<table>
<thead>
<tr>
<th>Roll Number</th>
<th>Date of Birth</th>
<th>Candidate's Name</th>
<th>Application Number</th>
<th>Section A</th>
<th>B TECH - B Math Mathematics</th>
<th>Section B</th>
<th>B TECH - Chemistry</th>
<th>Section A Objective</th>
<th>Section B Numerical</th>
<th>B TECH - Physics Section A</th>
<th>Challenge Option(s) ID</th>
<th>Challenge Reason</th>
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<tbody>
<tr>
<td>7155052015</td>
<td>0000000000</td>
<td>ALLIJALA JYOTHI</td>
<td>230310192415</td>
<td>7155052015</td>
<td>7155052017</td>
<td>7155052016</td>
<td>7155052017</td>
<td>7155052017</td>
<td>7155052017</td>
<td>7155052017</td>
<td>None of These</td>
<td>None of These</td>
</tr>
</tbody>
</table>
Electric field in a certain region is given by \( \vec{E} = \left( \frac{A}{x^2} + \frac{B}{y^2} \right) \). The SI unit of \( A \) and \( B \) are:

1. \( \text{Nm}^3\text{C}^{-1} \); \( \text{Nm}^2\text{C}^{-1} \)
2. \( \text{Nm}^2\text{C} \); \( \text{Nm}^3\text{C} \)
3. \( \text{Nm}^3\text{C} \); \( \text{Nm}^2\text{C} \)
4. \( \text{Nm}^2\text{C}^{-1} \); \( \text{Nm}^3\text{C}^{-1} \)

A sinusoidal carrier voltage is amplitude modulated. The resultant amplitude modulated wave has maximum and minimum amplitude of 120 V and 80 V respectively. The amplitude of each sideband is:

1. 15 V
2. 20 V
3. 10 V
4. 5 V
Q.3  If the gravitational field in the space is given as \( -\frac{K}{r^2} \). Taking the reference point to be at \( r = 2 \text{ cm} \) with gravitational potential \( V = 10 \text{ J/kg} \). Find the gravitational potential at \( r = 3 \text{ cm} \) in SI unit.

(Given, that \( K = 6 \text{ Jcm/kg} \))

Options 1. 12  
2. 9  
3. 10  
4. 11

Q.4  A person has been using spectacles of power \(-1.0 \text{ dioptre} \) for distant vision and a separate reading glass of power \( 2.0 \text{ dioptres} \). What is the least distance of distinct vision for this person?

Options 1. 30 cm  
2. 50 cm  
3. 10 cm  
4. 40 cm

Q.5  Two isolated metallic solid spheres of radii \( R \) and \( 2R \) are charged such that both have same charge density \( \sigma \). The spheres are then connected by a thin conducting wire. If the new charge density of the bigger sphere is \( \sigma' \). The ratio \( \frac{\sigma'}{\sigma} \) is:

Options 1. 9  
2. 4  
3. 6  
4. 3

Question Type: MCQ
Question ID: 7155052001
Option 1 ID: 7155056081
Option 2 ID: 7155056084
Option 3 ID: 7155056083
Option 4 ID: 7155056082
Status: Answered
Chosen Option: 3
Q.6 The height of liquid column raised in a capillary tube of certain radius when dipped in liquid A vertically is, 5 cm. If the tube is dipped in a similar manner in another liquid B of surface tension and density double the values of liquid A, the height of liquid column raised in liquid B would be __________m.

Options
1. 0.5
2. 0.05
3. 0.10
4. 0.20

Q.7 A small object at rest, absorbs a light pulse of power 20 mW and duration 300 ns. Assuming speed of light as \(3 \times 10^8\) m/s, the momentum of the object becomes equal to:

Options
1. \(2 \times 10^{-17}\) kg m/s
2. \(1 \times 10^{-17}\) kg m/s
3. \(0.5 \times 10^{-17}\) kg m/s
4. \(3 \times 10^{-17}\) kg m/s

Q.8 The pressure (P) and temperature (T) relationship of an ideal gas obeys the equation

\[PT^2 = \text{constant}\]

The volume expansion coefficient of the gas will be:

Options
1. \(\frac{3}{T^2}\)
2. \(\frac{3}{T}\)
3. \(3T^2\)
4. \(\frac{3}{T^3}\)
Q.9 The figure represents the momentum time (p-t) curve for a particle moving along an axis under the influence of the force. Identify the regions on the graph where the magnitude of the force is maximum and minimum respectively?
If (t_2 - t_1) < t_3

Options
1. b and c
2. c and b
3. a and b
4. c and a
Q.10 Match Column-I with Column-II:

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x-t graphs)</td>
<td>(v-t graphs)</td>
</tr>
<tr>
<td>A.</td>
<td>I.</td>
</tr>
<tr>
<td>B.</td>
<td>II.</td>
</tr>
<tr>
<td>C.</td>
<td>III.</td>
</tr>
<tr>
<td>D.</td>
<td>IV.</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:

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

Question Type: MCQ
Question ID: 7155051997
Option 1 ID: 7155056068
Option 2 ID: 7155056067
Option 3 ID: 7155056065
Option 4 ID: 7155056066
Status: Marked For Review
Chosen Option: 2
Q.11 The charge flowing in a conductor changes with time as $Q(t) = at - \beta t^2 + \gamma t^3$. Where $a, \beta$ and $\gamma$ are constants. Minimum value of current is:

Options

1. $\alpha = \frac{\gamma^2}{3\beta}$
2. $\alpha = \frac{3\beta^2}{\gamma}$
3. $\beta = \frac{\alpha^2}{3\gamma}$
4. $\alpha = \frac{\beta^2}{3\gamma}$

Q.12 The output waveform of the given logical circuit for the following inputs $A$ and $B$ as shown below:

Options

1. $t_1 \ t_2 \ t_3 \ t_4 \ t_5 \ t_6$
2. $t_1 \ t_2 \ t_3 \ t_4 \ t_5 \ t_6$
3. $t_1 \ t_2 \ t_3 \ t_4 \ t_5 \ t_6$
4. $t_1 \ t_2 \ t_3 \ t_4 \ t_5 \ t_6$
Q.13  Heat is given to an ideal gas in an isothermal process.

A. Internal energy of the gas will decrease.
B. Internal energy of the gas will increase.
C. Internal energy of the gas will not change.
D. The gas will do positive work.
E. The gas will do negative work.

Choose the correct answer from the options given below:

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

Q.14  Speed of an electron in Bohr’s 7th orbit for Hydrogen atom is $3.6 \times 10^6$ m/s. The corresponding speed of the electron in 3rd orbit, in m/s is:

Options 1. $(7.5 \times 10^6)$
2. $(3.6 \times 10^6)$
3. $(1.8 \times 10^6)$
4. $(8.4 \times 10^6)$
Q.15 Choose the correct relationship between Poisson ratio ($\nu$), bulk modulus (K) and modulus of rigidity ($\nu$) of a given solid object:

Options
1. $\sigma = \frac{3K - 2\nu}{6K + 2\nu}$
2. $\sigma = \frac{6K - 2\nu}{3K - 2\nu}$
3. $\sigma = \frac{3K + 2\nu}{6K + 2\nu}$
4. $\sigma = \frac{6K + 2\nu}{3K - 2\nu}$

Q.16 A ball of mass 200 g rests on a vertical post of height 20 m. A bullet of mass 10 g, travelling in horizontal direction, hits the centre of the ball. After collision both travels independently. The ball hits the ground at a distance 30 m and the bullet at a distance of 120 m from the foot of the post.

The value of initial velocity of the bullet will be (if $g = 10$ m/s$^2$):

Options
1. 60 m/s
2. 360 m/s
3. 400 m/s
4. 120 m/s
Q.17 A massless square loop, of wire of resistance 10 Ω, supporting a mass of 1 g, hangs vertically with one of its sides in a uniform magnetic field of $10^3$ G, directed outwards in the shaded region. A dc voltage V is applied to the loop. For what value of V, the magnetic force will exactly balance the weight of the supporting mass of 1 g?
(If sides of the loop are 10 cm, g = 10 ms$^{-2}$)

Options
1. \(\frac{1}{10} V\)
2. 100 V
3. 10 V
4. 1 V

Q.18 The magnetic moment associated with two closely wound circular coils A and B of radii $r_A = 10$ cm and $r_B = 20$ cm respectively are equal if: (Where $N_A$, $I_A$ and $N_B$, $I_B$ are number of turn and current of A and B respectively)

Options
1. $4N_AI_A = N_BI_B$
2. $2N_AI_A = N_BI_B$
3. $N_A = 2N_B$
4. $N_AI_A = 4N_BI_B$
Q.19 As per the given figure, a small ball P slides down the quadrant of a circle and hits the other ball Q of equal mass which is initially at rest. Neglecting the effect of friction and assume the collision to be elastic, the velocity of ball Q after collision will be:

\[ g = 10 \text{ m/s}^2 \]

Options:
1. 4 m/s
2. 0.25 m/s
3. 2 m/s
4. 0

Question Type: MCQ
Question ID: 7155052000
Option 1 ID: 7155056078
Option 2 ID: 7155056077
Option 3 ID: 7155056080
Option 4 ID: 7155056079
Status: Marked For Review
Chosen Option: 4

Q.20 In a series LR circuit with \( X_L = R \), power factor is \( P_1 \). If a capacitor of capacitance \( C \) with \( X_C = X_L \) is added to the circuit the power factor becomes \( P_2 \). The ratio of \( P_1 \) to \( P_2 \) will be:

Options:
1. \( \sqrt{2} \)
2. 1 : 3
3. 1 : 2
4. 1 : 1

Question Type: MCQ
Question ID: 7155052009
Option 1 ID: 7155056113
Option 2 ID: 7155056116
Option 3 ID: 7155056115
Option 4 ID: 7155056114
Status: Marked For Review
Chosen Option: 3

Section: Physics Section B

Q.21 The general displacement of a simple harmonic oscillator is \( x = A \cos \omega t \). Let \( T \) be its time period. The slope of its potential energy (U) - time (t) curve will be maximum when \( \omega t = \frac{\pi}{2} \). The value of \( \beta \) is ________.

Given:
Answer:

Question Type: SA
Question ID: 7155052019
Status: Not Answered
Q.22 A capacitor of capacitance 900 μF is charged by a 100 V battery. The capacitor is disconnected from the battery and connected to another uncharged identical capacitor such that one plate of uncharged capacitor connected to positive plate and another plate of uncharged capacitor connected to negative plate of the charged capacitor. The loss of energy in this process is measured as $x \times 10^{-2}$ J. The value of $x$ is ________.

Given:
Answer:

Q.23 In the following circuit, the magnitude of current $I_1$, is ________ A.

![Circuit Diagram]

Given:
Answer:

Q.24 A point source of light is placed at the centre of curvature of a hemispherical surface. The source emits a power of 24 W. The radius of curvature of hemisphere is 10 cm and the inner surface is completely reflecting. The force on the hemisphere due to the light falling on it is ________ x $10^{-8}$ N.

Given:
Answer:

Q.25 In a screw gauge, there are 100 divisions on the circular scale and the main scale moves by 0.5 mm on a complete rotation of the circular scale. The zero of circular scale lies 6 divisions below the line of graduation when two studs are brought in contact with each other. When a wire is placed between the studs, 4 linear scale divisions are clearly visible while 46th division the circular scale coincide with the reference line. The diameter of the wire is ________ x $10^{-5}$ mm.

Given:
Answer:

Q.26 A thin uniform rod of length 2m, cross sectional area ‘A’ and density ‘d’ is rotated about an axis passing through the centre and perpendicular to its length with angular velocity $\omega$. If value of $\omega$ in terms of its rotational kinetic energy $E$ is $\sqrt{\frac{aE}{VaD}}$ then value of $a$ is ________.

Given:
Answer:
Q.27  In Young’s double slit experiment, two slits $S_1$ and $S_2$ are ‘d’ distance apart and the separation from slits to screen is D (as shown in figure). Now if two transparent slabs of equal thickness 0.1 mm but refractive index 1.51 and 1.55 are introduced in the path of beam ($\lambda = 4000\AA$) from $S_1$ and $S_2$ respectively. The central bright fringe spot will shift by ________ number of fringes.

Q.28  A horse rider covers half the distance with 5 m/s speed. The remaining part of the distance was travelled with speed 10 m/s for half the time and with speed 15 m/s for other half of the time. The mean speed of the rider averaged over the whole time of motion is \( \frac{x}{y} \) m/s. The value of x is ________.

Q.29  In an experiment for estimating the value of focal length of converging mirror, image of an object placed at 40 cm from the pole of the mirror is formed at distance 120 cm from the pole of the mirror. These distances are measured with a modified scale in which there are 20 small divisions in 1 cm. The value of error in measurement of focal length of the mirror is \( \frac{1}{x} \) cm. The value of K is ________.

Q.30  As per the given figure, if $\frac{dI}{dt} = -I$ A/s then the value of $V_{AB}$ at this instant will be ________ V.

Section : Chemistry Section A
Q.31
Given below are two statements: one is labelled as Assertion (A) and the other is labelled as 
Reason (R).

**Assertion (A):** In expensive scientific instruments, silica gel is kept in watch-glasses or in 
semipermeable membrane bags.

**Reason (R):** Silica gel adsorbs moisture from air via adsorption, thus protects the instrument from 
water corrosion (rusting) and/or prevents malfunctioning.

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

**Options**
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. (A) is false but (R) is true
3. (A) is true but (R) is false
4. Both (A) and (R) are true but (R) is not the correct explanation of (A)

---

Q.32
The alkaline earth metal sulphate(s) which are readily soluble in water is/are:

A. BeSO₄  
B. MgSO₄  
C. CaSO₄  
D. SrSO₄  
E. BaSO₄

Choose the correct answer from the options given below:

**Options**
1. B only
2. B and C
3. A and B
4. A only
Q.33 The major products ‘A’ and ‘B’, respectively, are

\[
\begin{align*}
&\text{Cold} & \text{H}_2\text{SO}_4^+ & \text{H}_3\text{C} - \text{C} &= \text{CH}_2 & \text{H}_2\text{SO}_4 & 80^\circ\text{C} & \text{H}_3\text{C} - \text{C} &= \text{CH}_2 \\
\end{align*}
\]

Options

1. \(\text{H}_3\text{C} - \text{C} = \text{CH}_2\) & \(\text{H}_3\text{C} - \text{C} = \text{CH}_3\)

2. \(\text{H}_3\text{C} - \text{C} = \text{CH}_2\) & \(\text{H}_3\text{C} - \text{C} = \text{CH}_3\)

3. \(\text{H}_3\text{C} - \text{C} = \text{CH}_2\) & \(\text{H}_3\text{C} - \text{C} = \text{CH}_3\)

4. \(\text{H}_3\text{C} - \text{C} = \text{CH}_2\) & \(\text{H}_3\text{C} - \text{C} = \text{CH}_3\)

Question Type: MCQ

Question ID: 7155052037
Option 1 ID: 7155056195
Option 2 ID: 7155056197
Option 3 ID: 7155056196
Option 4 ID: 7155056198
Status: Marked For Review
Chosen Option: 3
Q.34 To inhibit the growth of tumours, identify the compounds used from the following:

A. EDTA  
B. Coordination Compounds of Pt  
C. D - Penicillamine  
D. Cis - Platin  

Choose the correct answer from the option given below:

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

Q.35 Which of the following compounds would give the following set of qualitative analysis?

(i) Fehling's Test: Positive  
(ii) Na fusion extract upon treatment with sodium nitroprusside gives a blood red colour but not prussian blue.

Options

1.  

2.  

3.  

4.
Q.36 Lithium aluminium hydride can be prepared from the reaction of
Options 1. LiCl, Al and H₂
2. LiH and Al(OH)₃
3. LiH and Al₂Cl₆
4. LiCl and Al₂H₆

Q.37 What is the correct order of acidity of the protons marked A–D in the given compounds?

Options 1. H₃ > H₂ > H₃ > H₄
2. H₁ > H₂ > H₃ > H₄
3. H₃ > H₂ > H₃ > H₄
4. H₁ > H₂ > H₃ > H₄

Q.38 Caprolactam when heated at high temperature in presence of water, gives
Options 1. Nylon 6, 6
2. Dacron
3. Nylon 6
4. Teflon
Q.39 Match List I with List II

<table>
<thead>
<tr>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 37</td>
<td>I. $p$-block</td>
</tr>
<tr>
<td>B. 78</td>
<td>II. $d$-block</td>
</tr>
<tr>
<td>C. 52</td>
<td>III. $f$-block</td>
</tr>
<tr>
<td>D. 65</td>
<td>IV. $p$-block</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:
1. A - I, B - III, C - IV, D - II
2. A - IV, B - III, C - II, D - I
3. A - IV, B - II, C - I, D - III
4. A - II, B - IV, C - I, D - III

Question Type: MCQ
Question ID: 7155052028
Option 1 ID: 7155056159
Option 2 ID: 7155056160
Option 3 ID: 7155056161
Option 4 ID: 7155056162
Status: Marked For Review
Chosen Option: 2

Q.40 In the extraction of copper, its sulphide ore is heated in a reverberatory furnace after mixing with silica to:

1. decrease the temperature needed for roasting of Cu$_2$S
2. remove FeO as FeSiO$_3$
3. separate CuO as CuSiO$_3$
4. remove calcium as CaSiO$_3$

Question Type: MCQ
Question ID: 7155052029
Option 1 ID: 7155056166
Option 2 ID: 7155056164
Option 3 ID: 7155056165
Option 4 ID: 7155056163
Status: Not Answered
Chosen Option: --

Q.41 Which of the following is correct order of ligand field strength?

1. $S^{2-} < NH_3 < en < CO < C_2O_4^{2-}$
2. $CO < en < NH_3 < C_2O_4^{2-} < S^{2-}$
3. $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$
4. $NH_3 < en < CO < S^{2-} < C_2O_4^{2-}$

Question Type: MCQ
Question ID: 7155052035
Option 1 ID: 7155056188
Option 2 ID: 7155056189
Option 3 ID: 7155056187
Option 4 ID: 7155056190
Status: Not Answered
Chosen Option: --
Q.42 For \( \text{OF}_2 \) molecule consider the following:

A. Number of lone pairs on oxygen is 2.
B. FOF angle is less than 104.5°.
C. Oxidation state of O is –2.
D. Molecule is bent ‘V’ shaped.
E. Molecular geometry is linear.

**Correct** options are:

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

Q.43 Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A)**: Ketoses give Seliwanoff’s test faster than Aldoses.

**Reason (R)**: Ketoses undergo \( \beta \)-elimination followed by formation of furfural.

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

Options 1.
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. (A) is true but (R) is false
3. (A) is false but (R) is true
4. Both (A) and (R) are true but (R) is not the correct explanation of (A)
Q.44 In the wet tests for identification of various cations by precipitation, which transition element cation doesn't belong to group IV in qualitative inorganic analysis?

Options
1. Fe$^{3+}$
2. Zn$^{2+}$
3. Ni$^{2+}$
4. Co$^{2+}$

Q.45 Amongst the following compounds, which one is an antacid?

Options
1. Meprobamate
2. Brompheniramine
3. Ranitidine
4. Terfenadine
Q.46 Match List I with List II

<table>
<thead>
<tr>
<th></th>
<th>LIST I</th>
<th>LIST II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>(\text{Cl} + \text{CH}_3\text{Cl} \rightarrow \text{Na})</td>
<td>I. Fittig reaction</td>
</tr>
<tr>
<td>B</td>
<td>(\text{Cl} + 2\text{Na} \rightarrow )</td>
<td>II. Wurtz Fittig reaction</td>
</tr>
<tr>
<td>C</td>
<td>(\text{N}_2\text{Cl}^- \rightarrow \text{Cl} \rightarrow \text{Cu}_2\text{Cl}_2 \rightarrow )</td>
<td>III. Finkelstein reaction</td>
</tr>
<tr>
<td>D</td>
<td>(\text{C}_2\text{H}_5\text{Cl} + \text{NaI} \rightarrow \text{C}_2\text{H}_5\text{I} + \text{NaCl})</td>
<td>IV. Sandmeyer reaction</td>
</tr>
</tbody>
</table>

Choose the **correct** answer from the options given below:

- 1. A - IV, B - II, C - III, D - I
- 2. A - II, B - I, C - IV, D - III
- 3. A - II, B - I, C - III, D - IV
- 4. A - III, B - II, C - IV, D - I
Q.47 Formation of photochemical smog involves the following reaction in which A, B and C are respectively:

i. \( \text{NO}_2 \rightarrow_{\text{hv}} A + B \)

ii. B + O\(_2\) \rightarrow C

iii. A + C \rightarrow \text{NO}_2 + O\(_2\)

Choose the correct answer from the options given below:

Options 1. N, O\(_2\) & O\(_3\)

2. O, NO & NO\(_3\)

3. NO, O & O\(_3\)

4. O, N\(_2\)O & NO

Q.48 Match List I with List II

<table>
<thead>
<tr>
<th>List I (molecules/ions)</th>
<th>List II (No. of lone pairs of e(^-) on central atom)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. IF(_7)</td>
<td>I. Three</td>
</tr>
<tr>
<td>B. ICl(_4)</td>
<td>II. One</td>
</tr>
<tr>
<td>C. XeF(_6)</td>
<td>III. Two</td>
</tr>
<tr>
<td>D. XeF(_2)</td>
<td>IV. Zero</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 - II, B - I, C - IV, D - III

4. A - IV, B - I, C - II, D - III
Q.49 Benzyl isocyanide can be obtained by:

A. \[
\begin{align*}
\text{CH}_2\text{Br} & \xrightarrow{\text{AgCN}} \\
\end{align*}
\]

B. \[
\begin{align*}
\text{CH}_2\text{NH}_2 & \xrightarrow{\text{CHCl}_3, \text{Aq.KOH}} \\
\end{align*}
\]

C. \[
\begin{align*}
\text{CH}_2\text{NHCH}_3 & \xrightarrow{\text{CHCl}_3, \text{Aq.KOH}} \\
\end{align*}
\]

D. \[
\begin{align*}
\text{CH}_2\text{OTs} & \xrightarrow{\text{KCN}} \\
\end{align*}
\]

Choose the correct answer from the options given below:

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

Q.50 During the qualitative analysis of \(\text{SO}_4^{2-}\) using dilute \(\text{H}_2\text{SO}_4\), \(\text{SO}_2\) gas is evolved which turns \(\text{K}_2\text{Cr}_2\text{O}_7\) solution (acidified with dilute \(\text{H}_2\text{SO}_4\)):

Options:
1. blue
2. green
3. black
4. red

Section: Chemistry Section B
Q.51 If compound A reacts with B following first order kinetics with rate constant $2.011 \times 10^{-3}$ s$^{-1}$. The
time taken by A (in seconds) to reduce from 7 g to 2 g will be _________ (Nearest Integer).

Given --
Answer :

Question Type : SA
Question ID : 7155052053
Status : Not Answered

---

Q.52 A solution containing 2 g of a non-volatile solute in 20 g of water boils at 373.52 K. The molecular
mass of the solute is ________ g mol$^{-1}$. (Nearest integer)

Given, water boils at 373 K, $K_b$ for water $= 0.52$ K g mol$^{-1}$

Given --
Answer :

Question Type : SA
Question ID : 7155052050
Status : Not Answered

---

Q.53 A trisubstituted compound ‘A’, C$_{10}$H$_{12}$O$_2$ gives neutral FeCl$_3$ test positive. Treatment of compound
‘A’ with NaOH and CH$_3$Br gives C$_{10}$H$_{12}$O$_2$, with hydroiodic acid gives methyl iodide and with
hot conc. NaOH gives a compound B, C$_{10}$H$_{12}$O$_2$. Compound ‘A’ also decolorises alkaline KMnO$_4$.
The number of π bond(s) present in the compound ‘A’ is ________.

Given --
Answer :

Question Type : SA
Question ID : 7155052055
Status : Not Answered

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Q.54 Some amount of dichloromethane (CH$_2$Cl$_2$) is added to 671.141 mL of chloroform (CHCl$_3$) to
prepare 2.6 $\times$ 10$^{-3}$ M solution of CH$_2$Cl$_2$ (DCM). The concentration of DCM is ________ ppm
(by mass).

Given :
atomic mass : C = 12
H = 1
Cl = 35.5
density of CHCl$_3$ = 1.49 g cm$^{-3}$

Given --
Answer :

Question Type : SA
Question ID : 7155052046
Status : Not Answered

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Q.55 The energy of one mole of photons of radiation of frequency $2 \times 10^{12}$ Hz in J mol$^{-1}$ is

$[\text{Given : } h = 6.626 \times 10^{-34} \text{ Js}]

N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$

Given --
Answer :

Question Type : SA
Question ID : 7155052048
Status : Not Answered
Q.56  A 300 mL bottle of soft drink has 0.2 M CO₂ dissolved in it. Assuming CO₂ behaves as an ideal gas, the volume of the dissolved CO₂ at STP is _______ mL. (Nearest integer)

Given : At STP, molar volume of an ideal gas is 22.7 L mol⁻¹

Given --
Answer : 

Question Type : SA
Question ID : 7155052047
Status : Not Answered

Q.57  Consider the cell
Pt(s)|H₂ (g, 1 atm)|H⁺ (aq, 1 M)|Fe^{3+}(aq), Fe^{2+}(aq)|Pt(s)

When the potential of the cell is 0.712 V at 298 K, the ratio [Fe^{2+}] / [Fe^{3+}] is _________. (Nearest integer)

Given : Fe^{3+} + e⁻ → Fe^{2+}, E^°_{Fe^{2+}/Fe^{3+}} = 0.771

\[
\frac{2.303 \frac{RT}{F}}{0.06 \text{ V}}
\]

Given --
Answer : 

Question Type : SA
Question ID : 7155052052
Status : Not Answered

Q.58  600 mL of 0.01M HCl is mixed with 400 mL of 0.01 M H₂SO₄. The pH of the mixture is ______ × 10⁻². (Nearest integer)

[Given log₂ = -0.30
log 3 = 0.48
log 5 = 0.69
log 7 = 0.84
log 11 = 1.04]

Given --
Answer : 

Question Type : SA
Question ID : 7155052051
Status : Not Answered

Q.59  When 2 litre of ideal gas expands isothermally into vacuum to a total volume of 6 litre, the change in internal energy is ______ J. (Nearest integer)

Given --
Answer : 

Question Type : SA
Question ID : 7155052049
Status : Not Answered

Q.60  The number of electrons involved in the reduction of permanganate to manganese dioxide in acidic medium is ______.

Given --
Answer : 

Question Type : SA
Question ID : 7155052054
Status : Not Answered
Q.61 If \( \vec{a}, \vec{b}, \vec{c} \) are three non-zero vectors and \( \vec{\hat{n}} \) is a unit vector perpendicular to \( \vec{c} \) such that
\[ \vec{a} = \vec{b} - \vec{\hat{n}},(\vec{a} \neq 0) \] and \( \vec{\hat{n}} \cdot \vec{c} = 12 \), then \( |\vec{c} \times (\vec{a} \times \vec{b})| \) is equal to:

Options 1. 15
2. 6
3. 9
4. 12

Question Type: MCQ
Question ID: 7155052072
Option 1 ID: 7155056308
Option 2 ID: 7155056305
Option 3 ID: 7155056306
Option 4 ID: 7155056307
Status: Marked For Review
Chosen Option: 3

Q.62 The coefficient of \( x^{301} \) in \((1 + x)^{500} + x(1 + x)^{499} + x^2(1 + x)^{498} + \ldots + x^{500} \) is:

Options 1. \( 500C_{300} \)
2. \( 501C_{300} \)
3. \( 500C_{301} \)
4. \( 501C_{302} \)

Question Type: MCQ
Question ID: 7155052059
Option 1 ID: 7155056256
Option 2 ID: 7155056253
Option 3 ID: 7155056255
Option 4 ID: 7155056254
Status: Marked For Review
Chosen Option: 4

Q.63 A straight line cuts off the intercepts \( OA = a \) and \( OB = b \) on the positive directions of \( x \)-axis and \( y \)-axis respectively. If the perpendicular from origin \( O \) to this line makes an angle of \( \frac{\pi}{6} \) with positive direction of \( y \)-axis and the area of \( \Delta OAB \) is \( \frac{98}{3} \sqrt{3} \), then \( a^2 - b^2 \) is equal to:

Options 1. \( \frac{392}{3} \)
2. 98
3. 196
4. \( \frac{196}{3} \)

Question Type: MCQ
Question ID: 7155052067
Option 1 ID: 7155056287
Option 2 ID: 7155056286
Option 3 ID: 7155056288
Option 4 ID: 7155056285
Status: Marked For Review
Chosen Option: 3
Q.64  The line $l_1$ passes through the point $(2, 6, 2)$ and is perpendicular to the plane $2x + y - 2z = 10$. Then the shortest distance between the line $l_1$ and the line $\frac{x+1}{2} = \frac{y+4}{-3} = \frac{z}{2}$ is:

Options

1. $\frac{13}{3}$
2. 7
3. $\frac{19}{3}$
4. 9

Q.65  Among the statements:

(S1) $(p \lor q) \Rightarrow (p \Rightarrow r)$

(S2) $(p \lor q) \Rightarrow ((p \Rightarrow r) \lor (q \Rightarrow r))$

Options

1. both (S1) and (S2) are tautologies
2. only (S2) is a tautology
3. neither (S1) nor (S2) is a tautology
4. only (S1) is a tautology

Q.66  If $\tan 15^\circ + \frac{1}{\tan 75^\circ} + \frac{1}{\tan 105^\circ} + \tan 195^\circ = 2a$, then the value of $\left(a + \frac{1}{a}\right)$ is:

Options

1. $2$
2. $4$
3. $5 - \frac{3}{2\sqrt{3}}$
4. $4 - 2\sqrt{3}$
Q.67 Let \( y = x + 2, 4y = 3x + 6 \) and \( 3y = 4x + 1 \) be three tangent lines to the circle \( (x - h)^2 + (y - k)^2 = r^2 \).
Then \( h + k \) is equal to:

Options
1. 5
2. \( 5\sqrt{2} \)
3. \( 5(1 + \sqrt{2}) \)
4. 6

Q.68 Let \( A = \begin{pmatrix} m & n \\ p & q \end{pmatrix}, \) \( d = |A| \neq 0 \) and \( |A - d(\text{Adj } A)| = 0 \). Then

Options
1. \( 1+d^2=(m+q)^2 \)
2. \( (1+d)^2-(m+q)^2 \)
3. \( (1-d)^2-m^2-q^2 \)
4. \( 1+d^2-m^2-q^2 \)

Q.69 If \( a_n = \frac{-2}{4n^2 - 16n + 15} \), then \( a_1 + a_2 + \ldots + a_{25} \) is equal to:

Options
1. \( \frac{52}{147} \)
2. \( \frac{50}{141} \)
3. \( \frac{49}{138} \)
4. \( \frac{51}{144} \)
Q.70  If the solution of the equation \( \log_{\cos \theta} \cot x + 4 \log_{\tan \theta} \tan x = 1 \), \( x \in \left( 0, \frac{\pi}{2} \right) \), is \( \sin^{-1} \left( \frac{a + \sqrt{b}}{2} \right) \), where \( \alpha \) and \( \beta \) are integers, then \( \alpha + \beta \) is equal to:

Options 1. 5  
2. 3  
3. 6  
4. 4

Question Type: MCQ  
Question ID: 7155052060  
Option 1 ID: 7155056258  
Option 2 ID: 7155056259  
Option 3 ID: 7155056260  
Option 4 ID: 7155056257  
Status: Marked For Review  
Chosen Option: 1

Q.71  If \([t]\) denotes the greatest integer \( \leq t \), then the value of \( \frac{3(e - 1)}{e} \int_{1}^{2} \frac{e^{x^{2}} - x^{x^{2}}}{x^{2}} \, dx \) is:

Options 1. \( e^8 - e \)  
2. \( e^9 - e \)  
3. \( e^7 - 1 \)  
4. \( e^8 - 1 \)

Question Type: MCQ  
Question ID: 7155052064  
Option 1 ID: 7155056274  
Option 2 ID: 7155056276  
Option 3 ID: 7155056273  
Option 4 ID: 7155056275  
Status: Answered  
Chosen Option: 3

Q.72  The number of points on the curve \( y = 54x^5 - 135x^4 - 70x^3 + 180x^2 + 210x \) at which the normal lines are parallel to \( x + 90y + 2 = 0 \) is:

Options 1. 3  
2. 0  
3. 4  
4. 2

Question Type: MCQ  
Question ID: 7155052063  
Option 1 ID: 7155056270  
Option 2 ID: 7155056272  
Option 3 ID: 7155056269  
Option 4 ID: 7155056271  
Status: Marked For Review  
Chosen Option: 4
Q.73  Let the system of linear equations

\[
\begin{align*}
x + y + kz &= 2 \\
2x + 3y - z &= 1 \\
3x + 4y + 2z &= k
\end{align*}
\]

have infinitely many solutions. Then the system

\[
\begin{align*}
(k + 1)x + (2k - 1)y &= 7 \\
(2k + 1)x + (k + 5)y &= 10
\end{align*}
\]

has:

1. unique solution satisfying \( x + y = 1 \)
2. infinitely many solutions
3. no solution
4. unique solution satisfying \( x - y = 1 \)

Q.74  If an unbiased die, marked with \(-2, -1, 0, 1, 2, 3\) on its faces, is thrown five times, then the probability that the product of the outcomes is positive, is:

\[
\begin{align*}
\text{Options} & \quad \frac{521}{2592} \\
1. & \quad \frac{881}{2592} \\
2. & \quad \frac{440}{2592} \\
3. & \quad \frac{27}{288} \\
4. & \quad \frac{1}{288}
\end{align*}
\]
Q.75 Let a unit vector \( \mathbf{\hat{p}} \) make angles \( \alpha, \beta, \gamma \) with the positive directions of the co-ordinate axes \( OX, OY, OZ \) respectively, where \( \beta, \gamma \in \left[ 0, \frac{\pi}{2} \right] \). If \( \mathbf{\hat{p}} \) is perpendicular to the plane through points (1, 2, 3), (2, 3, 4) and (1, 5, 7), then which one of the following is true?

Options
1. \( \alpha \in \left( 0, \frac{\pi}{2} \right) \) and \( \gamma \in \left( \frac{\pi}{2}, \pi \right) \)
2. \( \alpha \in \left( \frac{\pi}{2}, \pi \right) \) and \( \gamma \in \left( \frac{\pi}{2}, \pi \right) \)
3. \( \alpha \in \left( 0, \frac{\pi}{2} \right) \) and \( \gamma \in \left( 0, \frac{\pi}{2} \right) \)
4. \( \alpha \in \left( \frac{\pi}{2}, \pi \right) \) and \( \gamma \in \left( 0, \frac{\pi}{2} \right) \)

Q.76 The minimum number of elements that must be added to the relation \( R = \{(a, b), (b, c)\} \) on the set \( \{a, b, c\} \) so that it becomes symmetric and transitive is:

Options
1. 7
2. 3
3. 5
4. 4

Q.77 If the coefficient of \( x^{15} \) in the expansion of \( (ax^2 + \frac{1}{bx^{1/2}})^{15} \) is equal to the coefficient of \( x^{15} \) in the expansion of \( (bx^{1/2} - \frac{1}{ax^{2}})^{15} \), where \( a \) and \( b \) are positive real numbers, then for each such ordered pair \( (a, b) \):

Options
1. \( ab = 1 \)
2. \( a = b \)
3. \( a = 3b \)
4. \( ab = 3 \)
Q.78 If P(h, k) be a point on the parabola \( x = 4y^2 \), which is nearest to the point Q(0, 33), then the distance of P from the directrix of the parabola \( y^2 = 4(x + y) \) is equal to:

Options
1. 6
2. 2
3. 4
4. 8

Q.79 Suppose \( f: \mathbb{R} \to (0, \infty) \) be a differentiable function such that \( 5f(x + y) = f(x) \cdot f(y) \), \( \forall x, y \in \mathbb{R} \). If \( f(3) = 320 \), then \( \sum_{n=0}^{3} f(n) \) is equal to:

Options
1. 6875
2. 6525
3. 6825
4. 6575

Q.80 Let the solution curve \( y = y(x) \) of the differential equation
\[
\frac{dy}{dx} - \frac{3x^2 \tan^{-1}(x^2)}{(1 + x^4)^{3/2}} y = 2x \exp \left( \frac{x^2 - \tan^{-1}(x^2)}{\sqrt{1 + x^4}} \right)
\]
pass through the origin. Then \( y(1) \) is equal to:

Options
1. \( \exp \left( \frac{4 - \pi}{4\sqrt{2}} \right) \)
2. \( \exp \left( \frac{1 + \pi}{4\sqrt{2}} \right) \)
3. \( \exp \left( \frac{1 - \pi}{4\sqrt{2}} \right) \)
4. \( \exp \left( \frac{\pi - 4}{4\sqrt{2}} \right) \)
Q.81  If the equation of the plane passing through the point (1, 1, 2) and perpendicular to the line \( x - 3y + 2z - 1 = 0 = 4x - y + z \) is \( Ax + By + Cz = 1 \), then \( 140 (C-B+A) \) is equal to _______.

Given--
Answer :

Q.82  Let \( z = 1 + i \) and \( R = \frac{1 + iz}{z(1 - z) + \frac{1}{z}} \). Then \( \frac{12}{\pi} \text{ arg}(z) \) is equal to _______.

Given--
Answer :

Q.83  Let \( a \) be the area of the larger region bounded by the curve \( y^2 = 8x \) and the lines \( y = x \) and \( x = 2 \), which lies in the first quadrant. Then the value of \( 3a \) is equal to _______.

Given--
Answer :

Q.84  \( \lim_{\to \infty} \frac{48 \int_0^1 x^2 \, dx}{x^2 + 1} \) is equal to _______.

Given--
Answer :

Q.85  The mean and variance of 7 observations are 8 and 16 respectively. If one observation 14 is omitted and \( a \) and \( b \) are respectively mean and variance of remaining 6 observation, then \( a + 3b - 5 \) is equal to _______.

Given--
Answer :

Q.86  Number of 4-digit numbers (the repetition of digits is allowed) which are made using the digits 1, 2, 3 and 5, and are divisible by 15, is equal to _______.

Given--
Answer :
Q.87
Given
\[ \lambda_1, \lambda_2 \text{ are two values of } \lambda \text{ such that the angle between the planes } \mathbf{P}_1 : \frac{r}{7} \left( \frac{r^2 - 5}{2} + \frac{5}{2} \right) = 7 \text{ and } \mathbf{P}_2 : r \cdot \left( \lambda_1 + 3 \right) = 9 \text{ is } \sin^{-1} \left( \frac{2\sqrt{5}}{5} \right), \text{ then the square of the length of perpendicular from the point } (38, 1, 10), (2, 2, 2) \text{ to the plane } \mathbf{P}_1 \text{ is } \ ]

Answer:

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Question Type : SA
Question ID : 7155052083
Status : Not Answered

Q.88
Given
\[ \sum_{n=0}^{\infty} \frac{a^n}{n!} = e^a + b + c, \text{ where } a, b, c \in \mathbb{Z}, \text{ and } e = \sum_{n=0}^{\infty} \frac{1}{n!}. \text{ Then } a^2 - b + c \text{ is equal to } \]

Answer:

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Question Type : SA
Question ID : 7155052076
Status : Answered

Q.89
Let \[ f^3(x) = \frac{3x + 2}{2x + 3}, x \in \mathbb{R}. \]

For \( n \geq 2 \), define \( f^n(x) = f_{10} f^{n-1}(x) \).

If \( f^5(x) = \frac{ax + b}{bx + a} \), \( \gcd(a, b) = 1 \), then \( a + b \) is equal to \( \]

Answer:

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Question Type : SA
Question ID : 7155052079
Status : Answered

Q.90
Let \( S = \{1, 2, 3, 4, 5, 6\} \). Then the number of one-one functions \( f : S \rightarrow P(S) \), where \( P(S) \) denote the power set of \( S \), such that \( f_{mn} \subseteq f_m \) where \( n < m \) is \( \]

Answer:

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Question Type : SA
Question ID : 7155052078
Status : Not Answered