

MHT CET 2020 Biology Answer Key PDF

Question 1

Option: (C) – 1

Explanation: Using the standard relations for transistor current gains, $\beta_{dc} = \frac{\alpha_{dc}}{1-\alpha_{dc}}$, we can rearrange this to $\frac{1}{\beta_{dc}} = \frac{1}{\alpha_{dc}} - 1$. Subtracting $\frac{1}{\beta_{dc}}$ from both sides yields $\frac{1}{\alpha_{dc}} - \frac{1}{\beta_{dc}} = 1$.

Question 2

Option: (D) – 0, 1

Explanation: For the typical logic gate configuration under these inputs, the first combination of high inputs produces a low output (0). When the inputs are switched to low, the logic inversion cascade yields a high output (1).

Question 3

Option: (D) – undergoes total internal reflection at second refracting surface.

Explanation: A ray incident normally on the first face enters without deviation and hits the second face at an angle of 60° . Since the critical angle is $\sin^{-1}(1/1.5) = 41.8^\circ$ and $60^\circ > 41.8^\circ$, the ray undergoes total internal reflection.

Question 4

Option: (C) – $\frac{\mu_0 \pi R_2^2}{2R_1}$

Explanation: The magnetic field at the center of ring A is $B = \frac{\mu_0 I}{2R_1}$. The magnetic flux linked with the smaller concentric ring B is $\phi = B \cdot \pi R_2^2 = \frac{\mu_0 \pi R_2^2 I}{2R_1}$, giving mutual inductance $M = \frac{\phi}{I} = \frac{\mu_0 \pi R_2^2}{2R_1}$.

Question 5

Option: (C) – $\frac{L^2}{mr^3}$

Explanation: The centripetal force is $F = \frac{mv^2}{r}$. Expressing velocity in terms of angular momentum, $L = mvr \Rightarrow v = \frac{L}{mr}$, and substituting this back into the force equation yields $F = \frac{L^2}{mr^3}$.

Question 6

Option: (C) – 6.5

Explanation: Using $|\vec{A}_1 + \vec{A}_2|^2 = A_1^2 + A_2^2 + 2\vec{A}_1 \cdot \vec{A}_2 = 16$, we substitute values to find $2\vec{A}_1 \cdot \vec{A}_2 = -9 \Rightarrow \vec{A}_1 \cdot \vec{A}_2 = -4.5$. The dot product $(2\vec{A}_1 + \vec{A}_2) \cdot (\vec{A}_1 - \vec{A}_2) = 2A_1^2 - A_2^2 - \vec{A}_1 \cdot \vec{A}_2 = 18 - 16 + 4.5 = 6.5$.

Question 7

Option: (B) – 0.16 A m^2

Explanation: The initial length is $L = \pi R = 0.314 \text{ m} \Rightarrow R = 0.1 \text{ m}$. Bending the magnet into a semicircle reduces the effective pole separation to $2R = 0.2 \text{ m}$, yielding a new magnetic moment of $M' = m \times 2R = 0.8 \times 0.2 = 0.16 \text{ A m}^2$.

Question 8

Option: (D) – 21 J

Explanation: Work done by a variable force is calculated by integrating the force function over the displacement: $W = \int_0^2 (10 + 0.5x) dx = [10x + 0.25x^2]_0^2 = 20 + 1 = 21 \text{ J}$.

Question 9

Option: (C) – 20 N

Explanation: For a conical pendulum system in a horizontal circle, tension components yield $T \cos \theta = mg$ and $T \sin \theta = F_c$. Dividing these gives the centripetal force $F_c = mg \tan \theta = 2 \times 10 \times \tan(45^\circ) = 20 \text{ N}$.

Question 10

Option: (C) – $I\omega^2/4$

Explanation: By conservation of angular momentum, $I\omega = 2I\omega' \Rightarrow \omega' = \omega/2$. The loss in kinetic energy is calculated as $\Delta KE = \frac{1}{2}I\omega^2 - \frac{1}{2}(2I)(\omega/2)^2 = \frac{1}{4}I\omega^2$.

Question 11

Option: (A) – 2 : 1

Explanation: Acceleration due to gravity at depth $d = R/2$ is $g_d = g(1 - d/R) = g/2$. The ratio of the surface value to the value halfway deep is therefore $g : g_d = 2 : 1$.

Question 12

Option: (C) – 0.8

Explanation: The distance of the n -th fringe from the center is directly proportional to the wavelength of light used. Thus, the ratio of the fringe positions is $X_{\text{blue}} : X_{\text{green}} = \lambda_b/\lambda_g = 4350/5450 \approx 0.8$.

Question 13

Option: (A) – 16 times.

Explanation: The path radius of a charge in a magnetic field is $r = \frac{\sqrt{2mE}}{qB}$. For the radius to remain constant while the magnetic field B is increased 4 times, the energy E must scale as B^2 , which is $4^2 = 16$ times.

Question 14

Option: (C) – (C)

Explanation: The capacitive reactance is inversely proportional to the frequency, $X_c = \frac{1}{2\pi fC}$. This inverse relationship is correctly represented by a rectangular hyperbola graph.

Question 15

Option: (B) – 3×10^{-2} m

Explanation: The upward surface tension force is $F = T \cdot \pi d$. Substituting the given parameters, $63 \times 10^{-4} = 7 \times 10^{-2} \times \frac{22}{7} \times d$, which yields a diameter of approximately 3×10^{-2} m.

Question 16

Option: (C) – $-a_2\hat{j} - a_3\hat{k}$

Explanation: First, the cross product is $\hat{i} \times \vec{A} = a_2\hat{k} - a_3\hat{j}$. Taking the cross product of $\hat{i}$ with this result yields $\hat{i} \times (a_2\hat{k} - a_3\hat{j}) = -a_2\hat{j} - a_3\hat{k}$.

Question 17

Option: (C) – 2.5×10^5 A/m

Explanation: The magnetic field intensity is $H = nI = 250 \times 2 = 500$ A/m. The intensity of magnetisation is $M = (\mu_r - 1)H = (500 - 1) \times 500 \approx 2.5 \times 10^5$ A/m.

Question 18

Option: (D) – 7 : 108

Explanation: For the first line of Lyman, $\frac{1}{\lambda_1} = R(1 - 1/4) = \frac{3R}{4}$. For Paschen, $\frac{1}{\lambda_2} = R(1/9 - 1/16) = \frac{7R}{144}$. The ratio $\lambda_1 : \lambda_2 = \frac{4}{3R} \times \frac{7R}{144} = 7 : 108$.

Question 19

Option: (A) – $\frac{n}{2\sqrt{2}}$

Explanation: Fundamental frequency is given by $n = \frac{1}{2L}\sqrt{\frac{T}{m}}$. For $L' = 2L$ and $m' = 2m$, the new frequency is $n' = \frac{1}{2(2L)}\sqrt{\frac{T}{2m}} = \frac{n}{2\sqrt{2}}$.

Question 20

Option: (B) – 2 R

Explanation: Using the Lens Maker's Formula for a plano-convex lens, $\frac{1}{f} = (\mu - 1) \left(\frac{1}{R} - \frac{1}{\infty} \right)$. Substituting $\mu = 1.5$ gives $\frac{1}{f} = 0.5 \times \frac{1}{R} \Rightarrow f = 2R$.

Question 21

Option: (D) – $\sqrt{2}$ T

Explanation: The time period of a spring-mass system is $T = 2\pi\sqrt{M/k}$. Adding an identical mass M increases the total mass to $2M$, causing the new time period to become $T' = 2\pi\sqrt{2M/k} = \sqrt{2}T$.

Question 22

Option: (A) $-\frac{hc}{\phi + eV_s}$

Explanation: By Einstein's photoelectric equation, the maximum kinetic energy is $eV_s = \frac{hc}{\lambda} - \phi$. Rearranging this expression to solve for the wavelength gives $\lambda = \frac{hc}{\phi + eV_s}$.

Question 23

Option: (D) $-4M$

Explanation: An octave corresponds to doubling the fundamental frequency ($2n$). Since the frequency is proportional to the square root of the tension ($n \propto \sqrt{M}$), the hanging mass must be increased fourfold to $4M$.

Question 24

Option: (C) -3.2 cm

Explanation: Gravity at height h is $g' = g\left(\frac{R}{R+h}\right)^2 = g\left(\frac{6400}{8000}\right)^2 = 0.64g$. Since spring extension is proportional to gravity, the new extension is $0.64 \times 5\text{ cm} = 3.2\text{ cm}$.

Question 25

Option: (D) $-8 \times 10^{-24}\text{ Am}^2$

Explanation: The magnetic moment of a revolving electron is $M = \frac{evr}{2}$. Substituting the values, we obtain $M = \frac{1.6 \times 10^{-19} \times 2 \times 10^6 \times 0.5 \times 10^{-10}}{2} = 8 \times 10^{-24}\text{ Am}^2$.

Question 26

Option: (B) -3 cm

Explanation: The difference between successive resonance lengths gives half-wavelength: $\lambda/2 = 74.1 - 24.1 = 50\text{ cm} \implies \lambda = 100\text{ cm}$. The end correction is $e = \lambda/4 - l_1 = 0.9\text{ cm}$. Since $e = 0.3d$, the diameter $d = 3\text{ cm}$.

Question 27

Option: (D) -3 J

Explanation: The total kinetic energy of a rolling body is $KE = \frac{1}{2}mv^2(1 + \frac{K^2}{R^2})$. For a ring, $KE = mv^2 = 4\text{ J}$. For a disc, $KE = \frac{3}{4}mv^2 = \frac{3}{4}(4) = 3\text{ J}$.

Question 28

Option: (b) $-2.5 \times 10^6\text{ m/s}$

Explanation: The magnetic force is given by $F = qvB \sin \theta$. Rearranging and substituting the given values yields $v = \frac{F}{qB \sin \theta} = \frac{4.8 \times 10^{-19}}{1.6 \times 10^{-19} \times 2.4 \times 10^{-6} \times 0.5} = 2.5 \times 10^6\text{ m/s}$.

Question 29

Option: (b) $- \text{magnet is stationary}$.

Explanation: In a suspended-type moving coil galvanometer, the permanent magnet remains completely stationary while the light coil is suspended and free to rotate within the magnetic field.

Question 30

Option: (d) $-1\text{ V}, 19\text{ V}$

Explanation: Applying Kirchhoff's Voltage Law to the loop for both directions of the 3 A current resolves the system of linear equations, yielding the respective battery electromotive force values of 1 V and 19 V .

Question 31

Option: (a) $-[L^{-1/2}M^{3/2}T^{-2}]$

Explanation: From the relation $F \propto x/\sqrt{d}$, we find $[x] = [F][d]^{1/2}$. Substituting the dimensions of force $[MLT^{-2}]$ and density $[ML^{-3}]$ yields $[x] = [MLT^{-2}][M^{1/2}L^{-3/2}] = [L^{-1/2}M^{3/2}T^{-2}]$.

Question 32**Option:** (a) – 25 cm**Explanation:** The initial balance condition is $5/R = l_1/(100 - l_1)$. When shunted, the right gap resistance becomes $R/2$, giving $10/R = 1.6l_1/(100 - 1.6l_1)$. Dividing these equations yields $l_1 = 25$ cm.**Question 33****Option:** (b) – $2E_1 = E_2$ **Explanation:** The electric field intensity due to an infinite plane sheet is $E_1 = \sigma/2\epsilon_0$. Near a charged conductor, it is $E_2 = \sigma/\epsilon_0$. Comparing these shows $2E_1 = E_2$.**Question 34****Option:** (b) – $\sqrt{2}$ d**Explanation:** The line-of-sight propagation range of an antenna is proportional to the square root of its height, $d \propto \sqrt{h}$. Doubling the height of the antenna increases the range to $\sqrt{2}d$.**Question 35****Option:** (a) – decrease by $\frac{15}{16}$ **Explanation:** The initial centripetal force is $F_1 = \frac{mV^2}{r}$. The new force is $F_2 = \frac{m(V/2)^2}{4r} = \frac{F_1}{16}$. The required change is $F_2 - F_1 = -\frac{15}{16}F_1$, which is a decrease by $\frac{15}{16}$.**Question 36****Option:** (d) – an autumiser.**Explanation:** A hydraulic jack, brake, and press all operate on Pascal's law of transmission of fluid pressure. An atomizer operates instead on Bernoulli's principle of fluid dynamics.**Question 37****Option:** (b) – $\frac{1}{2\pi}[\frac{YA}{mL}]^{1/2}$ **Explanation:** The force constant of the wire acting as a spring is $k = \frac{YA}{L}$. The frequency of vertical simple harmonic oscillation is then given by $f = \frac{1}{2\pi}\sqrt{\frac{k}{m}} = \frac{1}{2\pi}\sqrt{\frac{YA}{mL}}$.**Question 38****Option:** (a) – $\frac{4W_1+3W}{4A}$ **Explanation:** The tension in the wire at a height of $3L/4$ from the bottom is the sum of the load W_1 and the weight of the bottom portion of the wire, $T = W_1 + \frac{3}{4}W$. The stress is $\frac{T}{A} = \frac{4W_1+3W}{4A}$.**Question 39****Option:** (d) – $\frac{7}{2}R, \frac{5}{2}R$, rigid diatomic.**Explanation:** For a rigid diatomic gas, the specific heat capacities are $C_v = \frac{5}{2}R$ and $C_p = \frac{7}{2}R$, which correctly yields the ratio of specific heats $\gamma = C_p/C_v = 1.4$.**Question 40****Option:** (c) – 9×10^{-3} **Explanation:** The pressure at the ocean bottom is $P = \rho gh = 10^3 \times 10 \times 2000 = 2 \times 10^7$ N/m². The fractional compression is then calculated as $\frac{\Delta V}{V} = K \cdot P = 45 \times 10^{-11} \times 2 \times 10^7 = 9 \times 10^{-3}$.**Question 41****Option:** (d) – $\frac{P \cdot m}{K_B \cdot T}$ **Explanation:** From the ideal gas equation $PV = NK_B T$, we can substitute $N = M/m$ to obtain $P = \frac{\rho K_B T}{m}$. Rearranging this for density gives $\rho = \frac{P \cdot m}{K_B \cdot T}$.**Question 42****Option:** (a) – 0.48 s**Explanation:** When forces act simultaneously in the same direction, the effective force constant is $k = k_1 + k_2$. Since $k \propto 1/T^2$, this gives $\frac{1}{T^2} = \frac{1}{T_1^2} + \frac{1}{T_2^2} \implies T = \frac{T_1 T_2}{\sqrt{T_1^2 + T_2^2}} = 0.48$ s.

Question 43**Option:** (c) – $\frac{2u}{1+\frac{m}{M}}$ **Explanation:** Using the standard formulas for one-dimensional elastic collisions, the final velocity of the target mass m initially at rest is $V = \frac{2Mu}{M+m}$. Dividing the terms by M yields $\frac{2u}{1+m/M}$.**Question 44****Option:** (d) – 1.8 V**Explanation:** The stopping potential V_s is related to the incident photon energy E and the work function ϕ by $eV_s = E - \phi = 3 \text{ eV} - 1.2 \text{ eV} = 1.8 \text{ eV} \implies V_s = 1.8 \text{ V}$.**Question 45****Option:** (b) – 1 : 1**Explanation:** By simplifying the bridge symmetry of the five-capacitor network, the equivalent capacitance in both directions reduces identically, keeping their ratio as 1 : 1.**Question 46****Option:** (d) – Reflected light is plane polarised light but transmitted light is partially polarised.**Explanation:** At the Brewster/polarizing angle, the reflected light is completely plane-polarized parallel to the surface, while the refracted (transmitted) light remains partially polarized.**Question 47****Option:** (a) – 506 Hz**Explanation:** The frequency must differ from 510 Hz by 4, and 512 Hz by 6. The only value satisfying both conditions simultaneously is $510 - 4 = 512 - 6 = 506 \text{ Hz}$.**Question 48****Option:** (b) – $\frac{\pi m^2 e^6}{4\epsilon_0^3 h^4 n^4}$ **Explanation:** The centripetal force is $F = \frac{mv^2}{r}$. Substituting Bohr's expressions for the velocity $v = \frac{e^2}{2\epsilon_0 n h}$ and orbit radius $r = \frac{\epsilon_0 n^2 h^2}{\pi m e^2}$ yields $F = \frac{\pi m^2 e^6}{4\epsilon_0^3 h^4 n^4}$.**Question 49****Option:** (b) – $3VT(\frac{1}{r} - \frac{1}{R})$ is released.**Explanation:** When drops coalesce, the surface area decreases, releasing energy $\Delta E = T \cdot \Delta A = 4\pi T(nr^2 - R^2)$. Since the total volume is $V = \frac{4}{3}\pi R^3$, this simplifies to $3VT(\frac{1}{r} - \frac{1}{R})$.**Question 50****Option:** (d) – blue colour.**Explanation:** The resolving power of a microscope is inversely proportional to the wavelength of light used, $RP \propto 1/\lambda$. Blue light has the shortest wavelength among the choices, maximizing resolving power.**Question 51****Option:** (a) – Fe**Explanation:** Iron lies above hydrogen in the electrochemical reactivity series, allowing it to displace hydrogen gas from dilute sulfuric acid. Bismuth, copper, and mercury lie below hydrogen and do not react.**Question 52****Option:** (d) – Prontosil**Explanation:** Prontosil is an antibacterial drug (specifically a sulfa drug) used to treat bacterial infections. The other choices (Iproniazid, Serotonin, and Veronal) are all classified as tranquilizers.**Question 53****Option:** (a) – Gallium**Explanation:** Zone refining is based on the principle that impurities are more soluble in the

molten state of a metal. This method is highly effective for purifying semiconductor elements like Gallium to high purities.

Question 54

Option: (b) – $\Delta H - \Delta U = \Delta nRT$

Explanation: The thermodynamic relation between enthalpy change (heat at constant pressure) and internal energy change (heat at constant volume) is given by the standard equation $\Delta H = \Delta U + \Delta nRT$.

Question 55

Option: (a) – $2.1 \times 10^{-5} \text{ s}^{-1}$

Explanation: For a first-order chemical reaction, the rate is given by $\text{Rate} = k[A]$. Rearranging for the rate constant yields $k = \frac{\text{Rate}}{[A]} = \frac{6.3 \times 10^{-6}}{0.3} = 2.1 \times 10^{-5} \text{ s}^{-1}$.

Question 56

Option: (b) – NO_2

Explanation: Nitrogen dioxide (NO_2) contains a total of 17 valence electrons, making it an odd-electron molecule. The nitrogen atom contains one unpaired electron, contributing to its paramagnetic behavior.

Question 57

Option: (c) – Benzaldehyde

Explanation: The Gattermann-Koch reaction involves treating benzene with carbon monoxide and hydrochloric acid under pressure in the presence of anhydrous AlCl_3 and Cu_2Cl_2 to yield benzaldehyde.

Question 58

Option: (d) – Butan-2-one

Explanation: The mild oxidation of butan-2-ol, which is a secondary alcohol, selectively oxidizes the secondary hydroxyl group to a carbonyl group, yielding the ketone butan-2-one.

Question 59

Option: (d) – Polythene

Explanation: Polythene is formed by the repeated addition of ethylene monomers without the elimination of any small by-product molecules, making it a classic example of an addition polymer.

Question 60

Option: (a) – $\text{C}_2\text{H}_5\text{N}(\text{COCH}_3)_2$

Explanation: Treating a primary amine like ethylamine with an excess of acetic anhydride in pyridine results in the complete acetylation of both amine hydrogens, forming a diacetyl derivative.

Question 61

Option: (a) – nitrogen

Explanation: The Dumas method is a classical analytical chemistry technique used for the quantitative estimation of nitrogen content in organic compounds by measuring nitrogen gas.

Question 62

Option: (b) – The shape of hybrid orbitals is same as that of atomic orbitals

Explanation: Hybrid orbitals are formed by mixing atomic orbitals, which completely reorganizes their electron density. This produces a distinct directional shape unlike the original spherically symmetric or dumbbell-shaped orbitals.

Question 63

Option: (a) – $\frac{0.1 \times N_A}{2}$

Explanation: Moles of the element in 4 g is $4/40 = 0.1$, which corresponds to $0.1N_A$ atoms.

Since a body-centered cubic (bcc) unit cell contains 2 atoms, the total number of unit cells is $\frac{0.1N_A}{2}$.

Question 64

Option: (a) – $\text{BaO}_2 + \text{H}_2\text{SO}_4$

Explanation: In Merck's method, hydrogen peroxide is prepared on an industrial scale by reacting hydrated barium peroxide (BaO_2) with a cold dilute solution of sulfuric acid.

Question 65

Option: (d) – 692 K

Explanation: The melting point of elemental zinc is 419.5°C . Converting this temperature to the Kelvin scale yields approximately $419.5 + 273.15 \approx 692$ K.

Question 66

Option: (d) – 77.7 %

Explanation: $\text{K}_3[\text{Fe}(\text{CN})_6]$ dissociates into 4 ions ($n = 4$). Using the relation $i = 1 + (n - 1)\alpha$, we substitute $3.333 = 1 + 3\alpha \Rightarrow 3\alpha = 2.333 \Rightarrow \alpha \approx 0.777$ or 77.7%.

Question 67

Option: (d) – 425 kJ mol^{-1}

Explanation: The enthalpy of formation is $\Delta_f H = \frac{1}{2}\text{BE}(\text{H} - \text{H}) + \frac{1}{2}\text{BE}(\text{Cl} - \text{Cl}) - \text{BE}(\text{H} - \text{Cl})$. Substituting values, $-90 = \frac{430}{2} + \frac{240}{2} - \text{BE}(\text{H} - \text{Cl}) \Rightarrow \text{BE}(\text{H} - \text{Cl}) = 215 + 120 + 90 = 425 \text{ kJ/mol}$.

Question 68

Option: (d) – Butylated Hydroxy Anisole

Explanation: Butylated Hydroxy Anisole (BHA) is a synthetic antioxidant widely added to fat-containing foods to prevent oxidative rancidity and preserve quality.

Question 69

Option: (a) – 800 mm of Hg

Explanation: According to Boyle's Law at constant temperature, $P_1V_1 = P_2V_2$. Substituting the values, $400 \times 400 = P_2 \times 200 \Rightarrow P_2 = 800 \text{ mm of Hg}$.

Question 70

Option: (c) – Nylon-6,6

Explanation: Nylon-6,6 is a polyamide formed by the condensation polymerization of adipic acid and hexamethylenediamine, which contains repeating amide ($-\text{CO} - \text{NH}-$) linkages.

Question 71

Option: (d) – 1 M KCl

Explanation: Freezing point depression is a colligative property given by $\Delta T_f = iK_fm$. Since KCl dissociates into 2 ions ($i = 2$), it produces twice the particles of the non-electrolyte alternatives ($i = 1$), maximizing depression.

Question 72

Option: (d) – 112 pm

Explanation: The single covalent C – H bond in alkanes where the carbon is sp^3 hybridized has a highly consistent characteristic bond length of approximately 112 pm.

Question 73

Option: (c) – $\text{C}_3\text{H}_5\text{Br}$

Explanation: Allyl bromide contains an allyl group ($\text{CH}_2 = \text{CH} - \text{CH}_2 -$) bonded to a bromine atom. This molecular structure corresponds to the formula $\text{C}_3\text{H}_5\text{Br}$.

Question 74

Option: (a) – $\text{C}_5\text{H}_5\text{NH}^+\text{CrO}_3\text{Cl}^-$

Explanation: Pyridinium chlorochromate (PCC) is a mild oxidizing agent that selectively optimizes primary alcohols to aldehydes without further oxidation to carboxylic acids.

Question 75**Option:** (b) – 127.65 pm**Explanation:** For a face-centered cubic (fcc) lattice, the atomic radius is related to the edge length by $r = \frac{a}{2\sqrt{2}}$. Substituting $a = 361$ pm yields $r = \frac{361}{2.828} \approx 127.65$ pm.**Question 76****Option:** (c) – It contains two asymmetric carbon atoms.**Explanation:** Glyceraldehyde ($\text{CH}_2\text{OH} - \text{CHOH} - \text{CHO}$) is the simplest aldose sugar. It contains only a single asymmetric (chiral) carbon atom, making the statement of having two asymmetric carbons false.**Question 77****Option:** (d) – 2,4,6 - tribromoaniline**Explanation:** Aniline reacts rapidly with bromine water at room temperature due to the highly activating nature of the amino group, forming a white precipitate of 2,4,6-tribromoaniline.**Question 78****Option:** (b) – Conductivity**Explanation:** Conductivity (κ) is the reciprocal of resistivity and is defined as conductance per unit length, yielding the standard SI unit of Siemens per meter (S/m).**Question 79****Option:** (d) – Pinacol**Explanation:** Hydrolysis of 2,2-dichloropropane yields propanone (A). Reacting propanone with magnesium in benzene followed by hydrolysis produces the symmetrical diol pinacol (B).**Question 80****Option:** (c) – Li**Explanation:** Lithium possesses the most negative standard reduction potential in the electrochemical series, making it the strongest reducing agent among all stable metallic elements.**Question 81****Option:** (b) – Cr ($Z=24$)**Explanation:** The anomalous ground-state electronic configuration of chromium is $[\text{Ar}]3d^54s^1$. This configuration contains 6 unpaired electrons (5 in the d-subshell and 1 in the s-subshell).**Question 82****Option:** (b) – 353.5 pm**Explanation:** For a face-centered cubic (fcc) unit cell, the relation is $a = 2\sqrt{2}r$. Substituting the atomic radius of 125 pm gives $a = 2 \times 1.414 \times 125 = 353.5$ pm.**Question 83****Option:** (c) – It is heterocyclic with oxygen atom in ring**Explanation:** Pyran is a six-membered, non-aromatic heterocyclic ring compound containing five carbon atoms and one oxygen atom in the ring system.**Question 84****Option:** (d) – Loss and gain of electron**Explanation:** Hybridization involves only the mixing and redistribution of atomic orbitals within a single atom. It does not involve the transfer (loss or gain) of electrons between different atoms.**Question 85****Option:** (c) – $\text{Ca}(\text{HCO}_3)_2$ **Explanation:** Passing carbon dioxide through slaked lime initially forms insoluble calcium carbonate. Continuing to pass excess CO_2 converts the precipitate into soluble calcium bicarbonate ($\text{Ca}(\text{HCO}_3)_2$).

Question 86**Option:** (a) – 1.0 mole**Explanation:** In the complex $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$, only the single chloride ion outside the coordination sphere is ionizable, resulting in the precipitation of exactly 1.0 mole of silver chloride.**Question 87****Option:** (c) – +6**Explanation:** The chemical formula of potassium ferrate is K_2FeO_4 . Letting x be the oxidation state of iron: $2(+1) + x + 4(-2) = 0 \implies x = +6$.**Question 88****Option:** (d) – $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ **Explanation:** Platinum(II) complexes with d^8 configuration are strongly favored to form four-coordinate square planar geometries rather than six-coordinate octahedral configurations.**Question 89****Option:** (d) – One**Explanation:** Lactic acid ($\text{CH}_3\text{-CH}(\text{OH})\text{-COOH}$) is a 2-hydroxycarboxylic acid containing a single aliphatic secondary alcohol hydroxyl group in its molecular structure.**Question 90****Option:** (d) – Vinyl alcohol**Explanation:** In vinyl alcohol ($\text{CH}_2 = \text{CH-OH}$), the carbon atom bonded to the hydroxyl group is part of a double bond and is therefore sp^2 hybridized, not sp^3 .**Question 91****Option:** (c) – 560.0 sec**Explanation:** Using the first-order rate integrated expression, $t = \frac{2.303}{k} \log \left(\frac{[A]_0}{[A]} \right) = \frac{2.303}{6.0 \times 10^{-4}} \log \left(\frac{0.0210}{0.0150} \right) \approx 3838 \times 0.146 \approx 560$ seconds.**Question 92****Option:** (a) – 2, 4**Explanation:** In the molecule 2-iodo-3,3-dimethylpentane, there are exactly 2 tertiary carbon atoms and 4 primary carbon atoms within the branched alkane framework.**Question 93****Option:** (b) – 1.75 V**Explanation:** The standard electromotive force of the cell is calculated as $E_{\text{cell}}^\circ = E_{\text{cathode}}^\circ - E_{\text{anode}}^\circ = E_{\text{Au}}^\circ - E_{\text{Ni}}^\circ = 1.50 - (-0.25) = 1.75$ V.**Question 94****Option:** (c) – 6.07 g**Explanation:** Based on the stoichiometry of the reaction $2\text{Au} + 3\text{Cl}_2 \rightarrow 2\text{AuCl}_3$, chlorine acts as the limiting reactant. Calculating from the moles of chlorine gives 6.07 g of gold chloride.**Question 95****Option:** (a) – 4 - Hydroxybenzene sulphonic acid**Explanation:** Chlorobenzene is converted to phenol (A) via nucleophilic substitution. Phenol then undergoes electrophilic sulfonation at the para position to yield 4-hydroxybenzene sulfonic acid (B).**Question 96****Option:** (a) – 1386.0 kJ**Explanation:** The molar mass of CO_2 is 44 g/mol. The number of moles in 0.154 kg is $154/44 = 3.5$ moles. The heat liberated is $3.5 \times 396 \text{ kJ} = 1386 \text{ kJ}$.**Question 97****Option:** (b) – $\text{H}_3\text{PO}_3 + \text{PH}_3$

Explanation: Orthophosphorous acid (H_3PO_3) is unstable and undergoes self-oxidation-reduction (disproportionation) to yield orthophosphoric acid (H_3PO_4) and phosphine gas (PH_3).

Question 98

Option: (c) – 0.01 M

Explanation: The moles of urea present are $\frac{6.022 \times 10^{20}}{6.022 \times 10^{23}} = 10^{-3}$ moles. The molarity of the solution in 100 mL is then $10^{-3}/0.1 \text{ L} = 0.01 \text{ M}$.

Question 99

Option: (d) – Solid foam

Explanation: Pumice stone is a volcanic rock containing trapped gas bubbles inside a solid silica matrix, classifying it as a solid foam colloidal dispersion.

Question 100

Option: (a) – 2- Methyl - 2 - nitropropane

Explanation: 2-Methyl-2-nitropropane is a tertiary nitroalkane. Lacking any α -hydrogen atoms, it is completely unable to react with nitrous acid.

Question 101

Option: (c) – A- (iii), B- (iv), C- (i), D- (ii)

Explanation: Fibrinogen causes semen coagulation, fructose serves as sperm energy source, prostaglandins stimulate reproductive contractions, and vaginal Lactobacilli prevent fungal infections.

Question 102

Option: (b) – DNA

Explanation: During the translation phase of protein synthesis, only messenger, transfer, and ribosomal RNA molecules are actively involved. DNA is required for transcription but not translation.

Question 103

Option: (c) – aerobic conditions, high CO_2 conc. and enough light intensity.

Explanation: Non-cyclic photophosphorylation operates efficiently under aerobic conditions in the presence of adequate carbon dioxide levels and sufficient light intensity to drive electron transfer.

Question 104

Option: (a) – JG apparatus

Explanation: Renin is synthesized, stored, and secreted into the bloodstream by the specialized juxtaglomerular (JG) cells located in the afferent arterioles of the kidneys.

Question 105

Option: (d) – P - 680

Explanation: The reaction center of photosystem II (PS II) consists of a specialized chlorophyll-a dimer called P-680, named for its absorption peak at 680 nm.

Question 106

Option: (c) – 00

Explanation: Messenger RNA is a single-stranded nucleic acid molecule. Since it is single-stranded, it does not form complementary base pairs, resulting in zero base pairs.

Question 107

Option: (d) – Paramoecium

Explanation: Anabaena, Streptococcus, and Nostoc are prokaryotic organisms. Paramecium is a single-celled eukaryote belonging to the kingdom Protista.

Question 108

Option: (c) – Anabaena

Explanation: The leaf cavities of the water fern *Azolla* host a symbiotic nitrogen-fixing cyanobacterium species called *Anabaena azollae*.

Question 109

Option: (d) – 5 - 10 days.

Explanation: Blood platelets are cell fragments produced in the bone marrow. They circulate in the blood and have an average lifespan of about 5 to 10 days before being destroyed.

Question 110

Option: (b) – $Hb^A Hb^S$

Explanation: A carrier individual for the sickle-cell trait is heterozygous, possessing one normal hemoglobin allele (Hb^A) and one defective sickle-cell allele (Hb^S).

Question 111

Option: (a) – Proprioceptors

Explanation: Proprioceptors are specialized sensory receptors located in muscles, tendons, and joints that are highly sensitive to vibration, tension, and body movement.

Question 112

Option: (a) – seminal vesicles

Explanation: Fructose is synthesized and secreted by the seminal vesicles. This sugar serves as the primary energy substrate required for sperm motility.

Question 113

Option: (d) – C_4 pathway reaction take place in mesophyll chloroplast and C_4 pathway reactions in bundle sheath chloroplast.

Explanation: In C_4 plants, initial carbon fixation (the C_4 pathway) occurs in the mesophyll cells, while the subsequent Calvin cycle (C_3 pathway) occurs in the bundle-sheath cells.

Question 114

Option: (d) – conjugated

Explanation: Conjugated proteins consist of simple amino acid chains covalently or non-covalently bonded to a non-protein prosthetic group (such as a lipid, carbohydrate, or metal ion).

Question 115

Option: (d) – atrial systole

Explanation: During the human cardiac cycle, atrial systole is the shortest phase, lasting for only 0.1 seconds out of the total 0.8-second cycle.

Question 116

Option: (d) – a- iv, b-iii, c-ii, d-i

Explanation: The female banded Krait provides DNA probes, dog pancreas yielded early insulin, human hair roots serve as DNA samples, and *E. coli* is used to produce Humulin.

Question 117

Option: (d) – Heredity material of bacterium

Explanation: Plasmids are extrachromosomal, double-stranded circular DNA molecules. The primary hereditary information of a bacterium is stored in its chromosomal nucleoid DNA.

Question 118

Option: (a) – runner

Explanation: A runner is a subaerial stem modification that creeps horizontally along the soil surface, forming roots at nodes to establish new vegetative clones.

Question 119

Option: (b) – Karl Correns

Explanation: While de Vries, Correns, and Tschermak independently rediscovered Mendel's principles in 1900, it was Karl Correns who formally formulated them as the laws of inheritance.

Question 120**Option:** (d) – connective**Explanation:** The two anther lobes of a stamen are structurally held together and connected to the filament by a band of sterile vascular tissue called the connective.**Question 121****Option:** (c) – blood**Explanation:** Senescent and dead white blood cells are actively phagocytosed and cleared in the spleen, liver, and lymph nodes, rather than being broken down in circulating blood.**Question 122****Option:** (b) – catecholamines**Explanation:** Under acute stress, the adrenal medulla secretes catecholamines (adrenaline and noradrenaline), which trigger the "fight-or-flight" response including sweating and tachycardia.**Question 123****Option:** (d) – combined**Explanation:** Combined water is chemically bound within the molecular structure of soil minerals, such as hydrated oxides of aluminum and silicon, and is unavailable to plant roots.**Question 124****Option:** (c) – N, P, K**Explanation:** Nitrogen, Phosphorus, and Potassium are primary macronutrients required in large quantities by crops. They are called critical elements because they are most commonly deficient in soil.**Question 125****Option:** (c) – Madagascar**Explanation:** Lemurs are primitive primates that are endemic exclusively to the island of Madagascar, where they diversified in isolation from mainland competitors.**Question 126****Option:** (d) – (i) -c, (ii) - e, (iii) - a, (iv) - d, (v) -b**Explanation:** This matches the standard phenotypes with their respective genetic notations for Drosophila wing sizes, such as normal wings mapped to Vg^+ and vestigial mapped to vg .**Question 127****Option:** (b) – Mesozoic**Explanation:** The Mesozoic Era, famously known as the "Age of Reptiles," is divided into three major geological periods: the Triassic, Jurassic, and Cretaceous.**Question 128****Option:** (a) – AUG-UAG**Explanation:** AUG is the universal start (initiating) codon that codes for methionine, while UAG (amber) is a stop (terminating) codon that signals the end of translation.**Question 129****Option:** (b) – Implantation — Setting of zygote in the endometrium uterus.**Explanation:** This is a mismatch because it is the blastocyst (an advanced multicellular stage), not the single-celled zygote, that implants into the uterine endometrial lining.**Question 130****Option:** (d) – Release of CO_2 **Explanation:** Glycolysis is the anaerobic breakdown of glucose to pyruvate. This metabolic pathway does not release carbon dioxide, which is instead released during the link reaction and Krebs cycle.**Question 131****Option:** (a) – 0.49

Explanation: According to the Hardy-Weinberg principle, the frequency of the homozygous dominant genotype (AA) is p^2 . Given the allele frequency $p = 0.7$, $p^2 = 0.7^2 = 0.49$.

Question 132

Option: (d) – deaths

Explanation: Mortality is a demographic measure defined as the number of deaths of individuals in a population per unit area per unit of time.

Question 133

Option: (d) – fragrance

Explanation: Ornithophilous (bird-pollinated) flowers produce abundant nectar and bright colors to attract birds, but they lack fragrance because birds have a poorly developed sense of smell.

Question 134

Option: (b) – (i) -b, (ii)-c, (iii)-d, (iv)-a

Explanation: Symport couples transport of two molecules in the same direction, facilitated diffusion uses proteins, antiport transports in opposite directions, and plasmolysis is protoplast shrinkage.

Question 135

Option: (b) – budding

Explanation: Both Hydra (a multicellular animal) and yeast (a unicellular fungus) commonly reproduce asexually by forming cellular outgrowths called buds.

Question 136

Option: (c) – 94° C

Explanation: Taq polymerase is isolated from the thermophilic bacterium *Thermus aquaticus*. This enzyme is extremely heat-stable and can withstand denaturation temperatures up to 94°C.

Question 137

Option: (b) – lymphatic vessels

Explanation: Lymphatic vessels are low-pressure channels that contain numerous one-way internal semilunar valves to prevent the backflow of lymph, similar to veins.

Question 138

Option: (c) – Queen bee and worker bees have haploid number of chromosomes.

Explanation: This statement is incorrect because in honeybees, females (queens and workers) are diploid ($2n = 32$) arising from fertilized eggs, whereas only males (drones) are haploid ($n = 16$).

Question 139

Option: (c) – liver

Explanation: Jaundice is characterized by high levels of bilirubin in the blood. This occurs due to excessive breakdown of red blood cells combined with impaired liver function or bile duct obstruction.

Question 140

Option: (c) – $C_{55}H_{70}O_5N_4Mg$

Explanation: The empirical chemical formula of chlorophyll-a is $C_{55}H_{72}O_5N_4Mg$. (Note: option (c) is closest to this standard molecular formula).

Question 141

Option: (b) – The sperm secretes antifertilizin.

Explanation: During fertilization, the egg surface secretes a glycoprotein called fertilizin, while the sperm head secretes a complementary acidic protein called antifertilizin to facilitate binding.

Question 142

Option: (c) – sweat

Explanation: Mammary glands (breasts) are developmentally modified apocrine sweat glands specialized for the synthesis and secretion of milk.

Question 143

Option: (d) – cuboidal cells with many microvilli

Explanation: The proximal convoluted tubule (PCT) is lined with simple cuboidal epithelial cells featuring a dense brush border of microvilli to maximize reabsorption.

Question 144

Option: (c) – High dose of UV-B rays

Explanation: Snow blindness (photokeratitis) is a painful inflammatory condition of the cornea caused by exposure to high levels of ultraviolet-B (UV-B) radiation reflected from snow or ice.

Question 145

Option: (b) – 4

Explanation: Among the animals listed, the tiger, lion, musk deer, and great Indian bustard are classified as endangered or critically endangered species in India.

Question 146

Option: (d) – Hyaluronic acid

Explanation: Cellulose, starch, and glycogen are homopolysaccharides made entirely of glucose. Hyaluronic acid is a heteropolysaccharide composed of alternating amino sugar and uronic acid units.

Question 147

Option: (a) – Camel

Explanation: The camel is a desert-adapted mammal possessing very long loops of Henle in its nephrons, allowing it to produce highly concentrated urine to conserve water.

Question 148

Option: (a) – distillation

Explanation: Wine and beer are produced solely by the natural fermentation of sugars by yeast, without undergoing the post-fermentation concentration process of distillation.

Question 149

Option: (b) – coronary artery

Explanation: The coronary arteries branch off from the aorta and carry highly oxygenated blood to the myocardium (heart muscle) to support its continuous contraction.

Question 150

Option: (a) – Usnea and Cladonia

Explanation: Usnic acid is a naturally occurring dibenzofuran derivative uniquely synthesized and extracted from lichen genera such as Usnea and Cladonia.

Question 151

Option: (a) – histamine

Explanation: Histamine is a vasodilator released by mast cells during inflammatory and allergic reactions. It acts on vascular smooth muscle to cause vasodilation.

Question 152

Option: (d) – Pneumonia

Explanation: Pneumonia is an infectious inflammatory disease of the lungs characterized by the accumulation of fluid (exudate) and inflammatory cells within the alveoli.

Question 153

Option: (c) – Patients called non-progressors develop AIDS very slowly or never at all.

Explanation: A small subset of HIV-infected individuals, known as long-term non-progressors, maintain low viral loads and normal CD4 counts for many years without developing clinical AIDS.

Question 154**Option:** (d) – cambium**Explanation:** Grafting requires the vascular cambium of the scion and stock to align and fuse. This is not possible in monocots because they have closed vascular bundles lacking cambium.**Question 155****Option:** (c) – photosynthetic bacteria**Explanation:** Photosynthetic bacteria (like purple and green sulfur bacteria) contain bacteriochlorophyll rather than chlorophyll-a, which allows them to perform anoxygenic photosynthesis.**Question 156****Option:** (d) – Lead**Explanation:** Chronic or acute exposure to lead via contaminated drinking water causes hemolytic anemia, severe abdominal colic (lead colic), diarrhea, and systemic pain.**Question 157****Option:** (c) – A- iv, B- i, C- ii, D- iii**Explanation:** This matches the standard human respiratory capacities: Tidal volume is 500 ml, IRV is 2500–3000 ml, Residual volume is 1000 ml, and Vital capacity is 4500 ml.**Question 158****Option:** (a) – fatty acids and glycerol**Explanation:** During chemical digestion, pancreatic and intestinal lipases hydrolyze lipid molecules, breaking them down into their constituent fatty acids and glycerol.**Question 159****Option:** (d) – stem borer**Explanation:** Maize varieties with high concentrations of aspartic acid, combined with low nitrogen and sugar content, are naturally resistant to infestation by the maize stem borer.**Question 160****Option:** (b) – chondroblasts**Explanation:** Chondroblasts are active, immature cells that secrete the extracellular matrix of cartilage. Once they become embedded in the matrix, they mature into chondrocytes.**Question 161****Option:** (a) – Gibberellin**Explanation:** During the germination of cereal grains, the phytohormone gibberellin signals the aleurone layer to synthesize hydrolytic enzymes like α -amylase to mobilize starch.**Question 162****Option:** (c) – lysed bacterial cells**Explanation:** In recombinant DNA workflows using bacteriophage vectors, plaque formation on agar plates is caused by the localized lysis and destruction of host bacterial cells.**Question 163****Option:** (b) – 6, 4 and 3**Explanation:** Citric acid is a tricarboxylic acid with 6 carbons, oxaloacetic acid is a dicarboxylic acid with 4 carbons, and pyruvic acid is a keto-acid with 3 carbon atoms.**Question 164****Option:** (a) – neural canal**Explanation:** The spinal cord runs through the central canal or neural canal formed by the aligned vertebral foramina of the articulated vertebral column.**Question 165****Option:** (c) – calcium oxalate

Explanation: Approximately 75% to 80% of all diagnosed kidney stones (renal calculi) are composed primarily of insoluble calcium oxalate crystals.

Question 166

Option: (d) – oospore

Explanation: In angiosperms, syngamy is the fusion of a male gamete with the egg cell (oosphere), resulting in the formation of a diploid zygote, also termed an oospore.

Question 167

Option: (c) – bacteria

Explanation: Bacteriophage lambda is a virus that naturally infects *Escherichia coli*, making lambda-based cloning vectors highly efficient for gene transfer into bacterial cells.

Question 168

Option: (d) – 50-80

Explanation: Biogas produced by anaerobic digestion consists primarily of methane gas, which typically comprises 50% to 80% of the total volume.

Question 169

Option: (c) – *Apis mellifera* and *Apis florea* are domesticated species of honey bee.

Explanation: This statement is incorrect because *Apis florea* (the little honeybee) is a wild, open-nesting species that cannot be successfully hived or domesticated.

Question 170

Option: (c) – 2 and 3

Explanation: A typical Mendelian monohybrid cross (e.g., $Tt \times Tt$) produces 2 distinct phenotypes (dominant and recessive) and 3 distinct genotypes (TT, Tt, tt).

Question 171

Option: (a) – Mexico

Explanation: Nobel laureate Norman Borlaug developed high-yielding, disease-resistant semi-dwarf wheat varieties at the cooperative research center in Mexico.

Question 172

Option: (d) – nucleoid

Explanation: Prokaryotes lack a membrane-bound nucleus; their genetic material consists of a circular DNA molecule localized in an irregularly shaped region called the nucleoid.

Question 173

Option: (a) – to increase the nutritional value of crop plants.

Explanation: Biofortification is a plant breeding strategy aimed at increasing the density of essential vitamins and minerals in food crops through genetic or agronomic means.

Question 174

Option: (b) – CO poisoning due to high CO level in the furnace room.

Explanation: Asphyxiation in furnace environments is primarily caused by carbon monoxide (CO) gas, which binds tightly to hemoglobin to form carboxyhemoglobin, blocking oxygen transport.

Question 175

Option: (d) – 98.7 %

Explanation: In Morgan's dihybrid cross involving yellow body and white eyes in *Drosophila*, the genes are tightly linked on the X chromosome, showing 98.7% parental combinations.

Question 176

Option: (b) – 1660 kb

Explanation: The archaeon *Methanococcus jannaschii* was the first autotrophic organism to have its genome sequenced, which comprises a single circular chromosome of approximately 1660 kb.

Question 177**Option:** (d) – eye**Explanation:** The VI cranial nerve is the abducens nerve, which innervates the lateral rectus muscle of the eye. Damage to this nerve severely impairs lateral eye movement.**Question 178****Option:** (b) – matrix of mitochondria**Explanation:** With the exception of succinate dehydrogenase (which is bound to the inner membrane), all enzymes of the Krebs cycle are located in the soluble mitochondrial matrix.**Question 179****Option:** (a) – Deuteromycetes**Explanation:** Deuteromycetes are classified as "Fungi Imperfecti" because they lack a known sexual reproduction stage, reproducing only via asexual spores.**Question 180****Option:** (a) – only b**Explanation:** Eukaryotic cells contain membrane-bound organelles like mitochondria and ribosomes, but they completely lack mesosomes, which are specialized invaginations of prokaryotic membranes.**Question 181****Option:** (b) – heterozygous for the two selected traits.**Explanation:** A cross between two homozygous parent lines differing in two traits (AABB × aabb) always produces F₁ offspring that are completely heterozygous (AaBb).**Question 182****Option:** (b) – d, b, c, a**Explanation:** The steps of chemical evolution proceeded from forming a solid earth core (d), synthesizing organic monomers (b), forming protoproteins (c), to the transition to autotrophy (a).**Question 183****Option:** (b) – Mesometrium**Explanation:** The mesometrium is the largest portion of the broad ligament of the uterus, consisting of a double fold of peritoneum that secures the uterus to the pelvic wall.**Question 184****Option:** (d) – Pea, Bean, Gram, Ground-nut**Explanation:** These are all dicotyledonous plants that completely consume the endosperm during embryo development, resulting in exalbuminous (non-endospermic) mature seeds.**Question 185****Option:** (a) – production of Carbon g/m²/day**Explanation:** Net primary productivity (NPP) represents the organic matter accumulated by producers per unit area.**Question 186****Option:** (d) – 100 μ**Explanation:** The unfertilized human oocyte is a relatively large cell compared to other human body cells, measuring about 100 μm in diameter.**Question 187****Option:** (b) – A- nucleolus, B - chromatin network**Explanation:** Inside the eukaryotic nucleus, the prominent dense spherical body is the nucleolus (A) and the dispersed, thread-like genetic material is the chromatin network (B).**Question 188****Option:** (c) – gyri

Explanation: The folded surface of the cerebral cortex consists of prominent ridges or elevations called gyri, while the shallow grooves or depressions between them are called sulci.

Question 189

Option: (a) – striated, voluntary and skeletal.

Explanation: The typical muscle tissue attached to bones is characterized under the microscope as having a striated appearance, and is controlled voluntarily.

Question 190

Option: (a) – cystic fibrosis

Explanation: Recombinant human DNase (dornase alfa) is inhaled by cystic fibrosis patients to break down extracellular DNA in mucus, reducing its viscosity and clearing airways.

Question 191

Option: (a) – a spirochaete bacterium called *Treponema pallidum*

Explanation: Syphilis is a highly infectious sexually transmitted disease caused by the motile, spiral-shaped spirochete bacterium known as *Treponema pallidum*.

Question 192

Option: (c) – inflorescence

Explanation: Marijuana is a psychoactive drug prepared primarily from the dried, unfertilized female inflorescences (flowering tops) of the *Cannabis sativa* plant.

Question 193

Option: (c) – Fumaric acid

Explanation: During the Krebs cycle, fumaric acid is converted directly to malic acid by the enzyme fumarase via a simple hydration reaction, involving no oxidation or decarboxylation.

Question 194

Option: (d) – plants only

Explanation: Viroids are infectious agents composed solely of a short, circular single-stranded RNA lacking a protein coat. They are known to infect and cause disease only in plants.

Question 195

Option: (c) – hydrogen

Explanation: Within the double-helix structure of a DNA molecule, complementary nitrogenous bases pair specifically with one another across strands through weak hydrogen bonds.

Question 196

Option: (a) – sheep

Explanation: Hisardale is a synthetic breed of sheep developed in Punjab by cross-breeding Bikaneri ewes with exotic Marino rams.

Question 197

Option: (a) – 0.7 and 0.9

Explanation: The respiratory quotient (RQ), defined as CO_2 produced divided by O_2 consumed, is approximately 0.7 for pure fats and 0.9 for pure protein substrates.

Question 198

Option: (b) – xerarch succession

Explanation: Primary ecological succession starting on bare, dry rock surfaces (beginning with pioneer lichens and progressing to mosses, herbs, and trees) is called xerarch succession.

Question 199

Option: (c) – Sachs

Explanation: The classic botanical concept of the “Grand period of growth,” describing the sigmoidal rate of plant tissue growth over time, was first defined by Julius von Sachs.

Question 200

Option: (b) – endothecium

Explanation: The endothecium is the sub-epidermal layer of the anther wall. It develops hygroscopic fibrous thickenings that lose water at maturity, facilitating anther dehiscence.

