Amines)</th>
<th>LIST II (pK_a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Aniline</td>
<td>I. 3.25</td>
</tr>
<tr>
<td>B. Ethanamine</td>
<td>II. 3.00</td>
</tr>
<tr>
<td>C. N-Ethylethanamine</td>
<td>III. 9.38</td>
</tr>
<tr>
<td>D. N, N-Diethylethanamine</td>
<td>IV. 3.29</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options

1. A-III, B-IV, C-II, D-I
2. A-III, B-II, C-I, D-IV
3. A-III, B-II, C-IV, D-I
4. A-I, B-IV, C-II, D-III

Question Type: MCQ
Question ID: 7155051667
Option 1 ID: 7155055015
Option 2 ID: 7155055016
Option 3 ID: 7155055017
Option 4 ID: 7155055018
Status: Answered
Chosen Option: 2
Q.43 ‘A’ in the given reaction is

\[
\begin{align*}
\text{Options} & \\
1. & \quad \text{OH} \quad \text{COOH} \\
2. & \quad \text{CO} \quad \text{O} \\
3. & \quad \text{O} \quad \text{O} \\
4. & \quad \text{O} \quad \text{OH}
\end{align*}
\]

Question Type: MCQ
Question ID: 7155051666
Option 1 ID: 7155055013
Option 2 ID: 7155055012
Option 3 ID: 7155055014
Option 4 ID: 7155055011
Status: Not Answered
Chosen Option: --
Q.44 Match List I with List II

<table>
<thead>
<tr>
<th>Isomeric pairs</th>
<th>List II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Propanamine and N-Methylpentane</td>
<td>I. Metamers</td>
</tr>
<tr>
<td>B. Hexan-2-one and Hexan-3-one</td>
<td>II. Positional isomers</td>
</tr>
<tr>
<td>C. Ethanamide and Hydroxymethane</td>
<td>III. Functional isomers</td>
</tr>
<tr>
<td>D. ( \alpha )-nitrophenol and ( \beta )-nitrophenol</td>
<td>IV. Tautomers</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

Options 1. A-III, B-I, C-IV, D-II
2. A-III, B-IV, C-I, D-II
3. A-IV, B-III, C-I, D-II
4. A-II, B-III, C-I, D-IV

Q.45 Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Carbon forms two important oxides - CO and CO\(_2\). CO is neutral whereas CO\(_2\) is acidic in nature

Reason R: CO\(_2\) can combine with water in a limited way to form carbonic acid, while CO is sparingly soluble in water

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

Options 1. Both A and R are correct and R is the correct explanation of A
2. Both A and R are correct but R is NOT the correct explanation of A
3. A is not correct but R is correct
4. A is correct but R is not correct
Q.46  The isomeric deuterated bromide with molecular formula C₆H₄DBr having two chiral carbon atoms is

Options 1. 2 – Bromo – 1 – deuto – 2 – methylpropane
2. 2 – Bromo – 3 – deuterobutane
3. 2 – Bromo – 1 – deuterobutane
4. 2 – Bromo – 2 – deuterobutane

Question Type: MCQ
Question ID: 7155051668
Option 1 ID: 7155055021
Option 2 ID: 7155055020
Option 3 ID: 7155055019
Option 4 ID: 7155055022
Status: Answered
Chosen Option: 4

Q.47  When the hydrogen ion concentration [H⁺] changes by a factor of 1000, the value of pH of the solution ________

Options 1. decreases by 2 units
2. increases by 2 units
3. decreases by 3 units
4. increases by 1000 units

Question Type: MCQ
Question ID: 7155051653
Option 1 ID: 7155054959
Option 2 ID: 7155054962
Option 3 ID: 7155054961
Option 4 ID: 7155054960
Status: Answered
Chosen Option: 3

Q.48  A chloride salt solution acidified with dil. HNO₃ gives a curdy white precipitate, [A], on addition of AgNO₃. [A] on treatment with NH₄OH gives a clear solution, B. A and B are respectively:

Options 1. H[AgCl₃] & [Ag(NH₃)₂]Cl
2. AgCl & [Ag(NH₃)₂]Cl
3. H[AgCl₃] & (NH₄)[Ag(OH)₂]
4. AgCl & (NH₄)[Ag(OH)₂]

Question Type: MCQ
Question ID: 7155051663
Option 1 ID: 7155055000
Option 2 ID: 7155055001
Option 3 ID: 7155055002
Option 4 ID: 7155054999
Status: Not Attempted and Marked For Review
Chosen Option: --
Q.49

A. Ammonium salts produce haze in atmosphere.
B. Ozone gets produced when atmospheric oxygen reacts with chlorine radicals.
C. Polychlorinated biphenyls act as cleansing solvents.
D. 'Blue baby' syndrome occurs due to the presence of excess of sulphate ions in water.

Choose the correct answer from the options given below:

Options
1. A and D only
2. B and C only
3. A, B and C only
4. A and C only

Q.50

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

**Assertion A:** Butylated hydroxy anisole when added to butter increases its shelf life.

**Reason R:** Butylated hydroxy anisole is more reactive towards oxygen than food.

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

Options
1. A is not correct but R is correct
2. Both A and R are correct but R is NOT the correct explanation of A
3. Both A and R are correct and R is the correct explanation of A
4. A is correct but R is not correct

Section: Chemistry Section B

Q.51

Number of hydrogen atoms per molecule of a hydrocarbon A having 85.8% carbon is ________

(Given: Molar mass of A = 84 g mol⁻¹)

Given 12

Answer:
Q.52 Total number of moles of AgCl precipitated on addition of excess of AgNO₃ to one mole each of the following complexes [Co(NH₃)₄Cl₂]Cl₂, [Ni(H₂O)₆]Cl₂, [Pt(NH₃)₂Cl₂] and [Pt(NH₃)₄]Cl₂ is __________.

Given--
Answer:

Question Type: SA
Question ID: 7155051678
Status: Not Answered

Q.53 The number of pairs of the solutions having the same value of the osmotic pressure from the following is __________.

(Assume 100% ionization)

A. 0.500 M C₂H₅OH (aq) and 0.25 M KBr (aq)
B. 0.100 M K₄[Fe(CN)₆] (aq) and 0.100 M FeSO₄(NH₄)₂SO₄ (aq)
C. 0.05 M K₃[Fe(CN)₆] (aq) and 0.25 M NaCl (aq)
D. 0.15 M NaCl (aq) and 0.1 M BaCl₂ (aq)
E. 0.02 M KCl,MgCl₂,6H₂O (aq) and 0.05 M KCl (aq)

Given--
Answer:

Question Type: SA
Question ID: 7155051674
Status: Not Answered

Q.54 Based on the given figure, the number of correct statement/s is/are __________.

[A diagram of liquid molecules on the surface and in the bulk is shown]

A. Surface tension is the outcome of equal attractive and repulsive forces acting on the liquid molecule in bulk.
B. Surface tension is due to uneven forces acting on the molecules present on the surface.
C. The molecule in the bulk can never come to the liquid surface.
D. The molecules on the surface are responsible for vapour pressure if the system is a closed system.

Given--
Answer:

Question Type: SA
Question ID: 7155051671
Status: Not Attempted and Marked For Review

Q.55 28.0 L of CO₂ is produced on complete combustion of 16.8 L gaseous mixture of ethene and methane at 25°C and 1 atm. Heat evolved during the combustion process is __________kJ.

Given: ΔHᵣ(CH₄) = -900 kJ mol⁻¹
ΔHᵣ(C₂H₄) = -1400 kJ mol⁻¹

Given--
Answer:

Question Type: SA
Question ID: 7155051673
Status: Not Answered
Q.56  The number of given orbitals which have electron density along the axis is ______

Pₓ, Pᵧ, Pz, dₓ²-y², dₓz, dₓ²-z²

Given --
Answer:

Q.57  The number of incorrect statement/s from the following is/are ______

A. Water vapours are adsorbed by anhydrous calcium chloride.
B. There is a decrease in surface energy during adsorption.
C. As the adsorption proceeds, ΔH becomes more and more negative.
D. Adsorption is accompanied by decrease in entropy of the system.

Given --
Answer:

Q.58  Number of compounds giving (i) red colouration with ceric ammonium nitrate and also (ii) positive iodoform test from the following is ______

Given --
Answer:

Q.59  \(\text{Pt}(s) \mid \text{H}_2(g)(1 \text{ bar}) \mid \text{H}^+(aq)(1 \text{ M}) \mid M^{2+}(aq), M^+(aq) \mid \text{Pt}(s)\)

The \(E_{\text{cell}}\) for the given cell is 0.1115 V at 298 K when \(\frac{[M^+(aq)]}{[M^{2+}(aq)]} = 10^x\)

The value of \(x\) is ______

Given: \(E^0_{\text{M}^{3+}/\text{M}^+} = 0.2\) V

\[\frac{2.303RT}{F} = 0.059V\]

Given: 8.28
Answer:
Q.60  A first order reaction has the rate constant, \( k = 4.6 \times 10^{-3} \text{ s}^{-1} \). The number of correct statement/s from the following is/are ________

Given: \( \log 3 = 0.48 \)

A. Reaction completes in 1000 s.
B. The reaction has a half-life of 500 s.
C. The time required for 10% completion is 25 times the time required for 90% completion.
D. The degree of dissociation is equal to \( (1 - e^{-kt}) \)
E. The rate and the rate constant have the same unit.

Answer:

---

Q.61  The number of numbers, strictly between 5000 and 10000, can be formed using the digits 1, 3, 5, 7, 9 without repetition, is

Options 1. 12
2. 120
3. 6
4. 72

---

Question Type: SA
Question ID: 7155051676
Status: Not Attempted and Marked For Review

Section: Mathematics Section A

Question Type: MCQ
Question ID: 7155051686
Option 1 ID: 7155055063
Option 2 ID: 7155055064
Option 3 ID: 7155055061
Option 4 ID: 7155055062
Status: Not Answered
Chosen Option: --
Q.62
Let \( A = \begin{bmatrix} 1 & 3 \\ \frac{1}{\sqrt{10}} & \frac{1}{\sqrt{10}} \\ -3 & 1 \\ \frac{1}{\sqrt{10}} & \frac{1}{\sqrt{10}} \end{bmatrix} \) and \( B = \begin{bmatrix} 1 & -i \\ 0 & 1 \end{bmatrix} \), where \( i = \sqrt{-1} \).

If \( M = A^T B A \), then the inverse of the matrix \( A M^{2023} A^T \) is

Options:
1. \( \begin{bmatrix} 1 & -2023i \\ 0 & 1 \end{bmatrix} \)
2. \( \begin{bmatrix} 1 & 2023i \\ 0 & 1 \end{bmatrix} \)
3. \( \begin{bmatrix} 1 & 0 \\ 2023i & 1 \end{bmatrix} \)
4. \( \begin{bmatrix} 1 & 0 \\ -2023i & 1 \end{bmatrix} \)

Question Type: MCQ
Question ID: 7155051684
Option 1 ID: 7155055053
Option 2 ID: 7155055054
Option 3 ID: 7155055055
Option 4 ID: 7155055056
Status: Not Answered
Chosen Option: --

Q.63
Let \( T \) and \( C \) respectively be the transverse and conjugate axes of the hyperbola \( 16x^2 - y^2 + 64x + 4y + 44 = 0 \). Then the area of the region above the parabola \( x^2 - y + 4 \), below the transverse axis \( T \) and on the right of the conjugate axis \( C \) is:

Options:
1. \( 4\sqrt{6} + \frac{44}{3} \)
2. \( 4\sqrt{6} - \frac{28}{3} \)
3. \( 4\sqrt{6} - \frac{44}{3} \)
4. \( 4\sqrt{6} + \frac{28}{3} \)

Question Type: MCQ
Question ID: 7155051694
Option 1 ID: 7155055096
Option 2 ID: 7155055093
Option 3 ID: 7155055095
Option 4 ID: 7155055094
Status: Not Answered
Chosen Option: --
Q.64  Let \( f(x) = 2x^3 + \lambda, \lambda \in \mathbb{R}, x \in \mathbb{R}^+, \) and \( f(4) = 133, f(5) = 255. \) Then the sum of all the positive integer divisors of \( (f(3) - f(2)) \) is

Options:
1. 61
2. 58
3. 59
4. 60

Q.65  Let \( A, B, C \) be \( 3 \times 3 \) matrices such that \( A \) is symmetric and \( B \) and \( C \) are skew-symmetric.

Consider the statements

(S1) \( A^{13} B^{26} - B^{26} A^{13} \) is symmetric

(S2) \( A^{26} C^{13} - C^{13} A^{26} \) is symmetric

Then,

Options:
1. Only S2 is true
2. Both S1 and S2 are false
3. Both S1 and S2 are true
4. Only S1 is true

Q.66  The shortest distance between the lines \( x + 1 = 2y = -12z \) and \( x - y + 2 = 6z - 6 \) is

Options:
1. 2
2. 3
3. \( \frac{1}{2} \)
4. \( \frac{3}{2} \)
Q.67 Let \( \vec{a} = \hat{i} - \hat{j} + \hat{k} \) and \( \vec{b} = 1 \) \( \vec{a} \cdot \vec{b} = 1 \) and \( \vec{a} \times \vec{b} = \hat{i} - \hat{j} \). Then \( \vec{a} - 6\hat{b} \) is equal to

Options:
1. \( 3(\hat{i} + \hat{j} - \hat{k}) \)
2. \( 3(\hat{i} - \hat{j} - \hat{k}) \)
3. \( 3(\hat{i} + \hat{j} + \hat{k}) \)
4. \( 3(\hat{i} - \hat{j} + \hat{k}) \)

Q.68 If the function \( f(x) = \begin{cases} \frac{\mu}{\cot 6x} & \frac{\pi}{2} < x < \pi \\ \left(1 - \frac{x}{\cos x}\right) \frac{\mu}{\cos x} & 0 < x < \frac{\pi}{2} \end{cases} \)

is continuous at \( x = \frac{\pi}{2} \), then \( 9\lambda + 6\log_2u + \mu^6 - e^{6\lambda} \) is equal to

Options:
1. 8
2. \( 2e^4 + 8 \)
3. 10
4. 11
Q.69
The integral \( \int_1^2 \frac{dx}{x^3 (x^2 + 2)^2} \) is equal to

Options
1. \( \frac{11}{6} + \log_4 4 \)
2. \( \frac{11}{12} - \log_4 4 \)
3. \( \frac{11}{12} + \log_4 4 \)
4. \( \frac{11}{6} - \log_4 4 \)

Q.70
The equations of two sides of a variable triangle are \( x = 0 \) and \( y = 3 \), and its third side is a tangent to the parabola \( y^2 = 6x \). The locus of its circumcentre is:

Options
1. \( 4y^2 - 18y - 3x - 18 = 0 \)
2. \( 4y^2 - 18y + 3x + 18 = 0 \)
3. \( 4y^2 + 18y + 3x + 18 = 0 \)
4. \( 4y^2 - 18y - 3x + 18 = 0 \)

Q.71
Let \( \Delta, \nabla \in \{\land, \lor\} \) be such that \((p \rightarrow q) \land (p \lor q)\) is a tautology. Then

Options
1. \( \land = \land, \lor = \land \)
2. \( \land = \lor, \lor = \land \)
3. \( \land = \land, \lor = \lor \)
4. \( \land = \lor, \lor = \lor \)

Question Type: MCQ
Question ID: 7155051693
Option 1 ID: 7155055092
Option 2 ID: 7155055090
Option 3 ID: 7155055089
Option 4 ID: 7155055091
Status: Not Answered
Chosen Option: 4
Q.72  The foot of perpendicular of the point \((2, 0, 5)\) on the line \(\frac{x+1}{2} = \frac{y-1}{5} = \frac{z+1}{-1}\) is \((\alpha, \beta, \gamma)\). Then, which of the following is NOT correct?

Options
1. \(\frac{\alpha \beta}{\gamma} = \frac{4}{15}\)
2. \(\frac{\gamma}{\alpha} = \frac{5}{8}\)
3. \(\frac{\beta}{\gamma} = -5\)
4. \(\frac{\gamma}{\beta} = -8\)

Q.73  Let \(f : \mathbb{R} \to \mathbb{R}\) be a function defined by

\[f(x) = \log_{\sqrt{2}}(\sqrt{2}x - \cos x + m - 2)\], for some \(m\), such that the range of \(f\) is \([0, 2]\). Then the value of \(m\) is ________

Options
1. 5
2. 4
3. 3
4. 2
Q.74 If the four points, whose position vectors are \(3i - 4j + 2k, 1 + 2j - k, -2i - j + 3k\) and \(5i - 20j + 4k\) are coplanar, then \(\alpha\) is equal to

Options

1. \(\frac{73}{17}\)
2. \(\frac{-73}{17}\)
3. \(\frac{107}{17}\)
4. \(\frac{-107}{17}\)

Q.75 Let the function \(f(x) = 2x^3 + (2p - 7)x^2 + 3\) have a maxima for some value of \(x < 0\) and a minima for some value of \(x > 0\). Then, the set of all values of \(p\) is

Options

1. \(\begin{pmatrix} -\frac{9}{2} & \frac{9}{2} \end{pmatrix}\)
2. \(\begin{pmatrix} 0, \frac{9}{2} \end{pmatrix}\)
3. \(\begin{pmatrix} -\infty, \frac{9}{2} \end{pmatrix}\)
4. \(\begin{pmatrix} \frac{9}{2}, \infty \end{pmatrix}\)
Q.76 Let $z$ be a complex number such that $\frac{z-2i}{z+i} = 2, z \neq -i.$ Then $z$ lies on the circle of radius 2 and

Options 1. $(0, 2)$
2. $(0, 0)$
3. $(2, 0)$
4. $(0, -2)$

Q.77 Let $N$ be the sum of the numbers appeared when two fair dice are rolled and let the probability that $N - 2, \sqrt[3]{N}, N + 2$ are in geometric progression be $\frac{k}{48}.$ Then the value of $k$ is

Options 1. 16
2. 2
3. 4
4. 8

Q.78 The number of functions

$$f: \{1, 2, 3, 4\} \rightarrow \{a \in \mathbb{Z} \mid |a| \leq 8\}$$

satisfying $f(n) + \frac{1}{n} f(n + 1) = 1, \ \forall \ n \in \{1, 2, 3\}$ is

Options 1. 2
2. 3
3. 4
4. 1
Q.79 Let \( y = y(t) \) be a solution of the differential equation

\[
\frac{dy}{dt} + \alpha y = ye^{-\beta t}
\]

where, \( \alpha > 0, \beta > 0 \) and \( \gamma > 0 \). Then \( \lim_{t \to \infty} y(t) \)

Options 1. \( \text{is 0} \)
2. \( \text{does not exist} \)
3. \( \text{is 1} \)
4. \( \text{is -1} \)

Q.80 \( \sum_{k=0}^{n} \binom{51-k}{3} \) is equal to

Options 1. \( \binom{51}{3} - 45 \binom{42}{3} \)
2. \( \binom{51}{4} - 45 \binom{42}{4} \)
3. \( \binom{52}{4} - 45 \binom{42}{4} \)
4. \( \binom{52}{3} - 45 \binom{42}{3} \)

Section: Mathematics Section B

Q.81 If \( \int_{0}^{1} \log_{e} x \, dx = \frac{m}{n} \log\left( \frac{10}{3} \right) \), where \( m \) and \( n \) are coprime natural numbers, then \( m^{2} + n^{2} - 5 \) is equal to

Given:
Answer:
Q.82 Let \( \alpha \in \mathbb{R} \) and let \( \alpha, \beta \) be the roots of the equation \( x^2 + \frac{60}{x} x + a = 0 \). If \( \alpha^4 + \beta^4 = -30 \), then the product of all possible values of \( \alpha \) is

Given --
Answer :

Question Type: SA
Question ID: 7155051701
Status: Not Answered

Q.83 If the shortest distance between the line joining the points \((1, 2, 3)\) and \((2, 3, 4)\), and the line \(\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-2}{0}\), is \( \alpha \), then \( 28\alpha^2 \) is equal to ________.

Given --
Answer :

Question Type: SA
Question ID: 7155051708
Status: Not Answered

Q.84 For the two positive numbers \( a, b \), if \( a, b \) and \( \frac{1}{18} \) are in a geometric progression, while \( \frac{1}{a}, 10 \) and \( \frac{1}{b} \) are in an arithmetic progression, then \( 16a + 12b \) is equal to ________.

Given --
Answer :

Question Type: SA
Question ID: 7155051704
Status: Not Answered

Q.85 The remainder when \((2023)^{2023}\) is divided by 35 is ________.

Given --
Answer :

Question Type: SA
Question ID: 7155051703
Status: Not Answered

Q.86 Suppose Anil’s mother wants to give 5 whole fruits to Anil from a basket of 7 red apples, 5 white apples, and 8 oranges. If in the selected 5 fruits, at least 2 oranges, at least one red apple and at least one white apple must be given, then the number of ways, Anil’s mother can offer 5 fruits to Anil is ________.

Given --
Answer :

Question Type: SA
Question ID: 7155051702
Status: Not Answered

Q.87 Points \((-3, 2), Q(9, 10)\) and \(R(0, 4)\) lie on a circle \( C \) with \( PR \) as its diameter. The tangents to \( C \) at the points \( Q \) and \( R \) intersect at the point \( S \). If \( S \) lies on the line \( 2x - ky = 1 \), then \( k \) is equal to ________.

Given --
Answer :

Question Type: SA
Question ID: 7155051705
Status: Not Answered
<table>
<thead>
<tr>
<th>Question</th>
<th>Given</th>
<th>Answer</th>
<th>Question Type</th>
<th>Question ID</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.88</td>
<td>If (m) and (n) respectively are the numbers of positive and negative values of (\theta) in the interval ([-\pi, \pi]) that satisfy the equation (\cos 2\theta \cos \frac{\theta}{2} = \cos 3\theta \cos \frac{3\theta}{2}), then (mn) is equal to ______.</td>
<td></td>
<td>SA</td>
<td>7155051710</td>
<td>Not Answered</td>
</tr>
<tr>
<td>Q.89</td>
<td>25% of the population are smokers. A smoker has 27 times more chances to develop lung cancer than a non-smoker. A person is diagnosed with lung cancer and the probability that this person is a smoker is (\frac{k}{10}). Then the value of (k) is ______.</td>
<td></td>
<td>SA</td>
<td>7155051709</td>
<td>Not Answered</td>
</tr>
<tr>
<td>Q.90</td>
<td>A triangle is formed by X-axis, Y-axis and the line (3x + 4y = 60). Then the number of points ((a, b)) which lie strictly inside the triangle, where (a) is an integer and (b) is a multiple of (a), is _______.</td>
<td></td>
<td>SA</td>
<td>7155051707</td>
<td>Not Answered</td>
</tr>
</tbody>
</table>