MHT CET 2016 Paper 2 Physics & Chemistry Answer Key PDF

Question 1 Option: (A) – increase
Explanation: The potential gradient along the potentiometer wire is $k = V/L$. Increasing the wire length L while keeping the driving voltage V constant decreases the potential gradient k, thereby increasing the balancing length $l = e/k$ for a given cell.

Question 2 Option: (C) – 10^{-3}
Explanation: The magnetic induction is $B = \phi/A = (6 \times 10^{-4}\,\text{Wb})/(3 \times 10^{-4}\,\text{m}^2) = 2\,\text{T}$. Using the relation $\mu = B/H$ with $H = 2000\,\text{A/m}$ yields a magnetic permeability of $2/2000 = 10^{-3}\,\text{Wb/A-m}$.

Question 3 Option: (B) – 200 V
Explanation: The peak value of secondary e.m.f. is $e_0 = MI_0\omega = MI_0(2\pi f)$. Substituting $M = 1\,\text{H}$, $I_0 = 2/\pi\,\text{A}$, and $f = 50\,\text{Hz}$ yields a peak e.m.f. of $1 \times (2/\pi) \times 100\pi = 200\,\text{V}$.

Question 4 Option: (C) – $\frac{\lambda'}{3}\sqrt{\frac{m}{M}}$
Explanation: The de-Broglie wavelength is given by $\lambda = h/\sqrt{2mqV}$. Comparing the ratio for an electron and a proton with $V_p = 9V_e$ yields $\lambda_p = \frac{\lambda'}{3}\sqrt{\frac{m}{M}}$.

Question 5 Option: (C) – 6I
Explanation: The resultant intensity is $I_{\text{res}} = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\phi = 10I + 6I\cos\phi$. Calculating the intensities at $\phi_P = \pi/2$ and $\phi_Q = \pi$ gives $I_P = 10I$ and $I_Q = 4I$, yielding a difference of $6I$.

Question 6 Option: (A) – depends on wavelength and is different for different colours
Explanation: According to Brewster's law, $\tan i_p = \mu$. Since the refractive index μ of a medium varies with the wavelength of light, the polarising angle $i_p must$ also depend on the wavelength of the incident light.

Question 7 Option: (D) – $\left[\frac{r_1}{r_2}\right]^2$
Explanation: The radius of the circular path is $r = \frac{\sqrt{2mVq}}{qB}$. Since V, q, and B are constant, the radius is proportional to the square root of the mass ($r \propto \sqrt{m}$), which means that $m \propto r^2$.

Question 8 Option: (B) – does not radiate light and velocity remains unchanged
Explanation: According to Bohr's first postulate of hydrogen-like atoms, an electron revolving in a stable stationary orbit does not lose energy through electromagnetic radiation, and its orbital speed remains constant.

Question 9 Option: (D) – $\mu_0 nI(1+\chi)$
Explanation: The magnetic field inside a solenoid with a core is $B = \mu_0\mu_r nI$. Substituting the relative permeability in terms of magnetic susceptibility, $\mu_r = 1 + \chi$, yields the expression $B = \mu_0 nI(1+\chi)$.

Question 10 Option: (A) – 1 A
Explanation: By the bridge balance condition, $X/6 = 2/3 \implies X = 4\,\Omega$. The equivalent resistance of the parallel combination of the gaps and the wire is $5\,\Omega$, resulting in a current of $5\,\text{V}/5\,\Omega = 1\,\text{A}$ drawn from the source.

Question 11 Option: (B) – $\frac{11\epsilon_0 A}{18d}$
Explanation: For parallel-connected capacitors, $C_{\text{eq}} = C_1 + C_2 + C_3$. Summing the capacities of the three individual components with varying plate separations yields $C_{\text{eq}} = \epsilon_0(A/3)[1/d + 1/2d + 1/3d] = 11\epsilon_0 A/18d$.

Question 12 Option: (C) – 1
Explanation: The Barkhausen criterion for sustained oscillations in a feedback amplifier requires the loop gain to be unity, meaning $|A\beta| = 1$, and the phase shift around the loop to be an integer multiple of 2π.

Question 13 Option: (A) – increase
Explanation: Decreasing the incident wavelength increases the energy of the incident photons. Because the work function of the material remains constant, the maximum kinetic energy and hence the stopping potential of the emitted photoelectrons must increase.

Question 14 Option: (B) – $\frac{i}{5}$
Explanation: A 20% reduction in velocity means the refractive index is $\mu = 1/0.8 = 1.25 = 5/4$. For small angles of incidence, the angle of deviation is $\delta \approx i(1 - 1/\mu) = i(1 - 4/5) = i/5$.

Question 15 Option: (C) – $g\sqrt{N}$
Explanation: The critical frequency of the ionosphere is given by the relation $f_c \approx 9\sqrt{N}$, where N is the maximum electron density per unit volume. In some standard memory-based papers, the numerical factor is represented symbolically as g.

Question 16 Option: (A) – 186 Hz
Explanation: The frequency of a wire is $n \propto \sqrt{T}$. Setting up the frequency ratio for tensions of 225 N and 256 N with 6 beats gives $15/16 = (N - 6)/(N + 6)$, which yields a fork frequency of $N = 186$ Hz.

Question 17 Option: (B) – $\left[\frac{2}{3}\right]$rd kinetic energy per unit volume of a gas
Explanation: According to the kinetic theory of gases, the pressure exerted by an ideal gas is $P = \frac{1}{3}\rho v_{\text{rms}}^2$. This can be rewritten as $P = \frac{2}{3}\left(\frac{1}{2}\rho v_{\text{rms}}^2\right)$, which is 2/3 of the kinetic energy per unit volume.

Question 18 Option: (A) – $\left[\frac{m_1}{m_1+m_2}\right]^{1/2}$
Explanation: By conservation of linear momentum at the mean position, the new velocity is $v' = \frac{m_1}{m_1+m_2}v$. Equating the maximum velocities in terms of the amplitudes and angular frequencies yields the ratio $A_1/A = \sqrt{m_1/(m_1 + m_2)}$.

Question 19 Option: (A) – $\frac{v^2}{8\pi r}$
Explanation: Using the kinematic equation $v^2 = u^2 + 2a_t s$ with $u = 0$ and the distance for two complete revolutions $s = 4\pi r$ yields $v^2 = 8\pi r a_t$, which gives $a_t = v^2/8\pi r$.

Question 20 Option: (B) – $\frac{1}{2}$
Explanation: The speed of a transverse wave is $v = \sqrt{T/m} \propto 1/r$. Since the material and tension are identical and the radius of string A is double that of B, the ratio of their wave speeds is $V_A/V_B = 1/2$.

Question 21 Option: (C) – Initial phase
Explanation: Damping decreases the amplitude and slightly increases the time period of the oscillations over time. However, the initial phase is established at the beginning of motion ($t = 0$) and remains unaffected by subsequent damping.

Question 22 Option: (B) – $\frac{2}{3}$ cm
Explanation: The total end correction of an open organ pipe is $2e = 1.2r$. Equating this to 0.8 cm yields $1.2r = 0.8$, which gives an inner pipe radius of $r = 2/3$ cm.

Question 23 Option: (C) – $\frac{\pi}{8}$ cm
Explanation: The wave equation $y = 12\sin(5t - 4x)$ gives a wave number $k = 4$ rad/cm. Using the relation $\Delta\phi = k\Delta x$ with a phase difference of $\pi/2$ yields a path difference of $\Delta x = \pi/8$ cm.

Question 24 Option: (C) – $-\frac{16\text{Gm}}{r}$
Explanation: The null point lies at $x = r/4$ from mass m. The total gravitational potential at this point is the sum of individual potentials, given by $V = -\frac{Gm}{r/4} - \frac{9Gm}{3r/4} = -16Gm/r$.

Question 25 Option: (D) – $\frac{16E}{9}$
Explanation: Since $E = \sigma AT^4$, reducing the dimensions to 1/3 scales the area to $A/9$. Doubling the absolute temperature scales the T^4 term by 16, yielding a new emission rate of $\frac{16}{9}E$.

Question 26 Option: (A) – rigid diabetic
Explanation: The ratio $\gamma - 1 = R/C_v = 0.4$ yields an adiabatic constant of $\gamma = 1.4$. This value corresponds to a diatomic gas composed of rigid molecules with five degrees of freedom.

Question 27 Option: (D) – 0.2
Explanation: The minimum velocities at the highest and lowest points for complete vertical motion are $\sqrt{gR}$ and $\sqrt{5gR}$. The ratio of their kinetic energies is equal to the ratio of their squared velocities, which is $1/5 = 0.2$.

Question 28 Option: (D) – 81 : 1
Explanation: Strain energy per unit volume is $u = \frac{1}{2Y}(\text{Stress})^2 \propto 1/d^4$. Given a diameter ratio of 1:3 for the smaller to larger wire, the ratio of their strain energies is $(3/1)^4 = 81 : 1$.

Question 29 Option: (A) – 3 J
Explanation: The rolling kinetic energy is $K = \frac{1}{2}mv^2(1 + K^2/R^2)$. For a ring, $K_{\text{ring}} = mv^2 = 4\,\text{J}$. For a disc, $K_{\text{disc}} = \frac{3}{4}mv^2 = \frac{3}{4}(4\,\text{J}) = 3\,\text{J}$.

Question 30 Option: (B) – 3
Explanation: The apparent frequencies are $F_1 = n(V + V_1)/V$ and $F_2 = n(V - V_1)/V$. Equating their ratio to 2 yields $(V + V_1)/(V - V_1) = 2 \implies V = 3V_1$, which gives the ratio $V/V_1 = 3$.

Question 31 Option: (C) – 8E
Explanation: When a drop of radius R splits into 512 identical droplets, the new radius is $r = R/8$. The total final surface area increases by a factor of $512 \times (1/8)^2 = 8$, increasing the surface energy to $8E$.

Question 32 Option: (B) – $\frac{1}{2}$
Explanation: The moments of inertia are $I_1 = ML^2/12$ and $I_2 = ML^2/3$, giving radii of gyration $k_1 = L/\sqrt{12}$ and $k_2 = L/\sqrt{3}$. The ratio of the radii of gyration is $k_1/k_2 = \sqrt{3/12} = 1/2$.

Question 33 Option: (C) – $mgl(1 - \cos\theta)$
Explanation: The maximum kinetic energy at the lowest point equals the potential energy at the highest point of swing, which is given by $mgh = mgl(1 - \cos\theta)$.

Question 34 Option: (C) – $\frac{1}{120}$
Explanation: The hour hand of a clock covers 360° in 12 hours. Thus, its angular speed in degrees per second is $\omega = 360°/(12 \times 3600\,\text{s}) = 1/120\,\text{degree/s}$.

Question 35 Option: (A) – $h = R$
Explanation: The acceleration due to gravity at height h is $g_h = g[R/(R + h)]^2$. Setting $g_h = g/4$ yields $R/(R + h) = 1/2 \implies h = R$.

Question 36 Option: (B) – Diode with outward arrows
Explanation: A light-emitting diode (LED) is represented by a standard p-n junction diode symbol with two small outward-pointing arrows on the anode side to indicate the emission of light.

Question 37 Option: (D) – 1.67 W
Explanation: Work done is the change in stored energy: $W_1 = W = \frac{1}{2}C(10^2 - 5^2) = 37.5\,C$. The second step requires $W_2 = \frac{1}{2}C(15^2 - 10^2) = 62.5\,C$. The ratio gives $W_2 = \frac{62.5}{37.5}W = 1.67W$.

Question 38 Option: (C) – 0.5
Explanation: The change in magnetic flux is $\Delta\phi = 90\%$ of $(4 \times 10^{-4}\,\text{Wb}) = 3.6 \times 10^{-4}\,\text{Wb}$. Using $e = \Delta\phi/t$ with $e = 0.72\,\text{mV}$ gives $t = (3.6 \times 10^{-4})/(7.2 \times 10^{-4}) = 0.5\,\text{s}$.

Question 39 Option: (A) – wavelength of light decreases
Explanation: The resolving power of a telescope is R.P. $= D/(1.22\lambda)$. Reducing the wavelength λ of the light used increases the resolving power of the instrument.

Question 40 Option: (D) – 5λ
Explanation: Writing the photoelectric equations, $eV = hc/\lambda - hc/\lambda_0$ and $eV/6 = hc/3\lambda - hc/\lambda_0$. Multiplying the second by 6 and equating them yields $5hc/\lambda_0 = hc/\lambda \implies \lambda_0 = 5\lambda$.

Question 41 Option: (A) – $T_1 = 3T$
Explanation: The effective acceleration in water is $g' = g(1-\sigma/\rho) = g(1-1000/1125) = g/9$. Since the time period is inversely proportional to $\sqrt{g}$, we get $T_1 = T\sqrt{g/g'} = 3T$.

Question 42 Option: (C) – $\frac{2T}{(R-r)\rho g}$
Explanation: Equating the upward surface tension force $T \cdot 2\pi(R+r)$ to the downward gravitational weight of the liquid in the annular space $\pi(R^2-r^2)h\rho g$ yields $h = 2T/[(R-r)\rho g]$.

Question 43 Option: (D) – 300 Hz
Explanation: Using the relation $f_{c,3} - f_{o,2} = 150\,\text{Hz}$, we write $7(v/4L) - 3(v/2L) = 150 \implies 3.5n_o - 3n_o = 150 \implies n_o = 300\,\text{Hz}$.

Question 44 Option: (A) – $\frac{I}{5}$
Explanation: Equating volumes gives $R_s = R/2$. The moment of inertia of the disc is $I = \frac{1}{2}MR^2$, and for the sphere is $I_s = \frac{2}{5}MR_s^2 = \frac{1}{10}MR^2 = I/5$.

Question 45 Option: (B) – $\frac{Wl^3}{4bd^3Y}$
Explanation: According to the elastic theory of bending beams, the central depression (sag) produced by a load W at the midpoint is given by the formula $\delta = Wl^3/(4Ybd^3)$.

Question 46 Option: (D) – n=2 to p=1
Explanation: According to the Rydberg formula, the energy of emission is largest when transitioning to the ground state $p = 1$, resulting in the minimum emitted wavelength.

Question 47 Option: (B) – $\frac{KV}{K+1}$
Explanation: The equivalent capacitance is $C_{\text{eq}} = KC/(K+1)$. The potential drop across the unfilled series capacitor of capacitance C is given by $V_2 = V(C_{\text{eq}}/C) = KV/(K+1)$.

Question 48 Option: (A) – has a very high impedance
Explanation: A parallel LC resonant circuit acts as a rejector circuit. At resonance, its impedance becomes theoretically infinite, preventing the flow of current.

Question 49 Option: (C) – $3970\,\Omega$
Explanation: Halving the deflection requires halving the current, which doubles the total resistance from $2000\,\Omega$ to $4000\,\Omega$. The required series resistance is $4000 - 30 = 3970\,\Omega$.

Question 50 Option: (B) – 2.7×10^{-4} cm
Explanation: The dark band between the 4th and 5th bright bands is the 5th dark band, having path difference $\Delta x = 4.5\lambda = 4.5 \times 6000 \times 10^{-8}\,\text{cm} = 2.7 \times 10^{-4}\,\text{cm}$.

Question 51 Option: (D) – Fluoride
Explanation: According to Fajan's rules, because fluorine is the most electronegative halogen, magnesium fluoride (MgF_2) possesses the least covalent character and highest ionic character.

Question 52 Option: (D) – $Cl_{(g)}$
Explanation: The chlorine free radical ($Cl^{\bullet}$) is produced as a product in the first step of the reaction and is entirely consumed as a reactant in the second step, defining it as a reaction intermediate.

Question 53 Option: (C) – Arginine
Explanation: Arginine is a basic amino acid because of the presence of a strongly basic guanidino group in its side chain, which easily protonates at physiological pH.

Question 54 Option: (D) – Henry's law
Explanation: Henry's law states that at a constant temperature, the solubility of a gas in a liquid solvent is directly proportional to the partial pressure of that gas above the liquid.

Question 55 Option: (D) – p-nitrophenol
Explanation: The nitro group ($-NO_2$) at the para-position exerts strong electron-withdrawing resonance (-R) and inductive (-I) effects, which highly stabilizes the conjugate phenoxide ion.

Question 56 Option: (A) – Pb
Explanation: Lead (Pb) undergoes oxidation to Pb^{2+} at the anode, losing electrons to reduce silver ions. Therefore, metallic lead acts as the reducing agent in the cell.

Question 57 Option: (A) – Polonium
Explanation: Polonium is the only metal known to crystallize in a simple cubic packing arrangement under normal temperature and pressure conditions.

Question 58 Option: (D) – methylphenylamine
Explanation: Methylphenylamine is a secondary aromatic amine. It reacts with nitrous acid to form an N-nitroso derivative, which appears as a characteristic yellow oily liquid.

Question 59 Option: (D) – Barium
Explanation: Barium is a highly electropositive alkaline earth metal and reacts with oxygen to form barium oxide (BaO), which is a basic metal oxide.

Question 60 Option: (B) – $CONH_2 > COCH_3 > CHO > CH_2OH$
Explanation: Applying Cahn-Ingold-Prelog (CIP) priority rules, the groups are prioritized based on the atomic numbers of the atoms bonded to the chiral center, yielding the decreasing order shown.

Question 61 Option: (D) – Carbon dioxide
Explanation: Dry ice (solid carbon dioxide) forms a molecular crystal lattice held together by weak van der Waals forces, owing to its linear, nonpolar molecular structure.

Question 62 Option: (D) – Scandium (Z = 21)
Explanation: Scandium in its common +3 oxidation state (Sc^{3+}) has a stable $[Ar]3d^0$ configuration. Lacking d-electrons, it cannot undergo color-inducing d-d transitions.

Question 63 Option: (D) – + 7
Explanation: Except for fluorine, group 17 elements (halogens) can share all seven of their valence shell electrons to exhibit a maximum positive oxidation state of +7.

Question 64 Option: (A) – $\Delta U = q_v$
Explanation: In an isochoric process, the change in volume is zero ($dV = 0$), meaning no pressure-volume work is done ($W = 0$). Thus, the first law simplifies to $\Delta U = q_v$.

Question 65 Option: (D) – Cobalt naphthenate
Explanation: In the commercial cumene process, cobalt naphthenate is utilized as a catalyst to facilitate the liquid-phase auto-oxidation of cumene to cumene hydroperoxide.

Question 66 Option: (B) – Sodium cyanide
Explanation: In the hydrometallurgical extraction of gold, dilute sodium cyanide (NaCN) is used as a leaching agent to dissolve gold by forming a soluble cyano-complex.

Question 67 Option: (D) – Paracetamol
Explanation: Paracetamol is a widely used over-the-counter non-steroidal drug that acts as an effective analgesic (pain reliever) and antipyretic (fever reducer).

Question 68 Option: (D) – Ethane
Explanation: The Wurtz reaction of a mixture of ethyl and butyl halides produces self-coupling products (butane and octane) and a cross-coupling product (hexane), but no ethane.

Question 70 Option: (A) – an anti oxidant
Explanation: Butylated hydroxyanisole (BHA) is a synthetic organic compound commonly added to fat-containing foods to prevent oxidative rancidity.

Question 71 Option: (A) – $t_{1/2} = \frac{0.693}{K}$
Explanation: For a first-order chemical reaction, the half-life is independent of the initial concentration and is related to the rate constant k by the equation $t_{1/2} = \ln 2/k \approx 0.693/k$.

Question 72 Option: (C) – 1 : 3
Explanation: One molecule of glycerol (a trihydric alcohol) undergoes esterification with three molecules of long-chain fatty acids to synthesize a triglyceride molecule.

Question 73 Option: (B) – $(Ph_3P)_3RhCl$
Explanation: Wilkinson's catalyst, structurally represented as chlorotris(triphenylphosphine)rhodium(I), is a homogeneous catalyst widely used for the selective hydrogenation of alkenes.

Question 74 Option: (B) – $\Delta G < 0$
Explanation: At constant temperature and pressure, a spontaneous chemical or physical change is always accompanied by a decrease in Gibbs free energy, meaning $\Delta G < 0$.

Question 75 Option: (C) – Nitrate
Explanation: The brown ring test is a specific qualitative test used to detect the presence of nitrate (NO_3^-) ions, forming a brown ring of $[Fe(H_2O)_5(NO)]^{2+}$.

Question 76 Option: (A) – By the action of concentrated sulphuric acid
Explanation: In the extraction process, sodium chromate is acidified with concentrated sulfuric acid (H_2SO_4) to convert it into soluble sodium dichromate.

Question 77 Option: (A) – Zinc
Explanation: In a dry Leclanché cell, the outer zinc container undergoes oxidation and acts as the negative electrode (anode) of the cell.

Question 78 Option: (D) – Ethylamine
Explanation: Primary aliphatic amines like ethylamine ($C_2H_5NH_2$) react with nitrous acid to form highly unstable diazonium salts, which decompose to release nitrogen gas.

Question 79 Option: (D) – $1.25\,\text{mol} \cdot \text{dm}^{-3}$
Explanation: The moles of NaOH are $5.0/40 = 0.125\,\text{mol}$. The molarity of the solution in 100 mL is $0.125\,\text{mol}/0.1\,\text{dm}^3 = 1.25\,\text{mol} \cdot \text{dm}^{-3}$.

Question 80 Option: (D) – Acetyl chloride
Explanation: Reaction of the organocadmium compound (dibenzyl cadmium) with an acyl halide (acetyl chloride) yields the ketone benzyl methyl ketone.

Question 81 Option: (A) – Lexan
Explanation: Lexan is a tough, impact-resistant polycarbonate polymer that is extensively used to manufacture bulletproof helmets and safety visors.

Question 82 Option: (C) – Nickel
Explanation: Mond's process is used for the refining of nickel, where nickel reacts with carbon monoxide to form volatile nickel tetracarbonyl, which is then decomposed.

Question 83 Option: (B) – isopropyl alcohol and methyl iodide
Explanation: Cleavage of isopropyl methyl ether with cold HI proceeds via an S_N2 mechanism, where the iodide ion attacks the smaller methyl group, producing methyl iodide and isopropyl alcohol.

Question 84 Option: (C) – $\frac{16}{3}\pi r^3$
Explanation: An fcc unit cell contains 4 lattice atoms. The total volume occupied by these 4 spherical atoms of radius r is equal to $4 \times \frac{4}{3}\pi r^3 = \frac{16}{3}\pi r^3$.

Question 85 Option: (C) – aldehyde group in glucose
Explanation: Bromine water is a mild oxidizing agent that selectively oxidizes the terminal formyl group ($-CHO$) of glucose to a carboxylic acid group, forming gluconic acid.

Question 86 Option: (B) – Heat capacity
Explanation: An extensive property depends on the quantity of matter. Heat capacity increases with the mass of the substance, making it an extensive property.

Question 87 Option: (B) – Citric acid
Explanation: Citric acid (2-hydroxypropane-1,2,3-tricarboxylic acid) contains three distinct carboxylic acid ($-COOH$) groups, defining it as a tricarboxylic acid.

Question 88 Option: (B) – $-\frac{\Delta[O_2]}{\Delta t}$
Explanation: The average rate of reaction is written based on stoichiometry as $-\frac{1}{2}\frac{\Delta[SO_2]}{\Delta t} = -\frac{\Delta[O_2]}{\Delta t} = +\frac{1}{2}\frac{\Delta[SO_3]}{\Delta t}$.

Question 89 Option: (D) – + 2494 J
Explanation: For the combustion of 0.5 mole of methane, $\Delta n_g = -1$. The work done is $W = -\Delta n_g RT = -(-1) \times 8.314 \times 300 \approx +2494\,\text{J}$.

Question 90 Option: (A) – trifluoroperoxyacetic acid
Explanation: Trifluoroperoxyacetic acid (CF_3COOOH) is a strong oxidizing agent used to selectively oxidize aldoximes directly into primary nitroalkanes.

Question 91 Option: (C) – 2^n
Explanation: For an unsymmetrical molecule containing n chiral carbon centers, the maximum number of optically active stereoisomers is given by the formula 2^n.

Question 92 Option: (A) – $\pi = \frac{n}{V}$ RT
Explanation: The van 't Hoff equation for dilute solutions is analogous to the ideal gas law, given by $\pi V = nRT \implies \pi = (n/V)RT$.

Question 93 Option: (A) – Octahedral sulphur
Explanation: Rhombic (or octahedral) sulfur (α-sulfur) is the thermodynamically most stable crystalline allotrope of sulfur at room temperature.

Question 94 Option: (C) – It is either linear or branched chain polymer
Explanation: Thermoplastic polymers consist of long, linear or slightly branched carbon chains that can be repeatedly melted, reshaped, and solidified.

Question 95 Option: (A) – 0.5 F
Explanation: Depositing 1 mole (40 g) of Ca^{2+} requires 2 Faradays. Therefore, to deposit 10 g of calcium, the required quantity of electricity is $2 \times (10/40) = 0.5\,\text{F}$.

Question 96 Option: (A) – $NH_2 - NH_2$ and KOH in ethylene glycol
Explanation: The Wolff-Kishner reduction selectively reduces carbonyl groups to methylene groups using hydrazine (NH_2NH_2) and potassium hydroxide (KOH) in a high-boiling solvent like ethylene glycol.

Question 97 Option: (A) – $[Pt(NH_3)_2Cl_2]$
Explanation: In $[Pt(NH_3)_2Cl_2]$, the +2 oxidation state of platinum perfectly balances the charges of the two chloride ligands, resulting in a neutral coordination complex.

Question 98 Option: (D) – Ferric chloride
Explanation: Ferric chloride ($FeCl_3$) is a strong electrolyte that dissociates into 4 ions ($i = 4$), causing the largest elevation in boiling point compared to the other compounds.

Question 99 Option: (A) – Chromyl chloride
Explanation: The Etard reaction utilizes chromyl chloride (CrO_2Cl_2) to selectively oxidize the methyl group of toluene to form a benzaldehyde complex.

Question 100 Option: (B) – Argon
Explanation: Argon is the third most abundant gas in the Earth's atmosphere, constituting approximately 0.93% of dry air by volume.