Physics

Question: A particle covers 90° along the circumference of a circle of radius 2 km as shown find its displacement.

Options:
(a) 2km
(b) \( \pi \) km
(c) \( 2\sqrt{2} \) km
(d) 4 km
Answer: (c)

Question: 2 wires A and B are made of same material and have same mass. Radius of A is 2 mm and B is 4mm If resistance of B is 2 \( \Omega \), resistance of A is

Options:
(a) 4 \( \Omega \)
(b) 8 \( \Omega \)
(c) 16 \( \Omega \)
(d) 32 \( \Omega \)
Answer: (c)

Question: In a system of 3 kg and 2 kg, 3 kg is moved by 2 units towards COM. How much should 2kg move so that COM does not change position.

Options:
(a) \( \frac{4}{3} \) units
(b) \( \frac{5}{3} \) units
(c) \( \frac{7}{3} \) units
(d) \( \frac{7}{5} \) units
Answer: (a)

Question: A satellite revolves around the earth. The distance of the satellite at which it should be placed from the earth depends on time period of the earth, mass of the earth and universal gravitational constant

\[ G = \text{[M}^{-1} \text{L}^3 \text{T}^{-2}] \]

Find the Relation between distance & Time Period

Options:
(a) \( R \propto T^3 \)
(b) \( R \propto T^{2/3} \)
(c) \( R \propto T^{-3} \)
(d) $R \propto T^{-2/3}$
Answer: (b)

Question: A gas of 1 mole at an initial temperature $T$ expands adiabatically to double its volume. Find work done ($\gamma = 3/2$)
Options:
(a) $RT(2-\sqrt{2})$
(b) $2RT$
(c) $RT/2$
(d) $3RT$
Answer: (a)

Question: A bar magnet has a magnetic moment of 0.5 Am$^2$ and its is placed in an external magnetic field of $8 \times 10^{-2}$ T. Find the work done when it is rotated from most stable position to unstable position
Options:
(a) $MB$
(b) -$MB$
(c) 2 $MB$
(d) -$2MB$
Answer: (d)

Question: In YDSE, Width of one slit is 4 times the other. Find ratio of maximum intensity to minimum intensity of the interferences pattern on the screen
Options:
(a) 3/1
(b) 9/1
(c) 4/1
(d) 2/1
Answer: (b)

Question: Two long wires A and B carry current $i$ and $2i$ in the same direction as shown. Ratio of magnetic field at point P, at a distance of $R$ on the right of B and at point Q, at a distance of $R$ on near of A. is $x/7$ then find $x$

Options:
Answer: (5)

Question: A capacitor of capacitance 12.5 pF was charged by a voltage battery of 12V. Then the battery is removed and a dielectric of dielectric constant 6 is introduced between the plates of the capacitors find the change in potential energy.
Options:
(a) 775 pJ
(b) -775 pJ
(c) 900 pJ
(d) -900 pJ
Answer: (b)

Question: A bulb rated 50W, 200V is connected to a battery of 100V. Find the power dissipated.

Options:
(a) 50W
(b) 25W
(c) 12.5W
(d) 6.25W
Answer: (c)

Question: Statement-1: Contact angle between liquid and solid depends on nature of the solid
Statement-2: Rise of a liquid in a capillary tube is independent of its inner radius
Options:
(a) Only statement 1 is correct
(b) Only statement 2 is correct
(c) Both are correct
(d) Both are incorrect
Answer: (a)

Question: A glass lab of refractive index √2 and thickness 3cm. Glass is incident by a light at an angle equal to the critical angle of glass and air. Find lateral displacement of light ray as it comes of the glass.

Sin 15 = 0.25
Options:
(a) √3 cm
(b) √3/2 cm
(c) 1/√2 cm
(d) 1 cm
Answer: (b)

Question: A charged particle of charge q is kept at the centre of the face of a cube. Find the flux linked with the cube
Options:
(a) \( \frac{q}{\varepsilon_0} \)
(b) \( \frac{q}{2\varepsilon_0} \)
(c) $\frac{q}{6\varepsilon_0}$
(d) $\frac{q}{24\varepsilon_0}$
Answer: (b)

Question: Moment of momentum of an electron in the 4th orbit is
Options:
(a) $\frac{h}{2\pi}$
(b) $\frac{h}{4\pi}$
(c) $\frac{2h}{\pi}$
(d) $\frac{h}{\pi}$
Answer: (c)
Chemistry

Question: Number of sigma and pi bonds in 2-oxo-hex-4-ynoic acid
Options:
(a) 16
(b) 18
(c) 19
(d) 17
Answer: (b)

Question: What is A & B ?

Options:
Answer: Solution : A- O₃ and Zn, CH₃COOH
B- NaOH, I₂

Question: Integer- 3 moles of gas is isothermal compressed from 60L to 40L through a constant pressure of 5 atm heat supplied is (-)______
Options:
Answer: 100 L atm

Question: Vanillin from vanilla beans contains how many oxygen and pi bonds ?
Options:
(a) 2-O and 2 pi bonds
(b) 3-O and 4 pi bonds
(c) 2-O and 3 pi bonds
(d) 3-O and 2 pi bonds
Answer: (b)

Question: S - 1 : Correct order of ionization enthalpy is given as : F > Cl > Li > Na
S - 2 : Correct order of electron gain enthalpy is given as - ΔHₑₒₐ : Cl > F > Li > Na
Options:
(a) S1-Correct ; S2-Incorrect
(b) S1-Incorrect ; S2-Correct
(c) S1-Correct ; S2-Correct
(d) S1-Incorrect ; S2-Incorrect
Question: Which of the following have a pyramidal shape?
Options:
(a) \( \text{S}_2\text{O}_3^{2-} \)
(b) \( \text{SO}_4^{2-} \)
(c) \( \text{SO}_3^{2-} \)
(d) \( \text{S}_2\text{O}_7^{2-} \)
Answer: (c)

Question: IUPAC name of Catechol is:-
Options:
(a) Benzene, 1, 2 - diol
(b) Benzene - 1, 3 - diol
(c) Benzene - 1, 4 - diol
(d) 3 - Hydroxyphenol
Answer: (a)

Question: Consider the following statements:
Statement I: The number of emitted photoelectrons increases with increase in frequency of incident light.
Statement II: Kinetic energy of emitted photoelectrons increases with increase in frequency of incident light.
Options:
(a) Statement I is true but statement II is false
(b) Statement I is false but statement II is true
(c) Both Statement I and statement II are true
(d) Both Statement I and statement II are false
Answer: (b)

Question: \( \text{MnO}^{2+} \) conc \( \text{H}_2\text{SO}_4 \) when reacted with which salt yield greenish yellow gas. Salt X contains:
Options:
(a) \( \text{F}^- \)
(b) \( \text{Br}^- \)
(c) \( \text{I}^- \)
(d) \( \text{Cl}^- \)
Answer: (b)

Question: Adsorbents used in adsorption chromatography:
Options:
(a) Silica gel
(b) Alumina
(c) Both A and B
(d) None of the above
Answer: (c)

Question: Find no. of compound with non zero dipole moment
\( \text{BeCl}_2 \), \( \text{BCl}_3 \), \( \text{NF}_3 \), \( \text{H}_2\text{O} \), \( \text{H}_2\text{S} \), \( \text{CCl}_4 \), \( \text{XeF}_4 \), \( \text{CO}_2 \), \( \text{HBr} \)
Options:
(a) 4
(b) 3
(c) 5
(d) 6
Answer: (a)

Pthalimide

Find no. of \( \pi \) bonds in .

Options:
Answer: ()

The correct order of ionisation enthalpy for Li, Na, Cl, F is :

Options:
(a) Na < Li < Cl < F
(b) Li < Na < Cl < F
(c) Na < Li < F < Cl
(d) F < Cl < Li < Na
Answer: (a)

Angular momentum for 4th orbit ?

Options:
(a) \( \frac{h}{\pi} \)
(b) \( \frac{3h}{2\pi} \)
(c) \( \frac{8h}{\pi} \)
(d) \( \frac{2h}{\pi} \)
Answer: (d)

SO\(_2\)(g) + \( \frac{1}{2} \) O\(_2\) (g) ⇌ SO\(_3\) (g) ; \( K_c = 4.9 \times 10^{-2} \)

2SO\(_3\)(g) ⇌ 2SO\(_2\)(g) + O\(_2\)(g) \( K_c = ? \)

Options:
(a) 410
(b) 420
(c) 415
(d) 425
Answer: (c)

Which of the following statement is incorrect ?

Options:
(a) Atoms are indivisible particles, which cannot be created or destroyed chemical reaction.
(b) Atoms combine in any ratio to form compounds.
(c) Atoms reorganize in a chemical reaction.
(d) Atoms of different elements have different masses and chemical properties.
Answer: (b)

Which of the following are the correct statements about fuel cell.
Options:
(a) S - 1 : It is a galvanic cell
(b) S - 2 Fuel cell have efficiency of 40%
(c) S - 3 : It is eco friendly
(d) S - 4 : Aluminium as a catalyst used in this cell
Answer: (d)

Question: Arrange the following in increasing order of their first ionisation enthalpy:
Al, Ga, In, Tl, B
Options:
(a) Tl < In < Ga < Al < B
(b) In < Al < Ga < Tl < B
(c) In < Ga < Al < B < Tl
(d) B < Al < Ga < In < Tl
Answer: (b)

Question: Correct order of stability
Options:

(a) 

(b) 

(c) 

(d) 

Answer: (a)

Question: Find out the number of unpaired electrons in d-subshell for \([\text{Co(H}_2\text{O})_6]^{3+}\)
Options:
(a) 3
(b) 4
(c) 0
(d) 2
Answer: (c)
Question: Which of the following statement is incorrect?
Options:
(a) In homogeneous mixture composition is uniform
(b) Compounds are formed when atoms of different element combine together in any ratio
(c) Atoms of same element have identical atomic mass properties
(d) In heterogeneous mixture composition is not uniform
Answer: (b)

Question: Match column I and column II

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) ( \alpha )- Glucose &amp; ( \alpha )-Galactose</td>
<td>a) Homologs</td>
</tr>
<tr>
<td>ii) ( \alpha )- Glucose &amp; ( \alpha )-Fructose</td>
<td>b) Epimer</td>
</tr>
<tr>
<td>iii) ( \alpha )- Glucose &amp; ( \beta )-Glucose</td>
<td>c) Anomer</td>
</tr>
<tr>
<td>iv) ( \alpha )-Ribose &amp; ( \alpha )-Glucose</td>
<td>d) Functional isomers</td>
</tr>
</tbody>
</table>

Options:
(a) i - b, ii - d, iii - a, iv - c
(b) i - b, ii - d, iii - c, iv - a
(c) i - d, ii - b, iii - c, iv - a
(d) i - a, ii - c, iii - d, iv - b
Answer: (b)

Question: Find the value of \( x + y \) in given complex \([\text{Fe}(\text{NH}_3)_x (\text{CN})_y]^{-1}\)
Options:
(a) 6
(b) 4
(c) 5
(d) 2
Answer: (a)

Question: What are B & C respectively?

\[
\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br} \xrightarrow{\text{NaOH, C}_2\text{H}_5\text{OH}} \xrightarrow{\text{H}^+ / \text{H}_2\text{O}} \xrightarrow{\text{B}_2\text{H}_6/\text{OH}^-} \text{H}_2\text{O} / \text{OH}^- \xrightarrow{\text{C}}
\]
Question: Which of the following represents correct unit of slope of graph between molar conductivity (Δm) and (concn)½?
Options:
(a) S cm½ mol½
(b) S cm³/² mol⁻²
(c) S cm⁷/² mol⁻³/²
(d) S cm⁵/² mol⁻³/²
Answer: (c)

Question: Calculate heat for isothermal process if expansion takes place from 20L to 60L against 5 atm pressure.
Options:
(a) + 200
(b) - 200
(c) - 300
(d) + 300
Answer: (a)

Question: S - 1: Correct order of ionisation enthalpy is given as: F > Cl > Li > Na
S - 2: Correct order of electron gain enthalpy is given as: ΔHeq: Cl > F > Li > Na
Options:
(a) S1-Correct ; S2-Incorrect
(b) S1-Incorrect ; S2-Correct
(c) S1-Correct ; S2-Correct
(d) S1-Incorrect ; S2-Incorrect
Answer: (c)
Maths

**Question:** Team A has 4 men and 5 women. Team B has 4 women and 5 men. In how many ways can we pick 4 from each team such that there are 4 men and 4 women (integer type question)

**Answer:** 5626

**Question:** \[
\frac{1 \times 2^2 + 2 \times 3^2 + 3 \times 4^2 + \ldots + 100 \times 101^2}{1^2 + 2^2 + 3^2 + 4 + \ldots + 100^2 + 101}
\]

**Options:**
(a) 305/302
(b) 305/301
(c) 301/305
(d) 302/301

**Answer:** (b)

**Question:** \[
\int_{-1}^{1} \frac{\cos ax}{(1+3x)} \, dx = \frac{2}{\pi}
\]

Find a

**Options:**
(a) \(\pi/4\)
(b) \(\pi/3\)
(c) \(\pi/2\)
(d) \(\pi/5\)

**Answer:** (c)

**Question:** Coeff of \(x^4, x^5, x^6\) was in AP in expansion of \((1+x)^n\) Find maxm

**Options:**
(a) 14
(b) 7
(c) 21
(d) 0

**Answer:** (a)

**Question:** a, b, c in A.P., a, b, c AM was 8, find the cube of their GM such that a+1, b, c+3 were in GP

**Options:**
(a) 120
(b) 240
(c) 360
(d) 540

**Answer:** (a)
**Question:** If \( \cos^{-1} x - \sin^{-1} y = \theta \) Find minimum of \( x^2 + y^2 + 2xy \sin \theta \)

**Options:**
(a) 0
(b) 1
(c) 2
(d) 3

**Answer:** (a)

**Question:** Let \( y = y(x) \) be the solution of differential equation \((x^2 + 4)2dy + (2x^3y + 8xy - 2)dx = 0\) If \( y(0) = 0 \), then \( y(2) \) is equal to.

**Options:**
(a) \( \pi/2 \)
(b) \( \pi/4 \)
(c) \( \pi/8 \)
(d) \( \pi/32 \)

**Answer:** (d)

**Question:** Let
\[
A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}
\]
and \( B = I + \text{adj}(A) + \text{adj}(A) + (\text{adj} A)^2 + (\text{adi} A)^{10} \). Then the sum of all elements of the matrix \( B \) is -

**Options:**
(a) 88
(b) -88
(c) 99
(d) 99

**Answer:** (b)

**Question:** A parabola \( y^2 = 12x \) has a chord \( PQ \) with \( PQ \) with mid-point \((4, 1)\) then equation of \( PQ \) passes through:

**Options:**
(a) \( \left( \frac{1}{2}, -20 \right) \)
(b) \( \left( \frac{1}{2}, -10 \right) \)
(c) \( \left( -10, -\frac{1}{2} \right) \)
(d) \( \left( -10, \frac{1}{2} \right) \)

**Answer:** (a)
**Question:** The area (in sq. units) of the region described by \( \{(x, y) : y^2 \leq 2x, \text{ and } y \geq 4x - 1 \} \) is

**Options:**
(a) 9/31
(b) 8/33
(c) 9/32
(d) 2/31

**Answer:** (c)

**Question:** A relation defined as \((x_1, y_1) R(x_2, y_2): x_1 \leq x_2 \& y_1 \leq y_2\) and given that
(a) \(R\) is reflexive but not symmetric
(b) \(R\) is transitive. Then,

**Options:**
(a) (a) is true and (b) is false
(b) (a) is false and (b) is true
(c) Both (a) and (b) are true
(d) Both (a) and (b) are false

**Answer:** (c)

**Question:** Let \( \vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = 2\hat{i} + 4\hat{j} - 5\hat{k} \) and
\( \vec{c} = x\hat{i} + 2\hat{j} + 3\hat{k}, x \in R \), If \( \vec{d} \) is unit vector in the direction \( \vec{b} + \vec{c} \) of such that \( \vec{a} \cdot \vec{d} = 1 \), then \((\vec{a} \times \vec{b}) \cdot \vec{c}\) is equal to

**Options:**
(a) 9
(b) 10
(c) 11
(d) 12

**Answer:** (c)

**Question:** Let \( P \) be the POI of the lines, find the distance of \( P \) from the given plane
\[
\frac{x - 2}{1} = \frac{y - 4}{5} = \frac{z - 2}{1}, \quad \frac{x - 2}{2} = \frac{y - 2}{3} = \frac{z - 3}{2}
\]
\(4x = 2y = z\)

**Options:**
(a)
(b)
(c)
(d)

**Answer:** ()

**Question:** Let
\[
f(x) = \int_0^x t + \sin (1 - e^t) \, dt, \quad f(0) = 0, \quad \lim_{x \to 0} \frac{f(x)}{x^5}
\]

**Options:**
(a) 1/6
(b) -1/6
(c) 1/2
(d) -1/2
Answer: (b)

**Question:** If 
\[ f(x) = 3 \sqrt{x - 2} + \sqrt{4 - x} \]
maximum value \( \alpha \) and minimum value is \( \beta \), then \( \alpha^2 + \beta^2 \)

**Options:**
(a) 20
(b) 21
(c) 22
(d) 23

**Answer:** (c)