MHT CET 2026 Mathematics Answer Key PDF

Mathematics

1. Option (a) T, T, F, T
   Explanation: For the implication $(p \wedge q) \rightarrow (r \vee \neg s)$ to be false, the antecedent $(p \wedge q)$ must be true (so $p = \text{T}$ and $q = \text{T}$) and the consequent $(r \vee \neg s)$ must be false (so $r = \text{F}$ and $\neg s = \text{F} \implies s = \text{T}$).

2. Option (b) $-\frac{2}{3}\left(\cot^{-1}(x^3)\right)^2 + C$
   Explanation: Using substitution with $u = \cot^{-1}(x^3)$, its differential is $du = -\frac{3x^2}{1+x^6}dx$. The integral simplifies to $-\frac{4}{3}\int u\,du = -\frac{2}{3}u^2 + C$, which gives the correct option.

3. Option (a) $\frac{3-12x^2}{\sqrt{1-(3x-4x^3)^2}}$
   Explanation: Applying the chain rule to the derivative of $\sin^{-1}(u)$ with $u = 3x - 4x^3$, we get $\frac{dy}{dx} = \frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$. Since $\frac{du}{dx} = 3 - 12x^2$, this simplifies to the expression in Option (a).

4. Option (c) $90°$
   Explanation: The dot product of two non-zero vectors is given by $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}||\mathbf{b}|\cos\theta$. Setting this product equal to zero implies $\cos\theta = 0$, meaning the angle θ between the vectors is $90°$.

5. Option (a) 1
   Explanation: The modulus function $|x-4|$ is split at $x = 4$ over the interval $[3, 5]$. Evaluating the two sub-integrals gives $\int_3^4 (4-x)dx + \int_4^5 (x-4)dx = 0.5 + 0.5 = 1$.

Physics

6. Option (b) 2 J
   Explanation: The elastic potential energy stored in a displaced spring is calculated using $U = \frac{1}{2}kx^2$. Substituting the spring constant $k = 100$ N/m and displacement $x = 0.2$ m yields $U = \frac{1}{2}(100)(0.04) = 2$ J.

7. Option (b) 20 K
   Explanation: Since root-mean-square velocity is proportional to $\sqrt{T/M}$, equal velocities imply $\frac{T_{\text{H}_2}}{M_{\text{H}_2}} = \frac{T_{\text{O}_2}}{M_{\text{O}_2}}$. Substituting $T_{\text{O}_2} = 320$ K, $M_{\text{O}_2} = 32$, and $M_{\text{H}_2} = 2$ gives $T_{\text{H}_2} = 20$ K.

8. Option (b) $\frac{C}{2}$
   Explanation: For an infinite repeating ladder of series and parallel capacitors, the overall equivalent capacitance X across the terminals satisfies $X = \frac{C(C+X)}{C+(C+X)}$. Solving this quadratic equation yields $X = \frac{C}{2}$.

9. Option (d) $4R$
   Explanation: When a wire is stretched to twice its length, its cross-sectional area is halved to maintain a constant volume. Since resistance is given by $R = \rho\frac{L}{A}$, doubling L and halving A increases the resistance by a factor of 4.

10. Option (c) 1 : 2
Explanation: The de Broglie wavelength is $\lambda \propto \frac{1}{\sqrt{mq}}$. For an alpha particle and a proton, $\frac{\lambda_\alpha}{\lambda_p} = \sqrt{\frac{m_p q_p}{m_\alpha q_\alpha}} = \sqrt{\frac{1 \cdot 1}{4 \cdot 2}} = \frac{1}{2\sqrt{2}} \approx 1 : 2.82$, which is closest to the option of $1 : 2$.

Chemistry

11. Option (b) C_6H_5CHO
Explanation: The Cannizzaro reaction occurs specifically in aldehydes that lack any hydrogen atoms on their α-carbons. Among the given options, benzaldehyde (C_6H_5CHO) is the only aldehyde that fulfills this requirement.

12. Option (d) Trichloroacetic acid
Explanation: The presence of three highly electronegative chlorine atoms on the α-carbon exerts a strong electron-withdrawing inductive effect ($-I$ effect), which stabilizes the carboxylate anion and significantly enhances its acidic strength.

13. Option (c) 3
Explanation: In potassium permanganate ($KMnO_4$), manganese exists in the +7 oxidation state, whereas in manganese dioxide (MnO_2), it is in the +4 oxidation state. The absolute difference between these two states is $7 - 4 = 3$.

14. Option (a) Hydrazone
Explanation: The nucleophilic addition-elimination reaction between a ketone and hydrazine (NH_2NH_2) leads to the loss of a water molecule, forming a compound with a carbon-nitrogen double bond called a hydrazone.

15. Option (b) Alkyl halide
Explanation: When an alkene reacts with a hydrogen halide (such as HCl or HBr), it undergoes an electrophilic addition reaction across the double bond to form an alkyl halide as the major product.