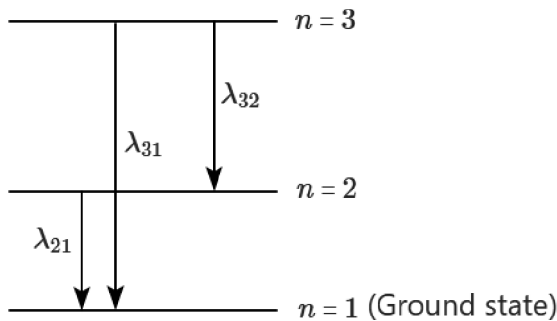# Physics - Section A

1 The figure represents the transitions between the different levels of an H-atom with n representing the (principal) quantum number of the electron in that energy level. The wavelengths of the emitted photons are shown, next to the transitions.

The energy levels are not drawn to scale.

The ratio $\lambda_{31}/\lambda_{21}$ equals:

1.	$\frac{9}{4}$	2.	$\frac{4}{9}$
3.	$\frac{3}{2}$	4.	$\frac{27}{32}$

2 An electric field of 10 N/C is applied across a wire of an area of cross-section 10^{-8} m^2 through which a current of 1 A is flowing. The resistivity of the material of the wire is:
1. 10^8 Ω-m
2. 10^{-7} Ω-m
3. 10^{-9} Ω-m
4. 10^7 Ω-m

3 The value of Stefan's constant (σ) is determined by experimentally measuring the remaining quantities in the equation: $E = A\sigma T^4$.
Both E, A are measured to an accuracy of 1%, while temperature T is measured to 0.5%. The error in the determination of σ is:
1. 2%
2. 4%
3. 2.5%
4. 0.5%

4 The dimensions of the quantity $\frac{\eta}{\rho}$ where η is the viscosity and ρ is the density are:
1. $\left[\frac{L}{T}\right]$
2. $\left[\frac{L^2}{T}\right]$
3. $\left[\frac{L}{T^2}\right]$
4. $\left[\frac{L^3}{T^2}\right]$

5 A block is connected to a wall by an elastic spring, which is initially unextended. A constant force F is applied to the block, so that the spring is stretched and the block moves to the right. The spring extends and slows the block down, and it comes to rest again, briefly. There is no friction anywhere. The displacement of the block is d.
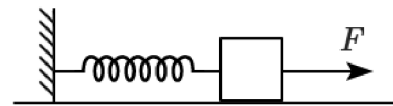

The work done by the force F equals:
1. $\frac{Fd}{2}$
2. Fd
3. $2Fd$
4. $\frac{Fd}{3}$

6 Given below are two statements:

| **Statement I:**	The poles of magnets cannot be separated by breaking into two pieces.
Statement II:	The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.

1.	**Statement I** is correct and **Statement II** is incorrect.
2.	**Statement I** is incorrect and **Statement II** is correct.
3.	Both **Statement I** and **Statement II** are correct.
4.	Both **Statement I** and **Statement II** are incorrect.

7 Two identical uniform rods of mass m, length L (each) are joined at their centres at right angles, as shown in the figure. The moment of inertia of the system about an axis passing through A, perpendicular to the plane of the rods, is:
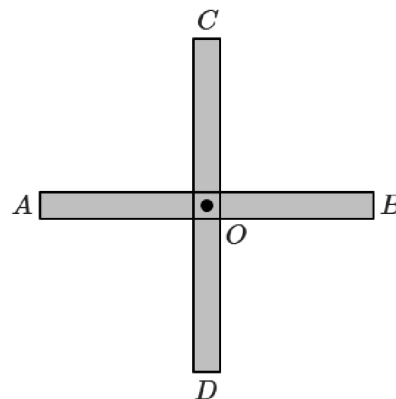
| 1.	$\frac{2}{3} \, mL^2$	2.	$\frac{5mL^2}{12}$
3.	$\frac{5}{6} \, mL^2$	4.	$\frac{7}{6} \, mL^2$

8 The graph represents the variation of the position of a particle (x) as a function of time (t); the variation being sinusoidal.
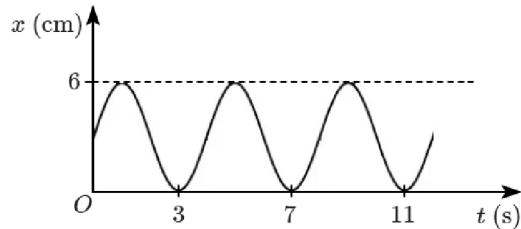
The frequency of the motion is:

1.	$\frac{1}{2}$ Hz	2.	$\frac{1}{3}$ Hz
3.	$\frac{1}{4}$ Hz	4.	$\frac{1}{8}$ Hz

9 A coil of radius R centred at O carries a current i. Point P is on the axis of coil at a distance R from the centre O as shown in the figure. The ratio of the magnetic field at point O to the magnetic field at point P is equal to:
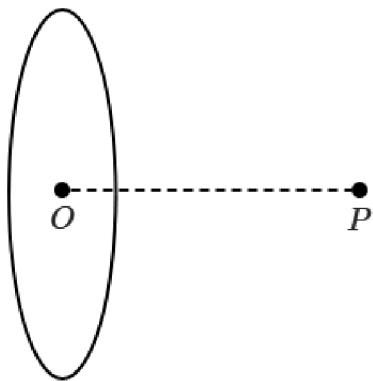
1. 2
2. $2\sqrt{2}$
3. $1\sqrt{2}$
4. $1/2\sqrt{2}$

10 Faraday's law of electromagnetic induction is used in the operation of:
1. metal detectors
2. jet engines
3. electromagnets
4. LEDs

11 The mass numbers of two nuclei, A and B, are 27 and 64, respectively. The ratio of their radii will be:
1. 3 : 4
2. 5 : 8
3. 2 : 1
4. 1 : 2

12 The inlet and outlet pipes have the same cross-section. At what speed v should water flow into the tank, so that the water level remains steady?
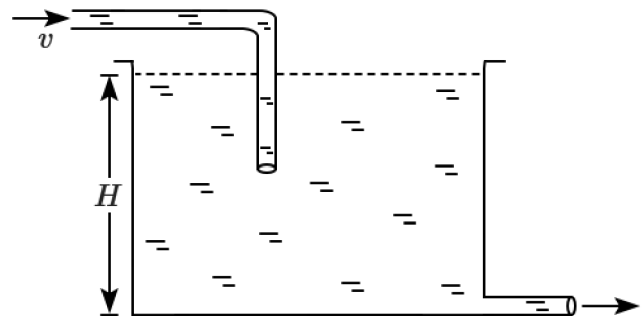
1.	$\sqrt{gH}$	2.	$\sqrt{2gH}$
3.	$\sqrt{\frac{gH}{2}}$	4.	$2\sqrt{gH}$

13 If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be:

1.	only inside the pipe
2.	only outside the pipe
3.	both inside and outside the pipe
4.	neither inside nor outside the pipe

14 Two stars are at separation 1 minute of arc. If they are viewed through a telescope of magnifying power 120, the angular separation between stars will appear to be:
1. 1 seconds of arc
2. 0.5 seconds of arc
3. 1°
4. 2°

15 The current supplied by the battery in the circuit shown in the figure is:
(neglect the internal resistance of the battery)
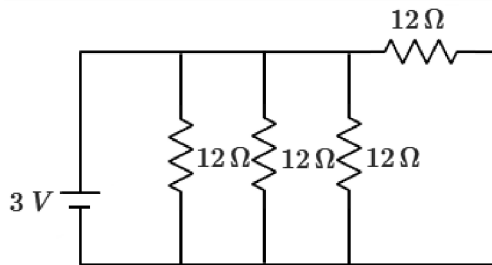
1.	1.0 A	2.	$\frac{3}{16}$ A
3.	$\frac{3}{12}$ A	4.	$\frac{3}{6}$ A

16 Two particles are projected in the air at the same speed u at an angle θ_1 and θ_2 (θ_1 and θ_2 are acute angles) to the horizontal, respectively. If the maximum height reached by the first particle is greater than that of the second, then which of the following is correct? (T_1 and T_2 are the times of flight of the two particles respectively)
1. $\theta_1 > \theta_2$
2. $\theta_1 = \theta_2$
3. $T_1 < T_2$
4. $T_1 = T_2$

17 The value of Wien's constant, b is 3×10^{-3} m-K. The cosmic background radiation can be considered to be equivalent to a blackbody radiation at 3 K. The most probable wavelength in this radiation is:
1. 1 mm
2. 1 m
3. 10^3 m
4. 1 μm

18 A particle of mass m and positive charge q is released from point A. Its speed is found to be v when it passes through point B. The potential difference between the two points will be:
1. $\frac{mv^2}{q}$
2. $\frac{mv^2}{2q}$
3. $\frac{2mv^2}{q}$
4. $\frac{mv}{2q}$

19 For the wave equation, $y = A\sin(Bt - Cx)$, match Column I with Column II:

Column I		Column II	
(a)	Wave speed	(p)	$\frac{B}{2\pi}$
(b)	Maximum particle speed	(q)	$\frac{C}{2\pi}$
(c)	Wave frequency	(r)	$\frac{B}{C}$
(d)	Wavelength	(s)	None of these

Codes:

1.	a - s, b - p, c - q, d - r
2.	a - r, b - p, c - q, d - s
3.	a - s, b - q, c - p, d - r
4.	a - r, b - s, c - p, d - s

20 The voltage across AB, $V_{AB} = 6$ to 7 V, and it can vary. A 5 V-Zener diode is to be connected between P, Q so that the voltage across the $100\,\Omega$ resistance is maintained at that value.
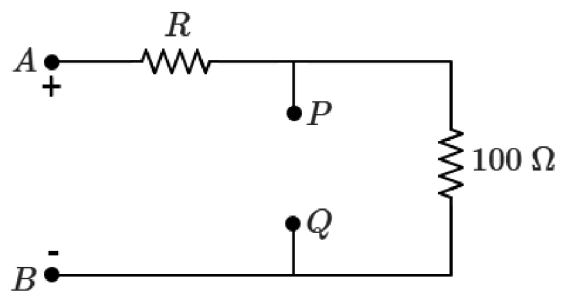
After the 5 V-Zener diode(s) is/are properly connected, the current through the $100\,\Omega$ resistor is:
1. 5 A
2. 0.05 A
3. 0.025 A
4. 0.1 A

21 Two blocks, moving towards each other with velocities 1 m/s and 4 m/s collide and come to rest, immediately thereafter. Their masses are in the ratio:
1. 1 : 4
2. 4 : 1
3. 2 : 1
4. 16 : 1

22 Let C_p and C_v denote the molar heat capacities of an ideal gas at constant pressure and volume, respectively. Which of the following is a universal constant?

1.	C_p/C_v	2.	C_pC_v
3.	$C_p - C_v$	4.	$C_p + C_v$

23 A block of mass 1 kg moving with a velocity of 3 m/s undergoes a collision with a second block of mass 2 kg, at rest. After the collision, the two blocks move together.
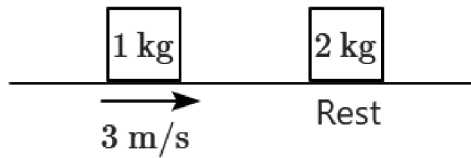

The velocity of the centre-of-mass of the system before the collision is:
1. 3 m/s
2. 2 m/s
3. 1 m/s
4. zero

24 A spacecraft, moving in outer space where there are no gravitational fields, fires its rockets. The initial mass of the spacecraft was 1000 kg, and it was moving with a velocity of 100 m/s. After firing its rockets, its mass becomes 900 kg and its velocity becomes 200 m/s, along the same direction. The momentum of the exhaust gases, backward, is:
1. 28×10^4 N-s
2. 18×10^4 N-s
3. 8×10^4 N-s
4. 4×10^4 N-s

25 A 2 kg block is attached to a string, which is connected to a point A. A horizontal force F is applied to the string at B, so that AB makes an angle of $30°$ with the vertical, in equilibrium. The force F equals: ($g = 10$ m/s^2)
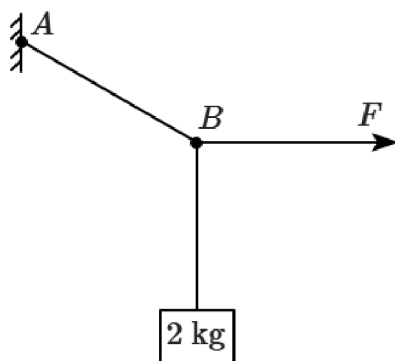
1.	10 N	2.	$10\sqrt{3}$ N
3.	$\dfrac{20}{\sqrt{3}}$ N	4.	$20\sqrt{3}$ N

26 Two particles move with the same uniform angular speed around two different circles of radii r, $2r$. Their accelerations are in the ratio:
1. 1 : 2
2. 1 : 4
3. 2 : 1
4. 4 : 1

27 One mole of an ideal monoatomic gas undergoes a slow reversible process in which its density (ρ) is inversely proportional to its absolute temperature (T).
The process is:
1. isothermal
2. isochoric
3. adiabatic
4. isobaric

28 One mole of an ideal monoatomic gas undergoes a slow reversible process in which its density (ρ) is inversely proportional to its absolute temperature (T).
The temperature of the gas increases from 300 K to 400 K. The work done by the gas during the process is:
(R: universal gas constant)
1. zero
2. $-100\,R$
3. $100\,R$
4. $50\,R$

29 A dipole, with a charge of magnitude 0.01 C and a separation distance of 0.4 mm, is positioned within an electric field that has a strength of 10 dyne/C. The maximum torque exerted on the dipole in this field is:
1. 4×10^{-9} N-m
2. 2×10^{-10} N-m
3. 4×10^{-10} N-m
4. 2×10^{-9} N-m

30 Which one of the following is not a vector quantity?
1. velocity
2. weight
3. electric charge
4. electric field

31 Lenses L_1 and L_2 of focal length 10 cm and 20 cm are placed with their principal axis coinciding with the x-axis: lens L_1 is placed at $x = 10$ cm, lens L_2 is placed at $x = 70$ cm.

L_1
$x = 10$ cm

L_2
$x = 70$ cm
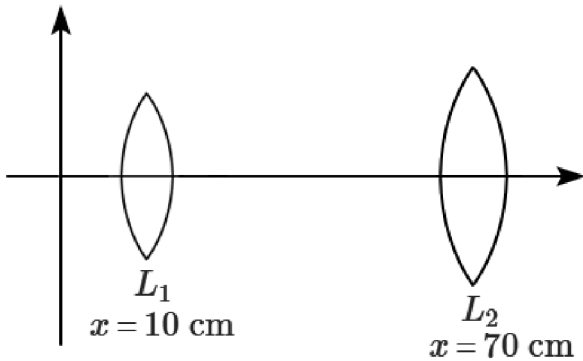
A point object is placed at the origin, it functions as a source of light. The final image is formed at $x =$
1. 90 cm
2. 110 cm
3. 50 cm
4. infinity

32 A string, under tension, and lying along the x-axis is set into transverse vibrations. The displacement at a point x is given by the function $y(x, t)$ where t represents the time:
$y(x, t) = (3 \text{ mm}) \sin\left(\frac{\pi x}{20 \text{ cm}}\right) \cos\left\{2\pi \left(100 \text{ s}^{-1}\right) t\right\}$
The frequency of vibration of the string is:
1. 100 Hz
2. 200 Hz
3. 100 π Hz
4. 200 π Hz

33 A ball of mass m falls from a height h_1 and rebounds to a height $h_2 (h_2 < h_1)$. The time of collision is τ. The impulse delivered to the ball during the collision is (nearly):
1. $mg\tau$
2. $m\left(\sqrt{2gh_1} - \sqrt{2gh_2}\right)$
3. $m\left(\sqrt{2gh_1} + \sqrt{2gh_2}\right)$
4. $m\sqrt{2g(h_1 + h_2)}$

34 A spring is used to launch a toy car (mass $= m$), on a smooth horizontal surface. Given are the following quantities:

I.	spring constant
II.	amount of spring compression
III.	altitude of the surface

Which of the above three qualities are needed to calculate the car's final speed?

1.	I and II only
2.	II and III only
3.	I and III only
4.	I, II, and III

35 Two metallic plates are placed parallel to each other, at a separation d. A dielectric ($K = 2$) of width $d/3$ is inserted into space between the plates, parallel to plates: the separation between the plates being d. The capacitance of the plates:

1.	increases by 20%
2.	decreases by 20%
3.	increases by 33%
4.	decreases by 25%

PHYSICS - SECTION B

36 Two plates A, B are bolted together by means of a bolt PQ so that they move together. External forces F_1, F_2 act along the planes of the plates. The material of the bolt PQ should have:
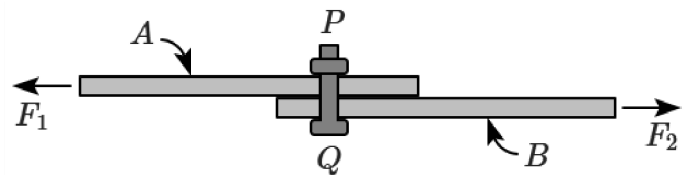
1.	small Young's modulus
2.	large Young's modulus
3.	small shear modulus
4.	large shear modulus

37 A square sheet of area 1 mm^2 is kept in front of a concave mirror of focal length 30 cm. If the principal axis of the mirror passes through the centre of the sheet, perpendicular to it, and the sheet is placed 90 cm from the mirror, what will be the area of the image formed by the mirror?
1. 1 mm^2
2. 0.25 mm^2
3. 4 mm^2
4. 0.5 mm^2

38 A time-varying current i splits into two parts:

(i) i_1, passing through inductor L_1 and
(ii) i_2, passing through inductor L_2
both connected in parallel. Then:
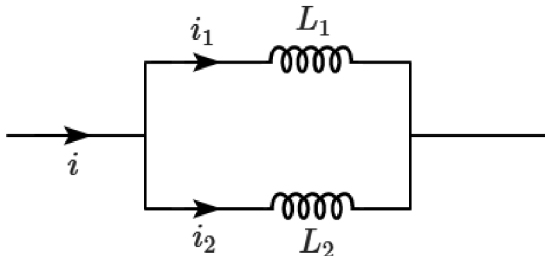
1.	$L_1 \dfrac{di_1}{dt} + L_2 \dfrac{di_2}{dt} = \text{constant}$
2.	$\dfrac{1}{L_1} \dfrac{di_1}{dt} + \dfrac{1}{L_2} \dfrac{di_2}{dt} = \text{constant}$
3.	$\dfrac{1}{L_1} \dfrac{di_1}{dt} = \dfrac{1}{L_2} \dfrac{di_2}{dt}$
4.	$L_1 \dfrac{di_1}{dt} = L_2 \dfrac{di_2}{dt}$

39 When an electron makes a transition from the state n to $(n-1)$ the change in the de-Broglie wavelength of the electron: $\Delta\lambda = |\lambda_n - \lambda_{n-1}|$
varies with large n as:

1.	$\dfrac{1}{n}$	2.	$\dfrac{1}{n^2}$
3.	$\dfrac{1}{n^4}$	4.	n^0, constant

40 In an LCR series circuit, the potential difference across each element is initially 60 V. Now the value of resistance alone is doubled, then the potential drops across R, L and C, respectively are:

1.	60 V, 30 V, 30 V
2.	60 V, 120 V, 120 V
3.	30 V, 120 V, 120 V
4.	60 V, 100 V, 80 V

41 An electromagnetic wave given by:

$\vec{E} = E_0(\hat{i} + \hat{j})\sin(\omega t - kz)$

is travelling in space, where $\vec{E}$ is the electric field at (x, y, z) at time t.
The electric field is along the vector:
1. $\hat{i} + \hat{j}$
2. $\hat{i} - \hat{j}$
3. $\hat{k}$
4. $\hat{i} + \hat{j} + \hat{k}$

42 When a p-n junction is reverse-biased,

1.	no current flows at all for any voltage
2.	a very small current flows, independent of voltage
3.	a small current flows for ordinary voltages, but a very large current may flow if the voltage is increased above a threshold
4.	no current flows for ordinary voltage, but a large current flows when voltage exceeds a threshold

43 Given below are two statements:

Assertion (A):	Zener diode is used in forward bias.
Reason (R):	When the applied voltage reaches the breakdown voltage of the zener diode, there is no change in the current.

1.	Both **(A)** and **(R)** are True and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are True but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	Both **(A)** and **(R)** are False.

44 The escape velocity of a rocket launched from the surface of the earth towards a planet:

1.	does not depend on the mass of the rocket.
2.	does not depend on the mass of the earth.
3.	depends on the mass of the rocket.
4.	depends on mass of the planet towards which it is moving.

45 Based on the given graph between stopping potential, V and frequency, ν of irradiation, the work function of the metal is equal to:
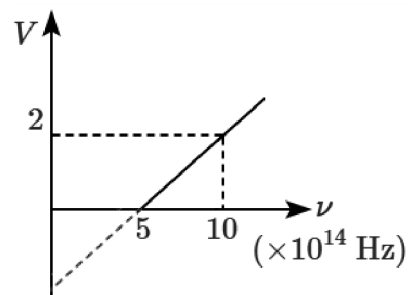
1. 1 eV
2. 3 eV
3. 2 eV
4. 4 eV

46 Given below are two statements:

|	
Assertion (A):	When a photon having an energy greater than 1.1 eV is absorbed in a reverse biased silicon diode, the diode conducts briefly.
Reason (R):	The band gap in silicon is 1.1 eV and when a photon having an energy greater than 1.1 eV is absorbed, it creates an electron-hole pair in the diode and the diode conducts.

1.	Both (A) and (R) are True and (R) is the correct explanation of (A).
2.	Both (A) and (R) are True but (R) is not the correct explanation of (A).
3.	(A) is True but (R) is False.
4.	(A) is False but (R) is True.

47 Consider the following figure representing the displacement of an object in one dimension.
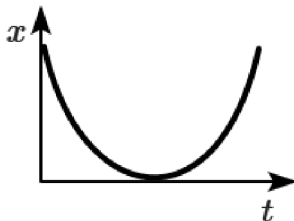
Which of the following best represents the graph of acceleration versus time?

48 An infinitely long straight line carries a uniform positive charge λ per unit length. A negative point charge $(-q)$ moves in a circular path with the charge λ as its axis, under the action of its electric field. The kinetic energy of the point charge is:
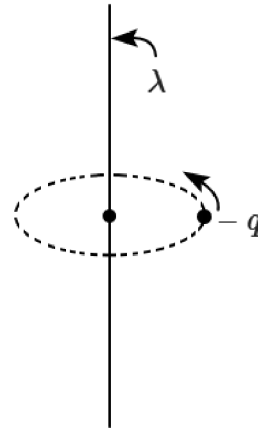
1.	$\dfrac{q\lambda}{4\pi\varepsilon_0}$	2.	$\dfrac{q\lambda}{2\pi\varepsilon_0}$
3.	$\dfrac{2q\lambda}{\pi\varepsilon_0}$	4.	$\dfrac{q\lambda}{8\pi\varepsilon_0}$

49 In Young's-double slit experiment, the distance between the slits and the screen is doubled. The separation between the slits is reduced to half. As a result the fringe width:

1.	is halved
2.	become four times
3.	remains unchanged
4.	is doubled

50 A physical pendulum consists of a uniform rod AB of mass m and length L, suspended from one end A – so as to rotate freely under gravity. If it is displaced slightly from its mean position, it executes SHM. Let the maximum kinetic energy of the rod be E_0.

If the time period of a simple pendulum of the same length is T_0, then the time period of this pendulum is:

1.	$\sqrt{\frac{2}{3}}T_0$	2.	$\sqrt{\frac{1}{12}}T_0$
3.	$\sqrt{\frac{3}{2}}T_0$	4.	T_0

CHEMISTRY - SECTION A

51 Given below are two statements:

Assertion (A):	Among the two O-H bonds in H_2O molecule, the energy required to break the first O-H bond and the other O-H bond is the same.
Reason (R):	The electronic environment around oxygen is the same even after the breakage of one O-H bond.

1.	Both **(A)** and **(R)** are True and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are True but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	Both **(A)** and **(R)** are False.

52 How many structural isomers are possible for the compound having molecular formula $C_3H_5Br_3$?
1. 5
2. 4
3. 6
4. 8

53 A molecule has the formula $C_5H_{10}O$. Which functional groups might it contain?
I: Alcohol
II: Ketone
1. **I** only
2. **II** only
3. Both **I** and **II**
4. Neither **I** nor **II**

54 The IUPAC name for the complex $[Co(NO_2)(NH_3)_5]Cl_2$ is:
1. Nitro-N-pentaamminecobalt(III)chloride
2. Nitro-N-pentaamminecobalt(II)chloride
3. Pentamminenitro-N-cobalt(II)chloride
4. Pentaamminenitrito-N-cobalt(II)chloride.

55 Match the substance given in Column I with the application given in Column II and mark the appropriate option:

	Column I (Substance)		Column II (Application)
A.	Liquid helium	(i)	Chlorinating agent
B.	Argon	(ii)	Inert atmosphere (metallurgy)
C.	PCl_5	(iii)	Cryogenics
D.	P_4O_{10}	(iv)	Dehydrating agent

	A	B	C	D
1.	(iii)	(ii)	(i)	(iv)
2.	(iii)	(iv)	(i)	(ii)
3.	(ii)	(iii)	(i)	(iv)
4.	(ii)	(iv)	(i)	(iii)

56 Which haloarenes is most reactive towards electrophilic substitution reaction?

57 Which of the following is π-acid ligand?
1. NH_3
2. CO
3. F^-
4. Ethylene diamine

58 The most probable radius (in pm) for finding the electron in He^+ is :
1. 26.5
2. 105.8
3. 0.0
4. 52.9

59 Which of the following exhibits a pπ-dπ bond?

1.	NO_3^-	2.	BO_3^{3-}
3.	CO_3^{2-}	4.	SO_3^{2-}

60 Which compound among the following does not exhibit paramagnetism?
1. $[Cu(NH_3)_4]Cl_2$
2. FeO
3. NO
4. N_2O_4

61 The incorrect electronic configuration among the following is/are :
A. $K = [Ar]4s^1$
B. $Pd = [Kr]4d^8, 5s^2$
C. $Cr = [Ar]3d^4, 4s^1$
D. $Cu = [Ar]3d^{10}, 4s^1$
1. C and D only
2. B and C only
3. A and D only
4. B, C, and D only

62 The addition of a catalyst during a chemical reaction alters which of the following quantities?
1. Enthalpy
2. Activation energy
3. Entropy
4. Internal energy

63 What substance could be added to one liter of water to serve as a buffer?
1. One mole of CH_3CO_2H and 0.5 moles of NaOH
2. One mole of NH_4Cl and one mole of HCl
3. One mole of NH_4OH and one mole of NaOH
4. One mole of CH_3CO_2H and one mole of HCl

64 The solubility of phenol in water is lower. This can be attributed to:
1. Non-polar nature of phenol
2. Acidic nature of -OH group
3. Non-polar hydrocarbon part in phenol
4. None of the above

65 What is the ΔH (enthalpy change) for the reaction represented by the equation,
$OF_2 + H_2O \rightarrow O_2 + 2HF$? ,
(Given the bond energies of $O - F, O - H, H - F$ and $O = O$ as 44, 111, 135, and 119 kcal mol^{-1}, respectively)
1. -222 kcal
2. -88 kcal
3. -111 kcal
4. -79 kcal

66 When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is:
1. $CH_3-CH=CH_2$
2. $CH_3-C≡CH$
3. $CH_3CH_2CH<^{NH_2}_{NH_2}$
4. $CH_3CH_2C<^{Cl}_{NH_2}$

67 For the elementary step, $(CH_3)_3 CBr(aq) \rightarrow (CH_3)_3C^+$ (aq) + Br$^-$ (aq), the molecularity is:
1. Zero
2. 1
3. 2
4. Cannot be ascertained

68 In a redox change, the oxidant $K_2Cr_2O_7$ is always reduced to:
1. Cr^{5+}
2. Cr^{4+}
3. Cr^{3+}
4. Cr^{2+}

69 Which statement accurately describes an element with an atomic weight of 39 and the electronic configuration 1s² 2s² 2p⁶ 3s² 3p⁶ 4s¹?
1. High value of Ionisation Energy
2. Transition element
3. Isotone with $^{38}_{18}Ar$
4. None of the above

70 The conjugate base of $[Al(H_2O)_3(OH)_3]$ is:
1. $[Al(H_2O)_3(OH)_2]^+$
2. $[Al(H_2O)_3(OH)_2O]^-$
3. $[Al(H_2O)_3(OH)_3]^-$
4. $[Al(H_2O)_2(OH)_4]^-$

71 Given below are two half-cell reactions:

$Mn^{2+} + 2e^- \rightarrow Mn$; $E_0 = -1.18V$

$2Mn^{3+} + 2e^- \rightarrow 2Mn^{2+}$; $E_0 = +1.51V$
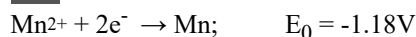
The E_0 for $3Mn^{2+} \rightarrow 2Mn^{+3} + Mn$ will be:
1. -2.69V; the reaction will not occur
2. -2.69V; the reaction will occur
3. -0.33V; the reaction will not occur
4. -0.33V; the reaction will occur

72 What is 'X' in the following sequence of reactions:

$$PhN_2Cl \xrightarrow[KCN]{CuCN} Z \xrightarrow{H^+/HOH} Y \xrightarrow{Soda-lime} X$$
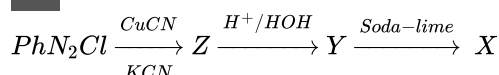
1. Benzoic acid
2. Sodium benzoate
3. Benzaldehyde
4. Benzene

73 As scuba divers ascend towards the surface of the water from underwater,
 the solubility of gases in their blood:
1. Increases
2. Decreases
3. First increases and then decreases
4. First decreases and then Increases

74 Which element among the following has the highest melting point?
1. Cr
2. Fe
3. Cu
4. Mo

75 Given below are two statements:

Assertion (A):	Among halogens, chlorine has the highest negative electron gain enthalpy value.
Reason (R):	The ionic radius of Cl⁻ is 184 pm.

1.	Both **(A)** and **(R)** are True and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are True but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	**(A)** is False but **(R)** is True.

76 The compound formed when acetylene is passed through dilute sulphuric acid in the presence of mercury(II) sulphate is:
1. Ether
2. Ketone
3. Acetic acid
4. Acetaldehyde

77 The oxidation number of the atom (in bold) in the following species is given. Identify, which one is incorrectly related?
1. $\mathbf{Cu}_2O$ is -1
2. $\mathbf{Cl}O_3^-$ is $+5$
3. $K_2\mathbf{Cr}_2O_7$ is $+6$
4. $H\mathbf{Au}Cl_4$ is $+3$

78 What is the approximate number of atoms present in 4.25 grams of NH_3?
1. 4×10^{23}
2. 2×10^{23}
3. 1×10^{23}
4. 6×10^{23}

79 What is the wavelength of light corresponding to photons with an energy of
1.00×10^3 kJ mol^{-1}?
1. 2.00×10^{31} m
2. 1.20×10^{-7} m
3. 1.20×10^{-4} m
4. 8.36×10^6 m
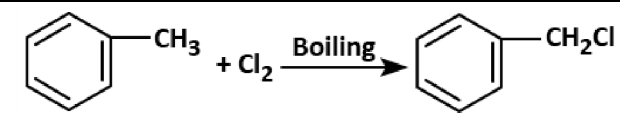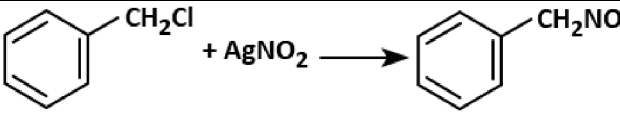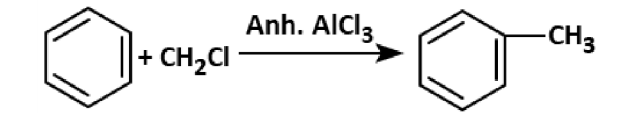
80 An aqueous solution of hydrogen sulphide shows the equilibrium,

$H_2S \rightleftharpoons H^+ + HS^-$
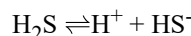
If dilute hydrochloric acid is added to an aqueous solution of hydrogen sulphide without any temperature change, then:

1.	The equilibrium constant will change
2.	The concentration of HS⁻ will increase
3.	The concentration of undissociated hydrogen sulphide will decrease
4.	The concentration of HS⁻ will decrease

81 Which of the following reactions is an example of free-radical substitution?

82 The total vapour pressure of a mixture of 1 mole A $\left(p_A^\circ = 150 \text{ torr}\right)$ and 2 mole B $\left(p_B^\circ = 240 \text{ torr}\right)$ is 200 mm. Mark the correct statement that is associated with it:
1. There is a positive deviation from Raoult's law.
2. There is a negative deviation from Raoult's law.
3. There is no deviation from Raoult's law.
4. None of the above.

83 How do electronegativities generally shift as you move down a group and across a period in the periodic table?

	Down a group	Across a period from left to right
1.	Increase	Increase
2.	Increase	Decrease
3.	Decrease	Increase
4.	Decrease	Decrease

84 Mark the incorrect order of the bond angle:
1. $NH_3 > NF_3$
2. $NF_3 < PF_3$
3. $NH_3 > PH_3$
4. $NH_3 > H_2O$

85 Given below are two statements:

Assertion (A):	Noble gases have very low boiling points.
Reason (R):	Noble gases, being monoatomic, have no interatomic forces except weak dispersion forces.

The correct option is:

1.	Both **(A)** and **(R)** are True and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are True but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	**(A)** is False but **(R)** is True.

CHEMISTRY - SECTION B

86 For the process $H_2O(l)(1\text{bar}, 373 \text{ K}) \rightarrow H_2O(g)$ (1 bar, 373 K), the correct set of thermodynamic parameters is:
1. $\Delta G = +ve, \Delta S = 0$
2. $\Delta G = 0, \Delta S = -ve$
3. $\Delta G = 0, \Delta S = +ve$
4. $\Delta G = -ve, \Delta S = +ve$

87 The secondary structure of a protein refers to:
1. α-helical backbone
2. Hydrophobic interactions
3. Sequence of α-amino acids
4. Fixed configuration of the polypeptide backbone

88 The standard emf of a cell, involving one electron change is found to be 0.591 V at 25°C.
The equilibrium constant of the reaction is :
(Given F=96500 C mol^{-1})
1. 1.0×10^1
2. 1.0×10^5
3. 1.0×10^{10}
4. 1.0×10^{30}

89 The type(s) of isomerism exhibited by the $[Co(en)_3]Cl_3$ complexes is/are:
1. Geometrical isomerism
2. Optical isomerism
3. Linkage isomerism
4. Both 1 and 2

90 Identify (X) in the given sequential reaction.
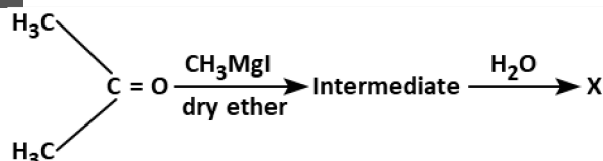
1. CH_3OH
2. Ethyl alcohol
3. Methyl cyanide
4. tert-Butyl alcohol

91 Brown ppt (A) dissolves in HNO_3, gives (B) which in turn gives white ppt (C) with NH_4OH. (C) on reaction with HCl gives solution (D) which gives white turbidity on addition of water. What is (D)?
1. $Ca(OH)_2$
2. $Bi(OH)_3$
3. BiOCl
4. $Bi(NO_3)_3$

92 Which of the following f-block metals have a half-filled f-subshell?
(a) Samarium (Sm)
(b) Gadolinium (Gd)
(c) Europium (Eu)
(d) Terbium (Tb)
[Atomic numbers : Sm = 62, Eu = 63, Gd = 64, Tb = 65]
1. (a) and (b)
2. (b)and (c)
3. (c)and (d)
4. (a) and (c)

93

Assertion (A):	Benzonitrile is prepared by the reaction of chlorobenzene with KCN.
Reason (R):	Chlorobenzene is more reactive than chloroalkane towards nucleophilic substitution reaction.

1.	Both (A) and (R) are True and (R) is the correct explanation of (A).
2.	Both (A) and (R) are True but (R) is not the correct explanation of (A).
3.	(A) is True but (R) is False.
4.	Both (A) and (R) are False.

94 Which of the following statements about primary amines is false?

1.	They react with alkaline $CHCl_3$ on heating to form carbylamines.
2.	They can be distinguished from tertiary amines based on Hinsberg's test.
3.	They are incapable of forming salts with acids.
4.	They can be prepared by the reduction of nitrobenzene with metals in an acidic medium.

95 Identify the option where hydrogen bonding is not primarily responsible for the following phenomena:

1.	Ice floats in water
2.	Higher Lewis basicity of primary amines than tertiary amines in aqueous solutions
3.	Formic acid is more acidic than acetic acid
4.	Dimerization of acetic acid in benzene

96

Assertion (A):	The two strands of DNA are complementary to each other
Reason (R):	Hydrogen bonds are formed between specific pairs of bases.

1.	Both (A) and (R) are True and (R) is the correct explanation of (A).
2.	Both (A) and (R) are True but (R) is not the correct explanation of (A).
3.	(A) is True but (R) is False.
4.	(A) is False but (R) is True.

97 The compound that does not react with sodium metal is:
1. Ethyne
2. 1-Pentyne
3. 2-Pentyne
4. 1-Propyne

98 When a mixture containing HCl and H_2SO_4 weighing 0.1 g undergoes treatment with an excess of $AgNO_3$ solution, resulting in the formation of 0.1435 g of AgCl, what is the weight percentage of H_2SO_4 in the mixture?
1. 36.5
2. 63.5
3. 50
4. None of the above

99 The value of C-O-C bond angle in ether molecule is:

1.	180°	2.	150°
3.	90°	4.	110°

100 Elements that generally exhibit multiple oxidation states and whose ions in an aqueous medium are usually colored are:
1. Metalloids
2. Transition elements
3. Non-metals
4. Noble gases

Biology I - Section A

101 In ecological terms, a population should be defined as a group of:
1. Communities in an ecosystem
2. Species in a community
3. Individuals in a family
4. Individuals in a species

102 In which of the following groups of organisms do you expect to find the greatest metabolic diversity?
1. Fungi
2. Plants
3. Bacteria
4. Animals

103 In Australia, the prickly pear cactus, when introduced, became invasive, primarily because:
1. It had no predator
2. It did not produce any secondary metabolite
3. It formed new mycorrhizal associations
4. It lost its horns

104 Which subunit of the RNA polymerase holoenzyme allows it to initiate the process of transcription?
1. Rho
2. Sigma
3. Omega
4. Epsilon

105 The channels that connect the adjacent plant cells through their walls are called:
1. Plasmodesmata
2. Desmosomes
3. Gap junctions
4. Intercalated discs

106 In a tRNA molecule, the attachment site for an amino acid is located:
1. At its 3' end
2. At its 5' end
3. In the anticodon loop
4. In the DHU loop

107 To prevent herbivory, many plants produce:
1. Dry fruits
2. Secondary metabolites
3. Tall stems
4. Deep roots

108 In a certain organism, three non-allelic gene pairs affect the same character in the same way. This would be called as:
1. Pleiotropy
2. Total Penetrance
3. Variable Expressivity
4. Polygenic Inheritance

109 Consider the following statements:
A single turn of the Krebs citric acid cycle produces
A: one molecule of $FADH_2$
B: two molecules of CO_2
1. only **A** is correct
2. only **B** is correct
3. both **A** and **B** are correct
4. both **A** and **B** are incorrect

110 The taxonomic category where you expect to find organisms least similar to one another would be:
1. Class
2. Genus
3. Family
4. Species

111 All chromosomes of a eukaryotic cell are replicated during which of the following phases of the interphase of the cell cycle?
1. G_1
2. G_0
3. S
4. G_2

112 When fatty acids are being used as respiratory substrates, they enter cellular respiration as:
1. Glucose
2. Glyceraldehyde Phosphate
3. Pyruvate
4. Acetyl Coenzyme A

113 Where does the early embryonic development of zygote in bryophytes take place?
1. In the Protonema.
2. In the Sporangium.
3. In the Antheridium.
4. In the Archegonium.

114 Regulation of gene expression in bacterial cells is almost exclusively at the level of:
1. Initiation of transcription
2. Post-transcription
3. Translation
4. Post-translation

115 Which of the following, most accurately, describes the function of an enzyme?
1. Enzymes cause chemical reactions
2. Enzymes change the rate of chemical reactions
3. Enzymes control the equilibrium points of reactions
4. Enzymes change the direction of reactions

116 The enzyme present in most RNA viruses that enables them to synthesize more viral RNA on the template of viral RNA is:
1. Reverse transcriptase
2. Viral nuclease
3. Restriction endonuclease
4. RNA polymerase

117 Name the German botanist who, for the first time, stated that all plant tissues are composed of individual cells:
1. Theodore Schwann
2. Rudolf Virchow
3. Matthias Schleiden
4. Alfred Russel Wallace

118 What was used to insert nematode-specific genes in the tobacco plant to make it resistant to the nematode *Meloidogyne incognita*?
1. Gene gun
2. Microinjection
3. Liposome
4. Agrobacterium vectors

119 Which of the following experiments in molecular biology unequivocally showed that DNA is the genetic material in bacteriophages?
1. Meselson-Stahl experiment
2. Hershey-Chase experiment
3. Delbrück-Luria experiment
4. Beadle-Tatum experiment

120 A change in chromosome number, where the changed number is not an exact multiple of the base number N, is called as:
1. Polyteny
2. Aneuploidy
3. Polyploidy
4. Euploidy

121 Which of the following cellular structures will not be found in *E. coli*?
1. Plasma membrane
2. Ribosome
3. Cell wall
4. Nuclear envelope

122 Which enzyme catalyzes the joining together of the Okazaki fragments on the lagging strand during DNA replication?
1. DNA ligase
2. DNA-dependent DNA polymerase
3. DNA-dependent RNA polymerase
4. Primase

123 All the following fungi are SAC fungi except:
1. Truffles
2. Morels
3. Mushrooms
4. Yeasts

124 Separation of homologous chromosomes during meiosis occurs at:
1. Anaphase I of meiosis I
2. Anaphase II of meiosis II
3. Metaphase I of meiosis I
4. Metaphase II of meiosis II

125 Rod-shaped bacteria are called:
1. Cocci
2. Spirilla
3. Vibrios
4. Bacilli

126 Regarding the anatomy of a dicot root, the term stele should not include:
1. Endodermis
2. Pericycle
3. Vascular bundles
4. Pith

127 Which molecule in the C_4 photosynthetic pathway combines with carbon dioxide?
1. Glyceraldehyde phosphate
2. Ribulose biphosphate
3. Phosphoenolpyruvate
4. Citric acid

128 Consider the given two statements:

Hugo de Vries

A:	was one of the rediscoverers of Mendel's laws
B:	gave a theory known as use and disuse of organs regarding evolution

1. only **A** is correct
2. only **B** is correct
3. both **A** and **B** are correct
4. both **A** and **B** are incorrect

129 Which disease is caused in humans by the protozoan *Trypanosoma gambiense*?
1. Malaria
2. African sleeping sickness
3. Elephantiasis
4. Dysentery

130 Resistance to certain antibiotics is a genetic trait carried in the bacterial cell by:
1. Chromosomal DNA
2. Plasmid DNA
3. Mesosome
4. Xenophore

131 Which plant growth regulators, respectively, prevent and promote leaf abscission in plants?
1. Auxin and Ethylene
2. Auxin and Abscisic Acid
3. Gibberellin and Cytokinin
4. Abscisic Acid and Ethylene

132 Consider the following statements:

In the Mitochondrial Electron Transport System, oxygen acts as
A: the final acceptor of electrons
B: the final acceptor of protons
1. only **A** is correct
2. only **B** is correct
3. both **A** and **B** are correct
4. both **A** and **B** are incorrect

133 The plant growth regulator, Gibberellins, which are produced in the apical portion of both stems and roots, mainly lead to:
1. Stem elongation
2. Phototropism
3. Growth of lateral branches
4. Abscission of leaves and fruits

134 Which of the following is a source for restriction enzymes?
1. Only bacterial cells
2. Only bacterial cells and unicellular yeasts
3. Eukaryotic cells only
4. All types of cells

135 What is the location of the electron carriers of a chloroplast?

1.	Within its thylakoid membranes
2.	Within its intrathylakoid space
3.	Within its inner membrane
4.	The intermembrane space between the inner and outer membrane

BIOLOGY I - SECTION B

136 Who was awarded Nobel prize for the invention of PCR?
1. Thomas Cech
2. Fred Sanger
3. Kary Mullis
4. Millstein and Kohler

137 Match each item in Column I with one in Column II and select the correct match from the codes given:

	Column I		Column II
A	Monocot stem	P	Conjoint and closed vascular bundles
B	Monocot root	Q	Polyarch xylem, radial vascular bundles
C	Dicot stem	R	Conjoint and open vascular bundles
D	Dicot root	S	Two to four xylem and phloem patches

CODES:

	A	B	C	D
1.	P	Q	R	S
2.	S	R	Q	P
3.	P	Q	S	R
4.	S	R	P	Q

138 Consider the given two statements:

Assertion (A):	Plasmid DNA is used to monitor bacterial transformation with foreign DNA.
Reason (R):	Plasmid is extrachromosomal DNA in some bacteria

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

139 Consider the given two statements:

I:	Water splitting complex is associated with PSII in photosynthetic plants.
II:	Chlorophyll a reaction center in PSII is called as P680

1. Only **I**
2. Only **II**
3. Both **I** and **II** are correct
4. Neither **I** nor **II**

140 Consider the given two statements:

I:	Meiosis preserves conservation of specific chromosome number of each species across generations in sexually reproducing organisms.
II:	Meiosis increases the genetic variability in the population of organisms from one generation to the next.

1. Only **I**
2. Only **II**
3. Both **I** and **II** are correct
4. Neither **I** nor **II**

141 Consider the two statements:

I:	Bladderwort and Venus fly trap are insectivorous plants.
II:	Cuscuta is a parasitic plant.

1. Only **I** is correct
2. Only **II** is correct
3. Both **I** and **II** are correct
4. Both **I** and **II** are incorrect

142 Ethylene:

I:	is highly effective in fruit ripening.
II:	breaks seed and bud dormancy.
III:	promotes root growth and root hair formation

1. **I**, **II** and **III** are correct
2. Only **II**
3. **I** and **II** are correct
4. Neither **I** nor **II**

143 Consider the given two statements:

I:	Ubiquinone is an electron carrier located within the inner mitochondrial membrane.
II:	Cytochrome c is an electron carrier located on the outer surface of the inner mitochondrial membrane.

1. Only **I**
2. Only **II**
3. Both **I** and **II** are correct
4. Neither **I** nor **II**

144 Consider the following three statements:

Euglena
A: Locomote by means of a flagellum
B: Have a rigid cell wall
C: Do not have chloroplast
1. Only **A** is correct
2. Only **B** and **C** are correct
3. **A**, **B**, and **C** are correct
4. Only **C** is correct

145 Members of Family Brassicaceae have:

I:	Four petals usually arranged in a cross shape
II:	Tetradynamous stamens

1.	Only **I**	2.	Only **II**
3.	Both **I** and **II**	4.	Neither **I** nor **II**

146 Consider the given two statements:

Assertion (A):	Endodermal cells of the root control the movement of water and minerals from the cortex to the vascular column.
Reason (R):	They do this by having some of their walls impregnated with suberin that forces fluid to move into the endodermal cells.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True, **(R)** is False
4.	**(A)** is False, **(R)** is False

147 Identify the incorrectly matched pair:

1. Basal placentation: Sunflower
2. Diadelphous stamen: Pea
3. Valvate aestivation: Bean
4. Perigynous flower: Rose

148 In Chlorophyceae:

I:	Vegetative reproduction is not seen.
II:	Asexual reproduction is by flagellated zoospores.
III:	Sexual reproduction is always oogamous.

1. Only **I** and **III** are correct
2. Only **II** is correct
3. Only **I** and **II** are correct
4. **I**, **II** and **III** are correct

149 Consider the given two statements:

Assertion (A):	In C_4 plants, photorespiration does not occur.
Reason (R):	They have a mechanism that increases the concentration of carbon dioxide at the site of RuBisCO.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

150 What makes Red Algae different from Green Algae and Brown Algae?

1.	Unlike Green Algae and Brown Algae, Red Algae do not have chlorophyll a.
2.	Unlike Green Algae and Brown Algae, Red Algae have no differentiated cells.
3.	Unlike Green Algae and Brown Algae, Red Algae are not photosynthetic.
4.	Unlike Green Algae and Brown Algae, Red Algae do not have any flagellated stages in their life cycles.

BIOLOGY II - SECTION A

151 Where are the mature sperms stored in human males?

1. In the seminal vesicles
2. In the seminiferous tubules
3. In the ampulla of vas deferens
4. In the epididymis

152 A woman whose father was colorblind marries a normal man. What are the chances that their son would have colorblindness?

1.	0%	2.	25%
3.	50%	4.	100%

153 The volume of air that will remain in the lungs after a normal expiration will be called as:

1. Expiratory reserve volume
2. Residual volume
3. Expiratory capacity
4. Functional residual capacity

154 Which tissues in the animal bodies form glands?

1. Epithelium
2. Connective
3. Neural
4. Muscle

155 Which of the following is most likely to lead to the denaturation of proteins?

1. Hydrophobic interactions
2. Heat
3. Hydrogen bonding
4. Low temperature

156 Consider the given two statements.

Statement A:	Skeletal muscle fiber is a syncytium.
Statement B:	Intercalated disc is a feature very frequently found in smooth muscles.

1. Only **Statement A** is correct.
2. Only **Statement B** is correct.
3. Both **Statement A** and **Statement B** are correct.
4. Both **Statement A** and **Statement B** are incorrect.

157 When an adequate strength of the stimulus is applied to a resting axonal membrane, which of the following will lead to depolarization and the development of action potential?

1. Efflux of sodium ions
2. Influx of sodium ions
3. Influx of potassium ions
4. Efflux of potassium ions

158 Consider the given two statements regarding the characteristics of the members of phylum Chordata.

Statement I:	Chordates have a dorsal hollow nerve cord that lies dorsal to the notochord.
Statement II:	Chordates have a pharynx with gill slits.

1. Only **Statement I** is correct.
2. Only **Statement II** is correct.
3. Both **Statement I** and **Statement II** are correct.
4. Both **Statement I** and **Statement II** are incorrect.

159 Tyrosine is not an essential amino acid. The human body can synthesize tyrosine from:

1. Methionine
2. Phenylalanine
3. Tryptophan
4. Threonine

160 How many of the given statements regarding sponges are correct?
A: Most sponges are asymmetrical.
B: Water exits from a sponge through the osculum.
C: Fertilization is internal in sponges.
D: Sponges acquire food by filtering water.

1. 1
2. 2
3. 3
4. 4

161 Genetic drift where a few individuals of a large population colonize an island is known as:

1.	Bottleneck effect	2.	Founder effect
3.	Adaptive radiation	4.	Gene migration

162 Which neurotransmitter is released by the anterior motor neuron at the neuromuscular junction?

1.	Adrenaline	2.	Noradrenaline
3.	Acetylcholine	4.	Serotonin

163 According to Oparin's Primary Abiogenesis Hypothesis, an important feature of the early atmosphere was the virtual absence of:

1.	Nitrogen gas	2.	Carbon dioxide gas
3.	Hydrogen cyanide gas	4.	Oxygen gas

164 The number of phenotypes and genotypes possible for the ABO blood group system in humans, respectively, are:

1.	4 and 6	2.	6 and 4
3.	4 and 9	4.	9 and 4

165 Which structure of the human brain will form a part of the diencephalon?
1. Cerebral cortex
2. Olfactory bulbs
3. Hypothalamus
4. Pons Varolii

166 What is the location of the pineal gland in the human body?
1. At the superior pole of the kidney.
2. On the dorsal side of the forebrain.
3. Beneath the sternal bone anterior to aorta.
4. On the back surface of the thyroid gland.

167 The destruction of which of the following cells by the virus that causes acquired immunodeficiency syndrome results in the development of opportunistic infections in patients suffering from the disease?
1. D-cells
2. Cytotoxic T-cells
3. Helper T-cells
4. Macrophages

168 Consider the given two statements.

Assertion (A):	Electrical synapses are rarer in the human body.
Reason (R):	Electrical synapses are faster than chemical synapses.

1.	Both (A) and (R) are True and (R) correctly explains (A)
2.	Both (A) and (R) are True but (R) does not correctly explain (A)
3.	(A) is True but (R) is False
4.	(A) is False, (R) is False

169 How does a steroid hormone alter the activity of its target cells?

1.	It leads to the generation of a second messenger in the target cell.
2.	It makes the target cell's plasma membrane freely permeable to all cations.
3.	It enters the cell and alters the gene expression.
4.	It digests holes in the cell's plasma membrane.

170 Where, within the loop of Henle, do you expect that the fluid will be most concentrated?
1. In the ascending limb
2. In the descending limb
3. At the hairpin bend
4. Just when it is joining the distal convoluted tubule

171 Binding of oxygen with hemoglobin is primarily related to:
1. Partial pressure of carbon dioxide
2. Hydrogen ion concentration
3. Temperature
4. Partial pressure of oxygen

172 Which extinct reptiles are considered as ancestors of dinosaurs, crocodiles, and birds?
1. Therapsids
2. Thecodonts
3. Pterosaurs
4. Plesiosaurs

173 The arrangement of outer and central microtubules in the axoneme of a cilia or a flagellum is called as:
1. 9 plus 2 pattern
2. 9 plus 0 pattern
3. 9 plus 1 pattern
4. 9 plus 9 pattern

174 Which animals amongst the following would be pseudocoelomates?
1. Nematodes
2. Cestodes
3. Hexapodes
4. Trematodes

175 How many of the given statements are correct?

A:	Left atrium has the thickest musculature in the human heart.
B:	SA node is located in the wall of the right atrium.
C:	Right ventricle pumps oxygenated blood into aorta.
D:	Heart is covered by a double-layered pericardium.
E:	Left atrium receives deoxygenated blood through pulmonary veins.

1. 1
2. 2
3. 3
4. 5

176 How do the neurohormones, oxytocin and antidiuretic hormone, reach the posterior pituitary?
1. By a portal vein
2. By a lymphatic vessel
3. By diffusion from the anterior pituitary gland
4. By axons

177 Natural selection acts only on the traits that are:
1. Dominant
2. Recessive
3. Acquired during the lifetime of an individual
4. Inherited

178 Which of the following was the first human hormone produced by recombinant DNA technology?
1. Erythropoietin
2. Human growth hormone
3. Human insulin
4. Thyroxine

179 Consider the given two statements.

Statement I:	The only vertebrates with jointed appendages are the insects.
Statement II:	The only invertebrates capable of flight are the insects.

1. Only **Statement I** is correct.
2. Only **Statement II** is correct.
3. Both **Statement I** and **Statement II** are correct.
4. Both **Statement I** and **Statement II** are incorrect.

180 Lysozyme, an enzyme present in saliva, kills the bacteria by destroying:
1. Their cell wall
2. The plasma membrane
3. The chromosomal DNA
4. The membrane-associated respiratory enzymes

181 The simplest tubular excretory system is the flame cell system, which is found in the animals of the phylum:
1. Platyhelminthes
2. Aschelminthes
3. Annelida
4. Mollusca

182 What type of lipid is cholesterol?
1. Triglyceride
2. Phospholipid
3. Unsaturated fat
4. Steroid

183 How many of the given statements are correct?

A:	Neutrophil is the most common white blood cell in human blood.
B:	Basophil is the rarest white blood cell in human blood.
C:	Lymphocytes are responsible for acquired immunity in human beings.
D:	Monocytes differentiate into macrophages and are phagocytic in nature.
E:	A total WBC count of 20,000 per mm^3 of blood will be normal.

1. 2
2. 3
3. 4
4. 5

184 What, according to Lamarck, is the reason for the especially long neck seen in giraffes?

1.	Ancestral giraffes with longer necks got more food and left more surviving offspring.
2.	Ancestral giraffes stretched their necks to get food.
3.	It was a divine creation.
4.	The giraffe is the mammal where the number of cervical vertebrae is much more than the number of cervical vertebrae in other mammals.

185 Consider the given two statements regarding the two arms of the acquired immunity in human beings:

Statement I:	The cell-mediated immune response is responsible for the rejection of grafts in organ transplant surgeries.
Statement II:	The humoral immunity is not associated with the formation of memory cells.

1. Only **Statement I** is correct.
2. Only **Statement II** is correct.
3. Both **Statement I** and **Statement II** are correct.
4. Both **Statement I** and **Statement II** are incorrect.

BIOLOGY II - SECTION B

186 Consider the given two statements:

Assertion (A):	Mitochondria and chloroplasts are not regarded as part of the endomembrane system in a eukaryotic cell.
Reason (R):	Mitochondria and chloroplasts are double membrane bound organelles.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

187 Consider the given two statements:

Assertion (A):	It is useful to cut the donor DNA and the vector DNA by the same restriction enzyme when constructing a recombinant DNA.
Reason (R):	Restriction enzymes cut dsDNA molecules.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

188 Consider the given two statements:

Assertion (A):	The effect of competitive inhibition can be overcome by increasing the substrate of the enzyme.
Reason (R):	The presence of a competitive inhibitor can decrease the rate of enzyme-catalyzed reaction by blocking the substrate from binding to the enzyme.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

189 Which of the following hormones does not achieve its peak secretion just before ovulation in the menstrual cycle?
1. Progesterone
2. Estrogen
3. LH
4. FSH

190 Consider the given two statements:

Assertion (A):	Human heart is myogenic.
Reason (R):	Human heart is made of cardiac muscle.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

191 Consider the given two statements:

Assertion (A):	Steroids are effective treatment for bronchial asthma.
Reason (R):	Bronchial asthma is an inflammatory condition.

1.	Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2.	Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3.	**(A)** is True but **(R)** is False
4.	**(A)** is False but **(R)** is True

192 How is polio transmitted?
1. Through contaminated food and water
2. Through droplet
3. By arthropod vectors
4. By vertebrate vectors

193 How many of the given features will be correct for echinoderms?

I:	All are marine.
II:	The adults are radially symmetrical.
III:	An excretory system is absent.
IV:	Development is indirect with free-swimming larva.

1. 1
2. 2
3. 3
4. 4

194 The decline of which of the following hormones is the most important reason for the trigger of menstrual flow?
1. Luteinizing hormone
2. Follicle-stimulating hormone
3. Estrogen
4. Progesterone

195 Identify the correct statements regarding frog:

I:	The ear in frog is an organ of hearing but not of balancing.
II:	There are 10 pairs of cranial nerves arising from the brain in a frog.

1. Only **I**
2. Only **II**
3. Both **I** and **II**
4. Neither **I** nor **II**

196 Consider the given two statements:

Assertion (A):	Juxtamedullary nephrons play very important role in concentration of urine.
Reason (R):	Juxtamedullary nephrons constitute about 85% of all nephrons in human kidneys.

1. Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2. Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3. **(A)** is True but **(R)** is False
4. **(A)** is False but **(R)** is True

197 Which of the following will be true for birds?

I:	All birds have feathers.
II:	All birds can fly.
III:	Only birds are warm blooded.
IV:	Only birds are oviparous and have direct development as well.

1. Only **I**
2. Only **III** and **IV**
3. Only **I** and **III**
4. Only **II** and **IV**

198 Consider the given two statements:

Assertion (A):	Red muscle fibers are adapted to generate quick, forceful contractions.
Reason (R):	Red muscle fibers have high glycolytic capacity.

1. Both **(A)** and **(R)** are True and **(R)** correctly explains **(A)**
2. Both **(A)** and **(R)** are True but **(R)** does not correctly explain **(A)**
3. **(A)** is True but **(R)** is False
4. Both **(A)** and **(R)** are False

199 A 9 + 2 arrangement of microtubules is seen in:

I:	Cilia
II:	Flagella
III:	Basal Body
IV:	Centriole

1. Only **I** and **II**
2. Only **III** and **IV**
3. Only **I** and **III**
4. Only **II** and **IV**

200 Consider the given two statements:

I:	DNA replication is semi-conservative in eukaryotes.
II:	DNA replication is semi-discontinuous in eukaryotes.

1. Only **I** is correct
2. Only **II** is correct
3. Both **I** and **II** are correct
4. Both **I** and **II** are incorrect

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.