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NEET 2026 Re-Exam Prediction Paper — Set B (Medium)

NEET UG 2026 Re-Exam — Prediction Paper

Set B · Medium · Full-Length (180 Q)

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

DIFFICULTY: MEDIUM

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

About this paper (Medium tier)

The balanced central forecast: NCERT-grounded with a fair share of application and two-step reasoning. Closest to a normal NEET.

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 dimensional formula for X = (electric field x magnetic field)/permeability of free space is the same as that of:

(a) Energy density

(b) Pressure gradient

(c) Force per unit length

(d) Power per unit area

Q2

A quantity Z = A^2 B / sqrt(C). If percentage errors in A, B and C are 2%, 1% and 4%, the maximum percentage error in Z is:

(a) 9%

(b) 7%

(c) 5%

(d) 11%

Q3

A particle moves along the x-axis with velocity v = 8 – 2t (m/s). The distance travelled in the first 6 seconds is:

(a) 16 m

(b) 8 m

(c) 12 m

(d) 20 m

Q4

Two particles are projected from the same point with the same speed at 30 and 60 degrees. The ratio of their maximum heights is:

(a) 1 : sqrt3

(b) 1 : 3

(c) sqrt3 : 1

(d) 3 : 1

Q5

Two blocks of masses 3 kg and 2 kg are connected by a light string over a frictionless pulley; the 3 kg block hangs and the 2 kg block rests on a frictionless table. The acceleration is (g = 10 m/s^2):

(a) 6 m/s^2

(b) 4 m/s^2

(c) 5 m/s^2

(d) 3 m/s^2

Q6

A car negotiates a frictionless banked curve of radius 50 m banked at angle theta with tan(theta) = 0.5. The maximum safe speed is (g = 10 m/s^2):

(a) ~16 m/s

(b) ~10 m/s

(c) ~25 m/s

(d) ~22 m/s

Q7

A 2 kg block is pushed against a spring of force constant 500 N/m, compressing it 0.2 m. Released on a frictionless surface, its speed as it leaves the spring is:

(a) ~5.0 m/s

(b) ~3.2 m/s

(c) ~2.0 m/s

(d) ~4.5 m/s

Q8

A solid sphere of mass M, radius R rolls without slipping down an incline of height h. Its centre-of-mass speed at the bottom is:

(a) sqrt(10gh/7)

(b) sqrt(4gh/3)

(c) sqrt(6gh/5)

(d) sqrt(2gh)

Q9

A uniform rod of mass M, length L rotates about an axis through one end perpendicular to its length. Its moment of inertia is:

(a) ML^2/12

(b) ML^2/4

(c) ML^2/3

(d) ML^2/2

Q10

A dancer spins at angular velocity w. Pulling her arms in reduces her moment of inertia to one-third. Her new angular velocity and the ratio of new to old rotational KE are:

(a) 3w and 3

(b) w/3 and 1/3

(c) 3w and 1/3

(d) 9w and 9

Q11

A satellite orbits at radius 2R (R = Earth's radius). If escape velocity from Earth's surface is 11.2 km/s, its orbital velocity is about:

(a) ~11.2 km/s

(b) ~7.9 km/s

(c) ~4.0 km/s

(d) ~5.6 km/s

Q12

Water flows through a horizontal pipe whose area reduces from 10 cm^2 to 5 cm^2. If the speed in the wider section is 2 m/s, the speed in the narrower section is:

(a) 1 m/s

(b) 8 m/s

(c) 4 m/s

(d) 6 m/s

Q13

A capillary tube of radius 0.2 mm is dipped in water (T = 0.072 N/m, density 1000 kg/m^3, contact angle 0). The rise of water is about (g = 10 m/s^2):

(a) ~1.8 cm

(b) ~3.6 cm

(c) ~14.4 cm

(d) ~7.2 cm

Q14

One mole of an ideal monatomic gas undergoes isothermal expansion. During this process:

(a) Internal energy increases and no heat is exchanged

(b) Heat absorbed equals work done by the gas and internal energy is unchanged

(c) Work done is zero and heat is absorbed

(d) Internal energy decreases while temperature rises

Q15

A Carnot engine has efficiency 40% with the sink at 300 K. To raise the efficiency to 50% keeping the sink fixed, the source temperature must increase by:

(a) 200 K

(b) 150 K

(c) 100 K

(d) 50 K

Q16

A particle in SHM of amplitude A is at the displacement where its kinetic energy equals its potential energy. That displacement is:

(a) A sqrt2

(b) A/2

(c) A/sqrt2

(d) A

Q17

A spring-mass system has time period T. If the mass and the spring constant are both doubled, the new time period is:

(a) T sqrt2

(b) T

(c) T/sqrt2

(d) 2T

Q18

A string fixed at both ends vibrates in its third harmonic. With length 1.5 m and wave speed 120 m/s, the frequency is:

(a) 40 Hz

(b) 60 Hz

(c) 120 Hz

(d) 80 Hz

Q19

Two tuning forks give 5 beats/s. One is 256 Hz. On loading the other with wax, the beats fall to 3/s. The original frequency of the second fork is:

(a) 253 Hz

(b) 251 Hz

(c) 261 Hz

(d) 259 Hz

Q20

An electric dipole of moment p in a uniform field E is rotated from theta = 0 to theta = 90 degrees. The work done is:

(a) pE

(b) pE/2

(c) zero

(d) 2pE

Q21

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

(a) kQ/2R

(b) zero

(c) 2kQ/R

(d) kQ/R

Q22

Three capacitors of 2 uF, 3 uF and 6 uF are connected in series. The equivalent capacitance is:

(a) 2 uF

(b) 11 uF

(c) 1 uF

(d) 0.5 uF

Q23

Match Column I (quantity) with Column II (SI unit): A. Electric flux – i. weber; B. Magnetic flux – ii. volt-metre; C. Capacitance – iii. coulomb/volt; D. Inductance – iv. volt-second/ampere.

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

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

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

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

Q24

In the given circuit, a battery of EMF 12 V and internal resistance 1 ohm drives an external resistance of 5 ohm. The terminal voltage is:

(a) 11 V

(b) 10 V

(c) 12 V

(d) 2 V

Q25

In a meter bridge, the balance point is at 25 cm when the known resistance in the right gap is 9 ohm. The unknown resistance in the left gap is:

(a) 3 ohm

(b) 12 ohm

(c) 27 ohm

(d) 6 ohm

Q26

How many of these statements about a metallic conductor at constant temperature are correct? (i) Drift velocity is proportional to applied field. (ii) Resistance is independent of length. (iii) Current density is proportional to field. (iv) Mobility depends on applied field.

(a) One

(b) Two

(c) Four

(d) Three

Q27

In the given circuit, 4 ohm and 6 ohm resistors in parallel are in series with a 2.6 ohm resistor across a 10 V battery of negligible internal resistance. The current drawn is:

(a) 10 A

(b) 2 A

(c) 1 A

(d) 5 A

Q28

A proton enters a 0.2 T field at 4 x 10^6 m/s perpendicular to it. The radius of its path is (m = 1.6 x 10^-27 kg, q = 1.6 x 10^-19 C):

(a) 0.4 m

(b) 0.2 m

(c) 2 m

(d) 0.1 m

Q29

A long solenoid with 500 turns per metre carries 4 A. The field inside is (mu0 = 4pi x 10^-7):

(a) ~2.5 x 10^-3 T

(b) ~1.0 x 10^-3 T

(c) ~6.3 x 10^-3 T

(d) ~5.0 x 10^-4 T

Q30

Assertion (A): Ferromagnetic materials lose ferromagnetism above the Curie temperature. Reason (R): Above the Curie temperature, thermal agitation destroys the alignment of magnetic domains.

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

(b) A is true but R is false

(c) A is false but R is true

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

Q31

A coil of inductance 0.5 H carries a current rising uniformly from 0 to 4 A in 0.2 s. The induced EMF is:

(a) 2 V

(b) 10 V

(c) 20 V

(d) 5 V

Q32

An ideal step-down transformer has 1000 primary and 100 secondary turns. The secondary delivers 5 A. The primary current is:

(a) 5 A

(b) 50 A

(c) 0.5 A

(d) 2.5 A

Q33

Statement I: In an LCR series AC circuit, the current lags the voltage when the circuit is predominantly inductive. Statement II: At resonance, the current in a series LCR circuit is minimum.

(a) Statement I is true, Statement II is false

(b) Both statements are false

(c) Statement I is false, Statement II is true

(d) Both statements are true

Q34

In a plane EM wave in vacuum the peak electric field is 30 V/m. The peak magnetic field is (c = 3 x 10^8 m/s):

(a) 1 x 10^-8 T

(b) 3 x 10^-7 T

(c) 9 x 10^-7 T

(d) 1 x 10^-7 T

Q35

A concave mirror of focal length 15 cm forms a real image 30 cm from the mirror. The object distance is:

(a) 60 cm

(b) 45 cm

(c) 15 cm

(d) 30 cm

Q36

A thin equiconvex lens has radii 20 cm each and refractive index 1.5. Its focal length in air is:

(a) 20 cm

(b) 40 cm

(c) 10 cm

(d) 15 cm

Q37

A ray passes through an equilateral prism (A = 60 degrees) at minimum deviation 30 degrees. The refractive index is:

(a) sqrt2

(b) 1.5

(c) 1.33

(d) sqrt3

Q38

In Young's double slit experiment the fringe width is 0.4 mm. If the apparatus is immersed in water (n = 4/3), the new fringe width is:

(a) 0.53 mm

(b) 0.3 mm

(c) 0.2 mm

(d) 0.4 mm

Q39

Light of wavelength 400 nm is incident on a metal of work function 2 eV. The maximum KE of the photoelectrons is (hc = 1240 eV.nm):

(a) 1.1 eV

(b) 2.0 eV

(c) 0.5 eV

(d) 3.1 eV

Q40

An electron and a proton have the same kinetic energy. The ratio of the de Broglie wavelength of the electron to that of the proton is:

(a) sqrt(me/mp)

(b) 1

(c) mp/me

(d) sqrt(mp/me)

Q41

The energy of an electron in the second excited state (n = 3) of hydrogen is:

(a) -13.6 eV

(b) -0.85 eV

(c) -3.4 eV

(d) -1.51 eV

Q42

A radioactive sample has a half-life of 10 days. The fraction remaining after 30 days is:

(a) 1/6

(b) 1/3

(c) 1/8

(d) 1/16

Q43

Binding energy of a deuteron is 2.2 MeV and of helium-4 is 28 MeV. When two deuterons fuse to form helium, the energy released is:

(a) 25.8 MeV

(b) 23.6 MeV

(c) 30.2 MeV

(d) 2.2 MeV

Q44

In a p-n junction diode under forward bias:

(a) Only minority carriers produce the large forward current

(b) The depletion region narrows and the barrier potential is lowered

(c) Majority carriers are pushed away from the junction

(d) The depletion region widens and current is negligible

Q45

In a full-wave rectifier with input frequency 50 Hz, the fundamental ripple frequency at the output is:

(a) 100 Hz

(b) 200 Hz

(c) 25 Hz

(d) 50 Hz

CHEMISTRY

45 Questions | All Compulsory

Chemistry (Q46 to Q90)

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

Q46

For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, the value of Kp is related to Kc by which expression at temperature T?

(a) $Kp = Kc(RT)^2$

(b) $Kp = Kc(RT)^{-2}$

(c) $Kp = Kc(RT)$

(d) $Kp = Kc(RT)^{-1}$

Q47

A 0.01 M solution of a weak monobasic acid is 5% ionised at 25°C. The dissociation constant (Ka) of the acid is approximately:

(a) 2.5×10^{-5}

(b) 5.0×10^{-5}

(c) 2.5×10^{-4}

(d) 5.0×10^{-4}

Q48

For the equilibrium $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$, which change will shift the equilibrium to the right (more decomposition)?

(a) Removing CO_2 as it forms

(b) Increasing the pressure of CO_2

(c) Adding more $CaCO_3$ solid

(d) Decreasing the temperature

Q49

The Ksp of $Mg(OH)_2$ is 1.0×10^{-11}. The molar solubility of $Mg(OH)_2$ in pure water is approximately:

(a) 1.4×10^{-4} M

(b) 2.2×10^{-4} M

(c) 1.0×10^{-4} M

(d) 1.0×10^{-6} M

Q50

The IUPAC name of the complex $K_3[Fe(CN)_6]$ is:

(a) Potassium hexacyanoferrate(III)

(b) Potassium hexacyanoferrate(II)

(c) Potassium ferricyanide(III)

(d) Potassium hexacyanidoferrate(III)

Q51

The spin-only magnetic moment of the complex ion $[CoF_6]^{3-}$ (Co^{3+}, d^6, weak-field ligand) is approximately:

(a) 2.83 BM

(b) 0 BM

(c) 4.90 BM

(d) 5.92 BM

Q52

Match List I (complex) with List II (number of unpaired electrons) and choose the correct option: List I: (A) $[Fe(CN)_6]^{4-}$ (B) $[Fe(H_2O)_6]^{2+}$ (C) $[Co(NH_3)_6]^{3+}$ (D) $[Ni(H_2O)_6]^{2+}$ List II: (i) 0 (ii) 2 (iii) 4

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

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

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

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

Q53

Assertion (A): $[Cu(NH_3)_4]^{2+}$ is square planar and shows colour. Reason (R): Cu^{2+} is a d^9 ion and undergoes dsp^2 hybridisation, with d-d transitions giving colour.

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

(d) A is true but R is false

Q54

Among $CH_3CH_2CH_2^+$ (n-propyl), $(CH_3)_2CH^+$ (isopropyl) and $CH_2{=}CH{-}CH_2^+$ (allyl), the correct order of stability is:

(a) isopropyl > allyl > n-propyl

(b) n-propyl > isopropyl > allyl

(c) allyl > isopropyl > n-propyl

(d) isopropyl > n-propyl > allyl

Q55

The number of structural (chain + positional) isomers possible for the molecular formula C_5H_{12} is:

(a) 3

(b) 5

(c) 2

(d) 4

Q56

Which of the following is the strongest acid?

(a) $ClCH_2COOH$

(b) $Cl_2CHCOOH$

(c) FCH_2COOH

(d) CH_3COOH

Q57

For a first-order reaction, 75% of the reactant is consumed in 60 minutes. The half-life of the reaction is:

(a) 30 min

(b) 20 min

(c) 15 min

(d) 40 min

Q58

The rate constant of a first-order reaction is $2.303 \times 10^{-3}\ s^{-1}$. The time required for the concentration to fall to 1/10 of its initial value is:

(a) 100 s

(b) 500 s

(c) 1000 s

(d) 2303 s

Q59

The activation energy of a reaction can be determined from the slope of the Arrhenius plot. If ln k is plotted against 1/T, the slope equals:

(a) Ea/R

(b) Ea/2.303R

(c) −Ea/R

(d) −Ea/2.303R

Q60

The correct decreasing order of basicity in aqueous solution is:

(a) $C_2H_5NH_2 > (C_2H_5)_2NH > (C_2H_5)_3N > C_6H_5NH_2$

(b) $(C_2H_5)_2NH > C_2H_5NH_2 > (C_2H_5)_3N > C_6H_5NH_2$

(c) $C_6H_5NH_2 > (C_2H_5)_3N > C_2H_5NH_2 > (C_2H_5)_2NH$

(d) $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NH_2$

Q61

In the carbylamine test, which class of amine gives a foul-smelling isocyanide?

(a) Both primary and secondary amines

(b) Only secondary amines

(c) Only tertiary amines

(d) Only primary amines

Q62

Aniline is treated with $NaNO_2$/HCl at 273–278 K, and the product is then warmed with water. The final product is:

(a) Nitrobenzene

(b) Benzene

(c) Phenol

(d) Chlorobenzene

Q63

According to MO theory, the bond order and magnetic nature of the N_2 molecule are:

(a) 3, paramagnetic

(b) 2.5, paramagnetic

(c) 3, diamagnetic

(d) 2, diamagnetic

Q64

The shape and hybridisation of the IF_7 molecule (central I, 7 bond pairs, no lone pair) are:

(a) Pentagonal bipyramidal, sp^3d^3

(b) Capped trigonal prismatic, sp^3d^2

(c) Square antiprismatic, sp^3d^3

(d) Octahedral, sp^3d^2

Q65

Which of the following statements about hydrogen bonding is/are correct? (I) H_2O has a higher boiling point than H_2S due to intermolecular H-bonding. (II) o-nitrophenol has a higher boiling point than p-nitrophenol. (III) HF is a weaker acid than HCl partly due to strong H-bonding.

(a) I, II and III

(b) I and III only

(c) II and III only

(d) I and II only

Q66

For a reaction at 300 K, $\Delta H = +30$ kJ/mol and $\Delta S = +100$ J/K/mol. The value of ΔG (in kJ/mol) is:

(a) +30

(b) 0

(c) −60

(d) +60

Q67

Using Hess's law: given enthalpies of formation of $CO_2(g) = -393$ kJ/mol and $CO(g) = -110$ kJ/mol, the enthalpy of the reaction $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$ is:

(a) −283 kJ/mol

(b) −503 kJ/mol

(c) +283 kJ/mol

(d) −110 kJ/mol

Q68

For an ideal gas, which of the following is true for an adiabatic process?

(a) $\Delta T = 0$ always

(b) $\Delta U = 0$, so $q = -w$

(c) $q = 0$, so $\Delta U = w$

(d) $w = 0$, so $q = \Delta U$

Q69

Which of the following correctly describes the structure of white phosphorus (P_4)?

(a) Square planar with 90° bond angles

(b) Tetrahedral P_4 with P–P–P bond angle of 60°

(c) Linear chain of P atoms

(d) Layered sheet structure

Q70

Match List I (interhalogen/species) with List II (shape) and choose the correct option: List I: (A) ClF_3 (B) BrF_5 (C) ICl (D) IF_7 List II: (i) Linear (ii) Bent T-shape (iii) Square pyramidal (iv) Pentagonal bipyramidal

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

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

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

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

Q71

Which of the following statements about Group 15 hydrides is correct?

(a) Basic character increases down the group: $NH_3 < PH_3 < AsH_3$

(b) Bond angle increases down the group: $NH_3 < PH_3 < AsH_3$

(c) Thermal stability decreases down the group: $NH_3 > PH_3 > AsH_3 > SbH_3$

(d) NH_3 has the lowest boiling point among the hydrides

Q72

In the aldol condensation, which of the following aldehydes cannot undergo self-aldol condensation?

(a) Propanal (CH_3CH_2CHO)

(b) Acetaldehyde (CH_3CHO)

(c) Benzaldehyde (C_6H_5CHO)

(d) Butanal ($CH_3CH_2CH_2CHO$)

Q73

Match List I (reagent/reaction) with List II (transformation) and choose the correct option: List I: (A) Clemmensen reduction (B) Wolff–Kishner reduction (C) Tollens' reagent (D) Fehling's solution List II: (i) >C=O → $>CH_2$ using Zn-Hg/HCl (ii) >C=O → $>CH_2$ using NH_2NH_2/KOH (iii) oxidises aldehyde, silver mirror (iv) oxidises aliphatic aldehyde, red ppt

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

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

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

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

Q74

The correct order of acidic strength among the following carboxylic acids is: HCOOH, CH_3COOH, C_6H_5COOH, $ClCH_2COOH$

(a) $ClCH_2COOH > HCOOH > C_6H_5COOH > CH_3COOH$

(b) $HCOOH > ClCH_2COOH > CH_3COOH > C_6H_5COOH$

(c) $CH_3COOH > HCOOH > C_6H_5COOH > ClCH_2COOH$

(d) $ClCH_2COOH > C_6H_5COOH > HCOOH > CH_3COOH$

Q75

Which of the following is a reducing sugar?

(a) Trehalose

(b) Sucrose

(c) Maltose

(d) Methyl α-D-glucoside

Q76

Which of the following statements about proteins is/are correct? (I) The secondary structure (α-helix, β-sheet) is stabilised by hydrogen bonds. (II) The peptide bond is an amide linkage (–CO–NH–). (III) Denaturation destroys the primary structure of a protein.

(a) I and III only

(b) II and III only

(c) I and II only

(d) I, II and III

Q77

For the cell reaction with $E°_{cell}$ = +0.46 V at 298 K and n = 2, the equilibrium constant (use 2.303RT/F = 0.059) is of the order:

(a) 10^{16}

(b) 10^{23}

(c) 10^{8}

(d) 10^{-8}

Q78

The limiting molar conductivity ($\Lambda°_m$) of CH_3COOH can be obtained from Kohlrausch's law using:

(a) $\Lambda^\circ(CH_3COONa) + \Lambda^\circ(HCl) - \Lambda^\circ(NaCl)$

(b) $\Lambda^\circ(CH_3COONa) - \Lambda^\circ(HCl) + \Lambda^\circ(NaCl)$

(c) $\Lambda^\circ(HCl) + \Lambda^\circ(NaCl) - \Lambda^\circ(CH_3COONa)$

(d) $\Lambda^\circ(CH_3COONa) + \Lambda^\circ(NaCl) - \Lambda^\circ(HCl)$

Q79

An aqueous solution contains a non-volatile solute. The relative lowering of vapour pressure is 0.2. If the solution contains 1 mole of solute, the number of moles of solvent is:

(a) 4

(b) 5

(c) 10

(d) 8

Q80

0.5 m aqueous solution of NaCl shows a van't Hoff factor i = 1.9. The percentage dissociation of NaCl is:

(a) 80%

(b) 85%

(c) 90%

(d) 95%

Q81

On reductive ozonolysis of an alkene, the products are acetone and acetaldehyde. The alkene is:

(a) 3-methyl-1-butene

(b) 2-pentene

(c) 2-methyl-1-butene

(d) 2-methyl-2-butene

Q82

When propene reacts with HBr in the presence of benzoyl peroxide, the major product is:

(a) 2-bromopropane

(b) 1-bromopropane

(c) 2-bromo-1-propene

(d) 1,2-dibromopropane

Q83

The acidic character of the following compounds increases in the order: phenol, p-nitrophenol, p-cresol (p-methylphenol)

(a) p-cresol < p-nitrophenol < phenol

(b) p-cresol < phenol < p-nitrophenol

(c) phenol < p-cresol < p-nitrophenol

(d) p-nitrophenol < phenol < p-cresol

Q84

In the Williamson synthesis, the best combination to prepare tert-butyl methyl ether without significant elimination is:

(a) methyl bromide + sodium tert-butoxide

(b) tert-butyl bromide + sodium methoxide

(c) tert-butyl bromide + methanol

(d) methyl iodide + tert-butyl alcohol

Q85

An optically active 2-bromobutane undergoes hydrolysis. Under purely SN1 conditions the product is largely racemised, whereas under SN2 conditions the product shows inversion of configuration. The reason racemisation accompanies the SN1 pathway is:

(a) 2-bromobutane cannot form a carbocation

(b) The planar carbocation intermediate is attacked from both faces with near-equal probability

(c) The nucleophile attacks from the back side only

(d) SN1 always proceeds with complete retention of configuration

Q86

Assertion (A): Lanthanoid contraction causes the atomic radii of Zr and Hf to be nearly the same. Reason (R): The poor shielding of 4f electrons leads to a steady decrease in size across the lanthanoid series.

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

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

(c) A is true but R is false

(d) A is false but R is true

Q87

A sample of pure iron weighing 11.2 g reacts completely with excess dilute H_2SO_4 to form $FeSO_4$ and H_2. What is the volume of H_2 liberated at STP and the mass of $FeSO_4$ formed? (Fe = 56, S = 32, O = 16)

(a) 8.96 L H_2 and 30.4 g $FeSO_4$

(b) 4.48 L H_2 and 30.4 g $FeSO_4$

(c) 4.48 L H_2 and 15.2 g $FeSO_4$

(d) 2.24 L H_2 and 15.2 g $FeSO_4$

Q88

Consider the orbitals 3p, 3d and 4s. The number of radial nodes in each, respectively, is:

(a) 1, 0, 1

(b) 1, 0, 3

(c) 0, 1, 2

(d) 2, 1, 0

Q89

In the balanced reaction $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$ (acidic medium), the number of moles of $C_2O_4^{2-}$ oxidised per mole of MnO_4^- is:

(a) 1

(b) 2/5

(c) 2

(d) 5/2

Q90

Arrange the following species in the correct order of increasing atomic/ionic radius: Na^+, Mg^{2+}, F^-, O^{2-} (all isoelectronic with Ne).

(a) $F^- < O^{2-} < Na^+ < Mg^{2+}$

(b) $Na^+ < Mg^{2+} < O^{2-} < F^-$

(c) $O^{2-} < F^- < Na^+ < Mg^{2+}$

(d) $Mg^{2+} < Na^+ < F^- < O^{2-}$

BOTANY

45 Questions | All Compulsory

Botany (Q91 to Q135)

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

Q91

In a cross between two pea plants, the F1 generation was self-pollinated to give an F2 of 480 plants. If the trait shows a 9:3:3:1 dihybrid ratio, approximately how many plants would be expected to show both recessive characters?

(a) 120

(b) 90

(c) 270

(d) 30

Q92

A woman with blood group AB marries a man with blood group O. What are the possible blood groups of their children?

(a) A and B only

(b) Only AB

(c) A, B, AB and O

(d) AB and O only

Q93

Assertion (A): In Mirabilis jalapa, a cross between red and white flowered plants gives pink F1 flowers. Reason (R): This is a case of incomplete dominance in which the heterozygote shows an intermediate phenotype because neither allele can completely mask the other.

(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

Q94

Match Column I (Chromosomal disorder) with Column II (Chromosomal constitution): Column I: A. Down syndrome B. Turner syndrome C. Klinefelter syndrome D. Normal human female Column II: i. 44 + XXY ii. Trisomy of 21 iii. 44 + XX iv. 44 + XO

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

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

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

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

Q95

A carrier woman for a sex-linked recessive condition marries a normal man. How many of the following statements are correct? 1. Half of the sons will be affected. 2. All daughters will be either carrier or normal. 3. None of the daughters will be affected. 4. Half of the daughters will be carriers.

(a) Four

(b) One

(c) Three

(d) Two

Q96

Two genes A and B are located 20 map units apart on the same chromosome. In a test cross of an AaBb (cis-configuration) individual, what percentage of the offspring are expected to be recombinant?

(a) 20%

(b) 80%

(c) 10%

(d) 40%

Q97

A transcription unit in DNA has three regions. In which direction does RNA polymerase synthesise RNA, and which strand serves as the template?

(a) RNA synthesised 3′→5′; the 5′→3′ strand is the template

(b) RNA synthesised 5′→3′; the strand with polarity 3′→5′ acts as template

(c) RNA synthesised 5′→3′; the 5′→3′ strand is the template

(d) RNA synthesised 3′→5′; the template equals the coding strand

Q98

In the lac operon of E. coli, how many of the following are correct? 1. The repressor is synthesised by the i gene. 2. Lactose acts as an inducer. 3. In the presence of inducer, the repressor cannot bind the operator. 4. The z gene codes for beta-galactosidase.

(a) Two

(b) Three

(c) Four

(d) One

Q99

Meselson and Stahl grew E. coli in 15N medium and then shifted to 14N medium. After two generations in 14N medium, what is the ratio of hybrid (15N/14N) to light (14N/14N) DNA molecules?

(a) 3:1

(b) 1:1

(c) 1:0

(d) 1:3

Q100

Statement I: The genetic code is degenerate, meaning some amino acids are coded by more than one codon. Statement II: AUG codes for methionine and also acts as the initiator codon.

(a) Both Statement I and Statement II are correct

(b) Statement I is correct, Statement II is incorrect

(c) Statement I is incorrect, Statement II is correct

(d) Both statements are incorrect

Q101

During eukaryotic RNA processing, which sequence correctly describes the maturation of hnRNA into mRNA?

(a) Capping → tailing → no splicing

(b) Splicing → tailing → capping

(c) Tailing → capping → splicing

(d) Capping → splicing (intron removal) → tailing

Q102

Match Column I (Group) with Column II (Characteristic): Column I: A. Dinoflagellates B. Euglenoids C. Slime moulds D. Diatoms Column II: i. Cell wall of indestructible silica ii. Cellulose plates in wall; cause red tides iii. Pellicle, no cell wall iv. Saprophytic with aggregating plasmodium

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

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

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

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

Q103

How many of the following groups store their reserve food as a starch-type carbohydrate (true starch or floridean starch)? 1. Chlorophyceae 2. Phaeophyceae 3. Rhodophyceae 4. Cyanobacteria

(a) One
(b) Four
(c) Three
(d) Two

Q104

In the life cycle of a moss (bryophyte), which statement about alternation of generations is correct?

(a) Both generations are independent and free-living
(b) The dominant photosynthetic gametophyte (n) bears the dependent sporophyte (2n)
(c) The dominant sporophyte (2n) bears a dependent gametophyte (n)
(d) The gametophyte is diploid and the sporophyte is haploid

Q105

Assertion (A): Gymnosperms are called naked-seeded plants. Reason (R): Their ovules are not enclosed by an ovary wall, so the seeds remain exposed.

(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

Q106

A flower has the following features: (5) fused sepals, 5 petals, 5 epipetalous stamens, and a bicarpellary syncarpous superior ovary with axile placentation and an obliquely placed septum. To which family does it belong?

(a) Fabaceae
(b) Brassicaceae
(c) Liliaceae
(d) Solanaceae

Q107

Match Column I (Family) with Column II (Characteristic feature): Column I: A. Fabaceae (aestivation) B. Solanaceae C. Liliaceae D. Fabaceae (stamens) Column II: i. Vexillary (papilionaceous) aestivation ii. Tepals (3+3), axile placentation iii. Diadelphous stamens (9)+1 iv. Berry fruit, oblique ovary

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

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

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

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

Q108

How many of the following terms are correctly defined? 1. Gamosepalous – sepals united 2. Epipetalous – stamens attached to petals 3. Polypetalous – petals free 4. Gamopetalous – petals free

(a) One

(b) Three

(c) Four

(d) Two

Q109

In a flower, the aestivation in which margins of sepals or petals overlap one another but not in any particular direction is called:

(a) Vexillary

(b) Twisted

(c) Valvate

(d) Imbricate

Q110

In C4 plants, the primary CO2 acceptor and the first stable product formed in the mesophyll cells are respectively:

(a) PEP and malic acid

(b) RuBP and 3-PGA

(c) RuBP and OAA

(d) PEP and oxaloacetic acid (OAA)

Q111

Assertion (A): Photorespiration in C3 plants does not produce ATP or NADPH. Reason (R): In photorespiration, RuBisCO acts as an oxygenase and no sugar is synthesised, so there is no

energy yield.

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

(b) A is true but R is false

(c) A is false but R is true

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

Q112

In the Calvin cycle, when 3 molecules of CO_2 are fixed, how many molecules of RuBP are regenerated and how many ATP are used specifically in the regeneration step?

(a) 3 RuBP using 9 ATP

(b) 3 RuBP using 6 ATP

(c) 3 RuBP regenerated using 3 ATP

(d) 6 RuBP using 6 ATP

Q113

In aerobic respiration, the complete oxidation of one molecule of glucose through glycolysis, the link reaction and the Krebs cycle releases how many molecules of CO_2, and at which stages?

(a) 6 CO_2 in total: 2 in glycolysis and 4 in the Krebs cycle

(b) 6 CO_2 in total: none in glycolysis, 2 in the link reaction, and 4 in the Krebs cycle

(c) 2 CO_2 in total, all released in the Krebs cycle

(d) 4 CO_2 in total: 2 in the link reaction and 2 in the Krebs cycle

Q114

Statement I: The respiratory quotient (RQ) of fats is less than 1. Statement II: During fat oxidation, more oxygen is consumed relative to the CO_2 released.

(a) Statement I is incorrect, Statement II is correct

(b) Both statements are incorrect

(c) Statement I is correct, Statement II is incorrect

(d) Both Statement I and Statement II are correct

Q115

Match Column I (Plant growth regulator) with Column II (Effect): Column I: A. Gibberellin B. Abscisic acid C. Ethylene D. Cytokinin Column II: i. Promotes fruit ripening and senescence ii. Bolting in rosette plants iii. Stress hormone, stomatal closure iv. Cell division, delays senescence

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

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

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

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

Q116

Assertion (A): A short-day plant flowers when the night length exceeds a critical period. Reason (R): The duration of the dark period is the decisive factor in photoperiodic induction of flowering.

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

(d) A is true but R is false

Q117

How many of the following effects are correctly attributed to auxins? 1. Promotion of apical dominance. 2. Induction of parthenocarpy. 3. Promotion of rooting in stem cuttings. 4. Breaking of seed dormancy in cereals.

(a) Four

(b) One

(c) Three

(d) Two

Q118

In a mature angiosperm embryo sac, the central cell, the two synergids, and the three antipodal cells contain respectively how many nuclei (before fertilisation)?

(a) 2 polar nuclei in central cell; 1 in each synergid; 1 in each antipodal

(b) 2 in central cell; 2 in each synergid; 2 in each antipodal

(c) 3 in central cell; 1 synergid; 3 antipodals

(d) 1 in central cell; 2 in each synergid; 1 in each antipodal

Q119

During double fertilisation in angiosperms, the two fusion events produce respectively:

(a) Haploid zygote and diploid endosperm

(b) Diploid zygote (syngamy) and triploid primary endosperm nucleus (triple fusion)

(c) Triploid zygote and diploid endosperm

(d) Diploid zygote and diploid endosperm

Q120

How many of the following statements about pollination are correct? 1. Geitonogamy involves transfer of pollen between two flowers of the same plant. 2. Xenogamy brings genetically different pollen to the stigma. 3. Autogamy in chasmogamous flowers requires synchrony of anther dehiscence and stigma receptivity. 4. Cleistogamous flowers are always cross-pollinated.

(a) Two

(b) One

(c) Three

(d) Four

Q121

Statement I: In meiosis, crossing over occurs during the pachytene stage of prophase I. Statement II: Synapsis of homologous chromosomes occurs during zygotene.

(a) Both statements are incorrect

(b) Statement I is correct, Statement II is incorrect

(c) Statement I is incorrect, Statement II is correct

(d) Both Statement I and Statement II are correct

Q122

How many of the following are correct differences between mitosis and meiosis? 1. Mitosis produces two diploid cells; meiosis produces four haploid cells. 2. Crossing over occurs in meiosis I but not in mitosis. 3. Homologous chromosomes pair only in meiosis. 4. DNA replicates twice in meiosis (once before each division).

(a) Two

(b) One

(c) Four

(d) Three

Q123

Assertion (A): Cytokinesis in plant cells occurs by cell-plate formation. Reason (R): The rigid cell wall of plant cells prevents division by a cleavage furrow.

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

Q124

Match Column I (Cell organelle) with Column II (Function): Column I: A. Rough ER B. Golgi apparatus C. Lysosome D. Mitochondria Column II: i. Intracellular digestion ii. Protein synthesis (membrane-bound ribosomes) iii. Site of oxidative phosphorylation iv. Packaging and modification of proteins

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

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

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

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

Q125

For an enzyme-catalysed reaction, if the Km of an enzyme is low, what does it indicate about the enzyme's affinity for its substrate?

(a) No relationship with affinity

(b) Low affinity for the substrate

(c) High affinity for the substrate

(d) The enzyme is denatured

Q126

How many of the following biomolecules are polysaccharides? 1. Cellulose 2. Glycogen 3. Inulin 4. Insulin

(a) One

(b) Four

(c) Three

(d) Two

Q127

In a PCR cycle, the three steps occur in the correct order as:

(a) Denaturation → extension → annealing

(b) Denaturation → annealing of primers → extension by Taq polymerase

(c) Extension → denaturation → annealing

(d) Annealing → denaturation → extension

Q128

Match Column I (Biotech tool/application) with Column II (Role/feature): Column I: A. Ti plasmid B. RNA interference C. Bt cotton D. Gel electrophoresis Column II: i. Separation of DNA fragments by size ii. Vector from Agrobacterium for plant transformation iii. Silencing of nematode mRNA iv. Cry protein-mediated insect resistance

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

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

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

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

Q129

How many of the following statements about restriction endonucleases are correct? 1. They recognise specific palindromic sequences. 2. They cut DNA at specific sites producing fragments. 3. They are also called 'molecular scissors'. 4. They join DNA fragments by forming phosphodiester bonds.

(a) Three

(b) Two

(c) Four

(d) One

Q130

In an ecological pyramid of energy, if the producers contain 20,000 kJ of energy, approximately how much energy is available at the third trophic level (secondary consumers)?

(a) 2000 kJ

(b) 20 kJ

(c) 2 kJ

(d) 200 kJ

Q131

Statement I: Gross primary productivity (GPP) minus respiration equals net primary productivity (NPP). Statement II: NPP is the biomass available for consumption by heterotrophs.

(a) Both Statement I and Statement II are correct

(b) Statement I is correct, Statement II is incorrect

(c) Both statements are incorrect

(d) Statement I is incorrect, Statement II is correct

Q132

Assertion (A): A logistic growth curve is sigmoid (S-shaped). Reason (R): Resources become limiting as the population approaches the carrying capacity (K).

(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

Q133

Match Column I (Population interaction) with Column II (Effect on the two species): Column I: A. Mutualism B. Competition C. Predation D. Commensalism Column II: i. +/0 ii. +/+ iii. -/- iv. +/-

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

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

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

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

Q134

According to the species-area relationship on a log-log scale (log S = log C + Z log A), the slope Z (regression coefficient) for most taxa over relatively small areas lies in the range:

(a) 0.1 to 0.2

(b) 1.0 to 1.5

(c) 0.001 to 0.01

(d) 0.6 to 1.2

Q135

How many of the following are examples of in-situ conservation? 1. National parks 2. Biosphere reserves 3. Zoological parks 4. Sacred groves

(a) One

(b) Two

(c) Four

(d) Three

ZOOLOGY

45 Questions | All Compulsory

Zoology (Q136 to Q180)

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

Q136

EcoRI is a restriction endonuclease that recognises a specific palindromic sequence. At which position does it cleave the DNA backbone?

(a) Between G and A on the 5′-GAATTC-3′ strand, leaving 5′ overhangs (sticky ends)

(b) Exactly at the centre between the two A residues, leaving blunt ends

(c) Between T and C, leaving blunt ends

(d) Between G and A on the 5′-GAATTC-3′ strand, leaving 3′ overhangs

Q137

In the cloning vector pBR322, the recognition site for the restriction enzyme PstI lies within the ampicillin-resistance gene. If a foreign DNA fragment is inserted at this PstI site, the resulting recombinant bacteria will be:

(a) Resistant to tetracycline but sensitive to ampicillin

(b) Resistant to both ampicillin and tetracycline

(c) Sensitive to both antibiotics

(d) Resistant to ampicillin but sensitive to tetracycline

Q138

Arrange the three steps of one PCR cycle in the correct order: (i) Annealing of primers (ii) Denaturation (iii) Extension by Taq polymerase.

(a) (ii) → (i) → (iii)

(b) (ii) → (iii) → (i)

(c) (i) → (ii) → (iii)

(d) (iii) → (ii) → (i)

Q139

In agarose gel electrophoresis of DNA, the separated fragments are visualised by staining with ethidium bromide and exposing to:

(a) X-rays

(b) UV radiation

(c) Visible white light only

(d) Infrared radiation

Q140

How many of the following statements regarding the Ti plasmid and bioreactors are CORRECT? (i) The Ti plasmid of Agrobacterium tumefaciens can be used as a vector to deliver genes into plant cells. (ii) A stirred-tank bioreactor allows mixing and oxygen availability throughout the culture. (iii) Bacteriophages and plasmids both serve as cloning vectors because they can replicate independently within bacterial cells. (iv) Downstream processing includes separation, purification and quality control of the product.

(a) One

(b) Four

(c) Two

(d) Three

Q141

Genetically engineered human insulin (Humulin) is produced by inserting genes for the A and B polypeptide chains separately into E. coli. After production, the mature insulin is assembled by:

(a) Methylating the B chain only

(b) Cleaving a single proinsulin chain by trypsin

(c) Adding a C-peptide that joins A and B chains

(d) Linking A and B chains by disulphide bonds

Q142

Bt cotton expresses a cry gene whose protein toxin is initially produced as an inactive protoxin. This protoxin becomes an active toxin in the insect gut because:

(a) Stomach proteases of the cotton plant cleave it

(b) The alkaline pH of the insect gut solubilises and activates the crystal protoxin

(c) The toxin is activated by the acidic pH of the gut

(d) It binds directly to the midgut without modification

Q143

In the strategy to develop nematode-resistant tobacco against Meloidogyne incognita, host cells were transformed using Agrobacterium vectors to produce both sense and antisense RNA. This silenced the parasite's gene by:

(a) RNA interference (formation of dsRNA)
(b) Increased translation of the parasite mRNA
(c) Point mutation of the nematode DNA
(d) Gene amplification

Q144

How many of the following are TRUE about enzyme classification and action? (i) Oxidoreductases catalyse oxidation-reduction reactions between two substrates. (ii) Ligases catalyse the joining of two compounds with hydrolysis of ATP. (iii) Lyases catalyse transfer of a group from one substrate to another. (iv) An enzyme lowers the activation energy of a reaction.

(a) Three
(b) Four
(c) One
(d) Two

Q145

A cofactor that is tightly and permanently bound to the apoenzyme by covalent bonds is called a:

(a) Free vitamin
(b) Metal-ion activator
(c) Prosthetic group
(d) Coenzyme

Q146

During the catabolism of a pure fat substrate, the respiratory quotient (RQ = CO2 released / O2 consumed) is approximately:

(a) 0.5
(b) 0.7
(c) 0.9
(d) 1.0

Q147

Which of the following correctly describes the secondary structure of a protein?

(a) The right-handed helix or pleated sheet stabilised by hydrogen bonds

(b) The overall three-dimensional folding into a globular shape

(c) The linear sequence of amino acids joined by peptide bonds

(d) The aggregation of multiple polypeptide subunits

Q148

Match List I (Biomolecule type) with List II (Example) and select the correct option: List I A. Nucleotide B. Amino acid C. Secondary metabolite D. Reducing sugar List II I. Glucose II. Adenylic acid III. Alkaloid (morphine) IV. Tyrosine

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

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

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

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

Q149

How many of the following animals possess a true coelom (eucoelomate condition)? Ascaris, Earthworm (Pheretima), Planaria, Cockroach, Hydra, Starfish

(a) Five

(b) Three

(c) Two

(d) Four

Q150

Match List I (Phylum) with List II (Diagnostic feature) and choose the correct option: List I A. Porifera B. Ctenophora C. Aschelminthes D. Echinodermata List II I. Water vascular system II. Canal system & choanocytes III. Comb plates for locomotion IV. Complete digestive tract, pseudocoelom

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

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

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

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

Q151

Which of the following is the correct combination of characters for Phylum Chordata that distinguishes it from non-chordates?

(a) Notochord, ventral solid nerve cord, ventral heart

(b) Notochord, dorsal hollow nerve cord, paired pharyngeal gill slits

(c) Solid dorsal nerve cord, pharyngeal slits, ventral notochord

(d) Absence of notochord, dorsal heart, closed circulation

Q152

Statement I: All members of Phylum Echinodermata are exclusively marine and show radial symmetry in the adult. Statement II: Echinoderm larvae are bilaterally symmetrical. In light of the above, choose the correct option.

(a) Statement I is incorrect but Statement II is correct

(b) Both Statement I and Statement II are correct

(c) Statement I is correct but Statement II is incorrect

(d) Both Statement I and Statement II are incorrect

Q153

During human spermatogenesis, one primary spermatocyte ultimately gives rise to four sperms, whereas in oogenesis one primary oocyte gives rise to only one functional ovum. The difference is mainly because in oogenesis:

(a) Meiosis does not occur at all

(b) Cytokinesis is unequal, producing polar bodies that degenerate

(c) Crossing over is completely absent

(d) Only mitosis occurs in the ovary

Q154

Which hormone surge is directly responsible for triggering ovulation in the human menstrual cycle?

(a) Sudden fall of estrogen

(b) Peak of progesterone

(c) Sharp peak of FSH

(d) Rapid surge of LH

Q155

Arrange the following events of early human development in the correct chronological order: (i) Implantation (ii) Fertilisation in ampulla (iii) Formation of blastocyst (iv) Cleavage to morula

(a) (ii) → (iii) → (iv) → (i)

(b) (iv) → (ii) → (iii) → (i)

(c) (ii) → (iv) → (iii) → (i)

(d) (ii) → (iv) → (i) → (iii)

Q156

Which of the following contraceptive methods works primarily as a copper-releasing intra-uterine device that suppresses sperm motility and makes the uterus unsuitable for implantation?

(a) Tubectomy

(b) Combined oral pills

(c) Diaphragm

(d) Copper-releasing IUDs (e.g., Cu-T)

Q157

Match List I (Assisted Reproductive Technology) with List II (Procedure) and select the correct answer: List I A. IVF B. ZIFT C. GIFT D. ICSI List II I. Transfer of ovum from a donor into the fallopian tube of another female II. Injection of a single sperm directly into the ovum III. Fertilisation outside the body, then early embryo transferred to fallopian tube IV. Embryo formed in lab and transferred (test-tube baby programme)

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

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

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

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

Q158

In a large randomly-mating population at Hardy-Weinberg equilibrium, the frequency of a recessive allele (a) is 0.2. What percentage of the population is expected to be heterozygous (Aa)?

(a) 16%

(b) 32%

(c) 4%

(d) 64%

Q159

The forelimbs of a whale, a bat and a human have a similar basic skeletal plan but perform different functions. This is an example of:

(a) Analogous organs showing convergent evolution

(b) Vestigial organs

(c) Homologous organs showing divergent evolution

(d) Adaptive convergence

Q160

Arrange the following in the correct sequence of human evolution from earliest to most recent: (i) Homo erectus (ii) Australopithecus (iii) Homo habilis (iv) Homo sapiens

(a) (iii) → (ii) → (i) → (iv)

(b) (iii) → (i) → (ii) → (iv)

(c) (ii) → (iii) → (i) → (iv)

(d) (ii) → (i) → (iii) → (iv)

Q161

At the tissue level, the oxygen-haemoglobin dissociation curve shifts to the right, favouring unloading of O2. How many of the following factors cause this rightward shift? (i) Increase in pCO2 (ii) Decrease in pH (more H+) (iii) Rise in temperature (iv) Decrease in pO2

(a) Three

(b) Four

(c) Two

(d) One

Q162

The largest fraction of carbon dioxide is transported in human blood in the form of:

(a) Carbonic acid bound to plasma proteins

(b) Bicarbonate ions (HCO3-)

(c) Carbaminohaemoglobin

(d) Dissolved CO2 in plasma

Q163

If a person's Tidal Volume is 500 mL, Inspiratory Reserve Volume is 3000 mL and Expiratory Reserve Volume is 1100 mL, what is the Vital Capacity (assuming these are the relevant volumes)?

(a) 4100 mL

(b) 4600 mL

(c) 3500 mL

(d) 3600 mL

Q164

In the cardiac cycle, the QRS complex of an ECG represents:

(a) Ventricular depolarisation

(b) Atrial repolarisation

(c) Ventricular repolarisation

(d) Atrial depolarisation

Q165

Assertion (A): A person with AB blood group is called a universal recipient. Reason (R): The plasma of an AB individual has no anti-A or anti-B antibodies.

(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

Q166

If the daily glomerular filtrate is 180 litres and the daily urine output is 1.8 litres, what percentage of the filtrate is reabsorbed by the nephrons?

(a) 99%

(b) 99.9%

(c) 90%

(d) 95%

Q167

Assertion (A): The counter-current mechanism in the kidney helps to maintain a high osmolarity gradient (interstitial concentration increasing towards the inner medulla). Reason (R): The loop of Henle and vasa recta together act as a counter-current system.

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

(b) A is true but R is false

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

(d) A is false but R is true

Q168

According to the sliding filament theory, during muscle contraction which of the following statements is CORRECT regarding the sarcomere?

(a) A-band, I-band and H-zone all shorten equally

(b) I-band and H-zone shorten while A-band length remains constant

(c) A-band shortens, I-band remains constant

(d) The length of actin and myosin filaments decreases

Q169

In a relaxed sarcomere the distance from one Z-line to the next is 3.2 µm. During contraction each half-sarcomere shortens by 0.4 µm. What is the length of the contracted sarcomere?

(a) 2.8 µm

(b) 2.0 µm

(c) 2.4 µm

(d) 1.6 µm

Q170

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

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

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

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

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

Q171

Assertion (A): In acquired immunity, the secondary immune response is faster and stronger than the primary response. Reason (R): Memory B and T cells generated during the first encounter recognise the pathogen on re-exposure.

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

(b) A is true but R is false

(c) A is false but R is true

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

Q172

The malarial parasite Plasmodium enters the human body as which infective stage, released from the salivary glands of the female Anopheles mosquito?

(a) Sporozoites

(b) Trophozoites

(c) Merozoites

(d) Gametocytes

Q173

During the propagation of a nerve impulse, the rising phase (depolarisation) of the action potential is mainly due to:

(a) Activity of the Na+-K+ ATPase pump

(b) Opening of voltage-gated Na+ channels and Na+ influx

(c) Opening of voltage-gated K+ channels and K+ efflux

(d) Closing of Cl- channels

Q174

In the human eye, the region of the retina where the photoreceptors converge to leave as the optic nerve, and which is devoid of rods and cones, is the:

(a) Blind spot

(b) Iris

(c) Fovea (yellow spot)

(d) Ciliary body

Q175

Match List I (Endocrine gland/hormone) with List II (Disorder due to abnormal secretion) and choose the correct option: List I A. Thyroid (deficiency in adult) B. Insulin (deficiency) C. Growth hormone (excess in adult) D. Parathyroid (deficiency) List II I. Diabetes mellitus II. Acromegaly III. Myxoedema IV. Tetany

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

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

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

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

Q176

Steroid hormones differ from protein hormones in their mechanism of action because steroid hormones:

(a) Bind to membrane receptors and activate cyclic AMP

(b) Easily cross the plasma membrane and bind intracellular receptors to regulate gene expression

(c) Cannot enter the cell and act via second messengers

(d) Are always faster-acting than peptide hormones

Q177

Which of the following animal tissues has cells that are tall, with the nucleus at the base, and is found lining the inner surface of the stomach and intestine where it performs secretion and absorption?

(a) Cuboidal epithelium

(b) Columnar epithelium

(c) Ciliated epithelium of trachea

(d) Squamous epithelium

Q178

Match List I (Microbe) with List II (Product/Role) and choose the correct option: List I A. Lactobacillus B. Saccharomyces cerevisiae C. Aspergillus niger D. Trichoderma polysporum List II I. Bread/ethanol production II. Cyclosporin A (immunosuppressant) III. Curd formation IV. Citric acid

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

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

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

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

Q179

In sewage treatment, the BOD (Biochemical Oxygen Demand) of the effluent indicates:

(a) The number of pathogens present per litre

(b) The amount of dissolved oxygen produced by aquatic plants

(c) The amount of oxygen consumed if all organic matter in one litre of water is oxidised by bacteria

(d) The total nitrogen content of the water

Q180

Phenylketonuria is an inborn error of metabolism inherited as an autosomal recessive trait. The biochemical defect is the lack of an enzyme that converts:

(a) Glucose into glycogen

(b) Tyrosine into melanin

(c) Homogentisic acid into maleylacetoacetate

(d) Phenylalanine into tyrosine

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