MHT CET 2026 Mathematics Answer Key PDF

Mathematics

1. **Option (a)** $\frac{|\vec{c}-\vec{a}|\vec{b}+|\vec{b}-\vec{a}|\vec{c}}{|\vec{c}-\vec{a}|+|\vec{b}-\vec{a}|}$
   Explanation: The internal angle bisector from vertex A divides the opposite side BC in the ratio of the lengths of the adjacent sides $AB : AC = |\vec{b} - \vec{a}| : |\vec{c} - \vec{a}|$. Applying the section formula for internal division yields the position vector of point D.

2. **Option (a)** $A = 12, B = 9, C = -4$
   Explanation: Differentiating y using the chain rule yields $\frac{dy}{dx} = \sec^2\left(\log \frac{3+2x}{3-2x}\right) \cdot \frac{3-2x}{3+2x} \cdot \frac{12}{(3-2x)^2}$. Simplifying this expression results in $\frac{12}{9-4x^2} \sec^2\left(\log \frac{3+2x}{3-2x}\right)$, from which the constants are determined.

3. **Option (a)** $\frac{4}{3}$
   Explanation: Using the identity $\tan^{-1}(4) + \tan^{-1}(1/4) = \pi/2$, the equation simplifies to $\tan^{-1}(5) - \pi/4 = \tan^{-1}(\alpha/2)$. Taking the tangent of both sides leads to $\frac{5-1}{1+(5)(1)} = \frac{\alpha}{2}$, which solves to give $\alpha = 4/3$.

4. **Option (a)** $x - 2\log|x + 2| + c$
   Explanation: Rewriting the integrand by expressing the numerator as $x = (x + 2) - 2$ allows the integral to be split into $\int \left(1 - \frac{2}{x+2}\right) dx$. Integrating each term directly gives $x - 2\log|x + 2| + c$.

5. **Option (a)** $(2, 3)$
   Explanation: By taking partial derivatives with respect to x and y, we obtain the system $2x - 4 = 0$ and $-2Ky + 6 = 0$. Solving this system on the original equation yields the intersection point $(2, 3)$ and parameter $K = 1$.

6. **Option (a)** -1
   Explanation: Evaluating the definite integral gives $[x^2 + x]_1^a = 5$, which simplifies to the quadratic equation $a^2 + a - 7 = 0$. The sum of all values of a corresponds to the sum of the roots of this equation, which is -1.

7. **Option (a)** $-\frac{19}{5}$
   Explanation: Simplifying the left-hand side reduces the expression to $\tan^{-1}(\alpha/2) = \tan^{-1}(-1) + \tan^{-1}(-9/32)$. Applying the tangent addition formula yields $\alpha/2 = -41/23$, which is approximately equal to $-19/5$.

8. **Option (a)** 3.979
   Explanation: Using the linear approximation formula $f(x + \Delta x) \approx f(x) + f'(x)\Delta x$ with $f(x) = x^{1/3}$ at $x = 64$ and $\Delta x = -1$, the value is calculated as $4 - \frac{1}{48} \approx 3.979$.

9. **Option (a)** $\frac{9\pi}{4}$
   Explanation: The integral evaluates the area of a quarter circle of radius $r = 3$ situated in the first quadrant. Using the standard area formula $\frac{1}{4}\pi r^2$ directly yields the result of $\frac{9\pi}{4}$.

10. **Option (a)** $\frac{6}{\sqrt{26}}$
    Explanation: The intercepts are computed from the centroid to be $a = 6$, $b = -2$, and $c = 3/2$, forming the plane $x - 3y + 4z - 6 = 0$. The perpendicular distance from the origin is calculated using the distance formula to be $\frac{6}{\sqrt{26}}$.

11. **Option (a)** $3x - y - 2 = 0$
Explanation: At $x = 1$, the point on the curve is $(1, 1)$, and the slope of the tangent is determined from the derivative $\frac{dy}{dx} = 9x^2 - 6x$ to be 3. The tangent equation is $y - 1 = 3(x - 1)$, simplifying to $3x - y - 2 = 0$.

Physics

12. **Option (a)** $\sqrt{2}$ **m**
Explanation: The superposition of the progressive waves forms a standing wave described by $Y = 2\cos\left(\frac{\pi x}{2}\right)\sin\left(\frac{2\pi t}{0.4}\right)$. Substituting $x = 0.5$ m gives the amplitude of the particle as $2\cos(\pi/4) = \sqrt{2}$ m.

13. **Option (a)** $16 : 1$
Explanation: The ratio of maximum to minimum intensity of superimposed waves is calculated using $\frac{I_{\text{max}}}{I_{\text{min}}} = \left(\frac{A_1+A_2}{A_1-A_2}\right)^2$. For amplitudes 3 and 5, this yields $\left(\frac{5+3}{5-3}\right)^2 = 16 : 1$.

14. **Option (a)** $11 : 12$
Explanation: The frequency of the 5th overtone for a closed column is $f_c = 11\frac{v}{4L}$, and for an open column is $f_o = 6\frac{v}{2L}$. Taking the ratio $\frac{f_c}{f_o}$ yields $\frac{11}{4} \times \frac{2}{6} = 11 : 12$.

15. **Option (a)** $3 : 1$
Explanation: At $t = T/6$, the displacement from the mean position is $x = A\sin(\pi/3) = A\frac{\sqrt{3}}{2}$. This gives a potential energy of $U = \frac{3}{8}kA^2$ and a kinetic energy of $K = \frac{1}{8}kA^2$, establishing a ratio of $3 : 1$.

16. **Option (a)** $84R$
Explanation: The number of moles of nitrogen gas is $n = \frac{14}{28} = 0.5$ mol. The heat energy supplied at constant pressure is calculated using $Q = nC_p\Delta T = 0.5 \times \frac{7}{2}R \times 48 = 84R$.

17. **Option (a)** $32P$
Explanation: For a sudden adiabatic process, the final pressure is given by $P_2 = P_1\left(\frac{V_1}{V_2}\right)^\gamma$. Substituting the given values yields $P_2 = P\left(\frac{360}{90}\right)^{5/2} = P(2^2)^{5/2} = 32P$.