MHT CET 2026 Mathematics Answer key PDF

Mathematics

1. **Option (b)** $2(\pi - 2)$
Explanation: Substituting $x = 4\cos\theta \implies dx = -4\sin\theta d\theta$ transforms the integral to $\int_0^{\pi/2} 4(1 - \cos\theta)d\theta$. Evaluating this yields $4\left[\theta - \sin\theta\right]_0^{\pi/2} = 4(\pi/2 - 1) = 2(\pi - 2)$.

2. **Option (c)** $(-\infty, 0]$
Explanation: Since $\sin x > 0$, its values are bounded within the interval $(0, 1]$. Because the logarithm function is monotonically increasing, $y = \log(\sin x)$ ranges from $\lim_{u\to 0^+} \log u = -\infty$ to $\log 1 = 0$, giving the range $(-\infty, 0]$.

3. **Option (c)** $y = ax + b$
Explanation: Integrating the second derivative $\frac{d^2y}{dx^2} = 0$ twice with respect to x yields $y = C_1x + C_2$. This represents the general linear equation of a straight line, which uniquely matches the form of Option (c).

4. **Option (b)** $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$
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 $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$.

5. **Option (b)** $2i^n$
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 $\frac{2^n}{(-2i)^n} + \frac{(2i)^n}{2^n} = (-1/i)^n + i^n = i^n + i^n = 2i^n$.

Chemistry

6. **Option (a) Lucas Test reagent**
Explanation: Lucas reagent (anhydrous $ZnCl_2$ in concentrated HCl) is used to distinguish alcohols based on the rate of turbidity formation: tertiary alcohols react immediately, secondary take 5 minutes, and primary require heating.

7. **Option (c) Ethyl alcohol**
Explanation: Ethyl alcohol (C_2H_5OH) has the highest boiling point among the options because it undergoes extensive intermolecular hydrogen bonding, which requires significant energy to break compared to van der Waals forces.

8. **Option (a) Sodium phenoxide and methyl iodide**
Explanation: Anisole (methyl phenyl ether) is prepared via Williamson ether synthesis by reacting sodium phenoxide (C_6H_5ONa) with methyl iodide (CH_3I) through an S_N2 nucleophilic substitution mechanism.

9. **Option (a)** 1.28×10^{-3} **M**
Explanation: The degree of dissociation is $\alpha = \frac{\Lambda_m}{\Lambda_m^\circ} = \frac{5}{390} = \frac{1}{78}$. The concentration of H^+ ions is calculated as $[H^+] = C\alpha = 0.1 \times \frac{1}{78} \approx 1.28 \times 10^{-3}$ M.

10. **Option (c)** $+5$
Explanation: In orthophosphoric acid (H_3PO_4), setting the sum of the oxidation states of $3(H) + P + 4(O) = 0$ gives $3(+1) + x + 4(-2) = 0 \implies x = +5$.

Physics

11. **Option (a)** $2/7 \tan\theta$
Explanation: The minimum static friction coefficient is $\mu_s = \frac{\tan\theta}{1+MR^2/I}$. For a uniform solid sphere, $I = \frac{2}{5}MR^2$, which simplifies the expression directly to $\mu_s = \frac{\tan\theta}{1+5/2} = \frac{2}{7}\tan\theta$.

12. **Option (a)** $M\omega/(M+2m)$
Explanation: Applying the conservation of angular momentum about the rotation axis: $I_1\omega = I_2\omega_2$. This yields $\left(\frac{1}{2}MR^2\right)\omega = \left(\frac{1}{2}MR^2 + mR^2\right)\omega_2$, which simplifies to $\omega_2 = \frac{M\omega}{M+2m}$.

13. **Option (a)** $\sqrt{5/3}R$
Explanation: By the parallel axis theorem, the moment of inertia of a hollow sphere about a tangent is $I = \frac{2}{3}MR^2 + MR^2 = \frac{5}{3}MR^2$. Equating this to MK^2 gives the radius of gyration $K = \sqrt{5/3}R$.

14. **Option (b)** r_2/r_1
Explanation: According to Jurin's Law, the height to which a liquid rises in a capillary tube is inversely proportional to its inner radius ($h \propto 1/r$). Therefore, the ratio of the heights is $\frac{h_1}{h_2} = \frac{r_2}{r_1}$.

15. **Option (d)** $1/\sqrt{d}$
Explanation: The root mean square velocity of an ideal gas is given by $v_{\text{rms}} = \sqrt{\frac{3P}{d}}$. At a constant pressure P, the rms velocity varies inversely with the square root of the gas density ($v_{\text{rms}} \propto 1/\sqrt{d}$).