MHT CET 2026 Mathematics Answer Key PDF

Physics

1. **Option (b)** $4527°$**C**
   Explanation:
   Using $v_{\text{rms}} = \sqrt{\frac{3RT}{M}}$, equal r.m.s. velocity implies $\frac{T_1}{M_1} = \frac{T_2}{M_2}$. Substituting $T_1 = 300$ K, $M_1 = 2$ (for H_2), and $M_2 = 32$ (for O_2) yields $T_2 = 4800$ K, which corresponds to 4527°C.

2. **Option (b) Positive**
   Explanation:
   On a P-V indicator diagram, the adiabatic compression path CA lies below the isothermal expansion path AB. This forms a clockwise loop enclosing a positive area, meaning the net work done by the gas is positive.

3. **Option (a) Increase**
   Explanation:
   The efficiency of a Carnot engine is $\eta = 1 - \frac{T_2}{T_1}$. Increasing T_1 to $T_1 + \Delta T$ and decreasing T_2 to $T_2 - \Delta T$ decreases the ratio $\frac{T_2}{T_1}$, thereby increasing the overall efficiency.

4. **Option (c)** $T/12$
   Explanation:
   From the SHM displacement equation $x = A\sin(\omega t)$, setting $x = A/2$ gives $\sin(\omega t) = 1/2$. Thus, $\omega t = \pi/6$, and substituting $\omega = 2\pi/T$ yields $t = T/12$.

5. **Option (a)** 10.4 **s**
   Explanation:
   The time lost per day is given by $\Delta t = \frac{1}{2}\alpha\Delta\theta \times t$. Substituting $\alpha = 1.2 \times 10^{-5}/°\text{C}$, $\Delta\theta = 20°\text{C}$, and $t = 86400$ s yields $\Delta t \approx 10.4$ s.

Chemistry

6. **Option (c) London dispersion force**
   Explanation:
   Dinitrogen (N_2) is a symmetric, non-polar diatomic molecule with no permanent dipole moment. Consequently, the only intermolecular forces acting between the molecules are weak, temporary London dispersion forces.

7. **Option (c)** IF_3
   Explanation:
   At standard room temperature (25°C), ClF, BrF, and ClF_3 exist in the gaseous phase, whereas IF_3 (Iodine trifluoride) is a solid due to the stronger intermolecular forces arising from the highly polarizable iodine atom.

8. **Option (c)** $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
   Explanation:
   Combining Boyle's Law ($V \propto 1/P$) and Charles's Law ($V \propto T$) gives $PV/T =$ constant. For any two states of a gas, this combined relationship is expressed as $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$.

9. **Option (c)** 1.0 **M**
Explanation:
Using the Henderson-Hasselbalch equation, pH $= pK_a + \log \frac{[\text{Salt}]}{[\text{Acid}]}$. Substituting the given values, $5.5 = 4.5 + \log \frac{[\text{Salt}]}{0.1}$ simplifies to $\log \frac{[\text{Salt}]}{0.1} = 1$, which gives $[\text{Salt}] = 1.0$ M.

10. **Option (c)** 7×10^{-7} **mol · dm**$^{-3}$
Explanation:
For the sparingly soluble salt AgBr, the solubility product is $K_{sp} = S^2$. Substituting $K_{sp} = 4.9 \times 10^{-13}$ yields the solubility $S = \sqrt{4.9 \times 10^{-13}} = 7 \times 10^{-7}\ \text{mol} \cdot \text{dm}^{-3}$.

Mathematics

11. **Option (b)** $\frac{\pi}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$
Explanation:
Evaluating $\int_1^3 \frac{\sqrt{x}}{(1+x)^2}\, dx$ using the substitution $\sqrt{x} = \tan\theta$ transforms the expression into $2\int_{\pi/4}^{\pi/3} \sin^2\theta\, d\theta$. Integration yields $[\theta - \frac{\sin 2\theta}{2}]_{\pi/4}^{\pi/3} = \frac{\pi}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$.

12. **Option (a)** $\frac{1}{30\pi}$ **ft/min**
Explanation:
Differentiating the volume of a sphere $V = \frac{4}{3}\pi r^3$ with respect to time gives $\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$. Substituting $\frac{dV}{dt} = 30$ and $r = 15$ yields $\frac{dr}{dt} = \frac{30}{4\pi(15)^2} = \frac{1}{30\pi}$ ft/min.

13. **Option (d) the function is continuous for all x except zero**
Explanation:
The function $f(x) = \frac{x-|x|}{x}$ simplifies to 0 for $x > 0$ and 2 for $x < 0$. It is constant and continuous on both open intervals but is undefined at $x = 0$, leaving it continuous everywhere except at zero.

14. **Option (c)** $\pi/2$
Explanation:
Substituting $n = -(l+m)$ into $mn - 2ln + lm = 0$ gives $2(l/m)^2 + 2(l/m) - 1 = 0$, implying $m_1m_2 = -2l_1l_2$. Similarly, $m_1m_2 = -2n_1n_2$, which yields the dot product $l_1l_2 + m_1m_2 + n_1n_2 = 0$, confirming the lines are perpendicular.

15. **Option (a)** $\sqrt{15}$
Explanation:
By Lagrange's Mean Value Theorem, $f'(c) = \frac{f(5)-f(1)}{5-1} = -\frac{\sqrt{6}}{2}$. Setting $-\frac{c}{\sqrt{25-c^2}} = -\frac{\sqrt{6}}{2}$ and squaring both sides gives $5c^2 = 75$, which simplifies to $c = \sqrt{15}$ on the interval $[1, 5]$.