MHT CET 2026 Mathematics Answer key PDF

Chemistry

1. **Option (a)** 0.05
Explanation: For a second-order reaction, Rate $= k[\text{A}]^2$. Substituting the given values: $1.25 \times 10^{-2} = k(0.5)^2 \implies 1.25 \times 10^{-2} = 0.25k \implies k = 0.05$ dm^3 mol^{-1} s^{-1}.

2. **Option (b)** $(4, 2, 1, +1/2)$
Explanation: For a $4d$ orbital, the principal quantum number $n = 4$ and the azimuthal quantum number $l = 2$. The magnetic quantum number m_l can take any integer value from -2 to $+2$ (here, 1), and the spin quantum number m_s is $+1/2$.

3. **Option (b)** $\mathbf{s^{-1}}$
Explanation: The unit of the rate constant for an n^{th}-order reaction is (mol dm^{-3})$^{1-n}$ s^{-1}. For a first-order reaction ($n = 1$), this formula simplifies directly to s^{-1}.

4. **Option (a)** $\mathbf{CO + H_2}$
Explanation: Water gas is an industrial fuel gas prepared by passing steam over red-hot coke at high temperatures (1270 K). It consists of an equimolar mixture of carbon monoxide (CO) and hydrogen gas (H_2).

5. **Option (a)** 0.2 **mole of solute is dissolved in** 250 **ml**
Explanation: Electrolytic conductivity (κ) depends on ion concentration and increases with higher concentration due to more ions per unit volume. The concentration here (0.8 M) is the highest among all the options.

Mathematics

6. **Option (a)** $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$
Explanation: Multiplying both sides by 2 gives $2 \sin x \cos x = \sin 2x = 1/2$. The general solution for $\sin 2x = \sin(\pi/6)$ is $2x = n\pi + (-1)^n \frac{\pi}{6}$, which simplifies to $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$.

7. **Option (a)** $2i^n$
Explanation: Expanding the complex terms, we obtain $(1 - i)^2 = -2i \implies (1 - i)^{2n} = (-2i)^n$ and $(1 + i)^2 = 2i \implies (1 + i)^{2n} = (2i)^n$. Substituting these gives $\frac{2^n}{(-2i)^n} + \frac{(2i)^n}{2^n} = (-1/i)^n + i^n = i^n + i^n = 2i^n$.

8. **Option (a)** $\ln|\tan^{-1}(x + 1/x)| + C$
Explanation: Letting $t = \tan^{-1}(x + 1/x)$ yields $dt = \frac{x^2-1}{x^4+3x^2+1}dx$ upon differentiation. The integral simplifies to $\int \frac{1}{t} dt = \ln|t| + C = \ln|\tan^{-1}(x + 1/x)| + C$.

9. **Option (b)** $5\pi/6$
Explanation: Adding A and A^T gives $2 \sin \alpha = 1 \implies \sin \alpha = 1/2$. Since α is defined in the interval $(\pi/2, 3\pi/2)$, the second-quadrant angle that satisfies this equation is $\alpha = \pi - \pi/6 = 5\pi/6$.

10. **Option (a)** $x = 2 + 5\cos\theta, y = 3 + 5\sin\theta$
Explanation: Rewriting the circle's equation by completing the squares gives $(x - 2)^2 + (y - 3)^2 = 5^2$. This represents a circle centered at $(2, 3)$ with radius $R = 5$, yielding the parametric equations $x = 2 + 5\cos\theta$ and $y = 3 + 5\sin\theta$.

Physics

11. **Option (b) doubled**
Explanation: According to Wien's displacement law, $\lambda_{\max} T = \text{constant}$. Since frequency is inversely proportional to wavelength ($\nu = c/\lambda$), the peak frequency is directly proportional to temperature ($\nu_{\max} \propto T$), meaning it doubles when T doubles.

12. **Option (a)** 1.5
Explanation: The average molar heat capacities of the mixture are $C_v = \frac{1.5R + 2.5R}{2} = 2R$ and $C_p = C_v + R = 3R$. This yields a specific heat ratio of $\gamma = C_p/C_v = 3R/2R = 1.5$.

13. **Option (b) entirely used to do work**
Explanation: In an isothermal expansion, temperature is constant, so the change in internal energy is zero ($dU = 0$). By the first law of thermodynamics ($dQ = dU + dW$), all the supplied heat is converted into work ($dQ = dW$).

14. **Option (a)** 31°**C**
Explanation: Using the coefficient of performance formula $\beta = \frac{T_C}{T_H - T_C}$ with $T_C = 253$ K gives $5 = \frac{253}{T_H - 253} \implies T_H = 303.6$ K. In Celsius, the temperature is $303.6 - 273 \approx 31^\circ$C.

15. **Option (a)** π **m/s**
Explanation: Comparing $x = 0.01 \sin(100\pi t + 0.05)$ to the standard SHM form $x = A \sin(\omega t + \phi)$ gives $A = 0.01$ m and $\omega = 100\pi$ rad/s. The maximum velocity is $v_{\max} = A\omega = 0.01 \times 100\pi = \pi$ m/s.