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NEET 2026 Re-Exam Prediction Paper — Set C (Hard)

NEET UG 2026 Re-Exam — Prediction Paper

Set C · Hard · Full-Length (180 Q)

For the 21 June 2026 re-exam · NTA 2026 pattern · ChapterNotes.in

DIFFICULTY: HARD

QUESTIONS	MAX MARKS	DURATION	MARKING
180	720	3 hours	+4 / −1

About this paper (Hard tier)

The upside-risk paper: multi-step numericals, multi-concept links and nuanced traps, in case NTA pushes difficulty up.

1. 180 questions across Physics, Chemistry, Botany and Zoology — **45 each**. All compulsory (no optional Section B from 2025).
2. Each correct answer: **+4**. Each wrong answer: **−1**. Unanswered: **0**. Duration: **3 hours**.
3. Syllabus: NMC-rationalised NCERT 2025 (unchanged for 2026). Standard constants: g = 10 m/s², c = 3 × 10^8 m/s, unless stated.
4. This is AI-built practice material for the re-exam, calibrated against the actual NEET 2026 paper. For practice only; not affiliated with NTA.

PHYSICS

45 Questions | All Compulsory

Physics (Q1 to Q45)

+4 for correct, −1 for incorrect, 0 for unattempted.

Q1

The escape velocity of a body from a planet's surface is v_e. A dimensionless analysis-style check uses the form v_e = k·G^a·M^b·R^c, where G is the gravitational constant, M the planet's mass and R its radius. The exponents (a, b, c) are:

(a) (1/2, -1/2, 1/2)

(b) (1/2, 1/2, -1/2)

(c) (1, -1/2, -1/2)

(d) (1, 1, -1)

Q2

A physical quantity Z is measured as $Z = A^2B^{(1/2)}/(C^{(1/3)}D^3)$. The percentage errors in A, B, C, D are 1%, 2%, 3%, 4% respectively. The maximum percentage error in Z is closest to:

(a) 12%

(b) 10%

(c) 16%

(d) 20%

Q3

A projectile is launched at 20 m/s at 60° above horizontal (g = 10 m/s²). The radius of curvature of its trajectory at the highest point is:

(a) 20 m

(b) 5 m

(c) 40 m

(d) 10 m

Q4

Two particles are projected simultaneously from the same point with equal speeds u, one at angle θ and the other at (90°−θ) above the horizontal. The ratio of their maximum heights H_1/H_2 is:

(a) $\cot^2\theta$

(b) $\tan\theta$

(c) 1

(d) $\tan^2\theta$

Q5

Two blocks A (4 kg) and B (2 kg) are connected by a light string over a frictionless pulley, A on a rough horizontal table (μ = 0.5) and B hanging. The acceleration of the system is (g = 10 m/s²):

(a) 5 m/s²

(b) 2 m/s²

(c) 0 m/s² (system stays at rest)

(d) 3.3 m/s²

Q6

A car takes a banked turn of radius 80 m with banking angle 45° and tyre-road friction μ = 0.5 (g = 10). The maximum speed for which the car does not skid up the bank is closest to:

(a) 40 m/s

(b) 60 m/s

(c) 28 m/s

(d) 49 m/s

Q7

A particle of mass m moving at speed v collides head-on and perfectly inelastically with a stationary particle of mass 2m. The fraction of the initial kinetic energy lost in the collision is:

(a) 1/2

(b) 2/3

(c) 1/3

(d) 1/4

Q8

A solid sphere and a hollow sphere of the same mass and radius roll without slipping down the same incline from rest. The ratio v_{solid}^2/v_{hollow}^2 of their speeds at the bottom is:

(a) 5/3

(b) 21/25

(c) 25/21

(d) 3/5

Q9

A uniform rod of mass M and length L rotates about a horizontal axis through one end ($I = ML^2/3$). It is released from horizontal. The angular acceleration when the rod is 30° below horizontal is:

(a) $(3g)/(2L)$

(b) $(3\sqrt{3}\,g)/(4L)$

(c) $(\sqrt{3}\,g)/(2L)$

(d) $(3g)/(4L)$

Q10

A disc of moment of inertia $I_1 = 4$ kg·m² rotating at 9 rad/s is coupled coaxially to a stationary disc $I_2 = 2$ kg·m². They reach a common angular velocity. The fraction of initial rotational KE lost is:

(a) 1/6

(b) 1/3

(c) 2/3

(d) 1/2

Q11

A satellite in a circular orbit of radius r (total energy magnitude E = GMm/2r) is moved to an orbit of radius 2r. The additional energy required is:

(a) E/4

(b) E/2

(c) 2E

(d) E

Q12

Water flows through a horizontal pipe whose area decreases from 10 cm² to 5 cm². Speed in the wider section is 2 m/s and gauge pressure there is 8000 Pa. The gauge pressure in the narrower section is (ρ = 1000 kg/m³):

(a) 2000 Pa

(b) 8000 Pa

(c) 6000 Pa

(d) 4000 Pa

Q13

Two soap bubbles of radii 3 cm and 4 cm coalesce isothermally under isothermal conditions to form a single bubble. Using the surface-energy (excess-pressure) relation, the radius of the resulting single bubble is:

(a) 5 cm

(b) 7 cm

(c) 1 cm

(d) $\sqrt{7}$ cm

Q14

One mole of an ideal monoatomic gas undergoes a cycle: (1) isothermal expansion at 600 K doubling volume, (2) isochoric cooling to 300 K, (3) isothermal compression at 300 K halving volume, (4) isochoric heating to 600 K. Net work in one cycle (R = 8.3 J/mol·K, ln2 = 0.69):

(a) 1718 J

(b) 859 J

(c) 0 J

(d) 3436 J

Q15

A gas mixture contains n_1 moles of a monoatomic gas ($\gamma=5/3$) and n_2 moles of a diatomic gas ($\gamma=7/5$). If the effective ratio of specific heats of the mixture is exactly 1.5, the ratio n_1/n_2 is:

(a) 1

(b) 2

(c) 1/2

(d) 3

Q16

A particle in SHM has speed 8 cm/s at displacement 3 cm and speed 6 cm/s at displacement 4 cm. The amplitude of the motion is:

(a) 7 cm

(b) $\sqrt{7}$ cm

(c) 5 cm

(d) 10 cm

Q17

A 1 kg block on a frictionless surface attached to a spring (k = 100 N/m) executes SHM of amplitude 0.1 m. A 1 kg putty lump is dropped and sticks to the block exactly at the equilibrium position. The new amplitude is:

(a) 0.1 m

(b) 0.0707 m

(c) 0.141 m

(d) 0.05 m

Q18

Two tuning forks A (320 Hz) and B produce 5 beats/s. On loading B with wax the beat frequency increases to 8/s. The original frequency of B was:

(a) 328 Hz

(b) 315 Hz

(c) 325 Hz

(d) 312 Hz

Q19

A closed organ pipe and an open organ pipe of the same length L have their air columns vibrating. The frequency of the 3rd overtone of the open pipe is what multiple of the fundamental of the closed pipe?

(a) 8

(b) 3

(c) 4

(d) 6

Q20

An electric dipole is placed at the centre of a hollow conducting sphere. The electric flux through the sphere and the electric field just outside the sphere are respectively:

(a) zero and zero

(b) p/ε_0 and zero

(c) zero and non-zero

(d) non-zero and non-zero

Q21

A parallel plate capacitor (area A, separation d) is half-filled (lower half of the gap, parallel to plates) with dielectric K; the rest is air. The capacitance is:

(a) $(2K\varepsilon_0A)/[d(K+1)]$

(b) $(K\varepsilon_0A)/d$

(c) $(K+1)\varepsilon_0A/(2d)$

(d) $K\varepsilon_0A/(2d)$

Q22

Three point charges +q, +q and −2q are fixed at the vertices of an equilateral triangle of side a. The magnitude of the electric dipole moment of this configuration is:

(a) qa/2

(b) $\sqrt{3}$ qa

(c) qa

(d) 2qa

Q23

A hollow conducting sphere of radius R carries charge Q. The electric potential at a distance R/2 from its centre is:

(a) $Q/(8\pi\varepsilon_0R)$

(b) $2Q/(4\pi\varepsilon_0R)$

(c) $Q/(4\pi\varepsilon_0 R)$

(d) zero

Q24

In the network, a 12 V battery (internal resistance 1 Ω) drives a Wheatstone-like arrangement: 2 Ω and 4 Ω in series form one branch, 3 Ω and 6 Ω in series form a parallel branch, and a 9 Ω galvanometer-type resistor bridges the two midpoints. The bridge is balanced. The total current drawn from the battery is closest to:

(a) 3 A

(b) 4 A

(c) 2 A

(d) 1.5 A

Q25

In a metre bridge, the balance point with an unknown resistance X in the left gap and a known 6 Ω in the right gap is at 40 cm from the left end. If X and 6 Ω are interchanged, the new balance point (from the left end) is at:

(a) 60 cm

(b) 40 cm

(c) 36 cm

(d) 50 cm

Q26

How many of the following statements are correct? (1) Drift velocity is of order 10^{-4} m/s for typical currents. (2) Current density J = nev_d. (3) Drift velocity is independent of the applied electric field. (4) Resistivity of a metallic conductor increases with temperature.

(a) Two

(b) Three

(c) Four

(d) One

Q27

A potentiometer wire of length 10 m has a resistance of 20 Ω and is connected to a 2 V driver cell of negligible internal resistance through a 30 Ω series resistance. The potential gradient along the wire is:

(a) 0.08 V/m

(b) 0.04 V/m

(c) 0.16 V/m

(d) 0.2 V/m

Q28

A circular coil of 100 turns and radius 0.1 m carries 2 A. It is placed in a uniform field of 0.5 T with its plane parallel to the field. The torque on the coil is:

(a) π/2 N·m

(b) π N·m

(c) 2π N·m

(d) 0 N·m

Q29

Two long parallel wires 10 cm apart carry 5 A and 10 A in the same direction. The magnetic field at the midpoint between them and the nature of the mutual force are ($\mu_0/4\pi = 10^{-7}$):

(a) zero and attractive

(b) 6×10^{-5} T and attractive

(c) 2×10^{-5} T and repulsive

(d) 2×10^{-5} T and attractive

Q30

A charged particle of charge q and mass m enters a region of uniform magnetic field B at speed v perpendicular to B, describing a circle. If its speed is doubled and the field is halved, the ratio of the new radius to the original radius is:

(a) 4

(b) 1

(c) 1/2

(d) 2

Q31

A series LCR circuit has L = 2 H, C = 8 μF, R = 50 Ω. At resonance the quality factor Q is:

(a) 10

(b) 2.5

(c) 5

(d) 20

Q32

In a series LCR AC circuit at resonance, the applied rms voltage is 200 V, R = 40 Ω and $X_L = X_C$ = 100 Ω. The rms voltage across the inductor is:

(a) 200 V

(b) 100 V

(c) 500 V

(d) 250 V

Q33

A square loop of side 0.1 m and resistance 2 Ω moves at constant velocity 5 m/s out of a uniform magnetic field 0.4 T directed into the page, with one side perpendicular to the velocity. The magnitude of the induced current while the loop is partly in the field is:

(a) 0.05 A

(b) 0.1 A

(c) 0.4 A

(d) 0.2 A

Q34

An EM wave travels in vacuum along +z with $E = E_0 \sin(kz - \omega t)\,\hat{x}$. At the instant E points along +x, the directions of the Poynting vector and the magnetic field are respectively:

(a) +z and +y

(b) +z and −y

(c) +y and +z

(d) −z and +y

Q35

A point object lies on the principal axis of an equiconvex lens of focal length 20 cm. A plane mirror is placed 10 cm behind the lens, perpendicular to the axis. For the final image to coincide with the object, the object must be placed in front of the lens at a distance of:

(a) 40 cm

(b) 30 cm

(c) 20 cm

(d) 10 cm

Q36

A thin prism of angle 6° and refractive index 1.5 is combined with another thin prism of refractive index 1.6 to give dispersion without deviation. The angle of the second prism is:

(a) 7.2°

(b) 4.5°

(c) 6°

(d) 5°

Q37

Match Column I (optical instrument quantity) with Column II (governing relation): A. Magnifying power of compound microscope — i. f_o/f_e B. Magnifying power of telescope (normal adjustment) — ii. $(L/f_o)(D/f_e)$ C. Resolving power of telescope — iii. $D/(1.22\lambda)$ D. Limit of resolution of microscope — iv. $1.22\lambda/(2\ n\ \sin\theta)$

(a) A-i, B-ii, C-iii, D-iv

(b) A-ii, B-i, C-iv, D-iii

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

(d) A-ii, B-i, C-iii, D-iv

Q38

In Young's double-slit experiment, two points P and Q on the screen correspond to path differences $\lambda/3$ and $\lambda/4$ respectively. The ratio of intensities I_P/I_Q (relative to the maximum I_0) is:

(a) 2

(b) 1

(c) 1/4

(d) 1/2

Q39

Light of wavelength 300 nm falls on a metal whose threshold wavelength is 600 nm. The maximum kinetic energy of the emitted photoelectrons and the stopping potential are ($hc \approx 1240$ eV·nm):

(a) 4.13 eV and 4.13 V

(b) 6.2 eV and 6.2 V

(c) 2.07 eV and 2.07 V

(d) 1.03 eV and 1.03 V

Q40

An electron and a proton have the same de Broglie wavelength. The ratio of their kinetic energies $KE_{electron}/KE_{proton}$ is ($m_p/m_e \approx 1836$):

(a) 1/1836

(b) 1836

(c) $\sqrt{1836}$

(d) 1

Q41

In the Balmer series of hydrogen, the ratio of the wavelengths of the first member (Hα, n=3→2) to the second member (Hβ, n=4→2) is:

(a) 27/20

(b) 4/9

(c) 20/27

(d) 9/4

Q42

The binding energy per nucleon is 7.1 MeV for ^{4}He and 1.1 MeV for ^{2}H. The energy released when two deuterons fuse into one ^{4}He is closest to:

(a) 24 MeV

(b) 6 MeV

(c) 12 MeV

(d) 17.6 MeV

Q43

A radioactive sample has a half-life of 20 minutes. The fraction remaining undecayed after 50 minutes is closest to:

(a) 0.25

(b) 0.354

(c) 0.125

(d) 0.177

Q44

A Zener diode rated at 6 V is used with a series resistance of 200 Ω across an unregulated 9 V supply, feeding a load. If the load draws 10 mA, the current through the Zener diode is:

(a) 20 mA

(b) 5 mA

(c) 15 mA

(d) 10 mA

Q45

In a logic circuit, inputs A and B feed an OR gate; the OR output and input A feed a NAND gate; the NAND output is inverted by a NOT gate to give Y. For A = 1, B = 0, the output Y is:

(a) 0

(b) 1

(c) undefined

(d) oscillating

CHEMISTRY

45 Questions | All Compulsory

Chemistry (Q46 to Q90)

+4 for correct, –1 for incorrect, 0 for unattempted.

Q46

For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, 1 mole of N_2O_4 is taken in a 1 L vessel. At equilibrium, the degree of dissociation is 0.2. The value of Kc is:

(a) 0.10 mol/L

(b) 0.20 mol/L

(c) 0.40 mol/L

(d) 0.05 mol/L

Q47

A buffer is prepared by mixing 50 mL of 0.2 M NH_4OH ($K_b = 1.8 \times 10^{-5}$) with 50 mL of 0.2 M NH_4Cl. To this buffer, 10 mL of 0.1 M HCl is added. The approximate pH of the resulting solution is (log 1.8 = 0.26, total volume 110 mL):

(a) 8.96

(b) 9.26

(c) 9.18

(d) 9.34

Q48

For the equilibrium $A(g) \rightleftharpoons 2B(g)$, the K_p at 300 K is 8 atm. If the total pressure at equilibrium is doubled (by reducing volume at constant T), which statement is correct about the position of equilibrium and degree of dissociation α?

(a) α unchanged; Kp doubles

(b) α decreases; equilibrium shifts backward (toward A)

(c) α increases; Kp halves

(d) α increases; equilibrium shifts forward

Q49

The Ksp of $Mg(OH)_2$ is 1.0×10^{-11}. A solution is 0.01 M in $MgCl_2$. The minimum pH at which $Mg(OH)_2$ just begins to precipitate is approximately:

(a) 8.5

(b) 9.0

(c) 9.5

(d) 10.0

Q50

Match List I (complex) with List II (spin-only magnetic moment in BM) and choose the correct option: List I: (A) $[Fe(H_2O)_6]^{2+}$ (B) $[Fe(CN)_6]^{4-}$ (C) $[CoF_6]^{3-}$ (D) $[Co(NH_3)_6]^{3+}$ List II: (i) 0 (ii) 4.90 (iii) 0 (iv) 4.90

(a) A-ii, B-i, C-iv, D-iii

(b) A-iv, B-i, C-ii, D-iii

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

(d) A-i, B-ii, C-iii, D-iv

Q51

The IUPAC name of the complex $[Cr(NH_3)_4Cl_2]^+$ and the number of its possible geometrical isomers are respectively:

(a) diamminedichloridochromium(III) ion; 2

(b) tetraamminedichloridochromium(III) ion; 3

(c) tetraamminedichlorochromate(III); 3

(d) tetraamminedichloridochromium(III) ion; 2

Q52

For the complex ion $[Mn(CN)_6]^{3-}$, the d-electron configuration in the crystal field, number of unpaired electrons, and crystal field stabilisation energy (in Δ_o, ignoring pairing energy) are respectively:

(a) $t_2g^3eg^1$; 4; $-0.6\Delta_o$

(b) $t_2g^4eg^0$; 2; $-1.6\Delta_o + P$

(c) t_2g^4; 2; $-1.6\Delta_o$

(d) $t_2g^4eg^0$; 2; $-2.4\Delta_o$

Q53

Which of the following statements about coordination compounds is/are correct? (I) $[Ni(CN)_4]^{2-}$ is square planar and diamagnetic. (II) The complex $[Co(en)_2Cl_2]^+$ shows both geometrical and optical isomerism. (III) EAN of the central metal in $[Fe(CN)_6]^{4-}$ is 36. (IV) In $[Cr(H_2O)_6]^{3+}$, the d-orbital splitting absorbs in the visible region giving colour.

(a) I, III and IV only

(b) I, II and IV only

(c) I, II, III and IV all correct

(d) II, III and IV only

Q54

The increasing order of acidity of the following carboxylic acids: (i) FCH_2COOH (ii) $ClCH_2COOH$ (iii) CH_3COOH (iv) $O_2N–CH_2COOH$

(a) iii < ii < iv < i

(b) iii < i < ii < iv

(c) iv < i < ii < iii

(d) iii < ii < i < iv

Q55

Three carbocations are generated: (P) the cation from heterolysis of 1-chloro-2,2-dimethylpropane (neopentyl chloride) after rearrangement, (Q) the cyclopropylmethyl cation, and (R) the tropylium (cycloheptatrienyl) cation. Identify the correct order of decreasing thermodynamic stability:

(a) P > Q > R

(b) Q > R > P

(c) R > P > Q

(d) R > Q > P

Q56

The total number of structural isomers possible for C_4H_8 (including ring and chain, excluding stereoisomers) is:

(a) 5

(b) 3

(c) 4

(d) 6

Q57

A first-order reaction is 20% complete in 10 minutes. The time required for the reaction to be 75% complete is approximately (log 2 = 0.301, log 1.25 = 0.097):

(a) 62.1 min

(b) 45.0 min

(c) 31.0 min

(d) 55.4 min

Q58

The rate constant of a reaction doubles when temperature rises from 300 K to 310 K. The activation energy (Ea) is approximately (R = 8.314 J/K/mol, log 2 = 0.301):

(a) 26.8 kJ/mol

(b) 53.6 kJ/mol

(c) 107.2 kJ/mol

(d) 18.4 kJ/mol

Q59

For the gas-phase reaction 2A + B → products, the following initial-rate data were collected: [A]/M [B]/M Rate(M/s) 0.10 0.10 1.2×10^{-4} 0.20 0.10 2.4×10^{-4} 0.20 0.20 9.6×10^{-4} The rate law, overall order, and rate constant are respectively:

(a) Rate = $k[A][B]^2$; order 3; k = 0.12 $M^{-2}s^{-1}$

(b) Rate = $k[A]^2[B]$; order 3; k = 1.2 $M^{-2}s^{-1}$

(c) Rate = k[A][B]; order 2; k = 1.2×10^{-2} $M^{-1}s^{-1}$

(d) Rate = $k[A]^2[B]^2$; order 4; k = 1.2 $M^{-3}s^{-1}$

Q60

In aqueous solution the basicity of methylamine, dimethylamine and trimethylamine does NOT follow the simple +I-effect order. Arrange NH_3, CH_3NH_2, $(CH_3)_2NH$ and $(CH_3)_3N$ in the correct decreasing order of basicity in water, and identify why trimethylamine is not the strongest:

(a) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N > NH_3$; steric only

(b) $NH_3 > CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$; inductive withdrawal

(c) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$; trimethylamine is weaker due to reduced solvation/H-bonding stabilisation of its conjugate acid

(d) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$; purely the +I effect

Q61

An aromatic compound (C_7H_9N) is optically inactive, gives a positive carbylamine test, and on reaction with $NaNO_2$/HCl at 273 K followed by warming gives a phenol. The compound is:

(a) N,N-dimethylaniline

(b) N-methylaniline

(c) benzylamine

(d) o-toluidine (2-methylaniline)

Q62

Consider the sequence: $C_6H_5NH_2$ ⟶(i) $NaNO_2$/HCl, 273–278 K⟶ P ⟶(ii) HBF_4, then Δ⟶ Q ⟶(iii) CuCN/KCN⟶ R is NOT formed from Q in step (iii); instead identify P, and the product obtained when the SAME diazonium P is treated directly with CuCN/KCN. The diazonium salt P and the product of P + CuCN are respectively:

(a) benzene; toluene

(b) aniline; benzamide

(c) benzenediazonium chloride; benzonitrile (C_6H_5CN)

(d) nitrobenzene; benzaldehyde

Q63

According to molecular orbital theory, which of the following statements is/are correct? (I) The bond order of N_2^+ is 2.5 and it is paramagnetic. (II) O_2^{2-} (peroxide) has bond order 1 and is diamagnetic. (III) The bond dissociation energy of N_2 is greater than that of N_2^+. (IV) C_2 molecule has a bond order of 2 with both bonds being π-bonds.

(a) I, II and III only

(b) I, II, III and IV all correct

(c) I, III and IV only

(d) II, III and IV only

Q64

The correct order of dipole moment among the following is:

(a) $NF_3 > NH_3 > BF_3$

(b) $BF_3 > NH_3 > NF_3$

(c) $NH_3 > NF_3 > BF_3 = 0$

(d) $NH_3 = NF_3 > BF_3$

Q65

For the species ClF_3, the hybridisation of the central atom, the molecular shape, and the number of lone pairs on the central atom are respectively:

(a) sp^3d^2; T-shaped; 3 lone pairs

(b) sp^3; pyramidal; 1 lone pair

(c) sp^3d; T-shaped; 2 lone pairs

(d) sp^3d; trigonal planar; 0 lone pairs

Q66

For the reaction C(graphite) + $O_2(g) \rightarrow CO_2(g)$, $\Delta H = -393.5$ kJ/mol. Given ΔH for C(graphite) + $\frac{1}{2}O_2 \rightarrow CO$ is -110.5 kJ/mol. The enthalpy of combustion of CO to CO_2 is:

(a) −393.5 kJ/mol

(b) +283.0 kJ/mol

(c) −504.0 kJ/mol

(d) −283.0 kJ/mol

Q67

For a reaction at 500 K, $\Delta H = +30$ kJ/mol and $\Delta S = +100$ J/K/mol. The Gibbs energy change ΔG and the spontaneity are:

(a) $\Delta G = -20$ kJ/mol; spontaneous

(b) $\Delta G = +20$ kJ/mol; non-spontaneous

(c) $\Delta G = +80$ kJ/mol; non-spontaneous

(d) $\Delta G = -80$ kJ/mol; spontaneous

Q68

Assertion (A): For the isothermal reversible expansion of an ideal gas, $\Delta U = 0$ but the work done by the gas is non-zero. Reason (R): For an ideal gas, internal energy depends only on temperature, and during expansion the gas absorbs heat equal to the work done.

(a) A is false but R is true

(b) Both A and R are true but R is NOT the correct explanation of A

(c) A is true but R is false

(d) Both A and R are true and R is the correct explanation of A

Q69

Match List I (species) with List II (correct structural/bonding feature) and choose the correct option: List I: (A) XeF_4 (B) XeO_3 (C) ICl_3 (D) H_3PO_3 List II: (i) square planar, 2 lone pairs on Xe (ii) pyramidal, 1 lone pair on Xe (iii) dimeric I_2Cl_6 in solid, T-shaped monomer (iv) dibasic, one P–H bond

(a) A-i, B-iii, C-ii, D-iv

(b) A-ii, B-i, C-iv, D-iii

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

(d) A-iii, B-ii, C-i, D-iv

Q70

How many of the following statements about p-block elements are correct? (I) The acidic strength of oxoacids of chlorine increases: $HClO < HClO_2 < HClO_3 < HClO_4$. (II) Among the hydrides of group 15, basicity decreases $NH_3 > PH_3 > AsH_3 > SbH_3$. (III) In interhalogen compounds AX_3, the geometry is T-shaped. (IV) The thermal stability of group 16 hydrides decreases $H_2O > H_2S > H_2Se > H_2Te$. (V) Boron forms electron-deficient hydrides like B_2H_6 with 3-centre-2-electron bonds.

(a) 3

(b) 5

(c) 2

(d) 4

Q71

Assertion (A): The structure of $XeOF_4$ is square pyramidal. Reason (R): Xe in $XeOF_4$ is sp^3d^2 hybridised with one lone pair.

(a) A is false but R is true

(b) Both A and R are true and R is the correct explanation of A

(c) A is true but R is false

(d) Both A and R are true but R is NOT the correct explanation of A

Q72

In the reaction sequence: CH_3CHO ⟶dil. NaOH⟶ A (aldol) ⟶Δ, $-H_2O$⟶ B. The product B and the type of compound it is are:

(a) 3-hydroxybutanal; a β-hydroxy aldehyde

(b) Crotonic acid; a carboxylic acid

(c) Butane-1,3-diol; a diol

(d) But-2-enal ($CH_3CH=CHCHO$); an α,β-unsaturated aldehyde

Q73

Which one of the following will NOT undergo the Cannizzaro reaction but WILL give a positive iodoform test (odd-one-out)?

(a) 2,2-dimethylpropanal ($(CH_3)_3CCHO$)

(b) Benzaldehyde (C_6H_5CHO)

(c) Formaldehyde (HCHO)

(d) Acetaldehyde (CH_3CHO)

Q74

Match List I (reaction/reagent) with List II (product/transformation) and choose the correct option: List I: (A) HVZ reaction (B) Clemmensen reduction (C) Rosenmund reduction (D) Etard reaction List II: (i) C=O of ketone → CH_2 (acidic medium) (ii) α-halogenation of carboxylic acid (iii) acyl chloride → aldehyde (iv) toluene → benzaldehyde

(a) A-ii, B-iii, C-i, D-iv

(b) A-iv, B-i, C-iii, D-ii

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

(d) A-i, B-ii, C-iv, D-iii

Q75

Three sugars are tested: (P) a disaccharide that on hydrolysis gives glucose + fructose and does not reduce Tollens' reagent; (Q) a disaccharide of two glucose units joined α-1,4 that DOES reduce Tollens'; (R) a disaccharide of galactose + glucose that reduces Tollens'. Identify P, Q and R and the reason P is non-reducing:

(a) P = sucrose, Q = maltose, R = lactose; in sucrose both anomeric carbons are locked in the glycosidic bond

(b) P = lactose, Q = maltose, R = sucrose; lactose has no free anomeric –OH

(c) P = maltose, Q = sucrose, R = lactose; maltose lacks a free –CHO

(d) P = sucrose, Q = lactose, R = maltose; sucrose has a free ketose carbon

Q76

Assertion (A): In the native (3D) structure of proteins, the α-helix is stabilised primarily by hydrogen bonds. Reason (R): The secondary structure of proteins arises from regular folding of the polypeptide backbone, while the primary structure refers to the sequence of amino acids linked by peptide bonds.

(a) Both A and R are true but R is NOT the correct explanation of A

(b) A is false but R is true

(c) A is true but R is false

(d) Both A and R are true and R is the correct explanation of A

Q77

For the cell reaction $Ni(s) + 2Ag^+(aq) \rightarrow Ni^{2+}(aq) + 2Ag(s)$, $E°cell = 1.05$ V. If $[Ag^+] = 0.01$ M and $[Ni^{2+}] = 0.10$ M, the cell EMF at 298 K is ($2.303RT/F = 0.059$):

(a) 0.91 V

(b) 1.05 V

(c) 1.14 V

(d) 0.96 V

Q78

When a current of 0.5 A is passed for 32 minutes 10 seconds through a solution of $CuSO_4$, the mass of copper (atomic mass 63.5) deposited at the cathode is (F = 96500 C):

(a) 0.159 g

(b) 1.27 g

(c) 0.635 g

(d) 0.318 g

Q79

A 5% (by mass) solution of cane sugar (M = 342) is isotonic with a 0.877% (by mass) solution of an unknown solute X. The molar mass of X is approximately (assume equal densities, dilute solutions):

(a) 342 g/mol

(b) 60 g/mol

(c) 120 g/mol

(d) 180 g/mol

Q80

The freezing point of an aqueous solution of 0.1 m $FeCl_3$ (assuming 80% dissociation, Kf = 1.86 K kg/mol) is approximately:

(a) −0.186 °C

(b) −0.633 °C

(c) −0.744 °C

(d) −0.520 °C

Q81

A hydrocarbon X (C_5H_8) decolourises bromine water, gives a white precipitate with ammoniacal $AgNO_3$, and on hydration with dilute $H_2SO_4/HgSO_4$ gives a single ketone of formula $C_5H_{10}O$. The structure of X is:

(a) penta-1,4-diene

(b) pent-2-yne ($CH_3CH_2C{\equiv}CCH_3$)

(c) 2-methylbut-1-en-3-yne

(d) pent-1-yne ($CH_3CH_2CH_2C{\equiv}CH$)

Q82

An alkene X (C_6H_{12}) on reductive ozonolysis (O_3; then Zn/H_2O) gives only propanal (CH_3CH_2CHO) as the carbonyl product. The structure of X and the type of alkene it is are:

(a) hex-1-ene; a terminal alkene

(b) hex-2-ene; an unsymmetrical internal alkene

(c) hex-3-ene ($CH_3CH_2CH{=}CHCH_2CH_3$); a symmetrical internal alkene

(d) 2-methylpent-2-ene; a trisubstituted alkene

Q83

The increasing order of acidity (i.e., from highest to lowest pKa) of the following phenols is: (i) phenol (ii) p-nitrophenol (iii) p-cresol (p-methylphenol) (iv) p-chlorophenol

(a) ii < iv < i < iii

(b) iii < iv < i < ii

(c) i < iii < iv < ii

(d) iii < i < iv < ii

Q84

To prepare 2-ethoxy-2-methylpropane (tert-butyl ethyl ether) by Williamson synthesis with the highest yield and least elimination, the correct pair of reactants is:

(a) sodium tert-butoxide + 2-bromo-2-methylpropane

(b) 2-iodo-2-methylpropane + ethanol

(c) sodium tert-butoxide + bromoethane

(d) sodium ethoxide + 2-bromo-2-methylpropane (tert-butyl bromide)

Q85

For the solvolysis (SN1) of the following chlorides in aqueous ethanol, identify the correct rate order AND the controlling factor: (i) CH_3Cl, (ii) $C_6H_5CH_2Cl$ (benzyl), (iii) $(C_6H_5)_2CHCl$ (benzhydryl), (iv) $(C_6H_5)_3CCl$ (trityl).

(a) iv > iii > ii > i; rate set by increasing C–Cl bond strength

(b) iv > iii > ii > i; rate set by resonance stabilisation of the carbocation, increasing with number of aryl groups

(c) i > ii > iii > iv; rate set by decreasing steric strain

(d) ii > iii > iv > i; rate set by hyperconjugation only

Q86

Match List I (ion) with List II (calculated spin-only magnetic moment, BM) for aqueous high-spin complexes and choose the correct option: List I: (A) Ti^{3+} (B) V^{3+} (C) Cr^{3+} (D) Mn^{2+} List II: (i) 1.73 (ii) 2.83 (iii) 3.87 (iv) 5.92

(a) A-i, B-ii, C-iii, D-iv

(b) A-ii, B-i, C-iv, D-iii

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

(d) A-i, B-iii, C-ii, D-iv

Q87

On strong heating, 1.00 g of a sample containing only the hydrated carbonate $MgCO_3 \cdot xH_2O$ loses both its water and CO_2, leaving 0.345 g of MgO (Mg=24, C=12, O=16, H=1). The value of x (moles of water of crystallisation per formula unit) is approximately:

(a) 5

(b) 1

(c) 3

(d) 2

Q88

For the 4f, 5d and 6s orbitals of an atom, consider their radial and angular nodes. Which statement is correct?

(a) The 4f orbital has 0 radial nodes and 3 angular nodes; the 5d has 2 radial and 2 angular nodes; the 6s has 5 radial and 0 angular nodes

(b) All three orbitals have the same total number of nodes equal to 4

(c) The 4f orbital has 3 radial nodes; the 5d has 0 radial nodes; the 6s has 0 radial nodes

(d) The 6s orbital has more angular nodes than the 5d orbital

Q89

In an acidified solution, 25.0 mL of a $KMnO_4$ solution exactly oxidises 25.0 mL of 0.10 M $FeSO_4$ AND, separately, the same $KMnO_4$ would require a different volume of 0.10 M oxalic acid ($H_2C_2O_4$) for the same 25.0 mL aliquot. What is the molarity of the $KMnO_4$, and what volume of 0.10 M oxalic acid would 25.0 mL of this $KMnO_4$ oxidise? ($MnO_4^- \rightarrow Mn^{2+}$; $Fe^{2+} \rightarrow Fe^{3+}$; $C_2O_4^{2-} \rightarrow 2CO_2$)

(a) $KMnO_4$ = 0.02 M; 12.5 mL oxalic acid

(b) $KMnO_4$ = 0.05 M; 25.0 mL oxalic acid

(c) $KMnO_4$ = 0.10 M; 25.0 mL oxalic acid

(d) $KMnO_4$ = 0.02 M; 25.0 mL oxalic acid

Q90

Assertion (A): The first ionisation enthalpy of nitrogen is greater than that of oxygen, and that of beryllium is greater than that of boron. Reason (R): Half-filled ($2p^3$, as in N) and fully-filled ($2s^2$, as in Be) sub-shells have extra exchange-energy/symmetry stability, so removing an electron from them requires more energy than from the next element.

(a) Both A and R are true and R is the correct explanation of A

(b) A is true but R is false

(c) Both A and R are true but R is NOT the correct explanation of A

(d) A is false but R is true

BOTANY

45 Questions | All Compulsory

Botany (Q91 to Q135)

+4 for correct, –1 for incorrect, 0 for unattempted.

Q91

In a dihybrid cross between two pea plants, the F2 generation showed a deviation from the expected 9:3:3:1 ratio, instead giving 9:3:4. A student concludes that the two genes are NOT independently assorting. Which interpretation is correct?

(a) This is recessive epistasis where the homozygous recessive of one gene masks the other; genes still assort independently

(b) Incomplete dominance at both loci produces the 9:3:4 ratio

(c) This is dominant epistasis; the dominant allele of one gene masks the other

(d) The genes are linked and the deviation is due to recombination frequency

Q92

Consider the following statements regarding ABO blood grouping in humans: I. The I^A and I^B alleles are codominant to each other. II. Both I^A and I^B are dominant over i. III. A person with blood group AB produces antibodies against both A and B antigens. IV. The i allele is an example of a multiple allele but produces no surface sugar. How many of the above statements are correct?

(a) Four

(b) One

(c) Two

(d) Three

Q93

Genes A, B and C lie on the same chromosome. The recombination frequency between A and B is 8%, between B and C is 12%, and between A and C is 18%. A trihybrid in coupling phase is test-crossed to produce 2000 offspring. Assuming no interference, what is the approximate expected number of DOUBLE-recombinant offspring?

(a) 38

(b) 19

(c) 20

(d) 10

Q94

A colour-blind man marries a woman with normal vision whose father was colour-blind. Colour blindness is X-linked recessive. What is the probability that their first son is colour-blind?

(a) 1

(b) 3/4

(c) 1/4

(d) 1/2

Q95

A phenotypically normal couple has a son with Klinefelter syndrome (47,XXY) who is also red-green colour-blind, while neither parent is colour-blind. Colour blindness is X-linked recessive. In which parent and which meiotic division did the non-disjunction that produced the extra sex chromosome most likely occur?

(a) Non-disjunction in the mother at meiosis I, contributing both maternal X chromosomes

(b) Non-disjunction in the father at meiosis II, contributing two Y chromosomes

(c) Non-disjunction in the father at meiosis I, contributing both X and Y

(d) Non-disjunction in the mother at meiosis II, contributing two identical X^c chromosomes carrying the colour-blindness allele

Q96

Consider the following statements regarding pedigree analysis of an autosomal recessive trait: I. Affected individuals can appear in offspring of two unaffected (carrier) parents. II. The trait typically skips generations. III. Both males and females are affected with roughly equal frequency. IV. An affected father always passes the trait to all daughters. How many statements are correct?

(a) One

(b) Two

(c) Four

(d) Three

Q97

Consider these statements about a transcription unit: I. The promoter is located towards the 5′ end (upstream) of the coding strand. II. The terminator is located towards the 3′ end (downstream) of the coding strand. III. The template strand has 3′->5′ polarity in the direction of transcription. IV. RNA polymerase moves along the template in the 3′->5′ direction, synthesising RNA 5′->3′. How many statements are correct?

(a) Two

(b) Three

(c) Four

(d) One

Q98

In an E. coli lac operon, four mutant strains are constructed and grown in the presence and absence of lactose, with glucose absent. Which mutant would constitutively express the

structural genes (z, y, a) at high levels regardless of lactose, even when a normal repressor gene is also present in trans on a plasmid?

(a) A mutation deleting the CAP (catabolite activator protein) binding site

(b) A mutation in the i gene producing a repressor that cannot bind allolactose (super-repressor)

(c) A point mutation in the operator (O^c) that prevents repressor binding, in cis to the structural genes

(d) A nonsense mutation early in the z gene (beta-galactosidase)

Q99

In the Meselson-Stahl experiment, E. coli grown in ^15N medium were shifted to ^14N medium. After exactly THREE generations (rounds of replication) in ^14N, what fraction of DNA molecules will be of the hybrid (^15N/^14N) density?

(a) 1/8

(b) 1/2

(c) 1/4

(d) 1/16

Q100

Regarding the genetic code, consider: I. It is degenerate because one amino acid can be coded by more than one codon. II. AUG codes for methionine and also functions as the initiator codon. III. The codon UGA always codes for tryptophan in the standard code. IV. The code is non-overlapping and commaless. How many of the above statements are INCORRECT?

(a) Three

(b) Two

(c) One

(d) Zero

Q101

In a labelled diagram of a transcription unit on the coding (sense) strand drawn 5′->3′ left to right, three regions are marked X (left), Y (middle structural gene), Z (right). Which assignment is correct, and what is the polarity of the template strand?

(a) X = terminator, Z = promoter; template strand runs 5′->3′ left to right

(b) X = promoter, Z = terminator; template strand runs 3′->5′ left to right

(c) X = operator, Z = promoter; template strand runs 3′->5′ left to right

(d) X = terminator, Z = promoter; template strand runs 3′->5′ left to right

Q102

Match Column I (Algal class) with Column II (Stored food / cell-wall product): A. Chlorophyceae – i. Laminarin and mannitol B. Phaeophyceae – ii. Starch C. Rhodophyceae – iii. Floridean starch D. Cell-wall polysaccharide of brown algae – iv. Algin Choose the correct combination:

(a) A-ii, B-iii, C-i, D-iv

(b) A-i, B-ii, C-iii, D-iv

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

(d) A-iii, B-i, C-ii, D-iv

Q103

Assertion (A): Bryophytes are called the amphibians of the plant kingdom. Reason (R): The dominant photosynthetic phase in bryophytes is the diploid sporophyte which is independent of the gametophyte. Select the correct option:

(a) A is false but R is true

(b) Both A and R are true and R is the correct explanation

(c) Both A and R are false

(d) A is true but R is false

Q104

Consider the alternation of generations across plant groups: I. Pteridophytes – dominant sporophyte, free-living gametophyte (prothallus) II. Gymnosperms – dominant sporophyte, gametophyte highly reduced and dependent III. Bryophytes – dominant gametophyte, dependent sporophyte IV. Angiosperms – gametophyte represented by a few-celled structure dependent on sporophyte How many statements are correct?

(a) One

(b) Three

(c) Two

(d) Four

Q105

A unicellular eukaryote shows: a pellicle, two flagella, photosynthesis in light but heterotrophy in darkness, and storage of paramylon (a beta-1,3-glucan) rather than starch. To which group does it belong, and which statement is the odd one (false) for it?

(a) Slime moulds; the odd false statement is that it has flagella

(b) Chrysophytes; the odd false statement is that it is photosynthetic

(c) Dinoflagellates; the odd false statement is that it stores paramylon

(d) Euglenoids; the odd false statement is that it has a rigid cellulosic cell wall

Q106

The floral formula (radial symmetry, bisexual) K(5) C(5) A5 G(2) with axile placentation, bicarpellary syncarpous ovary placed obliquely, and a superior ovary corresponds to which family, and which single feature is the diagnostic CHECK against confusion with Liliaceae?

(a) Liliaceae; the C(5) corolla

(b) Solanaceae; the obliquely placed bicarpellary G(2) with axile placentation

(c) Solanaceae; the A5 free stamens

(d) Fabaceae; the K(5) gamosepalous calyx

Q107

Match Column I (Family) with Column II (Characteristic feature): A. Fabaceae – i. Vexillary aestivation, diadelphous stamens B. Solanaceae – ii. Epipetalous stamens, axile placentation C. Liliaceae – iii. Tepals in two whorls of 3, epiphyllous stamens D. Corolla aestivation in Fabaceae – iv. Descending imbricate Choose the correct combination:

(a) A-iii, B-ii, C-i, D-iv

(b) A-i, B-iii, C-ii, D-iv

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

(d) A-ii, B-i, C-iii, D-iv

Q108

Consider the following terms and their definitions: I. Gamosepalous – sepals united II. Epipetalous – stamens attached to petals III. Marginal placentation – ovules borne along the ventral suture of a monocarpellary ovary IV. Valvate aestivation – margins of sepals/petals just touch without overlapping How many of these definitions are correct?

(a) One

(b) Four

(c) Three

(d) Two

Q109

A flower has a bicarpellary, syncarpous ovary divided into chambers by a false septum (replum), with ovules attached to the parietal placenta. This combination is characteristic of which family and placentation?

(a) Brassicaceae; parietal placentation with replum (false septum)

(b) Liliaceae; basal placentation

(c) Fabaceae; marginal placentation

(d) Solanaceae; axile placentation

Q110

In a C4 plant, CO_2 is first fixed in mesophyll cells by PEP carboxylase, then decarboxylated in bundle-sheath cells for the Calvin cycle. If a C4 plant fixes 12 molecules of CO_2, how many ATP are consumed ONLY for the additional C4 (PEP regeneration) pumping step? (PEP regeneration costs 2 ATP per CO_2.)

(a) 24

(b) 12

(c) 36

(d) 18

Q111

Two plants, one C3 and one C4, are placed in a sealed transparent chamber under high light and warm temperature. Over time, what outcome is expected, and what is the underlying reason rooted in RuBisCO and CO_2 compensation point?

(a) Both die simultaneously because RuBisCO behaves identically in both

(b) The C4 plant dies first because PEP carboxylase cannot operate at low CO_2

(c) The C3 plant dies first because at the low CO_2 reached, RuBisCO oxygenase activity (photorespiration) dominates and the C3 plant's higher CO_2 compensation point cannot sustain net fixation, while the C4 plant continues fixing down to near-zero CO_2

(d) The C3 plant survives longer because it lacks photorespiration

Q112

In non-cyclic photophosphorylation, if 1 molecule of O_2 is evolved, how many electrons pass through the Z-scheme, and how many ATP and NADPH are produced (per the standard NCERT non-cyclic stoichiometry of 1 ATP and 1 NADPH per 2 electrons)?

(a) 4 electrons; 2 ATP and 2 NADPH

(b) 8 electrons; 4 ATP and 4 NADPH

(c) 4 electrons; 4 ATP and 4 NADPH

(d) 2 electrons; 1 ATP and 1 NADPH

Q113

During aerobic respiration, oxidation of one molecule of pyruvate to 3 CO_2 via the link reaction and Krebs cycle yields how many NADH, $FADH_2$ and GTP directly?

(a) 3 NADH, 1 $FADH_2$, 2 GTP

(b) 3 NADH, 1 $FADH_2$, 1 GTP

(c) 4 NADH, 2 $FADH_2$, 1 GTP

(d) 4 NADH, 1 $FADH_2$, 1 GTP

Q114

Germinating seeds are placed in a Ganong's respirometer. In Experiment 1 the seeds (a carbohydrate-rich variety) give an RQ of 1.0, while in Experiment 2 fatty seeds in early germination give an RQ of about 0.7. A third reading shows an RQ greater than 1. Which single explanation correctly accounts for ALL three observations?

(a) RQ >1 only occurs when carbohydrates are the substrate

(b) Fats give RQ >1 and organic acids give RQ <1

(c) RQ equals the ratio CO_2 released / O_2 consumed: =1 for carbohydrate (fully oxidised), <1 for fats (highly reduced, need extra O_2), >1 when an organic acid is the substrate or oxygen is limiting (partial anaerobiosis)

(d) RQ is always 1 and the differences are experimental error

Q115

Match Column I (Plant growth regulator) with Column II (Characteristic role): A. Gibberellin – i. Bolting in rosette plants; breaks bud and seed dormancy B. Cytokinin – ii. Promotes nutrient mobilisation and delays leaf senescence (Richmond-Lang effect) C. Abscisic acid – iii. Stress hormone; stomatal closure D. Ethylene – iv. Triple response, fruit ripening, breaks dormancy of potato buds Choose the correct combination:

(a) A-i, B-ii, C-iii, D-iv

(b) A-i, B-iii, C-ii, D-iv

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

(d) A-iv, B-ii, C-iii, D-i

Q116

Assertion (A): Vernalisation prevents premature flowering and enables a plant to acquire the competence to flower after exposure to low temperature. Reason (R): In biennials like sugar beet, vernalisation substitutes for the requirement of a long photoperiod. Select the correct option:

(a) Both A and R are false

(b) A is false but R is true

(c) Both A and R are true and R is the correct explanation

(d) A is true but R is false

Q117

Consider the following statements about plant growth: I. Apical dominance is the suppression of growth of lateral buds by the shoot apex, mediated by auxin. II. The phase of cell elongation precedes the phase of cell division (meristematic phase) in growth. III. Arithmetic growth produces a linear curve; geometric growth in limited resources produces a sigmoid (S-shaped) curve. IV. Removal of the shoot tip promotes the growth of lateral branches (used in tea/hedge pruning). How many statements are correct?

(a) Three

(b) One

(c) Two

(d) Four

Q118

Which one of the following correctly describes the mature angiosperm embryo sac (female gametophyte)?

(a) It is 8-celled and 8-nucleate with each nucleus in a separate cell

(b) It is 6-celled and 8-nucleate: egg, two synergids, and three antipodals only

(c) It is 7-celled and 8-nucleate: one egg cell, two synergids, three antipodals, and one central cell with two polar nuclei

(d) It is 7-celled and 7-nucleate with a single polar nucleus in the central cell

Q119

In double fertilisation, one male gamete fuses with the egg (syngamy) and the other with the two polar nuclei (triple fusion). If a plant has 2n = 16, what is the ploidy/chromosome number of the zygote and the primary endosperm nucleus (PEN), respectively?

(a) Zygote 2n = 16; PEN 2n = 16

(b) Zygote 2n = 16; PEN 3n = 24

(c) Zygote n = 8; PEN 3n = 24

(d) Zygote 3n = 24; PEN 2n = 16

Q120

Assertion (A): Apomixis produces seeds without fertilisation and the resulting offspring are genetically identical to the mother plant. Reason (R): In some Asteraceae and grasses, a diploid egg cell formed without meiosis develops into an embryo without fertilisation. Select the correct option:

(a) Both A and R are true but R is NOT the correct explanation

(b) A is false but R is true

(c) Both A and R are true and R is the correct explanation

(d) A is true but R is false

Q121

At which stages of the cell cycle are the major checkpoints located, and what does the G2/M checkpoint specifically verify?

(a) At M phase only; the G2/M checkpoint verifies cell size before G1

(b) At G0 and G1; the G2/M checkpoint verifies spindle attachment

(c) At G1/S and G2/M; the G2/M checkpoint verifies that DNA replication is complete and undamaged before mitosis

(d) At S phase only; the G2/M checkpoint verifies chromosome segregation

Q122

Consider the following distinctions between mitosis and meiosis: I. Crossing over occurs during pachytene of prophase I in meiosis but not in mitosis. II. Synapsis (pairing of homologues) occurs in both mitosis and meiosis. III. Chromosome number is halved in meiosis I (reductional) and maintained in meiosis II (equational). IV. Sister chromatids separate in anaphase of mitosis and in anaphase II of meiosis. How many statements are correct?

(a) Three

(b) Four

(c) Two

(d) One

Q123

A diploid plant cell (2n = 12) is observed. In which of the following will the DNA content be 4C while the chromosome number is still 12?

(a) Anaphase of mitosis (after sister separation)

(b) G2 phase and metaphase of mitosis

(c) G1 phase and anaphase II of meiosis

(d) Telophase of meiosis I

Q124

Match Column I (Cell organelle) with Column II (Distinctive feature): A. Mitochondria – i. 70S ribosomes, double membrane, cristae, own circular DNA B. Rough ER – ii. Ribosomes on surface; synthesis of secretory proteins C. Golgi apparatus – iii. Cis and trans faces; glycosylation and packaging D. Lysosome – iv. Acid hydrolases active at acidic pH; intracellular digestion Choose the correct combination:

(a) A-i, B-ii, C-iii, D-iv

(b) A-i, B-iii, C-ii, D-iv

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

(d) A-iii, B-ii, C-i, D-iv

Q125

An enzyme follows Michaelis-Menten kinetics with Km = 5 mM and Vmax = 100 micromol/min. At a substrate concentration [S] = 15 mM, what is the reaction velocity (using v = Vmax[S]/(Km+[S]))?

(a) 75 micromol/min

(b) 60 micromol/min

(c) 50 micromol/min

(d) 100 micromol/min

Q126

Consider the following statements about biomolecules: I. Cellulose is a polysaccharide with beta-1,4 glycosidic linkages and no helical secondary structure. II. Proteins can have quaternary structure only if composed of more than one polypeptide chain. III. A nucleoside consists of a nitrogenous base, a sugar and a phosphate group. IV. The primary structure of a protein refers to the sequence of amino acids. How many statements are correct?

(a) One

(b) Two

(c) Four

(d) Three

Q127

A circular plasmid vector and a piece of foreign DNA are both cut with the SAME restriction enzyme producing sticky ends, then mixed with DNA ligase. Besides the desired recombinant, several unwanted products form. Which strategy BEST ensures that only vectors carrying an insert are selected, exploiting insertional inactivation?

(a) Treat the host cells with EcoRI after transformation

(b) Use a vector where the insertion site lies within a selectable marker (e.g., the lacZ/beta-galactosidase or a tetracycline-resistance gene), so recombinants lose that marker's function (blue-white or differential-antibiotic screening) while non-recombinants retain it

(c) Heat the ligation mix to 90 degrees C to destroy non-recombinant plasmids

(d) Use a vector with two antibiotic-resistance genes and insert the foreign DNA outside both

Q128

Assertion (A): In Bt cotton, the cry genes are introduced to confer resistance against certain insect pests. Reason (R): The Bt toxin is produced as an active toxin in Bacillus thuringiensis and immediately kills the bacterium that produces it. Select the correct option:

(a) A is true but R is false

(b) A is false but R is true

(c) Both A and R are true but R is NOT the correct explanation

(d) Both A and R are true and R is the correct explanation

Q129

A PCR begins with 1 double-stranded template molecule. Because the first cycle's products have one strand longer than the target (only one primer-defined end), the discrete double-stranded fragments of EXACTLY the target length (both ends defined by primers) first appear in cycle 3 and accumulate as 2^n – 2n. After 5 complete cycles, how many such exact-length double-stranded amplicons are present?

(a) 32

(b) 10

(c) 20

(d) 22

Q130

In a terrestrial ecosystem, gross primary productivity (GPP) of producers is 20,000 kcal/m2/yr and respiratory loss (R) by producers is 12,000 kcal/m2/yr. If only 10% of net primary productivity (NPP) is transferred to herbivores, how much energy is available to primary consumers?

(a) 1200 kcal/m2/yr

(b) 8000 kcal/m2/yr

(c) 2000 kcal/m2/yr

(d) 800 kcal/m2/yr

Q131

Match Column I (Ecological pyramid) with Column II (Nature/feature): A. Pyramid of energy – i. Always upright B. Pyramid of biomass in a sea/pond – ii. Can be inverted (phytoplankton biomass < zooplankton) C. Pyramid of numbers in a tree ecosystem – iii. Inverted (one tree supports many herbivores) D. Pyramid of numbers in a grassland – iv. Generally upright Choose the correct combination:

(a) A-iii, B-ii, C-i, D-iv

(b) A-i, B-ii, C-iii, D-iv

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

(d) A-ii, B-i, C-iii, D-iv

Q132

Two interacting species are studied. Species X benefits while species Y is unaffected; in a second pair, species P is harmed while species Q is unaffected; in a third pair, the larger species M is harmed while the smaller N benefits and lives inside M. Identify, in order, the three interactions (X-Y, P-Q, M-N).

(a) Amensalism, commensalism, mutualism

(b) Mutualism, competition, predation

(c) Commensalism, amensalism, parasitism

(d) Commensalism, competition, parasitism

Q133

A population shows logistic growth following dN/dt = rN[(K-N)/K]. If K = 500, r = 0.1 per individual per year, and the current population N = 100, what is the instantaneous growth rate (dN/dt) in individuals per year?

(a) 10

(b) 40

(c) 5

(d) 8

Q134

The species-area relationship is log S = log C + Z log A, where Z is the slope. Consider: I. For small areas (within a region) Z typically ranges between 0.1 and 0.2. II. For very large areas (e.g., across continents) the slope Z is steeper, between 0.6 and 1.2. III. The relationship was first described by Alexander von Humboldt. IV. A larger Z always means lower species richness regardless of area. How many statements are correct?

(a) One

(b) Four

(c) Two

(d) Three

Q135

Assertion (A): According to the Rivet Popper hypothesis, the loss of key species (rivets) can lead to the collapse of an ecosystem. Reason (R): In Paul Ehrlich's analogy, every species is a rivet holding an airplane (ecosystem) together, and rivets on key parts (e.g., wings, representing keystone species) are more critical than those on seats. Select the correct option:

(a) Both A and R are true but R is NOT the correct explanation

(b) A is true but R is false

(c) Both A and R are true and R is the correct explanation

(d) A is false but R is true

ZOOLOGY

45 Questions | All Compulsory

Zoology (Q136 to Q180)

+4 for correct, –1 for incorrect, 0 for unattempted.

Q136

In a recombinant DNA experiment, a circular plasmid (6 kb) has two EcoRI sites and one BamHI site. EcoRI cuts creating fragments of 2 kb and 4 kb. A gene of interest (1.5 kb) flanked by EcoRI sites is to be inserted into the 4 kb fragment which carries the origin of replication. How many of the following statements are correct? (i) EcoRI produces sticky ends with 5′ overhangs. (ii) The 2 kb fragment lacking ori cannot independently replicate in the host. (iii) Ligation of the gene

requires DNA ligase forming phosphodiester bonds. (iv) The recognition sequence GAATTC is a palindrome read 5′->3′ on both strands.

(a) Four

(b) Three

(c) Two

(d) One

Q137

Match List I (Tool/Step) with List II (Function/Property) and select the correct combination: A. Ligase B. EcoRI C. Agarose gel D. Ethidium bromide I. Separates DNA fragments by size under electric field II. Joins DNA fragments via phosphodiester bonds III. Intercalates DNA, fluoresces orange under UV IV. Cleaves DNA at GAATTC palindrome

(a) A-II, B-IV, C-I, D-III

(b) A-III, B-IV, C-I, D-II

(c) A-II, B-I, C-IV, D-III

(d) A-IV, B-II, C-III, D-I

Q138

During a PCR run, the temperature profile per cycle is denaturation 94 degrees C, annealing 55 degrees C, extension 72 degrees C. Which statement is the single correct one?

(a) Taq polymerase synthesises DNA optimally at 55 degrees C during the annealing step

(b) Denaturation at 94 degrees C breaks the phosphodiester backbone separating the strands

(c) Extension at 72 degrees C denatures Taq polymerase, terminating the reaction

(d) Annealing at 55 degrees C allows primers to bind complementary single-stranded template regions

Q139

Assertion (A): pBR322 carries genes for ampicillin and tetracycline resistance, enabling insertional inactivation as a selectable marker. Reason (R): When foreign DNA is inserted at the BamHI/SalI site within the tetracycline-resistance gene, recombinants become tetracycline-sensitive but ampicillin-resistant.

(a) A is true but R is false

(b) Both A and R are true but R is NOT the correct explanation of A

(c) Both A and R are true and R is the correct explanation of A

(d) A is false but R is true

Q140

In a stirred-tank bioreactor producing a recombinant protein, which combination of features is required for optimal aerobic culture? Consider: (1) sparger for oxygen, (2) agitator/impeller, (3) cooling jacket for temperature control, (4) foam control system, (5) anaerobic seal preventing all gas exchange.

(a) 1, 2 and 5 only

(b) 2, 3, 4 and 5 only

(c) 1, 2, 3 and 4 only

(d) All of 1, 2, 3, 4 and 5

Q141

Recombinant human insulin (Humulin) is produced by inserting chains A and B as separate DNA sequences in E. coli. Which sequence of events correctly describes its production and assembly?

(a) A and B chains produced separately, extracted, then combined by creating disulphide bonds

(b) Insulin produced as mature hormone directly secreted with C-peptide intact

(c) A and B chains joined by peptide bonds catalysed by E. coli ribosomes in vivo

(d) A single proinsulin chain produced, then C-peptide enzymatically removed inside E. coli

Q142

How many of the following statements about biotechnological applications are correct? (i) Bt toxin Cry proteins exist as inactive protoxins, activated by the alkaline pH of the insect gut. (ii) Cry I Ac and Cry II Ab control cotton bollworms. (iii) RNAi against Meloidogyne incognita in tobacco silences nematode genes via dsRNA. (iv) ADA-SCID gene therapy using lymphocytes provides a permanent cure requiring no repeat infusions. (v) ELISA detects either antigens or antibodies for diagnosis.

(a) Five

(b) Three

(c) Two

(d) Four

Q143

Assertion (A): Gene therapy in the first ADA-SCID patient (1990) did not provide a permanent cure. Reason (R): The lymphocytes used were mortal cells, so periodic infusion of genetically engineered cells was required.

(a) A is true but R is false

(b) Both A and R are true and R is the correct explanation of A

(c) A is false but R is true

(d) Both A and R are true but R is NOT the correct explanation of A

Q144

An enzyme catalyses: ATP + glucose -> ADP + glucose-6-phosphate. To which class does this enzyme belong, and which statement about it is correct?

(a) Ligase; it joins ATP and glucose using a high-energy bond

(b) Lyase; it adds a group to a double bond without water

(c) Transferase; it transfers the phosphate (a chemical group) from ATP to glucose

(d) Hydrolase; it hydrolyses ATP to release a phosphate group

Q145

The respiratory quotient (RQ) values for substrates are a classic 2026 trap. How many of the following are correctly matched? (i) Carbohydrate – RQ = 1.0 (ii) Fat (tripalmitin) – RQ ~ 0.7 (iii) Protein – RQ ~ 0.9 (iv) Organic acid (malic acid) – RQ > 1.0 (v) Pure anaerobic fermentation of glucose – RQ = 1.0

(a) Five

(b) Four

(c) Two

(d) Three

Q146

Match List I (Cofactor type) with List II (Example) and choose the correct option: A. Prosthetic group B. Coenzyme C. Metal ion activator D. Apoenzyme I. NAD+ derived from niacin II. Haem tightly bound in peroxidase III. Zn2+ in carbonic anhydrase IV. Protein portion without cofactor

(a) A-IV, B-I, C-III, D-II

(b) A-I, B-II, C-III, D-IV

(c) A-II, B-III, C-I, D-IV

(d) A-II, B-I, C-III, D-IV

Q147

Assertion (A): The rate of an enzyme-catalysed reaction declines sharply above the optimum temperature. Reason (R): High temperature increases the kinetic energy of substrate molecules.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is NOT the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Q148

In a metabolic pool, which of the following statements regarding primary and secondary metabolites is correct?

(a) Antibiotics are primary metabolites essential for the producer's basic metabolism

(b) Amino acids and glucose are secondary metabolites of unknown physiological role

(c) Lectins and toxins are primary metabolites identified in all animal tissues

(d) Alkaloids and rubber are secondary metabolites with ecological/commercial roles

Q149

Match List I (Phylum) with List II (Exclusive diagnostic feature) and choose the correct option: A. Ctenophora B. Aschelminthes C. Annelida D. Echinodermata I. Water-vascular system and radial symmetry in adult II. Metameric segmentation with closed circulation III. Bioluminescence and comb plates for locomotion IV. Pseudocoelom and organ-system grade with complete gut

(a) A-IV, B-III, C-II, D-I

(b) A-III, B-IV, C-II, D-I

(c) A-I, B-IV, C-II, D-III

(d) A-III, B-II, C-IV, D-I

Q150

How many of the following animals are correctly described as triploblastic, coelomate AND deuterostome? (i) Asterias (ii) Balanoglossus (iii) Ascaris (iv) Branchiostoma (v) Petromyzon (vi) Neopilina

(a) Three

(b) Two

(c) Four

(d) Five

Q151

Assertion (A): Members of Phylum Porifera lack true tissues despite being multicellular. Reason (R): Cells in sponges are loosely arranged at the cellular grade of organisation, lacking division of labour at the tissue level.

(a) Both A and R are true but R is NOT the correct explanation of A

(b) A is false but R is true

(c) A is true but R is false

(d) Both A and R are true and R is the correct explanation of A

Q152

Which one of the following statements correctly distinguishes the notochord criterion in chordate classification?

(a) In Vertebrata the notochord persists unchanged and replaces the vertebral column

(b) In Hemichordata a true notochord extends the entire body length in adults

(c) In Urochordata the notochord is present only in the larval tail and lost in adults

(d) In Cephalochordata the notochord is restricted to the head region throughout life

Q153

During human spermatogenesis and oogenesis, how many of the following statements are correct? (i) One primary spermatocyte yields four functional sperms; one primary oocyte yields one functional ovum. (ii) Oogenesis begins before birth and primary oocytes are arrested at diplotene of prophase I. (iii) The secondary oocyte completes meiosis II only after sperm entry. (iv) The first polar body may or may not divide further; the second polar body forms at ovulation before fertilisation. (v) Spermiogenesis is the transformation of spermatids into spermatozoa.

(a) Two

(b) Three

(c) Five

(d) Four

Q154

Match List I (Hormone) with List II (Primary role in menstrual cycle) and choose the correct option: A. FSH B. LH C. Estrogen D. Progesterone I. Surge triggers ovulation at mid-cycle II. Stimulates

growth of ovarian follicles III. Maintains endometrium during luteal phase IV. Peaks in follicular phase, induces LH surge

(a) A-IV, B-I, C-II, D-III

(b) A-II, B-IV, C-I, D-III

(c) A-I, B-II, C-III, D-IV

(d) A-II, B-I, C-IV, D-III

Q155

Arrange the correct temporal sequence from fertilisation to implantation in humans: 1. Zona pellucida is shed (hatching) 2. Formation of blastocyst with trophoblast and inner cell mass 3. Morula reaches the uterus 4. Trophoblast attaches to the endometrium 5. Cleavage of the zygote in the isthmus/ampulla

(a) 5 -> 3 -> 1 -> 2 -> 4

(b) 5 -> 2 -> 3 -> 1 -> 4

(c) 5 -> 3 -> 2 -> 1 -> 4

(d) 3 -> 5 -> 2 -> 4 -> 1

Q156

Match List I (ART/Contraceptive technique) with List II (Description) and choose the correct option: A. ZIFT B. GIFT C. ICSI D. IUI I. Sperm directly injected into the ovum in vitro II. Zygote/early embryo (up to 8 blastomeres) transferred into the fallopian tube III. Transfer of an ovum collected from a donor into the fallopian tube of a recipient IV. Husband's/donor's semen introduced into the uterus

(a) A-II, B-I, C-III, D-IV

(b) A-II, B-III, C-I, D-IV

(c) A-I, B-III, C-II, D-IV

(d) A-III, B-II, C-I, D-IV

Q157

How many of the following statements regarding contraception and reproductive health are correct? (i) Lactational amenorrhoea is effective up to about six months postpartum with no side effects. (ii) Copper-releasing IUDs (CuT) act partly by suppressing sperm motility and fertilising capacity. (iii) Tubectomy and vasectomy are reversible terminal methods. (iv) Saheli is a non-steroidal once-a-week oral pill. (v) MTP is comparatively safe during the first trimester.

(a) Five

(b) Four

(c) Two

(d) Three

Q158

In a large randomly mating population, the frequency of an autosomal recessive disorder is 1 in 2500. Assuming Hardy-Weinberg equilibrium, what fraction of the population are carriers (heterozygotes)?

(a) Approximately 1 in 2500

(b) Approximately 1 in 100

(c) Approximately 1 in 25.5 (about 0.0392)

(d) Approximately 1 in 50

Q159

Match List I (Evolutionary evidence) with List II (Example) and choose the correct option: A. Homologous organs B. Analogous organs C. Connecting link D. Atavism I. Wings of butterfly and wings of bird II. Forelimbs of whale, bat and human III. Presence of a rudimentary tail in a human infant IV. Archaeopteryx between reptiles and birds

(a) A-I, B-II, C-IV, D-III

(b) A-IV, B-I, C-II, D-III

(c) A-II, B-I, C-IV, D-III

(d) A-II, B-I, C-III, D-IV

Q160

Assertion (A): The Hardy-Weinberg equilibrium is disturbed by genetic drift but not by mutation alone over evolutionary time. Reason (R): Genetic drift causes random changes in allele frequencies, especially in small populations.

(a) A is true but R is false

(b) Both A and R are true and R is the correct explanation of A

(c) Both A and R are true but R is NOT the correct explanation of A

(d) A is false but R is true

Q161

The oxygen-haemoglobin dissociation curve is sigmoid. A rightward shift (Bohr effect) occurs in actively respiring tissues. How many of the following favour a rightward shift (reduced O2 affinity, enhanced unloading)? (i) Rise in pCO2 (ii) Fall in pH (rise in H+) (iii) Rise in temperature (iv) Rise in 2,3-BPG (v) Rise in pO2

(a) Three

(b) Five

(c) Two

(d) Four

Q162

In a person, every 100 mL of blood delivers about 4 mL of CO_2 to the alveoli, and 100 mL of blood delivers about 5 mL of O_2 to tissues. Based on these figures, what is the approximate respiratory exchange ratio (R) at the lungs?

(a) 0.5

(b) 1.0

(c) 1.25

(d) 0.8

Q163

Which one of the following statements regarding the transport of CO_2 and regulation of respiration is correct?

(a) Oxygen concentration is the primary driver sensed by the respiratory rhythm centre

(b) The pneumotaxic centre in the medulla increases the duration of inspiration

(c) About 70% of CO_2 is transported as bicarbonate; carbonic anhydrase is present in RBCs

(d) Most CO_2 (about 70%) is carried dissolved in plasma as free CO_2

Q164

Study this description of the ECG: 'A normal ECG shows a P wave, followed by a QRS complex, then a T wave. The interval from the start of P to the start of QRS represents conduction through a specific structure.' Which statement is correct?

(a) The P wave corresponds to ventricular depolarisation initiating systole

(b) The P-R interval reflects the delay at the AV node before ventricular depolarisation

(c) The T wave represents atrial repolarisation occurring before ventricular contraction

(d) The QRS complex represents repolarisation of both ventricles

Q165

Assertion (A): In the blood coagulation cascade, conversion of prothrombin to thrombin requires the enzyme complex thrombokinase (prothrombinase). Reason (R): Thrombin then converts soluble fibrinogen into insoluble fibrin threads forming the clot.

(a) Both A and R are true and R is the correct explanation of A

(b) A is false but R is true

(c) Both A and R are true but R is NOT the correct explanation of A

(d) A is true but R is false

Q166

In the human nephron, the counter-current mechanism between the loop of Henle and vasa recta maintains a concentration gradient in the medulla. Which statement is correct?

(a) The descending limb actively pumps out NaCl while being permeable to water

(b) The DCT is the principal site impermeable to water under all conditions

(c) The ascending limb actively transports NaCl out but is impermeable to water

(d) The vasa recta runs perpendicular to the loop, abolishing the gradient

Q167

A patient's kidneys form 180 L of glomerular filtrate per day. If 1.8 L of urine is excreted, what percentage of filtrate is reabsorbed, and which hormone primarily controls the final water reabsorption?

(a) 99% reabsorbed; ADH (vasopressin) controls facultative water reabsorption

(b) 99% reabsorbed; ANF increases water reabsorption in collecting duct

(c) 90% reabsorbed; aldosterone controls water reabsorption directly

(d) 98% reabsorbed; renin reabsorbs water in the proximal tubule

Q168

According to the sliding-filament theory, during muscle contraction which set of changes occurs at the sarcomere? Consider: (1) A-band length constant, (2) I-band shortens, (3) H-zone narrows/disappears, (4) Z-lines move apart, (5) actin filaments slide over myosin.

(a) All five are correct

(b) 1, 2, 3 and 5 are correct; 4 is incorrect

(c) 2, 3 and 4 only

(d) 1, 4 and 5 only

Q169

In a resting sarcomere the A-band (thick-filament length) is 1.6 micrometre, and each of the two thin filaments extends 1.0 micrometre from its Z-line, giving a sarcomere length of 2.5 micrometre. Assuming the A-band length is unchanged and no thin filaments meet at the centre, what is the resting H-zone width?

(a) 0.5 micrometre

(b) 1.1 micrometre

(c) 0.3 micrometre

(d) 0.9 micrometre

Q170

Match List I (Joint) with List II (Type/Example) and choose the correct option: A. Between atlas and axis B. Between carpals C. Knee D. Between skull bones I. Hinge joint II. Pivot joint III. Fibrous (immovable) joint IV. Gliding joint

(a) A-II, B-IV, C-I, D-III

(b) A-III, B-IV, C-I, D-II

(c) A-I, B-IV, C-II, D-III

(d) A-II, B-I, C-IV, D-III

Q171

How many of the following statements about immunity are correct? (i) IgG is the only antibody class able to cross the placenta, giving natural passive immunity. (ii) The antibody monomer has two light and two heavy chains (H2L2). (iii) Active immunity from infection or vaccine is fast-acting and immediate. (iv) Colostrum is rich in IgA, providing passive immunity to the newborn. (v) Cell-mediated immunity is responsible for graft rejection.

(a) Two

(b) Four

(c) Three

(d) Five

Q172

Match List I (Disease) with List II (Causal organism) and choose the correct option: A. Filariasis B. Amoebiasis C. Ascariasis D. Ringworm I. Entamoeba histolytica II. Microsporum / Trichophyton III. Wuchereria bancrofti IV. Ascaris lumbricoides

(a) A-III, B-I, C-IV, D-II

(b) A-I, B-III, C-IV, D-II

(c) A-III, B-I, C-II, D-IV

(d) A-III, B-IV, C-I, D-II

Q173

Regarding an action potential along a neuron, which statement is the single correct one?

(a) The Na+/K+ pump pumps 2 Na+ out and 3 K+ in per ATP hydrolysed

(b) At the peak of depolarisation, the membrane briefly reverses to about +30 mV due to Na+ influx

(c) During the resting potential, the membrane is more permeable to Na+ than to K+

(d) Repolarisation is achieved by the rapid influx of K+ ions into the axon

Q174

Assertion (A): In the human eye, the region of the retina where the optic nerve leaves is the blind spot, having no photoreceptors. Reason (R): The fovea centralis (macula lutea) has the highest density of cones, giving the greatest visual acuity.

(a) A is true but R is false

(b) A is false but R is true

(c) Both A and R are true but R is NOT the correct explanation of A

(d) Both A and R are true and R is the correct explanation of A

Q175

Match List I (Endocrine condition) with List II (Hormone-gland defect) and choose the correct option: A. Diabetes insipidus B. Cretinism C. Acromegaly D. Addison's disease I. Hyposecretion of thyroxine in childhood II. Hyposecretion of ADH from neurohypophysis III. Hyposecretion of adrenal cortical hormones IV. Hypersecretion of GH in adults

(a) A-II, B-I, C-IV, D-III

(b) A-II, B-IV, C-I, D-III

(c) A-II, B-I, C-III, D-IV

(d) A-I, B-II, C-IV, D-III

Q176

Which one of the following correctly describes the mechanism of action of a hormone and the hypothalamo-pituitary axis?

(a) Protein hormones diffuse freely across the membrane to bind nuclear receptors

(b) Steroid hormones bind intracellular receptors and regulate gene expression directly

(c) The posterior pituitary synthesises oxytocin and vasopressin de novo

(d) Releasing hormones from the adenohypophysis control the hypothalamus

Q177

Match List I (Tissue) with List II (Location/feature) and choose the correct option: A. Squamous epithelium B. Ciliated columnar epithelium C. Adipose tissue D. Cardiac muscle I. Lines bronchioles and fallopian tubes, moves particles/ova II. Forms walls of blood vessels and air sacs (diffusion boundary) III. Branched, involuntary, striated with intercalated discs IV. Stores fat, found beneath the skin

(a) A-I, B-II, C-IV, D-III

(b) A-II, B-I, C-III, D-IV

(c) A-II, B-IV, C-I, D-III

(d) A-II, B-I, C-IV, D-III

Q178

Match List I (Microbe) with List II (Product/Role) and choose the correct option: A. Acetobacter aceti B. Methanobacterium C. Trichoderma polysporum D. Streptococcus I. Cyclosporin A (immunosuppressant) II. Vinegar (acetic acid) III. Streptokinase (clot buster) IV. Methane (biogas), also found in rumen of cattle

(a) A-II, B-IV, C-III, D-I

(b) A-II, B-IV, C-I, D-III

(c) A-II, B-I, C-IV, D-III

(d) A-IV, B-II, C-I, D-III

Q179

How many of the following statements about microbes in sewage and biogas are correct? (i) Secondary sewage treatment is a biological treatment involving aerobic microbial flocs. (ii) Anaerobic sludge digesters produce a mixture of gases including methane, H_2S and CO_2. (iii) BOD of sewage decreases when the primary effluent is passed into aeration tanks. (iv) Methanogens like Methanobacterium are present in the rumen of cattle and in biogas plants. (v) Activated sludge is entirely discarded; none is recycled as inoculum.

(a) Two

(b) Five

(c) Three

(d) Four

Q180

In a pedigree, a phenotypically normal couple has a son affected with haemophilia and a daughter who is a carrier. How many of the following inferences are correct? (i) The mother is necessarily a carrier (heterozygous) for the haemophilia allele. (ii) The father is necessarily a haemophiliac. (iii) The trait is X-linked recessive. (iv) The probability that their next son is haemophilic is 1/2. (v) An affected daughter would require the father to be haemophilic.

(a) Four

(b) Two

(c) Three

(d) Five

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