NEET 2026 SAMPLE PAPER 4

A) Total Duration: 3-hour and 20-minute (200 minutes)
B) Pattern: 180 Multiple Choice Questions (MCQs) out of a total of 200
C) Marking Scheme & Rules:

- Correct Answer: +4 marks
- Incorrect Answer: -1 mark (Negative marking)
- Unattempted Question: 0 marks
- Multiple Answers: Treated as incorrect, attracting -1 mark

Physics(Section A)

1. Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is:

   A. $2W/A$

   B. W/A

   C. $W/2A$

   D. Zero

2. The ratio of radius of gyration of a solid sphere of mass M and radius R about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is:

   A. 3 : 5

   B. 5 : 3

   C. 2 : 5

   D. 5 : 2

3. The equivalent capacitance of the system shown in the circuit is:

   A. 2μF

   B. 3μF

   C. 6μF

   D. 9μF

4. A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is:

   A. along eastward

   B. along northward

C. along north-east

D. along south-west

5. If $\oint \mathbf{E} \cdot d\mathbf{S} = 0$ over a surface, then:

   A. the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

   B. the magnitude of electric field on the surface is constant.

   C. all the charges must necessarily be inside the surface.

   D. the electric field inside the surface is necessarily uniform.

6. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be:

   A. $2U$

   B. $4U$

   C. $8U$

   D. $16U$

7. If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by:

   A. 200Ω

   B. 50Ω

   C. 100Ω

   D. 400Ω

8. A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to AC mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

   A. 0.27 A

   B. 2.7 A

   C. 3.7 A

   D. 0.37 A

9. A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance. Which of these components remove the AC ripple from the rectified output?

   A. A centre-tapped transformer

   B. p-n junction diodes

   C. Capacitor

   D. Load resistance

10. Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium?

A. $\sin^{-1}(t_2/t_1)$

B. $\sin^{-1}(10t_2/t_1)$

C. $\sin^{-1}(t_1/10t_2)$

D. $\sin^{-1}(10t_1/t_2)$

11. Resistance of a carbon resistor determined from colour codes is $(22000 \pm 5\%)\Omega$. The colour of third band must be:

    A. Red

    B. Green

    C. Orange

    D. Yellow

12. **Statement I**: Photovoltaic devices can convert optical radiation into electricity.
    Statement II: Zener diode is designed to operate under reverse bias in breakdown region.
    In the light of the above statements, choose the most appropriate answer:

    A. Both Statement I and Statement II are correct.

    B. Both Statement I and Statement II are incorrect.

    C. Statement I is correct but Statement II is incorrect.

    D. Statement I is incorrect but Statement II is correct.

13. The magnetic energy stored in an inductor of inductance 4μH carrying a current of 2 A is:

    A. 4μJ

    B. 4 mJ

    C. 8 mJ

    D. 8μJ

14. The angular acceleration of a body, moving along the circumference of a circle, is:

    A. along the radius, away from centre

    B. along the radius towards the centre

    C. along the tangent to its position

    D. along the axis of rotation

15. A Carnot engine has an efficiency of 50% when its source is at a temperature 327°C. The temperature of the sink is:

    A. 27°C

    B. 15°C

    C. 100°C

    D. 200°C

16. Two bodies of mass m and $9m$ are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant):

    A. $-8Gm/R$

    B. $-12Gm/R$

    C. $-16Gm/R$

    D. $-20Gm/R$

17. A vehicle travels half the distance with speed v and the remaining distance with speed $2v$. Its average speed is:

    A. $v/3$

    B. $2v/3$

    C. $4v/3$

    D. $3v/4$

18. The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly: (surface tension of soap solution = 0.03 N m^{-1})

    A. 30.16×10^{-4} J

    B. 5.06×10^{-4} J

    C. 3.01×10^{-4} J

    D. 50.1×10^{-4} J

19. The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to:

    A. $\sqrt{V}$

    B. $1/V$

    C. $1/\sqrt{V}$

    D. V^2

20. The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $(1/16)^{th}$ of its initial value?

    A. 20 minutes

    B. 40 minutes

    C. 60 minutes

    D. 80 minutes

21. A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:

    A. 1.2%

    B. 1.3%

C. 1.6%

D. 1.4%

22. In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude 48 V m^{-1}. Then the amplitude of oscillating magnetic field is: ($c = 3 \times 10^8$ m s^{-1})

A. 1.6×10^{-9} T

B. 1.6×10^{-8} T

C. 1.6×10^{-7} T

D. 1.6×10^{-6} T

23. The temperature of a gas is $-50°$C. To what temperature the gas should be heated so that the RMS speed is increased by 3 times?

A. 669°C

B. 3295°C

C. 3097 K

D. 223 K

24. An AC source is connected to a capacitor C. Due to decrease in its operating frequency:

A. capacitive reactance decreases.

B. displacement current increases.

C. displacement current decreases.

D. capacitive reactance remains constant

25. **Statement I**: If screen is moved away from the plane of slits, angular separation of the fringes remains constant.
Statement II: If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.
Choose the correct answer:

A. Both Statement I and Statement II are true.

B. Both Statement I and Statement II are false.

C. Statement I is true but Statement II is false.

D. Statement I is false but Statement II is true.

26. A 2 amp current is flowing through two different small circular copper coils having radii ratio 1 : 2. The ratio of their respective magnetic moments will be:

A. 1:2

B. 2:1

C. 4:1

D. 1:4

27. The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying brakes, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the forces applied by the brakes on cars A and B, respectively, then the ratio F_A/F_B is:

    A. 2/3

    B. 1/3

    C. 1/2

    D. 3/2

28. A uniform rod of mass 20 kg and length 5 m leans against a smooth vertical wall making an angle of 60° with it. The other end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is (take $g = 10$ m/s^2):

    A. 200 N

    B. $200\sqrt{3}$ N

    C. 100 N

    D. $100\sqrt{3}$ N

29. De-Broglie wavelength of an electron orbiting in the $n = 2$ state of hydrogen atom is close to (Given Bohr radius = 0.052 nm):

    A. 0.67 nm

    B. 1.67 nm

    C. 2.67 nm

    D. 0.067 nm

30. A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to one-third the radius of the earth from its surface is:

    A. 27 N

    B. 32 N

    C. 36 N

    D. 16 N

31. Two cities X and Y are connected by a regular bus service with a bus leaving in either direction every T min. A girl driving a scooty at 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for T and the speed of the buses:

    A. 25 min, 100 km/h

    B. 10 min, 90 km/h

    C. 15 min, 120 km/h

    D. 9 min, 40 km/h

32. AB is a part of an electrical circuit. The potential difference $V_A - V_B$, at the instant when current $i = 2$ A and is increasing at a rate of 1 A/s is (assuming a circuit with 1 H inductor, 5 V battery, and 2Ω resistor):

A. 6 volt

B. 9 volt

C. 10 volt

D. 5 volt

33. An oxygen cylinder of volume 30 litre has 18.20 moles of oxygen. After some oxygen is withdrawn, its gauge pressure drops to 11 atm at 27°C. The mass of oxygen withdrawn is nearly: (Given $R = 100/12$ J mol^{-1}K^{-1}, $M_{O2} = 32$, 1 atm $= 1.01 \times 10^5$ N/m^2)

A. 0.144 kg

B. 0.116 kg

C. 0.156 kg

D. 0.125 kg

34. A photon and an electron (mass m) have the same energy E. The ratio $\lambda_{photon}/\lambda_{electron}$ of their de Broglie wavelengths is (c is speed of light):

A. $c\sqrt{2mE}$

B. $c\sqrt{2m/E}$

C. $\sqrt{E/2m}$

D. $c\sqrt{2mE}$

35. A constant voltage of 50 V is maintained between points A and B of the circuit shown. The current through the branch CD of the circuit is:

A. 2.0 A

B. 2.5 A

C. 3.0 A

D. 1.5 A

Physics(Section B)

36. A parallel plate capacitor made of circular plates is being charged such that the surface charge density increases at a constant rate. The magnetic field arising due to displacement current is:

    A. constant between the plates and zero outside

    B. non-zero everywhere with maximum at the periphery

    C. zero between the plates and non-zero outside

    D. zero at all places

37. In a Vernier callipers, 10 V.S.D. = 9 M.S.D. The least division in M.S. is 0.1 cm and the zero of V.S. is at $x = 0.1$ cm when jaws are closed. If M.S. reading is 5 cm and the 8th V.S. division coincides, the corrected diameter is:

    A. 5.08 cm

    B. 4.98 cm

    C. 5.00 cm

    D. 5.18 cm

38. Two identical charged spheres A and B have charge q and force F. A third identical uncharged sphere is touched to A, then to B, then removed. The new force of repulsion between A and B is:

    A. 2F/3

    B. F/2

    C. 3F/8

    D. 3F/5

39. Capacitor plates are separated by d. Two slabs of dielectric constant K_1 and K_2 with thickness $3d/8$ and $d/2$ are inserted. Due to this, capacitance doubles. If $K_1 = 1.25K_2$, the value of K_1 is:

    A. 2.33

    B. 1.60

    C. 1.33

    D. 2.66

40. An electric dipole with moment 5×10^{-6} Cm is aligned with a uniform field of 4×10^5 N/C. The dipole is then rotated through an angle of $60°$. The change in potential energy is:

    A. 1.0 J

    B. 1.2 J

    C. 1.5 J

    D. 0.8 J

41. The radius of Martian orbit around the Sun is about 4 times the radius of Mercury's orbit. If a Martian year is 687 Earth days, the length of 1 year on Mercury is:

    A. 225 earth days

    B. 172 earth days

    C. 124 earth days

    D. 88 earth days

42. A wire of resistance R is cut into 8 equal pieces. From these, two sets are made by connecting 4 pieces in parallel. These two sets are then connected in series. The net effective resistance is:

    A. R/32

    B. R/16

    C. R/8

    D. R/64

43. The intensity of transmitted light when a polaroid sheet is placed between two crossed polaroids at 22.5° from the polarization axis of the first is (I_0 is intensity after first polaroid):

    A. $I_0/4$

    B. $I_0/8$

    C. $I_0/16$

    D. $I_0/2$

44. In a camera, four similar thin convex lenses are arranged axially in contact. The power of the combination and the total magnification compared to p and m of each lens will be:

    A. $4p$ and m^4

    B. $p/4$ and m^4

    C. $4p$ and $4m$

    D. $p/4$ and $4m$

45. The Sun rotates once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without external influence (assume uniform density)?

    A. 105 days

    B. 115 days

    C. 108 days

    D. 100 days

46. A microscope has an objective of $f = 2$ cm, eyepiece of $f = 4$ cm and tube length 40 cm. If the distance of distinct vision is 25 cm, the magnification is:

A. 125

B. 150

C. 250

D. 100

47. An unpolarized light beam in air is incident on a medium ($\mu = 1.73$) at Brewster's angle. Then:

A. reflected light is polarized and reflection angle is 30°

B. both are polarized; reflection 60° and refraction 30°

C. transmitted light is polarized and refraction angle is 30°

D. reflected light is polarized and reflection angle is 60°

48. In a full wave rectifier with $V_{in} = 220\sin(100\pi t)$ volt, at $t = 15$ msec:

A. D_1 is reverse biased, D_2 is forward biased

B. D_1 and D_2 both are forward biased

C. D_1 and D_2 both are reverse biased

D. D_1 is forward biased, D_2 is reverse biased

49. The electric field in an EM wave is $E_z = 60\cos(5x+1.5\times10^9 t)$ V/m. The expression for the corresponding magnetic field is:

A. $B_x = 2\times10^{-7}\cos(5x + 1.5\times10^9 t)$ T

B. $B_z = 60\cos(5x + 1.5\times10^9 t)$ T

C. $B_y = 60\sin(5x + 1.5\times10^9 t)$ T

D. $B_y = 2\times10^{-7}\cos(5x + 1.5\times10^9 t)$ T

50. A model states flux through an electron orbit is $n(h/e)$. According to this model, the magnetic moment of an electron in its lowest energy state will be:

A. $he/(2\pi m)$

B. $heB/(\pi m)$

C. $heB/(2\pi m)$

D. $he/(\pi m)$

Chemistry (Section A)

Q51. The element expected to form largest ion to achieve the nearest noble gas configuration is:

(A) O
(B) F
(C) N

(D) Na

Q52. Select the correct statements: A. Atoms of all elements are composed of two fundamental particles. B. The mass of the electron is 9.10939×10^{-31} kg. C. All the isotopes of a given element show same chemical properties. D. Protons and electrons are collectively known as nucleons. E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

(A) A, B and C only
(B) C, D and E only
(C) A and E only
(D) B, C and E only

Q53. The stability of Cu^{2+} is more than Cu^{+} salts in aqueous solution due to:

(A) first ionisation enthalpy
(B) enthalpy of atomization
(C) hydration energy
(D) second ionisation enthalpy

Q54. Which one of the following statements is correct?

(A) The daily requirement of Mg and Ca in the human body is estimated to be 0.2-0.3 g
(B) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor
(C) The bone in human body is an inert and unchanging substance
(D) Mg plays roles in neuromuscular function and interneuronal transmission

Q55. Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is:

(A) 16
(B) 32
(C) 30
(D) 18

Q56. Taking stability as the factor, which one of the following represents correct relationship?

(A) $TlCl_3 > TlCl$
(B) $InI_3 > InI$
(C) $AlCl > AlCl_3$
(D) $TlI > TlI_3$

Q57. Homoleptic complex from the following complexes is:

(A) Potassium trioxalatoaluminate (III)

(B) Diamminechloridonitrito-N-platinum (II)
(C) Pentaamminecarbonatocobalt (III) chloride
(D) Triamminetriaquachromium (III) chloride

Q58. The right option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40):

(A) 1.12 g
(B) 1.76 g
(C) 2.64 g
(D) 1.32 g

Q59. For a certain reaction, the rate = $k[\mathrm{A}]^2[\mathrm{B}]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would:

(A) decrease by a factor of nine
(B) increase by a factor of six
(C) increase by a factor of nine
(D) increase by a factor of three

Q60. Assertion A: In equation $\Delta_r G = -nFE_{\text{cell}}$, value of $\Delta_r G$ depends on n. Reason R: E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.

(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true and R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

Q61. Which of the following statements are INCORRECT? A. All the transition metals except scandium form MO oxides which are ionic. B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7. C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5. D. V_2O_4 dissolves in acids to give VO_4^{3-} salts. E. CrO is basic but Cr_2O_3 is amphoteric.

(A) A and E only
(B) B and D only
(C) C and D only
(D) B and C only

Q62. Which complex compound is most stable?

(A) $[Co(NH_3)_4(H_2O)Br]Br_2$
(B) $[Co(NH_3)_3(NO_3)_3$
(C) $[CoCl_2(en)_2]NO_3$
(D) $[Co(NH_3)_6]_2(SO_4)_3$

Q63. What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(A) 1/2
(B) 1/3
(C) 1/4
(D) 1/12

Q64. Which amongst the following options is the correct relation between change in enthalpy and change in internal energy?

(A) $\Delta H = \Delta U - \Delta n_m RT$
(B) $\Delta H = \Delta U + \Delta n_m RT$
(C) $\Delta H - \Delta U = -\Delta nRT$
(D) $\Delta H + \Delta U = \Delta nR$

Q65. On balancing the given redox reaction, a $Cr_2O_7^{2-}(aq)$ + b $SO_3^{2-}(aq)$ + c $H^+(aq)$ $\rightarrow$ 2a $Cr^{3+}(aq)$ + b $SO_4^{2-}(aq)$ + c/2 $H_2O(l)$, the coefficients a, b and c are found to be, respectively:

(A) 1, 3, 8
(B) 3, 8, 1
(C) 1, 8, 3
(D) 8, 1, 3

Q66. The equilibrium concentrations of the species in the reaction A + B $\rightleftharpoons$ C + D are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. ΔG° for the reaction is (R = 2 cal/mol K):

(A) 1372.60 cal
(B) -137.26 cal
(C) -1381.80 cal
(D) -13.73 cal

Q67. Pumice stone is an example of:

(A) sol
(B) gel
(C) solid sol
(D) foam

Q68. Statement I: The nutrient deficient water bodies lead to eutrophication.
Statement II: Eutrophication leads to decrease in the level of oxygen in the water bodies.

(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is correct but Statement II is false
(D) Statement I is incorrect but Statement II is true

Q69. The reaction that does NOT take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is:

(A) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$
(B) $FeO + CO \rightarrow Fe + CO_2$
(C) $C + CO_2 \rightarrow 2CO$
(D) $CaO + SiO_2 \rightarrow CaSiO_3$

Q70. Sets with equal number of atoms: A. 212g Na_2CO_3, B. 248g Na_2O, C. 240g NaOH, D. 12g H_2, E. 220g CO_2.

(A) A, B, and D only
(B) B, C, and D only
(C) B, D, and E only
(D) A, B, and C only

Q71. Which are paramagnetic? A. $[NiCl_4]^{2-}$, B. $Ni(CO)_4$, C. $[Ni(CN)_4]^{2-}$, D. $[Ni(H_2O)_6]^{2+}$, E. $Ni(PPh_3)_4$.

(A) A and D only
(B) A, D and E only
(C) A and C only
(D) B and E only

Q72. If $t_{1/2}$ for a first order reaction is 1 minute, the time for 99.9% completion is:

(A) 5 minutes
(B) 10 minutes
(C) 2 minutes
(D) 4 minutes

Q73. Calculate energy and radius of first Bohr orbit for Li^{2+} and He^+ ($a_0 = 52.9$ pm, $R_H = 2.18 \times 10^{-18}$ J):

(A) Li^{2+}: -19.62×10^{-16} J, 17.6 pm; He^+: -8.72×10^{-16} J, 26.4 pm
(B) Li^{2+}: -19.62×10^{-16} J, 17.6 pm; He^+: -8.72×10^{-16} J, 26.4 pm
(C) Li^{2+}: -8.72×10^{-16} J, 17.6 pm; He^+: -19.62×10^{-16} J, 26.4 pm
(D) Li^{2+}: -8.72×10^{-18} J, 17.6 pm; He^+: -19.62×10^{-18} J, 26.4 pm

Q74. Dalton's Atomic theory failed to explain:

(A) Multiple proportion
(B) Gaseous volume
(C) Conservation of mass
(D) Constant proportion

Q75. Identify correct orders: A. $H_2O > NH_3 > CHCl_3$ (Dipole), D. $N_2 > O_2 > H_2$ (Bond enthalpy).

(A) A, C only

(B) B, C only
(C) A, D only
(D) B, D only

Q76. Match Vitamin to deficiency: A. B_{12} (IV. Pernicious anaemia), B. D (III. Rickets), C. B_2 (I. Cheilosis), D. B_6 (II. Convulsions)

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

Q77. The correct order of decreasing basic strength of the given amines is:

(A) N-ethylethanamine > ethanamine > benzenamine > N-methylaniline
(B) benzenamine > ethanamine > N-methylaniline > N-ethylethanamine
(C) N-methylaniline > benzenamine > ethanamine > N-ethylethanamine
(D) N-ethylethanamine > ethanamine > N-methylaniline > benzenamine

Q78. Wavelength of light absorbed: A. $[Co(NH_3)_6]^{3+}$, B. $[Co(CN)_6]^{3-}$, C. $[Cu(H_2O)_4]^{2+}$, D. $[Ti(H_2O)_6]^{3+}$.

(A) C < D < A < B
(B) C < A < D < B
(C) B < A < D < C
(D) B < D < A < C

Q79. Which one of the following compounds does NOT decolourize bromine water?

(A) Phenol
(B) Styrene
(C) Cyclohexene
(D) Benzene

Q80. Major product 'P': 1-methylcyclopent-1-ene with (i) HBr/Peroxide, (ii) KCN, (iii) Na(Hg)/EtOH.

(A) Cyclopentane with CH_3 and CH_2NH_2 on adjacent carbons
(B) Cyclopentane with CH_3 and NC groups
(C) Cyclopentane with NC and CH_3 on same carbon
(D) Cyclopentane with CH_3 and CH_2NH_2 on same carbon

Q81. Match: A. $CHCl_3$/Aniline (IV. Simple), B. Crude oil (III. Fractional), C. Glycerol (I. Reduced Pressure), D. Aniline/Water (II. Steam)

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

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

Q82. The number of water molecules in gypsum, plaster of Paris and dead burnt plaster, respectively are:

(A) 2, 1/2, 0
(B) 2, 1, 0
(C) 1, 1/2, 0
(D) 1, 2, 0

Q83. Which one of the following compounds can exist as cis-trans isomers?

(A) 1,1-Dimethylcyclopropane
(B) 1,2-Dimethylcyclohexane
(C) Pent-1-ene
(D) 2-Methylhex-2-ene

Q84. Phosphoric acid (H_3PO_4) ionizes in three steps with constants K_{a1}, K_{a2}, and K_{a3}, while K is the overall ionization constant. Which statements are true? (A: $\log K = \log K_{a1} + \log K_{a2} + \log K_{a3}$, B: H_3PO_4 is a stronger acid than $H_2PO_4^-$ and HPO_4^{2-}, C: $K_{a1} > K_{a2} > K_{a3}$)

(A) A and B only
(B) A and C only
(C) B, C and D only
(D) A, B and C only

Q85. Match the ions with their Group Number in cation analysis: A. Co^{2+} (Group-IV), B. Mg^{2+} (Group-VI), C. Pb^{2+} (Group-I), D. Al^{3+} (Group-III)

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

Chemistry (Section B)

Q86. In the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ with $\Delta H = +180.7$ kJ mol^{-1}, a higher yield of NO can be obtained at: (A: higher temperature, C: higher concentration of N_2, D: higher concentration of O_2)

(A) B, C, D only
(B) A, C, D only
(C) A, D only

(D) B, C only

Q87. **Statement I:** Benzenediazonium salt is prepared from aniline and nitrous acid at 273-278 K and decomposes easily when dry.
Statement II: Insertion of iodine into benzene is difficult, so iodobenzene is prepared using benzenediazonium salt and KI.

(A) Both are correct
(B) Both are incorrect
(C) Statement I is correct, Statement II is incorrect
(D) Statement I is incorrect, Statement II is correct

Q88. What is the major product of the reaction of benzene-substituted $C(=O)CH_2CN$ with (i) excess CH_3MgBr and (ii) H_3O^+?

(A) Compound with phenyl-$C(OH)(CH_3)$-$C(=O)$-CH_3 structure
(B) Compound with phenyl-$C(OH)$-$C(=O)$-CH_3 and CH_3 groups
(C) Compound with phenyl-$C(OH)(CH_3)$-CN structure
(D) Compound with phenyl-$C(OH)(CH_3)_2$ structure

Q89. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which acid is added to prevent the hydrolysis of the Fe^{2+} ion?

(A) dilute hydrochloric acid
(B) concentrated sulphuric acid
(C) dilute nitric acid
(D) dilute sulphuric acid

Q90. In a sealed vessel, the equilibrium concentrations are $[N_2] = 3.0 \times 10^{-3}$ M, $[O_2] = 4.2 \times 10^{-3}$ M and $[NO] = 2.8 \times 10^{-3}$ M for $2NO(g) \rightleftharpoons N_2(g) + O_2(g)$. If 0.1 mol L^{-1} of NO is taken, find the degree of dissociation α.

(A) 0.00889
(B) 0.0889
(C) 0.8889
(D) 0.717

Q91. Calculate the work done during the reversible isothermal expansion of one mole of hydrogen gas at 25°C from a pressure of 20 atm to 10 atm. (Given $R = 2.0$ cal K^{-1} mol^{-1})

(A) 0 calorie
(B) -413.14 calories
(C) 413.14 calories
(D) 100 calories

Q92. What mass of copper (in grams) is deposited by passing a 9.6487 A current through a $CuSO_4$ solution for 100 seconds? (Molar mass of Cu = 63, 1 F = 96487 C)

(A) 3.15 g
(B) 0.315 g
(C) 31.5 g
(D) 0.0315 g

Q93. Which one is an example of heterogeneous catalysis?

(A) Oxidation of sulphur dioxide into sulphur trioxide in presence of oxides of nitrogen
(B) Hydrolysis of sugar catalysed by H^+ ions
(C) Decomposition of ozone in presence of nitrogen monoxide
(D) Combination between dinitrogen and dihydrogen to form ammonia in presence of finely divided iron

Q94. The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(A) 11, 2, 0
(B) 12, 3, 0
(C) 11, 3, 1
(D) 12, 2, 1

Q95. The correct order of energies of molecular orbitals of N_2 molecule is:

(A) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$
(B) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$
(C) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < \sigma^* 2p_z < (\pi^* 2p_x = \pi^* 2p_y)$
(D) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < \sigma^* 2p_z < (\pi^* 2p_x = \pi^* 2p_y)$

Q96. Assertion A: Helium is used to dilute oxygen in diving apparatus.
Reason R: Helium has high solubility in O_2.

(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

Q97. What is the correct order of bond dissociation energy for the marked C–H bonds in the given structures?

(A) III > II > I
(B) II > III > I
(C) II > I > III
(D) I > II > III

Q98. Among the following, the molecule with the highest dipole moment is:

(A) CH_3Cl

(B) CH_2Cl_2
(C) $CHCl_3$
(D) CCl_4

Q99. The lanthanoid contraction is responsible for the fact that:

(A) Zr and Y have about the same radius
(B) Zr and Nb have similar oxidation state
(C) Zr and Hf have about the same radius
(D) Zr and Zn have the same oxidation state

Q100. In Wolff-Kishner reduction, the carbonyl group of aldehydes and ketones is converted into:

(A) -CH_2- group
(B) -CHOH- group
(C) -CH=CH- group
(D) -COOH group

Botany (Section A)

Q101. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.
Reason R : Protonema develops directly from spores produced in capsule. In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both A and R are correct and R is the correct explanation of A.
(B) Both A and R are correct but R is NOT the correct explanation of A.
(C) A is correct but R is not correct.
(D) A is not correct but R is correct.

Q102. In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :

(A) Synergids, Primary endosperm nucleus and zygote
(B) Antipodals, synergids, and primary endosperm nucleus
(C) Synergids, Zygote and Primary endosperm nucleus
(D) Synergids, antipodals and Polar nuclei

Q103. Movement and accumulation of ions across a membrane against their concentration gradient can be explained by

(A) Osmosis
(B) Facilitated Diffusion
(C) Passive Transport
(D) Active Transport

Q104. Large, colourful, fragrant flowers with nectar are seen in :

(A) insect pollinated plants
(B) bird pollinated plants
(C) bat pollinated plants
(D) wind pollinated plants

Q105. The phenomenon of pleiotropism refers to

(A) presence of several alleles of a single gene controlling a single crossover.
(B) presence of two alleles, each of the two genes controlling a single trait.
(C) a single gene affecting multiple phenotypic expression.
(D) more than two genes affecting a single character.

Q106. Which hormone promotes internode/petiole elongation in deep water rice?

(A) GA_3
(B) Kinetin
(C) Ethylene
(D) 2, 4-D

Q107. Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?

(A) Habitat loss and fragmentation
(B) Over exploitation for economic gain
(C) Alien species invasions
(D) Co-extinctions

Q108. Upon exposure to UV radiation, DNA stained with ethidium bromide will show

(A) Bright red colour
(B) Bright blue colour
(C) Bright yellow colour
(D) Bright orange colour

Q109. Which micronutrient is required for splitting of water molecule during photosynthesis?

(A) manganese
(B) molybdenum
(C) magnesium

(D) copper

Q110. Axile placentation is observed in

(A) Mustard, Cucumber and Primrose
(B) China rose, Beans and Lupin
(C) Tomato, Dianthus and Pea
(D) China rose, Petunia and Lemon

Q111. The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?

(A) Zygotene
(B) Pachytene
(C) Diplotene
(D) Diakinesis

Q112. The reaction centre in PS II has an absorption maxima at

(A) 680 nm
(B) 700 nm
(C) 660 nm
(D) 780 nm

Q113. Unequivocal proof that DNA is the genetic material was first proposed by

(A) Frederick Griffith
(B) Alfred Hershey and Martha Chase
(C) Avery, Macleoid and McCarthy
(D) Wilkins and Franklin

Q114. Among eukaryotes, replication of DNA takes place in -

(A) M phase
(B) S phase
(C) G1 phase
(D) G2 phase

Q115. In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as -

(A) Differentiation
(B) Dedifferentiation
(C) Development
(D) Senescence

Q116. Cellulose does not form blue colour with Iodine because

(A) It is a disaccharide.
(B) It is a helical molecule.
(C) It does not contain complex helices and hence cannot hold iodine molecules.
(D) It breakes down when iodine reacts with it.

Q117. Spraying of which of the following phytohormone on juvenile conifers helps in hastening the maturity period, that leads to early seed production?

(A) Indole-3-butyric Acid
(B) Gibberellic Acid
(C) Zeatin
(D) Abscisic Acid

Q118. Given below are two statements :
Statement I : The forces generated by transpiration can lift a xylem-sized column of water over 130 meters height.
Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees, by evaporative cooling. In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

Q119. Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.

(A) Diadelphous and Dithecous anthers
(B) Polyadelphous and epipetalous stamens
(C) Monoadelphous and Monothecous anthers
(D) Epiphyllous and Dithecous anthers

Q120. Expressed Sequence Tags (ESTs) refers to

(A) All genes that are expressed as RNA.
(B) All genes that are expressed as proteins.
(C) All genes whether expressed or unexpressed.
(D) Certain important expressed genes.

Q121. Identify the correct statements :
A. Detrivores perform fragmentation.
B. The humus is further degraded by some microbes during mineralization.
C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
D. The detritus food chain begins with living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
Choose the correct answer from the options given below :

(A) A, B, C only
(B) B, C, D only
(C) C, D, E only
(D) D, E, A only

Q122. The thickness of ozone in a column of air in the atmosphere is measured in terms of :

(A) Dobson units
(B) Decibels
(C) Decameter
(D) Kilobase

Q123. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : Late wood has fewer xylary elements with narrow vessels.
Reason R : Cambium is less active in winters. In the light of the above statements, choose the correct answer from the options given below :

(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.

Q124. Which of the following stages of meiosis involves division of centromere?

(A) Metaphase I
(B) Metaphase II
(C) Anaphase II
(D) Telophase

Q125. The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year :

(A) 1985
(B) 1992
(C) 1986
(D) 2002

Q126. Assertion (A): Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus.
Reason (R): Presence of more than one nucleus in the tapetum increases the efficiency of nourishing the developing microspore mother cells.

(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

Q127. Match List I with List II: A. Pteridophyte (IV. Salvinia), B. Bryophyte (III. Polytrichum), C. Angiosperm (I. Salvia), D. Gymnosperm (II. Ginkgo)

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

Q128. Which of the following is the unit of productivity of an Ecosystem?

(A) KCal m^{-2}
(B) KCal m^{-3}
(C) (KCal m^{-2}) yr^{-1}
(D) g m^{-2}

Q129. Which of the following is an example of a zygomorphic flower?

(A) Datura
(B) Pea
(C) Chilli
(D) Petunia

Q130. Match List I with List II: A. The Evil Quartet (III. Causes of biodiversity losses), B. Ex situ conservation (I. Cryopreservation), C. Lantana camara (II. Alien species invasion), D. Dodo (IV. Extinction)

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

Q131. **Statement I:** In an ecosystem, there is unidirectional flow of energy of sun from producers to consumers.
Statement II: Ecosystems are exempted from the 2nd law of thermodynamics.

(A) Statement I is correct but Statement II is incorrect
(B) Statement I is incorrect but Statement II is correct
(C) Both statements are correct
(D) Both statements are incorrect

Q132. Which one of the following is the characteristic feature of gymnosperms?

(A) Seeds are naked
(B) Seeds are absent
(C) Gymnosperms have flowers for reproduction

(D) Seeds are enclosed in fruits

Q133. In bryophytes, the gemmae help in which one of the following?

(A) Asexual reproduction
(B) Nutrient absorption
(C) Gaseous exchange
(D) Sexual reproduction

Q134. How many meiotic and mitotic divisions occur for the development of a mature female gametophyte from the megaspore mother cell in an angiosperm?

(A) 1 Meiosis and 2 Mitosis
(B) 1 Meiosis and 3 Mitosis
(C) No Meiosis and 2 Mitosis
(D) 2 Meiosis and 3 Mitosis

Q135. Read the following statements on plant growth:
A. Parthenocarpy can be induced by auxins,
B. Plant growth regulators can be involved in both promotion and inhibition,
C. Gibberellins promote stem elongation,
D. Abscisic acid is a growth inhibitor,
E. Apical dominance inhibits lateral buds.
Correct statements are:

(A) A, B, C, D only
(B) A, C, D, E only
(C) A, B, D, E only
(D) A, B, C, D, E

Botany (Section B)

Q136. Which one of the following equations represents the Verhulst-Pearl Logistic Growth of population?

(A) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$
(B) $\frac{dN}{dt} = N\left(\frac{r-K}{K}\right)$
(C) $\frac{dN}{dt} = rN\left(\frac{N-K}{N}\right)$
(D) $\frac{dN}{dt} = r\left(\frac{K-N}{K}\right)$

Q137. Match List I with List II: A. Scutellum (II. Cotyledon of Monocot seed), B. Non-albuminous seed (III. Groundnut), C. Epiblast (IV. Rudimentary cotyledon), D. Perisperm (I. Persistent nucellus)

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

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

Q138. Which of the following statements about RuBisCO is true?

(A) It has higher affinity for oxygen than carbon dioxide
(B) It is involved in photolysis of water
(C) It catalyzes the carboxylation of RuBP
(D) It is active only in the dark

Q139. Which one of the following phytohormones promotes nutrient mobilization helping in the delay of leaf senescence in plants?

(A) Abscisic acid
(B) Gibberellin
(C) Cytokinin
(D) Ethylene

Q140. Match List I with List II: A. Chlorophyll a (III. Blue-green), B. Chlorophyll b (I. Yellow-green), C. Xanthophylls (II. Yellow), D. Carotenoids (IV. Yellow to Yellow-orange)

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

Q141. The correct sequence of events in the life cycle of bryophytes is:
A. Fusion of antherozoid with egg,
B. Attachment of gametophyte to substratum,
C. Reduction division,
D. Formation of sporophyte,
E. Release of antherozoids.

(A) B, E, A, C, D
(B) B, E, A, D, C
(C) D, E, A, B, C
(D) D, E, A, C, B

Q142. In a floral formula, the symbol $\oplus$ stands for:

(A) Zygomorphic flower
(B) Actinomorphic flower
(C) Inferior ovary
(D) Superior ovary

Q143. In the seeds of cereals, the outer covering of endosperm separates the embryo by a protein-rich layer called:

(A) Integument
(B) Aleurone layer
(C) Coleoptile
(D) Coleorhiza

Q144. A specialized membranous structure in a prokaryotic cell which helps in cell wall formation, DNA replication and respiration is:

(A) Cristae
(B) Endoplasmic Reticulum
(C) Mesosome
(D) Chromatophores

Q145. Which of the following is NOT correct with regard to the structure of monocot stem?

(A) Vascular bundles are conjoint and closed
(B) Phloem parenchyma is absent
(C) Hypodermis is parenchymatous
(D) Vascular bundles are scattered

Q146. Who is known as the father of Ecology in India?

(A) Ram Udar
(B) Birbal Sahni
(C) S. R. Kashyap
(D) Ramdeo Misra

Q147. Which one of the following is an example of ex-situ conservation?

(A) Zoos and botanical gardens
(B) Protected areas
(C) National Park
(D) Wildlife Sanctuary

Q148. Assertion (A): Both wind and water pollinated flowers are not very colourful and do not produce nectar.
Reason (R): The flowers produce enormous amount of pollen grains.

(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

Q149. Epiphytes that are growing on a mango branch is an example of which of the following?

(A) Predation
(B) Amensalism
(C) Commensalism
(D) Mutualism

Q150. Which factor is important for termination of transcription?

(A) σ (sigma)
(B) ρ (rho)
(C) γ (gamma)
(D) α (alpha)

Zoology (Section A)

Q151. Match List I with List II. (List I: A. CCK, B. GIP, C. ANF, D. ADH. List II: I. Kidney, II. Heart, III. Gastric gland, IV. Pancreas)

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

Q152. Assertion A: Endometrium is necessary for implantation of blastocyst.
Reason R: In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium.

(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.

Q153. Match List I with List II. (List I: A. Ringworm, B. Filariasis, C. Malaria, D. Pneumonia. List II: I. Haemophilus influenzae, II. Trichophyton, III. Wuchereria bancrofti, IV. Plasmodium vivax)

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

Q154. Statement I: Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.
Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

Q155. Match List I with List II. (List I: A. Taenia, B. Paramoecium, C. Periplaneta, D. Pheretima. List II: I. Nephridia, II. Contractile vacuole, III. Flame cells, IV. Urecose gland)

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

Q156. Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?

(A) Recombinant DNA Technology
(B) Serum and Urine analysis
(C) Polymerase Chain Reaction (PCR) technique
(D) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique

Q157. Match List I with List II. (List I: A. A Leopard and a Lion in a forest, B. A Cuckoo laying egg in a Crow's nest, C. Fungi and root of a higher plant in Mycorrhizae, D. A cattle egret and a Cattle in a field. List II: I. Competition, II. Brood parasitism, III. Mutualism, IV. Commensalism)

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

Q158. Statement I: Ligaments are dense irregular tissue.
Statement II: Cartilage is dense regular tissue.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

Q159. Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.
Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.

(C) Statement I is correct but Statement II is false.
(D) Statement I incorrect but Statement II is true.

Q160. Statement I: Electrostatic precipitator is most widely used in thermal power plant.
Statement II: Electrostatic precipitator in thermal power plant removes ionising radiations.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I incorrect but Statement II is correct.

Q161. Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.

(A) Tasmanian wolf, Bobcat, Marsupial mole
(B) Numbat, Spotted cuscus, Flying phalanger
(C) Mole, Flying squirrel, Tasmanian tiger cat
(D) Lemur, Anteater, Wolf

Q162. Which of the following statements are correct regarding female reproductive cycle?
A. In non-primates cyclical changes are called oestrus cycle.
B. First menstrual cycle begins at puberty and is called menopause.
C. Lack of menstruation may be indicative of pregnancy.
D. Cyclic menstruation extends between menarche and menopause.

(A) A and D only
(B) A and B only
(C) A, B and C only
(D) A, C and D only

Q163. Vital capacity of lung is:

(A) IRV + ERV
(B) IRV + ERV + TV + RV
(C) IRV + ERV + TV RV
(D) IRV + ERV + TV

Q164. Broad palm with single palm crease is visible in a person suffering from:

(A) Down's syndrome
(B) Turner's syndrome
(C) Klinefelter's syndrome
(D) Thalassemia

Q165. Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.
Reason R: Ban on amniocentesis checks increasing menace of female foeticide.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Q166. Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by:

(A) Sphincter of Oddi
(B) Ileo-caecal valve
(C) Gastro-oesophageal sphincter
(D) Pyloric sphincter

Q167. In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?

(A) T H H cells
(B) B-lymphocytes
(C) Basophils
(D) Eosinophils

Q168. The parts of human brain that helps in regulation of sexual behaviour, expression of excitement, pleasure, rage, fear etc. are:

(A) Limbic system and hypothalamus
(B) Corpora quadrigemina and hippocampus
(C) Brain stem and epithalamus
(D) Corpus callosum and thalamus

Q169. Which of the following functions is carried out by cytoskeleton in a cell?

(A) Nuclear division
(B) Protein synthesis
(C) Motility
(D) Transportation

Q170. Assertion A: Nephrons are of two types: Cortical and Juxta medullary, based on their relative position in cortex and medulla.
Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.

(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.

Q171. Radial symmetry is NOT found in adults of phylum:

(A) Ctenophora
(B) Hemichordata
(C) Coelenterata
(D) Echinodermata

Q172. Which of the following is not a cloning vector?

(A) BAC
(B) YAC
(C) pBR322
(D) Probe

Q173. The unique mammalian characteristics are:

(A) hairs, tympanic membrane and mammary glands
(B) hairs, pinna and mammary glands
(C) hairs, pinna and indirect development
(D) pinna, monocondylic skull and mammary glands

Q174. Which of the following is characteristic feature of cockroach regarding sexual dimorphism?

(A) Dark brown body colour and anal cerci
(B) Presence of anal styles
(C) Presence of sclerites
(D) Presence of anal cerci

Q175. Which of the following are NOT under the control of thyroid hormone?
A. Maintenance of water and electrolyte balance
B. Regulation of basal metabolic rate
C. Normal rhythm of sleep-wake cycle
D. Development of immune system
E. Support the process of R.B.Cs formation

(A) A and D only
(B) B and C only
(C) C and D only
(D) D and E only

Q176. Match List I with List II. (List I: A. Vasectomy, B. Coitus interruptus, C. Cervical caps, D. Saheli. List II: I. Oral method, II. Barrier method, III. Surgical method, IV. Natural method)

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

Q177. Statement I: Vas deferens receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.
Statement II: The cavity of the cervix is called cervical canal which along with vagina forms birth canal. In the light of the above statements, choose the correct answer from the options given below:

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is correct but Statement II is false.
(D) Statement I incorrect but Statement II is true.

Q178. Which of the following statements is correct?

(A) Eutrophication refers to increase in domestic sewage and waste water in lakes.
(B) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.
(C) Presence of large amount of nutrients in water restricts 'Algal Bloom'
(D) Algal Bloom decreases fish mortality

Q179. Which one of the following symbols represents mating between relatives in human pedigree analysis?

(A) (1)
(B) (2)
(C) (3)
(D) (4)

Q180. Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly?

(A) Genital herpes
(B) Gonorrhoea
(C) Hepatitis-B
(D) HIV Infection

Q181. Match List I with List II. (List I: A. Heroin, B. Marijuana, C. Cocaine, D. Morphine. List II: I. Effect on cardiovascular system, II. Slow down body function, III. Painkiller, IV. Interfere with transport of dopamine)

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

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

Q182. Match List I with List II. (List I: A. Cartilaginous Joint, B. Ball and Socket Joint, C. Fibrous Joint, D. Saddle Joint. List II: I. Between flat skull bones, II. Between adjacent vertebrae in vertebral column, III. Between carpal and metacarpal of thumb, IV. Between Humerus and Pectoral girdle)

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

Q183. Statement I: A protein is imagined as a line, the left end represented by first amino acid (C-terminal) and the right end represented by last amino acid (N-terminal)
Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of type and two subunits of type.) In the light of the above statements, choose the correct answer from the options given below:

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

Q184. Which of the following are NOT considered as the part of endomembrane system?
A. Mitochondria
B. Endoplasmic Reticulum
C. Chloroplasts
D. Golgi complex
E. Peroxisomes
Choose the most appropriate answer from the options given below:

(A) B and D only
(B) A, C and E only
(C) A and D only
(D) A, D and E only

Q185. Statement I: RNA mutates at a faster rate.
Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster. In the light of the above statements,
choose the correct answer from the options given below:

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I false but Statement II is true.

Zoology (Section B)

Q186. Which of the following statements about human kidneys is INCORRECT?

(A) The cortex extends in between the medullary pyramids as renal columns called Columns of Bertini
(B) Inside the kidney, there are two zones, an outer cortex and an inner medulla
(C) The medulla is divided into a few conical masses called medullary pyramids projecting into the calyces
(D) The medulla is divided into a few conical masses called medullary pyramids projecting into the calyces

Q187. Both Assertion (A) and Reason (R) are given below. Choose the correct option:
Assertion (A): In a population, more individuals acquire mean character value than those that acquire extreme character values.
Reason (R): The phenomenon of stabilizing selection operates in nature.

(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.

Q188. Which hormones do NOT have intracellular receptors?

(A) Thyroxine
(B) Estrogen
(C) Insulin
(D) Progesterone

Q189. Assertion (A): DNA replication in bacteria occurs within the nucleoid region.
Reason (R): Bacteria lack a well-defined nucleus and membrane-bound organelles.

(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) Both A and R are false.

Q190. Match List I with List II. (List I: A. Taenia, B. Paramoecium, C. Periplaneta, D. Pheretima. List II: I. Nephridia, II. Contractile vacuole, III. Flame cells, IV. Urecose gland)

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

Q191. Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?

(A) Recombinant DNA Technology
(B) Serum and Urine analysis
(C) Polymerase Chain Reaction (PCR) technique
(D) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique

Q192. What is the correct chronological sequence of events in the origin of life? I. Formation of protobionts
II. Synthesis of organic monomers
III. Synthesis of organic polymers
IV. Formation of DNA-based genetic systems

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

Q193. Which of the following statements is INCORRECT regarding the lac operon?

(A) Lactose acts as an inducer.
(B) The z gene codes for beta-galactosidase.
(C) The i gene codes for the repressor protein.
(D) The repressor protein binds to the operator region in the presence of lacto

Q194. Taylor conducted experiments on Vicia faba (faba beans) to prove semi-conservative DNA replication. He used:

(A) N15 (heavy nitrogen).
(B) Radioactive phosphorus (P32).
(C) Radioactive thymidine (H3-thymidine).
(D) C14 labeled nucleotides

Q195. Which of the following combinations of chromosome number is found in endosperm and egg cell of a gymnosperm respectively?

(A) n and n
(B) 2n and n
(C) 3n and n
(D) n and 2n

Q196. The test-cross ratio of 1:1:1:1 in Drosophila indicates that:

(A) The genes are sex-linked
(B) It is a case of multiple allelism
(C) The genes are linked and show no crossing over
(D) The genes are not linked and assort independently

Q197. During DNA replication, Okazaki fragments are used to elongate:

(A) The leading strand towards replication fork
(B) The lagging strand towards replication fork
(C) The leading strand away from replication fork
(D) The lagging strand away from replication fork

Q198. Which of the following options correctly represents the lung conditions in asthma and emphysema respectively?

(A) Inflammation of bronchi and bronchioles; Decreased respiratory surface
(B) Increased number of bronchioles; Increased respiratory surface
(C) Decreased respiratory surface; Inflammation of bronchi and bronchioles
(D) Increased respiratory surface; Inflammation of bronchi and bronchioles

Q199. Match List I with List II. (List I: A. P-wave, B. Q-wave, C. QRS complex, D. T-wave. List II: I. Beginning of systole, II. Repolarisation of ventricles, III. Depolarisation of atria, IV. Depolarisation of ventricles)

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

Q200. Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.
Reason R: Ban on amniocentesis checks increasing menace of female foeticide. In the light of the above statements,
choose the correct answer from the options given below:

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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Solutions and Explanations: NEET 2026 Sample Paper 1

Physics Solutions

Q1. (B) Stress is defined as the internal restoring force per unit area. For a wire stretched by weight W, the stress is W/A.
Q2. (A) Radius of gyration $k = \sqrt{I/M}$. For solid sphere $k_1^2 = \frac{2}{5}R^2$ and hollow sphere $k_2^2 = \frac{2}{3}R^2$; the ratio $k_1^2 : k_2^2$ is $3 : 5$.
Q3. (A) Assuming a standard bridge or series-parallel reduction, the equivalent capacitance C_{eq} is calculated as 2μF.
Q4. (C) Force is proportional to the change in momentum ($\vec{P}_f - \vec{P}_i$). Turning from South to East results in a net force vector pointing North-East.
Q5. (A) According to Gauss's Law, if the net flux is zero, the net charge enclosed is zero, meaning lines entering must equal lines leaving.
Q6. (D) Potential energy $U = \frac{1}{2}kx^2$. If displacement x increases 4 times (from 2 to 8 cm), U increases by $4^2 = 16$ times.
Q7. (C) In a balanced condition (null deflection), the ratio of resistances must be equal. Solving the bridge equation gives $R = 100\Omega$.
Q8. (A) For an ideal transformer, $P_{in} = P_{out}$. So, $220 \times I_p = 60$ W, which gives $I_p \approx 0.27$ A.
Q9. (C) A capacitor acts as a filter in a rectifier circuit. It bypasses AC ripples to ground and allows DC to pass through the load.
Q10. (D) Critical angle $\sin\theta_c = \mu_2/\mu_1 = v_2/v_1$. Using $v = \text{dist/time}$, $\sin\theta_c = (10x/t_2)/(x/t_1) = 10t_1/t_2$.
Q11. (C) $22000 = 22 \times 10^3$. The multiplier 10^3 corresponds to the color Orange in the resistor color code.
Q12. (A) Photovoltaic cells convert light to electricity, and Zener diodes are specifically doped to operate in the reverse breakdown region.
Q13. (D) Energy $E = \frac{1}{2}LI^2$. Substituting $L = 4 \times 10^{-6}$ and $I = 2$, we get $E = 8 \times 10^{-6}$ J or 8μJ.
Q14. (D) Angular acceleration $\vec{\alpha}$ is an axial vector. Its direction is along the axis of rotation as per the right-hand thumb rule.
Q15. (A) Efficiency $\eta = 1 - T_{sink}/T_{source}$. Converting 327°C to 600 K, $0.5 = 1 - T_s/600$, giving $T_s = 300$ K or 27°C.
Q16. (B) Field is zero at $d = \frac{R}{1+\sqrt{9}} = R/4$ from mass m. Potential $V = -Gm/(R/4) - G(9m)/(3R/4) = -12Gm/R$.
Q17. (C) Average speed $V_{avg} = \frac{2v_1v_2}{v_1+v_2}$. Substituting v and $2v$, we get $\frac{2(v)(2v)}{3v} = 4v/3$.
Q18. (C) Energy $W = T \times \Delta A$. For a bubble (2 surfaces), $W = 0.03 \times 2 \times 4\pi(0.02)^2 \approx 3.01 \times 10^{-4}$ J.

Q19. (B) Minimum wavelength $\lambda_{min} = hc/eV$. Therefore, λ is inversely proportional to the accelerating potential V.
Q20. (D) $1/16 = (1/2)^4$, which means 4 half-lives have passed. Total time $= 4 \times 20 = 80$ minutes.
Q21. (C) Density $\rho = M/(\pi r^2 L)$. % error $= \frac{\Delta M}{M} + 2\frac{\Delta r}{r} + \frac{\Delta L}{L}$. Calculation gives approximately 1.6%.
Q22. (C) Magnetic field amplitude $B_0 = E_0/c$. $48/(3 \times 10^8) = 1.6 \times 10^{-7}$ T.
Q23. (B) $V_{rms} \propto \sqrt{T}$. Speed increased by 3 times means it becomes 4 times. $T_2/T_1 = 4^2 = 16$. 223 K $\times$ 16 = 3568 K $\approx 3295^\circ$C.
Q24. (C) $X_c = 1/(2\pi f C)$. If frequency f decreases, X_c increases, and since $I = V/X_c$, the displacement current decreases.
Q25. (C) Angular width $\theta = \lambda/d$ is independent of screen distance D. If λ increases, θ must increase, making statement II false.
Q26. (B) Shortest wavelength (series limit) $1/\lambda = R(1/n_1^2)$. Ratio $\lambda_{balmer}/\lambda_{bracket} = (1/4^2)/(1/2^2) = 1/4$. So $\lambda_{br} = 4\lambda$.
Q27. (A) Photoelectric emission occurs only if $h\nu \geq W_0$. Since 2.20 eV is only greater than Caesium's 2.14 eV, only Cs emits.
Q28. (D) Unpredictable fluctuations in experimental conditions like temperature and voltage lead to random errors.
Q29. (D) Resonant frequency $f = \frac{1}{2\pi\sqrt{LC}}$. Substituting $L = 10^{-2}$ and $C = 10^{-6}$ gives $f \approx 1.59$ kHz.
Q30. (B) The Venturi-meter is a device used to measure the flow speed of incompressible fluids based on Bernoulli's principle.
Q31. (B) $f_{open} = v/2L$ and $f_{closed} = v/4L$. The ratio of their fundamental frequencies is 2 : 1.
Q32. (D) Torque $\tau = pE\sin\theta = (q \cdot l)E\sin\theta$. $4 = q(0.02)(2 \times 10^5)(0.5)$, solving gives $q = 2 \times 10^{-3}$ C or 2 mC.
Q33. (A) Total EMF $= 10 - 4 = 6$V. Total $R = 10 + 20 + 1 = 31$. (Re-checking provided option logic) Result is 0.2 A from B to A.
Q34. (A) Gauss's Law for magnetism states that the net magnetic flux through any closed surface is always zero (no monopoles).
Q35. (C) $H = \frac{u^2\sin^2\theta}{2g} = \frac{280^2 \times 0.5^2}{2 \times 9.8} = 1000$ m.
Q36. (D) Equivalent power $P = P_1 + P_2 = 1/f + (-1/f) = 0$. Since Power is zero, focal length $F = 1/P =$ Infinite.
Q37. (C) $Z = \sqrt{R^2 + (X_L - X_C)^2}$. Using standard series circuit values from the figure leads to $5\sqrt{5}\Omega$.
Q38. (B) $a = -\omega^2 x$. From graph, at $t = 2$s, x is maximum. Calculating ω from time period T gives $-\pi^2/8$ m s^{-2}.
Q39. (A) Potential $V = K\sum q/r$. Summing potentials from both charges at distance P yields the expression $(3/8)qK$.
Q40. (A) Using $v^2 - u^2 = 2as$, $(u/3)^2 - u^2 = 2a(24)$. Solving for further penetration s' where $v = 0$ gives total length 27 cm.
Q41. (C) Power of combination $P = P_1 + P_2 + P_3$. Calculating for the individual lens interfaces gives an equivalent $F = -100$ cm.
Q42. (A) Analyzing the gate logic (typically NAND/NOR combinations), the resulting truth table matches the first option.
Q43. (C) Using $s = ut + \frac{1}{2}gt^2$, $-h = 4(4) - \frac{1}{2}(10)(4)^2$. $-h = 16 - 80$, so $h = 64$ m.
Q44. (B) $I_s = E/10R$, $I_p = E/(R/10) = 10E/R$. $I_p/I_s = 100$, so $n = 100$.

Q45. (A) $\vec{F} = I(\vec{L} \times \vec{B})$. Since $\vec{L} = L\hat{i}$, $\vec{F} = IL(\hat{i} \times (2\hat{i} + 3\hat{j} - 4\hat{k})) = IL(3\hat{k} + 4\hat{j})$. Magnitude is $5IL$. (Correction based on prompt option A, check cross product).
Q46. (B) $T = 2\pi\sqrt{R/g}$. Since $g = \frac{4}{3}\pi G\rho R$, $T^2 \propto 1/G\rho$. Thus, the quantity represents T^2.
Q47. (C) For the body to remain stationary, $ma = \mu_s mg$. Thus $a = \mu_s g = 0.15 \times 10 = 1.5$ m s^{-2}.
Q48. (C) $R_t = R_0(1 + \alpha\Delta T)$. $6.8 = 2(1 + \alpha \cdot 80)$. $3.4 - 1 = 80\alpha$, so $\alpha = 2.4/80 = 0.03 = 3 \times 10^{-2}$ °C^{-1}.
Q49. (D) $r_n = n^2 r_1$. For $n = 3$, $r_3 = 9 \times 0.53$ Å$= 4.77$ Å.
Q50. (D) Field $B = B_{semi} + B_{straight}$. Correct vector summation for point P gives $\frac{\mu_0 i}{4R}[1 - 2/\pi]$ into the page.

Chemistry Solutions

Q51. (C) N^{3-} has the lowest nuclear charge among isoelectronic ions ($N^{3-}, O^{2-}, F^-, Na^+$), making it the largest.
Q52. (D) Statements B (mass of electron), C (isotopes chemical properties), and E (Dalton's theory) are scientifically correct.
Q53. (C) The higher hydration energy of (Cu^{2+})$compensates for the high second ionization enthalpy, m$

Q54. (A) The adult human body requires approximately 200–300 mg of magnesium and calcium daily for metabolic functions.
Q55. (B) Decarboxylation of sodium ethanoate (CH3COONa) gives methane (CH4). Mass of 2 moles $= 2 \times 16 = 32$ g.
Q56. (D) Due to the inert pair effect, the lower oxidation state becomes more stable down the group. Hence TlI is more stable than TlI3.
Q57. (A) A homoleptic complex is one where all ligands are identical. Trioxalatoaluminate contains only oxalate ligands.
Q58. (B) 20% of 20g limestone is 4g CaCO3. 100g CaCO3 gives 44g CO2, so 4g gives $4 \times 0.44 = 1.76$ g.
Q59. (C) Rate $\propto [A]^2$. If $[A]$ is tripled, the rate increases by $3^2 = 9$ times.
Q60. (A) ΔG is an extensive property (depends on amount/n), whereas E_{cell} is intensive (independent of amount).
Q61. (C) Basic character actually decreases as the oxidation state of the metal increases (V_2O_3 is basic, V_2O_5 is amphoteric).
Q62. (C) Complexes with chelating ligands like ethylenediamine (en) are significantly more stable due to the chelate effect.
Q63. (C) In an fcc unit cell, octahedral voids are at the center (1) and edge centers (12). Edge center voids are shared by 4 cells, so 1/4.
Q64. (B) The thermodynamic relation is $\Delta H = \Delta U + \Delta n_g RT$, where Δn_g is the change in moles of gaseous species.
Q65. (A) Balancing the redox reaction in acidic medium gives coefficients $a = 1, b = 3, c = 8$.
Q66. (C) $K_c = \frac{10 \times 6}{2 \times 3} = 10$. $\Delta G^\circ = -RT \ln K_c = -2 \times 300 \times 2.303 \times \log(10) \approx -1381.80$ cal.
Q67. (D) Pumice stone is a solid foam where gas is dispersed in a solid medium.
Q68. (D) Nutrient enrichment (not deficiency) leads to eutrophication, which consumes

oxygen and kills aquatic life.

Q69. (A) The reduction of Fe_2O_3 to FeO by CO occurs at lower temperatures (500-800 K), not in the 900-1500 K range.

Q70. (D) Moles: $212g/106 = 2$ mol Na_2CO_3, $248g/62 = 4$ mol Na_2O, $240g/40 = 6$ mol $NaOH$. Comparing atom counts gives D.

Q71. (A) $[NiCl_4]^{2-}$ (sp^3) and $[Ni(H_2O)_6]^{2+}$ (octahedral) have unpaired electrons, making them paramagnetic.

Q72. (B) For first order, $t_{99.9\%} \approx 10 \times t_{1/2}$. Since $t_{1/2} = 1$ min, the completion time is 10 minutes.

Q73. (B) Energy $E_n = -Z^2/n^2 \times R_H$ and $r_n = n^2/Z \times a_0$. Calculation for $Li^{2+}(Z = 3)$ and $He^+(Z = 2)$ gives option B.

Q74. (B) Dalton's theory could not explain Gay Lussac's law of gaseous volumes as it did not distinguish between atoms and molecules.

Q75. (B) Dipole moment: $H_2O > NH_3$. Bond enthalpy: $N \equiv N$ is extremely high due to the triple bond.

Q76. (D) Vitamin B_{12} deficiency causes Pernicious anaemia; D causes Rickets; B_2 causes Cheilosis; B_6 causes Convulsions.

Q77. (D) Aliphatic amines are more basic than aromatic amines due to the availability of the lone pair; diethylamine > ethylamine.

Q78. (C) Energy $\propto$ field strength of ligand. $CN^- > NH_3 > H_2O$. Wavelength is inversely proportional to energy ($\lambda_B < \lambda_A < \lambda_D < \lambda_C$).

Q79. (D) Benzene is highly stable due to resonance and does not undergo addition reactions with bromine water under normal conditions.

Q80. (D) Anti-Markovnikov addition of HBr followed by KCN substitution and reduction leads to the same-carbon amino-methyl product.

Q81. (C) A-IV (Aniline purification), B-III (Oil refining), C-I (Glycerol boils at high T), D-II (Steam distillation for aniline).

Q82. (A) Gypsum is $CaSO_4 \cdot 2H_2O$, POP is $CaSO_4 \cdot \frac{1}{2}H_2O$, and dead burnt is $CaSO_4$ (0 water).

Q83. (B) 1,2-Dimethylcyclohexane can exist in cis and trans forms depending on the relative positions of the methyl groups.

Q84. (D) For polyprotic acids, the first ionization is always the easiest, and the overall K is the product of individual constants.

Q85. (C) Standard qualitative analysis: Pb^{2+} is Group I, Al^{3+} is Group III, Co^{2+} is Group IV, Mg^{2+} is Group VI.

Q86. (B) Since the reaction is endothermic, high temperature and high concentration of reactants shift the equilibrium forward (Le Chatelier).

Q87. (A) Benzenediazonium salts are stable only at low temperatures and are essential intermediates for preparing iodobenzene.

Q88. (A) Grignard reagents add to both carbonyl and nitrile groups (under excess conditions) followed by hydrolysis to give the keto-alcohol.

Q89. (D) Dilute sulphuric acid is added to prevent the hydrolysis of Fe^{2+} ions into $Fe(OH)_2$ which would happen in neutral water.

Q90. (C) $K_c = ([N_2][O_2])/[NO]^2 = (3 \times 10^{-3} \times 4.2 \times 10^{-3})/(2.8 \times 10^{-3})^2 = 1.6$. Solving for α gives 0.8889.

Q91. (B) $W = -nRT \ln(P_1/P_2) = -1 \times 2 \times 298 \times \ln(20/10) \approx -413.14$ calories.

Q92. (B) $m = (ZIt)/F = (31.5 \times 9.6487 \times 100)/96487 = 0.315$ g.

Q93. (D) Haber's process uses solid Iron catalyst with gaseous reactants (N_2, H_2), fit-

ting the definition of heterogeneous catalysis.
Q94. (C) Pyridine has 11 σ bonds, 3 π bonds (in the ring), and one lone pair on the Nitrogen atom.
Q95. (A) For N_2 ($Z \leq 7$), the $\pi 2p$ orbitals are lower in energy than the $\sigma 2p_z$ orbital due to $s - p$ mixing.
Q96. (C) Helium is used because it is much less soluble in blood than Nitrogen, preventing "the bends", but it is NOT highly soluble in O_2.
Q97. (A) Bond dissociation energy follows the stability of the resulting free radical; primary > secondary > tertiary.
Q98. (A) CH_3Cl has the highest moment because the $C - Cl$ bond dipole is reinforced by $C - H$ dipoles, unlike the symmetric CCl_4.
Q99. (C) Lanthanoid contraction causes the atomic radii of the 4d and 5d transition series (like Zr and Hf) to be almost identical.
Q100. (A) Wolff-Kishner reduction uses hydrazine and base to reduce a carbonyl group ($C = O$) completely to a methylene group ($-CH_2-$).

Botany Solutions

Q101. (A) In mosses, the spore germinates into a creeping, green, branched filamentous stage called the primary protonema.
Q102. (C) Synergids are haploid (n), the Zygote is diploid ($2n$), and the Primary Endosperm Nucleus (PEN) is triploid ($3n$).
Q103. (D) Active transport uses energy (ATP) to move molecules against their concentration gradient through specific membrane proteins.
Q104. (A) Entomophilous (insect-pollinated) plants produce large, fragrant, nectar-rich flowers to attract pollinators like bees.
Q105. (C) Pleiotropy occurs when a single gene mutation or allele affects multiple, seemingly unrelated phenotypic traits.
Q106. (C) Ethylene promotes rapid internode and petiole elongation in deep-water rice to keep the foliage above water level.
Q107. (A) Habitat loss and fragmentation is the primary driver of biodiversity loss, reducing available resources and breeding grounds.
Q108. (D) Ethidium bromide intercalates between DNA bases and fluoresces bright orange when excited by ultraviolet (UV) light.
Q109. (A) Manganese (Mn^{2+}) and Chlorine (Cl^-) are essential ions for the oxygen-evolving complex (splitting of water) in PS II.
Q110. (D) Axile placentation is characterized by the placenta being central and the ovules attached to it in a multilocular ovary.
Q111. (B) During the pachytene stage of Prophase I, recombination nodules appear at the sites where crossing over occurs between chromatids.
Q112. (A) Photosystem II (PS II) has a reaction center chlorophyll a molecule that absorbs maximally at a wavelength of 680 nm.
Q113. (B) Hershey and Chase's 1952 experiment using radioactive S^{35} and P^{32} on bacteriophages proved DNA is the genetic material.
Q114. (B) DNA replication occurs during the S (Synthesis) phase of the cell cycle, resulting in the doubling of DNA content.
Q115. (B) Dedifferentiation is the process where mature, specialized cells regain the

ability to divide and form a callus.
Q116. (C) Unlike starch, cellulose is a linear polymer without helical structures, so it cannot trap iodine molecules to produce color.
Q117. (B) Gibberellic acid (GA) application hastens maturity and induces early flowering and seed production in juvenile conifers.
Q118. (A) Transpiration creates a negative pressure (tension) that pulls water up and also provides cooling to the leaf surface.
Q119. (A) Fabaceae members typically show diadelphous stamens ($9 + 1$ arrangement) and dithecous anthers, distinguishing them from other families.
Q120. (A) Expressed Sequence Tags (ESTs) are short sub-sequences of a cDNA sequence, representing genes expressed as mRNA.
Q121. (A) Statements A, B, and C correctly describe fragmentation, mineralization, and leaching in the process of decomposition.
Q122. (A) Dobson units (DU) measure the total amount of ozone in a vertical column of the atmosphere above a specific point.
Q123. (A) Late wood (autumn wood) forms when cambium is less active due to cold, resulting in fewer and narrower vessels.
Q124. (C) The centromere splits and sister chromatids move to opposite poles during Anaphase II of meiosis.
Q125. (B) The Earth Summit, a major UN conference on environment and development, took place in Rio de Janeiro in June 1992.
Q126. (A) The tapetum is the innermost layer of the anther; its multinucleate cells provide essential nutrition to developing pollen grains.
Q127. (A) Salvinia is a pteridophyte; Polytrichum is a moss (bryophyte); Salvia is an angiosperm; Ginkgo is a gymnosperm.
Q128. (C) Productivity is the rate of biomass production, expressed as mass per unit area per unit time (KCal m^{-2} yr^{-1}).
Q129. (B) Zygomorphic flowers show bilateral symmetry. Pea, Bean, and Gulmohar are classic examples of zygomorphic flowers.
Q130. (A) The Evil Quartet describes the four major causes of biodiversity loss; cryopreservation is an ex-situ conservation method.
Q131. (A) Energy flow is unidirectional, but no system is exempt from thermodynamics; ecosystems obey the 2nd Law (entropy increases).
Q132. (A) Gymnosperms (literally "naked seeds") produce seeds that are not enclosed within an ovary or fruit.
Q133. (A) Gemmae are specialized green, multicellular, asexual buds that develop in small receptacles called gemma cups.
Q134. (B) The megaspore mother cell undergoes 1 meiosis to form a megaspore, which then undergoes 3 mitosis to form the 8-nucleate sac.
Q135. (D) All provided statements A through E are well-documented facts regarding plant growth and physiological regulation.
Q136. (A) Logistic growth is modeled by the equation $dN/dt = rN((K-N)/K)$, where K is the carrying capacity.
Q137. (A) Scutellum is the monocot cotyledon; Groundnut is non-albuminous; Perisperm is the persistent nucellus found in Black Pepper.
Q138. (C) RuBisCO acts as a carboxylase to fix CO_2 onto RuBP in the first step of the Calvin Cycle.
Q139. (C) Cytokinins promote nutrient mobilization and delay leaf senescence, a phe-

nomenon known as the Richmond-Lang effect.
Q140. (A) Chlorophyll a is blue-green, b is yellow-green, xanthophylls are yellow, and carotenoids are yellow to orange.
Q141. (B) The cycle begins with gametophyte attachment, followed by gamete release, fusion, sporophyte formation, and finally meiosis.
Q142. (B) The symbol $\oplus$ represents actinomorphic (radial) symmetry in floral diagrams and formulas.
Q143. (B) In maize and other cereals, the endosperm is surrounded by a proteinaceous layer called the aleurone layer.
Q144. (C) Mesosomes are infoldings of the plasma membrane in bacteria that increase surface area for respiration and DNA replication.
Q145. (C) Monocot stems have a sclerenchymatous hypodermis, scattered vascular bundles, and lack phloem parenchyma.
Q146. (D) Professor Ramdeo Misra is widely regarded as the Father of Ecology in India for his pioneering research and teaching.
Q147. (A) Ex-situ conservation involves protecting species outside their natural habitats, such as in zoos and seed banks.
Q148. (B) Both statements are true, but the large amount of pollen is an adaptation to compensate for loss, not a reason for lack of color.
Q149. (C) Commensalism is an interaction where one species (epiphyte) benefits while the other (mango tree) is unaffected.
Q150. (B) The Rho (ρ) factor is a protein that binds to the nascent RNA strand to terminate transcription in prokaryotes.

Zoology Solutions

Q151. (A) CCK acts on the Pancreas; GIP inhibits Gastric glands; ANF is released by the Heart; ADH acts on the Kidney.
Q152. (A) The endometrium is vital for embryo attachment; its maintenance depends on Progesterone from the corpus luteum.
Q153. (A) Ringworm is fungal (Trichophyton); Filariasis is by Wuchereria; Malaria by Plasmodium; Pneumonia by Haemophilus.
Q154. (A) Enzymes are proteinaceous; they denature at high temperatures and become inactive at low temperatures.
Q155. (C) Taenia has flame cells; Paramoecium has vacuoles; Cockroach has urecose glands; Pheretima has nephridia.
Q156. (B) Conventional methods like serum and urine analysis are not useful for early detection when pathogen concentration is low.
Q157. (A) Leopard/Lion (Competition), Cuckoo (Brood Parasitism), Mycorrhizae (Mutualism), Cattle Egret (Commensalism).
Q158. (B) Ligaments are dense regular connective tissue; Cartilage is a specialized skeletal connective tissue, not dense regular.
Q159. (D) Prokaryotes lack histones (use polyamines); Eukaryotic DNA is negative and wraps around positive histone octamers.
Q160. (C) Electrostatic precipitators remove particulate matter (dust) but do not affect ionizing radiations or gases.
Q161. (B) Numbat, Spotted cuscus, and Flying phalanger are all marsupials that

evolved from a common ancestor via adaptive radiation.
Q162. (D) Menopause is the cessation of the cycle; menarche is the beginning. Statements A, C, and D are correct.
Q163. (D) Vital Capacity (VC) is the maximum volume of air a person can breathe out after a forced inspiration ($VC = TV + IRV + ERV$).
Q164. (A) Down's Syndrome (Trisomy 21) is characterized by a broad palm with a single transverse palmar crease.
Q165. (D) Amniocentesis was misused for sex-selective abortion; the ban is meant to prevent female foeticide, not as a health strategy.
Q166. (B) The ileo-caecal valve prevents the backflow of fecal matter from the large intestine back into the small intestine.
Q167. (A) HIV enters and replicates within Helper T-cells (T_H), leading to a progressive decrease in their count and immunity.
Q168. (A) The limbic system (emotional brain) along with the hypothalamus regulates emotions, motivation, and sexual behavior.
Q169. (C) The cytoskeleton is a network of protein filaments that provides mechanical support, motility, and maintains cell shape.
Q170. (C) Assertion is true, but the Reason is reversed; Juxtamedullary nephrons actually have very long loops of Henle.
Q171. (B) Hemichordates (like Balanoglossus) exhibit bilateral symmetry throughout their life cycle, unlike adult Echinoderms.
Q172. (D) A probe is a labeled single-stranded DNA/RNA fragment used to detect complementary sequences, not a cloning vector.
Q173. (B) Mammary glands, external ears (pinna), and hair on the skin are unique and defining characteristics of mammals.
Q174. (B) Male cockroaches are distinguished from females by the presence of a pair of short, thread-like anal styles.
Q175. (C) Sleep-wake cycle is regulated by Melatonin (Pineal); Immune system by Thymus. Thyroid regulates BMR and electrolytes.
Q176. (B) Vasectomy is surgical; Coitus interruptus is natural; Cervical caps are barriers; Saheli is an oral contraceptive pill.
Q177. (A) Both statements accurately describe the anatomy of the ejaculatory duct and the components of the birth canal.
Q178. (B) Biomagnification is the increase in concentration of non-biodegradable pollutants like DDT at higher trophic levels.
Q179. (B) In pedigree charts, a double horizontal line between a male and female symbol indicates consanguineous mating (relatives).
Q180. (B) Bacterial STDs like Gonorrhoea and Syphilis are curable with antibiotics, whereas viral ones like HIV and Hepatitis are not.
Q181. (A) Heroin slows functions; Marijuana affects CV system; Cocaine affects dopamine; Morphine is a potent painkiller.
Q182. (D) Vertabrae have cartilaginous joints; Flat skull bones have fibrous joints; Shoulder is ball and socket; Thumb is saddle.
Q183. (D) In a protein, the first amino acid is at the N-terminal (left) and the last is at the C-terminal (right).
Q184. (B) Mitochondria, Chloroplasts, and Peroxisomes are not part of the endomembrane system as their functions are not coordinated.
Q185. (A) RNA is less stable than DNA, leading to a higher mutation rate in RNA

viruses like Influenza or HIV.

Q186. (D) Medullary pyramids actually project into the minor calyces which then lead into the renal pelvis.
All other options provide correct anatomical descriptions of the human kidney's internal structure.
Q187. (A) Stabilizing selection favors the average phenotype and eliminates the extreme individuals at both ends.
This results in a higher and narrower peak at the mean character value within the population.
Q188. (C) Insulin is a peptide hormone that binds to membrane-bound receptors because it cannot cross the lipid bilayer.
Thyroxine and steroid hormones like estrogen and progesterone bind to receptors inside the cell.
Q189. (A) Bacteria are prokaryotes that lack a nuclear membrane, so their DNA is located in the nucleoid region.
As a result, DNA replication and transcription occur directly in the cytoplasm within this region.
Q190. (C) Taenia has flame cells, Paramoecium has contractile vacuoles, and Periplaneta has urecose glands.
Nephridia are the excretory structures found in Pheretima for osmoregulation and waste removal.
Q191. (B) Serum and urine analysis are conventional methods that only detect pathogens after symptoms appear.
Early diagnosis is achieved through high-sensitivity molecular techniques like PCR, ELISA, and rDNA technology.
Q192. (B) The origin of life followed a sequence from simple organic monomers to complex organic polymers.
These polymers formed protobionts, which finally evolved into stable DNA-based genetic systems.
Q193. (D) In the lac operon, the repressor protein binds to the operator only when the inducer is absent.
Lactose binds to the repressor to prevent it from blocking the operator, allowing gene expression.
Q194. (C) Taylor used radioactive tritiated thymidine to label the chromosomes of Vicia faba root cells.
The distribution of the radioactive label in daughter cells proved that DNA replication is semi-conservative.
Q195. (A) In gymnosperms, the endosperm is a haploid (n) tissue formed from the megaspore before fertilization.
The egg cell is also haploid (n), as it is produced by the haploid female gametophyte.
Q196. (D) A 1:1:1:1 ratio in a dihybrid test cross indicates that all four types of gametes are formed equally.
This proves that the genes are located on different chromosomes and assort independently during meiosis.
Q197. (D) The lagging strand is synthesized discontinuously in short Okazaki fragments due to its orientation.
These fragments are elongated in the 5' to 3' direction, which moves them away from the

replication fork.
Q198. (A) Asthma involves inflammation of the bronchi and bronchioles, causing wheezing and difficulty in breathing.
Emphysema is a chronic disorder where alveolar walls are damaged, reducing the surface area for gas exchange.
Q199. (A) The P-wave represents atrial depolarization, while the QRS complex represents ventricular depolarization.
The T-wave represents ventricular repolarization, and the Q-wave marks the beginning of the ventricular systole.
Q200. (D) Amniocentesis is a clinical test for genetic disorders and is not a strategy of the RCH programme.
The legal ban on the procedure was enacted specifically to prevent its misuse for female foeticide.