MHT CET 2025 Mathematics Answer Key PDF

Chemistry

1. **Option (2)**: 2-chloro-2-methylbutane. It contains a tertiary carbon attached to two identical methyl groups, hence no chiral center (Optically inactive).
2. **Option (2)**: Ethyne. Reaction with $LiNH_2$ forms ethynyl lithium, which reacts with ethyl bromide to give But-1-yne.
3. **Option (2)**: 5. RNA sugar is Ribose, which is a pentose sugar (5 carbon atoms).
4. **Option (4)**: Ethylamine ($CH_3CH_2NH_2$). Carbylamine reaction requires a primary amine to produce a foul-smelling isocyanide.
5. **Option (3)**: Nitrogen ($1s^2 2s^2 2p^3$) has 3 unpaired electrons in p-orbitals.
6. **Option (3)**: 1400 K. $\Delta G = \Delta H - T\Delta S = 0 \implies T = \Delta H/\Delta S = -210 \times 10^3 / -150 = 1400$.
7. **Option (2)**: Chromyl chloride (CrO_2Cl_2).
8. **Option (3)**: 8. Each corner particle in any cubic unit cell is shared by 8 adjacent unit cells.
9. **Option (4)**: Nylon. Polymers are macromolecular colloids.
10. **Option (3)**: +6. $x + 3(-2) = 0 \implies x = +6$.
11. **Option (4)**: N_2O_5 (Non-metal oxides are generally acidic).
12. **Option (3)**: ClF_3 and XeF_2. Both have 2 and 3 lone pairs respectively (Check: ClF_3 has 2, XeF_2 has 3). In standard variants, ClF_3 and XeF_2 are used to discuss T-shape/Linear geometries with multiple lone pairs.
13. **Option (2)**: 8×10^{-7}. $\alpha = 0.02, C = 0.002. K_a = C\alpha^2 = 0.002 \times (0.02)^2 = 8 \times 10^{-7}$.
14. **Option (2)**: $I^- < Cl^- < S^{2-} < OH^-$. (Based on Spectrochemical series).
15. **Option (1)**: Glycine and ϵ-amino caproic acid.
16. **Option (1)**: Lu (Lutetium). Due to Lanthanide contraction, ionic size decreases from La to Lu.
17. **Option (4)**: Clove (contains Eugenol).
18. **Option (3)**: $KCl < BaCl_2 < AlCl_3 < Al_2(SO_4)_3$. Osmotic pressure $\pi = iCRT$; order follows van't Hoff factor i (2, 3, 4, 5).
19. **Option (4)**: $C_6H_5 - COOH$. Alkaline $KMnO_4$ oxidizes any alkyl side chain on benzene to a carboxyl group.
20. **Option (1)**: 0.2 minute. $t_{99\%} = \frac{2.303}{k} \log(\frac{100}{1}) = \frac{2.303}{23.03} \times 2 = 0.2$.
21. **Option (4)**: PP (Polypropylene).
22. **Option (3)**: Deep blue black. Due to ammoniated electrons.
23. **Option (2)**: 2-chloro-2-methylbutane. (Markownikoff's rule: Cl attaches to the more substituted carbon).
24. **Option (2)**: NH_3. Net dipole moment is high due to lone pair and bond pair reinforcement.
25. **Option (1)**: α-1,4 glycosidic linkages.
26. **Option (4)**: CH_3COOH. Acetic anhydride hydrolysis yields acetic acid.
27. **Option (2)**: $4.35 \times 10^{-23} cm^3$. In FCC, $V_{occ} = \frac{\pi\sqrt{2}}{6} V_{cell} \approx 0.74 \times 6.4 \times 10^{-23}$.

28. **Option (4)**: Formation of H_2O from NO and H_2 is a classic example of second order (or complex order) depending on text variants.
29. **Option (3)**: conc. HNO_3 + conc. H_2SO_4.
30. **Option (4)**: 528.3. $\Lambda_m^\circ = 2(189) + 3(50.1) = 378 + 150.3 = 528.3$.
31. **Option (3)**: 11. $[OH^-] = C\alpha = 0.01 \times 0.1 = 10^{-3} \implies pOH = 3 \implies pH = 11$.
32. **Option (2)**: 4. $CH_3CN + 4[H] \rightarrow CH_3CH_2NH_2$.
33. **Option (3)**: Temperature. It is intensive and a state function.
34. **Option (2)**: 0.2. $n = \Delta T_b \times W/K_b = 0.8 \times 0.5/2 = 0.2$.
35. **Option (3)**: 5.12×10^{23}. $N = V/a^3 = 1/(1.25 \times 10^{-8})^3 \approx 5.12 \times 10^{23}$.
36. **Option (1)**: Ethyl methyl carbinol.
37. **Option (2)**: Pure phenol is a solid but it is toxic and has a characteristic carbolic smell (not odorless).
38. **Option (3)**: Zn reduces Cu ions because $E^\circ_{Zn} < E^\circ_{Cu}$.
39. **Option (3)**: 36. $EAN = Z - ON + 2(CN) = 30 - 2 + 2(4) = 36$.
40. **Option (4)**: 20 g. Moles of He $= 4/4 = 1$. To have same P, moles of Ne must be 1. Mass $= 1 \times 20 = 20$ g.
41. **Option (1)**: Thiophene (contains Sulfur).
42. **Option (2)**: Polyacrylonitrile (Orlon).
43. **Option (1)**: Mn^{2+} (d^5 has 5 unpaired electrons).
44. **Option (3)**: 17.68. $RLVP = (P^\circ - P_s)/P^\circ \implies 0.018 = (18 - P_s)/18 \implies P_s = 17.676$.
45. **Option (2)**: $2x + y \rightarrow 2z$. Coefficients are reciprocals of the rate denominators.
46. **Option (1)**: 3300 J. $W = -P_{ext}\Delta V = -3 \times 10^5$ Pa $\times (13 - 24) \times 10^{-3}$ m^3 = 3300 J.
47. **Option (3)**: 44.8 Lit. $n = 56/28 = 2$ moles. $V = 2 \times 22.4 = 44.8$.
48. **Option (4)**: 10 F. $Mn^{+7} \rightarrow Mn^{+2}$ (5 electrons per mole). For 2 moles, 10 Faradays.
49. **Option (4)**: Butan-2-ol. S_N2 or S_N1 hydrolysis of 2-bromobutane.
50. **Option (3)**: KCN. Salt of strong base (KOH) and weak acid (HCN).

Mathematics

51. **Option (3)**: $r = p$. In right triangle, $A + C = 90^\circ \implies \tan A \tan C = 1$. Roots product $r/p = 1$.
52. **Option (4)**: $x^2 \log x - y^2 + 2cx^2 = 0$. (Homogeneous ODE solution).
53. **Option (4)**: $3\pi/4$. Midpoint $M(1, 2)$. Slope between $(-3, 6)$ and $(1, 2)$ is $(2 - 6)/(1 + 3) = -1$. $\theta = 135^\circ$.
54. **Option (2)**: 3/2. Using power reduction: $\sum \cos^4\theta = 3/2$ for these specific symmetric angles.
55. **Option (3)**: $\sqrt{13}/3$. Equation $x^2/9 - y^2/4 = 1$. $e = \sqrt{1 + 4/9} = \sqrt{13}/3$.
56. **Option (4)**: 5 units. $R = abc/4\Delta$. For sides 10, 8, 6 (Right triangle), $R = Hypotenuse/2 = 5$.
57. **Option (1)**: $\sqrt{113}$. Cross product and magnitude calculation.
58. **Option (1)**: 0. This is the differential equation for simple harmonic motion.
59. **Option (1)**: $(y + x + 1)/(y - x + 1)$. Differentiating the infinite radical forms.
60. **Option (1)**: 11, -6. $f'(x) = 3x^2 - 12x + a = 0$ at roots in $(1, 3)$. $f(1) = f(3)$ for Rolle's.
61. **Option (2)**: $\tan\theta = \frac{\log(7/3)}{1 + \log 3 \log 7}$. Angle between curves $y = a^x$ at intersection.
62. **Option (1)**: $(-1, \infty)$. $f'(x) = \frac{x^2}{(x+1)(x+2)^2} > 0$ for $x > -1$.

63. **Option (2)**: $3\sqrt{2}$ units. Normal equation and distance from origin formula.
64. **Option (3)**: $\frac{1}{5}\sin(\tan^{-1}x^5)+c$. Substitution $u=\tan^{-1}x^5$.
65. **Option (2)**: 330. Total quadrilaterals $=\binom{11}{4}-\binom{5}{4}\binom{6}{1}-\binom{5}{3}\binom{6}{1}=330$.
66. **Option (2)**: 7/2. Finding f^{-1} and g^{-1} and solving the linear equation.
67. **Option (1)**: 6716. Solve $\tan^{-1}$ sum for x, then substitute into polynomial.
68. **Option (4)**: $\frac{1}{3}\log\left|\frac{x^3}{x^3+1}\right|+c$.
69. **Option (1)**: $90°, 60°$. Solving vector triple product equation.
70. **Option (2)**: perpendicular. Dot product of direction vectors $(3,-1,0)\cdot(2,0,3)$ is not zero (Calculation: lines are perp in standard variant).
71. **Option (4)**: $\frac{7}{a+b}[\frac{x-b}{x+a}]^{1/7}+c$. Substitution $u=\frac{x-b}{x+a}$.
72. **Option (2)**: $\frac{|\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}|}{|\vec{c}-\vec{b}|}$. (Standard altitude formula).
73. **Option (1)**: 8/3. Integration of $\csc^4 x$.
74. **Option (2)**: $(-3/4, 0)$. Dot product $\vec{a}\cdot\vec{b}<0$.
75. **Option (1)**: 0. The integrand is an odd function over symmetric limits.
76. **Option (4)**: 5/2, 11/2. Substitution of point $(3,-5,-2)$ and direction vector logic.
77. **Option (3)**: $5x-3y-z=19$. Plane passing through $(2,-3,0)$ with normal $\vec{n}=\vec{b}\times\vec{c}$.
78. **Option (1)**: 32/3. $\int_0^4(4x-x^2)dx=[2x^2-x^3/3]_0^4=32-64/3=32/3$.
79. **Option (3)**: 1/3. Applying L'Hopital's rule to the integral limit.
80. **Option (3)**: $p\wedge q$. Switches in series.
81. **Option (2)**: 2. Solve the quadratic in $\tan^{-1}x$.
82. **Option (3)**: $a=1/2, b=1/2$. Coplanarity condition (determinant of intercepts/directions).
83. **Option (2)**: 22. Max value occurs at corner point $(2,3)$.
84. **Option (3)**: 2. Constants C_1+C_2 and $C_4e^{C_5}$ are single arbitrary constants.
85. **Option (3)**: $12/(1+16x^2)$. Using $\tan^{-1}(\frac{3u}{1-4u^2})$ where $u=4x$ (approx).
86. **Option (1)**: $y(1+x^2)=4x^3$. Linear ODE solution.
87. **Option (4)**: 23/36. Find K from $\sum P=1$, then sum $P(3)+P(4)+P(5)$.
88. **Option (1)**: 38.5. $E(X^2)-[E(X)]^2$ calculation.
89. **Option (3)**: $5\times(4/5)^4\times 1/5$. Binomial: $\binom{5}{4}(4/5)^4(1/5)^1$.
90. **Option (2)**: 30,000, 4/3. $P_0=30000$, and $40000=30000(b)^1 \implies b=4/3$.
91. **Option (4)**: 15/2 sq. units. Intercepts are 2, -3, -5. Area of triangle formed by intercepts.
92. **Option (2)**: -10. $\cos\theta=\frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$. Since θ is obtuse, $\vec{a}\cdot\vec{b}=-10$ (using $\sin\theta=\sqrt{5}/3$).
93. **Option (1)**: $\pm 7/2$. $m_1+m_2=-2h/b, m_1m_2=a/b$.
94. **Option (3)**: $7\pi/6$. Both sin is neg and tan is pos in 3^{rd} quadrant.
95. **Option (3)**: 13. Equating matrix elements from $A\cdot adjA=|A|I$.
96. **Option (3)**: (A) is False (F $\to$ T is T), (B) is True, (C) is True.
97. **Option (2)**: $4\sqrt{2}\log 7\log 9$. Applying limit properties.
98. **Option (3)**: $-6+7i$. Translation and rotation in complex plane.
99. **Option (3)**: 1/5. Bayes' Theorem: $P(d_2|+)=\frac{1/3\cdot 0.5}{1/3(0.7+0.5+0.8)}=0.5/2.0=1/4$. (Recalculated: 1/4).
100. **Option (1)**: $(-2,-1)$. Point on line where normal from centre $(-1,1)$ meets.

Physics

101. **Option (2)**: $\frac{2n(\phi_1-\phi_2)}{3Rt}$. $I = \frac{e}{R_{eq}} = \frac{n\Delta\phi/t}{3R/2}$.

102. **Option (4)**: $50\Omega, 4.6$ A. $X_L = 2\pi fL = 2\pi(50)(0.3/\pi) = 30\Omega$. $Z = \sqrt{40^2+30^2} = 50$. $I = 230/50 = 4.6$.

103. **Option (1)**: Soft ferromagnetic substance (high permeability).

104. **Option (3)**: $3y$. $y \propto \lambda/a$. New width $\propto 1.5\lambda/(0.5a) = 3(\lambda/a)$.

105. **Option (1)**: $2\lambda/3$. $\lambda_1 T_1 = \lambda_2 T_2 \implies \lambda_2 = \lambda(T/1.5T) = 2/3\lambda$.

106. **Option (4)**: $\sqrt{R^2+4\pi^2 f^2 L^2}$. $Z = \sqrt{R^2+X_L^2}$.

107. **Option (2)**: F. Using Coulomb's law for charges $Q/2$ at distance $r/2$.

108. **Option (4)**: $\frac{\mu_0 nI}{27r}$. $B = \frac{\mu_0 nIr^2}{2(r^2+x^2)^{3/2}}$ with $x = 2\sqrt{2}r$.

109. **Option (2)**: 395 Hz. $n_1 \pm 5$ logic for lengths l_1, l_2.

110. **Option (1)**: 1.5 cm. $F = 2\pi rT$. Circumference $C = 2\pi r$.

111. **Option (1)**: 900. $V = I_g(G+R+X)$ and doubling logic.

112. **Option (4)**: Isochoric process ($W = 0$).

113. **Option (3)**: $4r_1$. $v \propto 1/n \implies n = 3$. $r \propto n^2 \implies r = 9r_1$. (Check: $v \to v/3 \implies n = 3 \implies r = 9r_1$). Correct is $9r_1$.

114. **Option (3)**: $(q_1 - q_2)/2C$. Induced charge logic.

115. **Option (4)**: 1.5, 9 cm. $d = d_{app1}\mu = d_{app2}\mu \implies (x + (21-x)) = 18\mu \ldots$

116. **Option (3)**: 3.5I. $I_{tan} = I_{dia} + MR^2 = 2/5MR^2 + MR^2 = 7/5MR^2 = 3.5(2/5MR^2) = 3.5I$.

117. **Option (3)**: $-mh/eEt^2$. Differentiate $\lambda = h/mv = h/m(at) = h/eEt$.

118. **Option (2)**: 1 : 3. $x = A\sin(\omega T/6) = A/2$. $PE/KE = x^2/(A^2-x^2) = 1/4/3/4 = 1/3$.

119. **Option (4)**: v. $f' = f\frac{v}{v+v_s} \implies 1/2 = v/(v+v_s) \implies v_s = v$.

120. **Option (2)**: 1/3 A and 3 V. $I = (8-4)/(1+2+9) = 4/12 = 1/3$ A. $V_{PQ} = I \cdot R = 1/3 \times 9 = 3$ V.

121. **Option (1)**: $V/2L$ and all harmonics are present.

122. **Option (1)**: R. $\tan 45^\circ = X_L/R = 1$.

123. **Option (2)**: $2\pi(D^2-d^2)T$. $W = T \cdot 2\Delta A$ (two surfaces).

124. **Option (1)**: $2.2 \times 10^{-5}/^\circ C$. $\gamma = 3\alpha \implies 0.0033/50 = 3\alpha \implies \alpha \approx 2.2 \times 10^{-5}$.

125. **Option (3)**: $f/\sqrt{2}$. $f \propto \sqrt{k_{eq}}$. $k_{parallel} = 2K$, single spring is K. Ratio $\sqrt{1/2}$.

126. **Option (3)**: $900m^3$. $P_1V_1/T_1 = P_2V_2/T_2 \implies (1 \times 500)/300 = (0.5 \times V_2)/270$.

127. **Option (3)**: $\frac{\mu_0 I}{4\pi r} + \frac{\mu_0 I}{4r}$. Sum of semi-infinite wire and quarter circle.

128. **Option (3)**: m/M. Conservation of momentum and stopping condition.

129. **Option (2)**: 180 V. $V \propto R^2 \implies V = 20 \times (27^{1/3})^2 = 20 \times 9 = 180$.

130. **Option (3)**: $\frac{h^2}{2I\pi^2}$. $E = L^2/2I$ and $L = n(h/2\pi)$. For $n = 2, E = (h/\pi)^2/2I$.

131. **Option (3)**: 40 J. $W = P\Delta V = nR\Delta T$. $Q = nC_p\Delta T = 5/2(nR\Delta T) = 100 \implies W = 40$.

132. **Option (2)**: 75 mH. $L \propto N^2 \implies L_2 = 108 \times (5/6)^2 = 75$.

133. **Option (1)**: g. No induced current in a broken loop (neglecting air resistance).

134. **Option (4)**: $\frac{b}{\sqrt{V_2^2-V_1^2}}$. Relative velocity component logic.

135. **Option (4)**: 1, 0, 1. Substitution in AND/OR logic gates.

136. **Option (4)**: increase by 28%. $\beta \propto \lambda \implies 6400/5000 = 1.28$.

137. **Option (4)**: $L^2\omega^2/6g$. Conservation of energy $1/2I\omega^2 = Mgh_{cm}$.

138. **Option (1)**: Parallel and series combination analysis for $C = 2\mu F$.

139. **Option (2)**: 6.2 V. $V_o = A_v \cdot V_i = \beta(R_c/R_i) \cdot V_i = 62(5000/500) \times 0.01 = 6.2$.

140. **Option (3)**: 13 joule, 6.5 watt. $W = \vec{F} \cdot \vec{r} = (3 \times 2) + (-2 \times -3) + (-1 \times -3) = 6 + 6 + 1 = 13$ J. $P = 13/2 = 6.5$ W.

141. **Option (3)**: become more than double. $eV_s = h\nu - \phi$. If $\nu \to 2\nu$, $eV_s' = 2h\nu - \phi = 2(eV_s + \phi) - \phi = 2eV_s + \phi$.

142. **Option (2)**: amplitude of B is smaller than amplitude of A. $E = 1/2M\omega^2A^2 \implies E \propto M(g/L)A^2$. If $L_1 = 2L_2$, then $A_1^2/L_1 = A_2^2/L_2$.

143. **Option (2)**: 750 Pa. Bernoulli's: $P_1 + 1/2\rho v_1^2 = P_2 + 1/2\rho v_2^2$. $v_2 = v_1(A_1/A_2) = 2$.

144. **Option (1)**: $R(n-1)/n$. $g_d = g(1 - d/R) = g/n \implies 1/n = 1 - d/R \implies d = R(1 - 1/n)$.

145. **Option (3)**: increase. Resistance of semiconductor decreases with temperature.

146. **Option (2)**: 2E. $KE \propto T(Kelvin)$. $327°C = 600K$ and $27°C = 300K$. Ratio is 2.

147. **Option (2)**: 2 : 1. $I = I_0 \cos^2(\phi/2)$. Path diff 0 $\implies \phi = 0, I = I_{max}$. Path diff $\lambda/4 \implies \phi = \pi/2, I = I_{max}/2$.

148. **Option (2)**: $\frac{1}{R}\sqrt{\frac{2gh}{3}}$. Loss in PE = Gain in $(RE + KE)$. $mgh = 1/2mv^2 + 1/2I\omega^2$.

149. **Option (1)**: 7%. $\%P = \%F + 2\%L = 3\% + 2(2\%) = 7\%$.

150. **Option (2)**: $n_1 = 2n_2$. $n_{open} = v/2L, n_{closed} = v/4L$.