Physics

Question: Dimensional formula of Planck's constant is
Options:
(a) \([M^2L^2T^{-1}]\)
(b) \([M^1L^2T^{-1}]\)
(c) \([M^2L^2T^{-2}]\)
(d) \([ML^2T^{-3}]\)
Answer: (b)

Question: Find the magnitude of force \(F\), if the given system is in equilibrium
Options:
(a) 10 N
(b) \(10/\sqrt{2}\)
(c) 0 N
(d) \(\frac{1}{10\sqrt{2}}\) N
Answer: (a)

Question: The equivalent resistance between terminal A and B in the network shown

Options:
(a) \(4R/3\)
(b) \(8R/3\)
(c) \(3R\)
(d) \(5R/2\)
Answer: (b)

Question: The nuclei at rest breaks into two parts with mass ratio 1 : 2. The ratio of their velocity and direction is
Options:
(a) Opposite Direction 2 : 1
(b) Same Direction 1 : 2
(c) Opposite Direction 1 : 1
Question: Two cars A and B are moving towards each other with speed 20 m/s each. When 300 m apart, they both apply breaks which causes deceleration of 2 m/s². The distance between them when they stop will be:
Options:
(a) 100 m
(b) 50 m
(c) 150 m
(d) 200 m
Answer: (a)

Question: For a wire, the original resistance was 50Ω at the initial temperature of 27°C. When the temperature is increased, its resistance becomes 62Ω. If the thermal coefficient of resistivity of the wire is $2.4 \times 10^{-2}$ K⁻¹, find the final temperature.
Options:
(a) 45°C
(b) 32°C
(c) 37°C
(d) 48°C
Answer: (c)

Question: Find the work done by a monatomic gas from A and B. Here the temperature of gas (1 mol) changes from 300 K to 330 K.
Options:
(a) 125 J
(b) 250 J
(c) 500 J
(d) 6250 J
Answer: (a)

Question: Two bubbles having radi $r_A$ and $r_B$ are having excess pressure $P_A$ and $P_B$ in them. If $P_A = 3P_B$, find $r_A/r_B$
Options:
(a) 9 : 1
(b) 1 : 9
(c) 1 : 3  
(d) 3 : 1  
Answer: (c)

Question: In the given ray diagram, find the distance (in cm) between the two convex lenses.

Options:  
Answer: (25)

Question: Find the work done (in J) by force $F = 3x^2 + 2x - 5$ in moving a particle $x = 2$ to $x = 4$.
Options:  
Answer: (58)

Question: There is an imaginary cube of side 2 m shown where edges are along axes. The electrostatic field varies as $\vec{E}(x) = 2x\hat{i}$, then flux through cube is Nm$^2$/C is__

Options:  
Answer: (16)

Question: Find the induced emf in the square loop of side 15 cm, moving with 2 cm/s after 10 sec.

Options:  
(a) 0
Question: A spring exerts a force on a book \( \mathbf{F} = -50x \), where \( x \) is the change in length of the spring. Find the time period of oscillation. (\( m = 0.5 \) kg)

Answer: (a)

Options:
(a) 0.63 s
(b) 3.14 s
(c) 1.57 s
(d) 0.31 s
Answer: (a)

Question: A proton and a deuteron having same kinetic energy, enter a transverse uniform magnetic field. The radius of circular paths of proton and deuteron are in the ratio of

Options:
(a) \( \sqrt{2} \)
(b) \( 1/2\sqrt{2} \)
(c) \( 1/\sqrt{2} \)
(d) \( 2\sqrt{2} \)
Answer: (c)

Question: A satellite of mass \( m \) is orbiting an orbit of radius \( 2r \) from center of the planet of mass \( M \) and radius \( r \). If satellite is given energy \( E = \frac{GMm}{6r} \), then find new radius of orbit in which satellite will revolve

Options:
(a) 14 r
(b) 6 r
(c) 8 r
(d) 12 r
Answer: (b)

Question: For which of the following the I - V characteristic shown below is possible?
Options:
(a) Transistor
(b) Zener diode
(c) Solar cell
(d) Diode used as rectifies
Answer: (b)

Question: For the circuit shown, the truth table is given. Find x and y.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>y</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Options:
(a) 0, 0
(b) 0, 1
(c) 1, 0
(d) 1, 1
Answer: (d)

Question: A ball of radius $10^{-4}$ m and density $10^5$ kg/m$^3$ is dropped from a height $h$ into water (viscosity = $9.8 \times 10^{-6}$ Pa - s) such that after falling into liquid, its speed does not change. Find the approximate value of height $h$.

Options:
(a) 2200 m
(b) 2350 m
(c) 2470 m
(d) 2520 m
Answer: (c)

Question: If work function of a metal is 2.13 eV and energy per photon of incident light is 3.13 eV, then maximum kinetic energy of photoelectrons (in eV) will be___.
Options:
Answer: (1)

Question: A photon of energy 10.2 eV is incident on hydrogen atom in ground state. Thereafter, the number of lines emitted will be:
Options:
Answer: (2)
Question: Correct order of bond angle of following compounds is:
Options:
(a) BF₃ > PF₃ > CIF₃
(b) PF₃ > CIF₃ > BF₃
(c) CIF₃ > PF₃ > BF₃
(d) BF₃ > CIF₃ > PF₃
Answer: (a)

Question: Identify the correct electronic configuration of Einsteinium is
Options:
(a) [Rn]5f⁴ 6d¹ 7s²
(b) [Rn]5f¹¹ 7s²
(c) [Rn]5f¹⁰ 6d¹ 7s²
(d) [Rn]5f¹¹ 6d¹ 7s¹
Answer: (b)

Question: Ca²⁺ makes which type of complex with EDTA
Options:
(a) Trigonal bipyramidal
(b) Square Planar
(c) Tetrahedral
(d) Octahedral
Answer: (d)

Question: The product obtained in the following reaction is:

\[
\text{CN} \quad \overset{(i)}{\text{CH₃MgBr (excess)}} \quad \overset{(ii)}{\text{H₃O}^+}
\]

\[
\begin{align*}
\text{C} & \quad \text{O} \\
\text{O} & \quad \text{C} \quad \text{O} \quad \text{C} \\
\text{CH₃} & \quad \text{CH₃}
\end{align*}
\]
Question: Fuming sulphuric acid has how many oxygen atoms?
Options:
Answer: (7)

Question: Total sum of electrons in $\pi^*$ orbitals of O$_2$, O$_2^+$, and O$_2^-$ is:
Options:
Answer: (6)

Question: Consider the following reaction and identify the major product P.
Options:
Question: Major product is:

Options:
Question: Which of the following is correct for strong electrolyte (B>0) ?
Options:
(a) $\lambda_m - \lambda_m^0 - B\sqrt{C} = 0$
(b) $\lambda_m + \lambda_m^0 - B\sqrt{C} = 0$
(c) $\lambda_m - \lambda_m^0 + B\sqrt{C} = 0$
(d) $\lambda_m + \lambda_m^0 + B\sqrt{C} = 0$
Answer: (c)
Question: Which of the following will give positive iodoform test?
Options:
(a) CH3-CH2-CH2-CHO
(b) CH3-CH-CH3
   O
(c) CH3 - CH2-C-CH2-CH3
(d) CH3 - CH2 - CH2 - CH2 - OH
Answer: (b)

Question: How many total number of stereoisomers are possible for the following structure?

Options:
Answer: (4)

Question:
Match the list and choose the correct option.
List I               List II
(I) Ni-Cd cell      (a) Rechargeable
(II) Fuel cell      (b) Anode
(III) Mercury cell  (c) Used in hearing aid
(IV) Leclanhe cell  (d) Combustion energy into electrical energy
Options:
(a) (i) - a ; (ii) -d; (iii)-c; (iv)-b
(b) (i) - b ; (ii) -a; (iii)-c; (iv)-d
(c) (i) - d ; (ii) -a; (iii)-c; (iv)-d
(d) (i) - a ; (ii) -b; (iii)-c; (iv)-d
Answer: (a)
Question: What is the correct order of C-C bond length of Ethane, Ethene and Ethyne?
Options:
(a) Ethane > Ethene > Ethyne
(b) Ethene > Ethane > Ethyne
(c) Ethyne > Ethene > Ethane
(d) Ethyne > Ethane > Ethane
Answer: (a)

Question: Match the complexes given in List-I with hybridisation of central metal atom/ion given in List - II and choose the correct option

<table>
<thead>
<tr>
<th>List I</th>
<th>List II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) K₂[Ni(CN)₄]</td>
<td>(a) sp³</td>
</tr>
<tr>
<td>(B) [Ni(CO)₄]</td>
<td>(b) sp³d²</td>
</tr>
<tr>
<td>(C) [Co(NH₃)₆]Cl</td>
<td>(c) dsp²</td>
</tr>
<tr>
<td>(D) Na₃[CoF₆]</td>
<td>(d) d²sp³</td>
</tr>
</tbody>
</table>

Options:
(a) A - I, B - II, C - III, D - IV
(b) A - III, B - I, C - IV, D - II
(c) A - IV, B - III, C - II, D - I
(d) A - I, B - II, C - IV, D - III
Answer: (b)
Question: Which one of the following statements regarding glucose is incorrect?
Options:
(a) Glucose is one of the monosaccharides of sucrose
(b) Glucose dissolves in water because it has aldehyde group
(c) Glucose has six carbon atoms in its structure
(d) Glucose is an aldose
Answer: (b)

Question: Which of the following compounds do not give Turnbull’s Test?
Options:
(a) Formaldehyde
(b) Formic acid
(c) Benzaldehyde
(d) Acetone
Answer: (d)

Question: Among the elements - Sc, Ti, V, Cr and Mn; find magnetic moment of element which have highest ionization enthalpy in +2 oxidation state (Nearest integer)
Options:
Answer: (6)

Question: How many of the following compounds will give Friedel Craft’s reaction?
Options:
Answer: (3)
JEE-Main-09-04-2024 (Memory Based)
[EVENING SHIFT]

Maths

**Question:** If \( \frac{z - 2i}{z + 2i} \) is purely imaginary then find the maximum value of \( |z + 8 + 6i| \).

**Options:**
(a) 11
(b) 12
(c) 14
(d) 16

**Answer:** ()

**Question:** Variance of the following is 160

<table>
<thead>
<tr>
<th>f</th>
<th>2</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>C</td>
<td>2C</td>
<td>3C</td>
<td>4C</td>
<td>5C</td>
<td>6C</td>
</tr>
</tbody>
</table>

Find c

**Answer:** (c=7)

**Question:** \( \sum_{n=0}^{\infty} a r^n = 57 \sum_{n=0}^{\infty} a^3 r^{3n} = 9747 \) What is \( a + 18r = ? \)

**Answer:** (31)

**Question:** \( \lim_{x \to 0} \frac{e - (1 + 2x)^{1/2x}}{x} \)

**Options:**
(a) e
(b) 1/e
(c) e^2
(d) 1/e^2

**Answer:** (a)

**Question:** In the expansion of \( \left( x^{2/3} + \frac{1}{2} x^{-2/5} \right)^9 \) find the sum of coefficients of \( x^{2/3} \) and \( x^{-2/5} \)

**Options:**
(a) 6.75
(b) 5.25
(c) 3.28
(d) 9.76

**Answer:** (b)
Question: \( \lim_{x \to \frac{\pi}{4}} \frac{\int x^{\frac{1}{2}}(\sin(2x) + \cos(x)) \, dx}{(x - \frac{\pi}{4})} \) 

Answer: (2) 

Question: \( 2\sin^{-1}(x) + 3\cos^{-1}(x) = \frac{7\pi}{5} \), find number of real solution of equation 

Answer: (No real solution) 

Question: \( I = \int_{-1}^{1} \ln\left(x + \sqrt{1 + x^2}\right) \, dx \) 

Answer: (1) 

Question: \( I = \int_{-1}^{1} \ln\left(x + \sqrt{1 + x^2}\right) \, dx \) 

Answer: (1) 

Question: \( \int_{\frac{1}{4}}^{\frac{1}{2}} \cos\left(\frac{2\cot^{-1}\left(\frac{1-x}{\sqrt{1+x}}\right)}{\theta}\right) \, dx \) 

Answer: () 

Question: \( \frac{x^2}{100} + \frac{y^2}{75} = 1 \) 

Answer: (225) 

Question: \( f'(x) = 3f(x) + \alpha \) \( \lim_{x \to \infty} f(x) = 7 \); \( \lim_{x \to 0} f(x) = 1 \). Find \( 9f(-\ln 3) \) = ? 

Answer: (61) 

Question: If \( f'(x) = 3f(x) + x \) and \( f(0) = 1 \), then \( f(x) \) is: 

Options: 
(a) \( \frac{10}{3}x + \frac{9}{10}e^{-3x} \) 
(b) \( \frac{10}{3}x + \frac{9}{10}e^{3x} \) 
(c) \( \frac{10}{3}x - \frac{9}{10}e^{-3x} \) 
(d) \( \frac{10}{3}x + \frac{9}{10}e^{2x} \) 

Answer: (b) 

Question: Dice is thrown 3 times then find the probability that \( x_1 < x_2 < x_3 \) (there \( x_1, x_2, x_3 \in [1, 6] \)) where \( x_1, x_2, x_3 \) are outcomes on dice. 

Options: 
(a) 7/54 
(b) 5/54 
(c) 11/54 
(d) 17/54 

Answer: (b)
Question: Find the area bounded by ellipse $x^2 + 3y^2 = 18$ below the line $y = x$ (in first qu)
Options:
(a) $3\pi + 1$
(b) $\sqrt{3}\pi$
(c) $3\pi - \frac{3}{4}$
(d) $\frac{3\pi + 1}{4}$
Answer: ()