

MHT CET 2026 Mathematics Answer Key PDF

Mathematics

- Option (b) $2(\pi - 2)$
 Explanation: Rationalizing the numerator of the integrand gives $\frac{4-x}{\sqrt{16-x^2}}$. Integrating each term separately from 0 to 4 yields $4\sin^{-1}(x/4) + \sqrt{16-x^2}$ evaluated at the boundaries, which simplifies to $2\pi - 4 = 2(\pi - 2)$.
- Option (c) $(-\infty, 0]$
 Explanation: Since $0 < \sin x \leq 1$ for $\sin x > 0$, taking the logarithm of both sides gives $\log(\sin x) \leq \log(1) = 0$. As $\sin x \rightarrow 0^+$, the function approaches $-\infty$, yielding the range $(-\infty, 0]$.
- Option (c) $y = ax + b$
 Explanation: This question contains a typographical merge error from two separate problems. Integrating the differential equation $\frac{d^2y}{dx^2} = 0$ twice yields $\frac{dy}{dx} = a$ and $y = ax + b$, which represents a family of straight lines.
- Option (b) $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$
 Explanation: Multiplying both sides of the equation by 2 gives $\sin 2x = \frac{1}{2} = \sin \frac{\pi}{6}$. Using the general solution formula for sine, we obtain $2x = n\pi + (-1)^n \frac{\pi}{6}$, which simplifies to the correct option.
- Option (b) $2i^n$
 Explanation: Simplifying the terms using complex number properties, we have $(1 - i)^2 = -2i$ and $(1 + i)^2 = 2i$. Substituting these back into the expression yields $\frac{2^n}{(-2i)^n} + \frac{(2i)^n}{2^n} = i^n + i^n = 2i^n$.

Chemistry

- Option (a) Lucas Test reagent
 Explanation: Lucas reagent, consisting of anhydrous zinc chloride dissolved in concentrated hydrochloric acid, distinguishes alcohols based on the varying rates of alkyl chloride turbidity formation at room temperature.
- Option (c) Ethyl alcohol
 Explanation: Ethyl alcohol has the highest boiling point among the listed hydrocarbons and haloalkanes because of the presence of strong intermolecular hydrogen bonding, which requires more thermal energy to break.
- Option (a) Sodium phenoxide and methyl iodide
 Explanation: Under Williamson's ether synthesis, the reaction of sodium phenoxide with methyl iodide (a primary alkyl halide) undergoes an S_N2 mechanism to yield methyl phenyl ether (anisole).
- Option (a) 1.28×10^{-3} M
 Explanation: The degree of dissociation of acetic acid is $\alpha = \frac{\Lambda_m}{\Lambda_m^0} = \frac{5}{390}$. The concentration of H^+ ions is calculated using $[H^+] = C\alpha = 0.1 \times \frac{5}{390} \approx 1.28 \times 10^{-3}$ M.
- Option (c) +5
 Explanation: In orthophosphoric acid (H_3PO_4), the sum of the oxidation states must be zero. Setting up the equation $3(+1) + x + 4(-2) = 0$ yields the oxidation state of phosphorus as $x = +5$.

Physics

11. Option (a) $\frac{2}{7} \tan \theta$

Explanation: For a solid sphere rolling without slipping, the frictional force is $f_s = \frac{2}{7} Mg \sin \theta$ and the normal force is $N = Mg \cos \theta$. Setting $\mu_s \geq f_s/N$ yields the minimum coefficient of static friction as $\frac{2}{7} \tan \theta$.

12. Option (a) $M\omega/(M + 2m)$

Explanation: Since no external torque acts on the system, angular momentum is conserved. Equating the initial and final angular momenta, $\frac{1}{2}MR^2\omega = (\frac{1}{2}MR^2 + mR^2)\omega'$, yields the new angular velocity.

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 $I = \frac{2}{3}MR^2 + MR^2 = \frac{5}{3}MR^2$. Setting $MK^2 = \frac{5}{3}MR^2$ gives the radius of gyration $K = \sqrt{5/3}R$.

14. Option (b) r_2/r_1

Explanation: According to Jurin's law, the capillary rise height h of a liquid is inversely proportional to the radius r of the tube. Thus, the ratio of the heights in the two tubes 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 the formula $v_{\text{rms}} = \sqrt{\frac{3P}{d}}$. At a constant pressure P , the velocity is inversely proportional to the square root of the gas density.