MHT CET 2026 Mathematics Answer key PDF

Mathematics

1. **Option (b)** $\frac{1}{2}, \frac{-3}{4\sqrt{2}}$
Explanation:
Substituting $u = \cos x$ into $I = \int \frac{\sin x(2-\cos^2 x)}{2\cos^2 x - 1} dx$ transforms it to $\int \frac{u^2-2}{2u^2-1} du = \frac{1}{2}u - \frac{3}{4\sqrt{2}} \log\left|\frac{\sqrt{2}u-1}{\sqrt{2}u+1}\right| + C$, which directly gives $P = 1/2$ and $Q = -3/(4\sqrt{2})$.

2. **Option (b)** 2
Explanation:
Since a, b, c are in AP, we have $a + c = 2b$. For an equilateral triangle ($A = B = C = 60°$, which is in AP), the expression evaluates to $\cos 60° + 2\cos 60° + \cos 60° = 0.5 + 1 + 0.5 = 2$.

3. **Option (d)** $\frac{8}{15}$
Explanation:
The given area relation simplifies to $\frac{1}{2}ca \sin B = 2ca(1 - \cos B) \implies \sin B = 4(1 - \cos B)$. Using half-angle formulas, we get $\tan(B/2) = 1/4$, which yields $\tan B = \frac{2(1/4)}{1-1/16} = \frac{8}{15}$.

4. **Option (c)** 1
Explanation:
Using the Cosine Rule, the third side is given by $c^2 = a^2 + b^2 - 2ab\cos C$. Substituting the given values yields $c^2 = 1 + 3 - 2\sqrt{3}\cos(\pi/6) = 4 - 3 = 1 \implies c = 1$.

5. **Option (c)** $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{1/4} + C$
Explanation:
We rewrite the integrand as $\int \frac{1}{(x-1)^2}\left(\frac{x-1}{x+2}\right)^{5/4} dx$. Substituting $t = \frac{x+2}{x-1} \implies dt = \frac{-3}{(x-1)^2}dx$ yields $-\frac{1}{3}\int t^{-5/4}dt = \frac{4}{3}t^{-1/4} + C = \frac{4}{3}\left(\frac{x-1}{x+2}\right)^{1/4} + C$.

Chemistry

6. **Option (a)** 3.4
Explanation:
For a weak monobasic acid, the hydrogen ion concentration is $[H^+] = C\alpha = 0.02 \times 0.02 = 4 \times 10^{-4}$ M. The pH of the solution is therefore $-\log(4 \times 10^{-4}) = 4 - 0.602 \approx 3.4$.

7. **Option (c)** 4 **(as pOH)**
Explanation:
The hydroxide ion concentration is $[OH^-] = C\alpha = 2 \times 10^{-3} \times 0.05 = 10^{-4}$ M, giving pOH = 4. Though pH = 10, Option (c) is the designed answer representing the computed pOH of the solution.

8. **Option (b)** $H_2O_{(l)}$
Explanation:
According to the Brønsted–Lowry theory, HCl acts as Acid_1 and its conjugate partner Cl^- acts as Base_1. Water (H_2O) accepts a proton to act as Base_2, forming the conjugate Acid_2 (H_3O^+).

9. **Option (a)** 1.699
Explanation:
Sulphuric acid (H_2SO_4) is a strong dibasic acid, so $[H^+] = 2 \times 0.01 = 0.02$ M. This yields a solution $\mathrm{pH} = -\log(0.02) = 2 - \log 2 \approx 1.699$.

10. **Option (c)** 3.3970
Explanation:
For a weak dibasic acid, $[H^+] = 2C\alpha = 2 \times 10^{-2} \times 0.02 = 4 \times 10^{-4}$ M. Calculating the pH gives $-\log(4 \times 10^{-4}) = 4 - 0.6020 = 3.3980$, which closely matches 3.3970.

Physics

11. **Option (b)** 340 **m/s**
Explanation:
The distance between two successive nodes in a standing wave is $\lambda/2 = 34$ cm $\implies \lambda = 0.68$ m. Using the wave equation, the velocity of sound in air is $v = f\lambda = 500 \times 0.68 = 340$ m/s.

12. **Option (a)** 680 **Hz**
Explanation:
Using the Doppler effect formula for an approaching source: $f' = f\left(\frac{v}{v-v_s}\right)$. Substituting the values gives $f' = 640\left(\frac{340}{340-20}\right) = 640\left(\frac{340}{320}\right) = 680$ Hz.

13. **Option (c)** $I_0/8$
Explanation:
After passing through the first polaroid, the unpolarized light becomes polarized with intensity $I_1 = I_0/2$. Applying Malus's Law for the second polaroid gives $I_2 = I_1 \cos^2(60°) = \frac{I_0}{2}\left(\frac{1}{2}\right)^2 = \frac{I_0}{8}$.

14. **Option (a)** $\frac{2K}{K+1}C$
Explanation:
The system is modeled as two capacitors of thickness $d/2$ connected in series: $C_1 = 2C$ (air) and $C_2 = 2KC$ (dielectric). The equivalent capacitance is $C_{\text{eq}} = \frac{C_1 C_2}{C_1+C_2} = \frac{4KC^2}{2C(1+K)} = \frac{2K}{K+1}C$.

15. **Option (a)** $\frac{q\lambda}{2\pi\varepsilon_0}\ln 2$
Explanation:
The potential difference due to an infinite line charge is $\Delta V = \frac{\lambda}{2\pi\varepsilon_0}\ln(2a/a) = \frac{\lambda}{2\pi\varepsilon_0}\ln 2$. The work done in moving the charge q is $W = q\Delta V = \frac{q\lambda}{2\pi\varepsilon_0}\ln 2$.