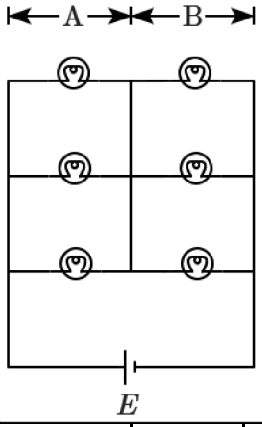
PHYSICS

1 Six similar bulbs are connected as shown in the figure with a DC source of emf E and zero internal resistance. The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be:



1.	2 : 1	2.	4 : 9
3.	9 : 4	4.	1 : 2

2 A disc of radius 2 m and mass 100 kg rolls on a horizontal floor. Its centre of mass has a speed of 20 cm/s. How much work is needed to stop it?

1. 1 J
2. 3 J
3. 30 J
4. 2 J

3 Body A of mass $4m$ moving with speed u collides with another body B of mass $2m$ at rest. The collision is head-on and elastic in nature. After the collision, the fraction of energy lost by the colliding body A is:

1.	$\frac{5}{9}$	2.	$\frac{1}{9}$
3.	$\frac{8}{9}$	4.	$\frac{4}{9}$

4 Two similar thin equi-convex lenses, of focal length f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1. When the space between the two lenses is filled with glycerin which has the same refractive index as that of glass $(\mu = 1.5)$, then the equivalent focal length is F_2. The ratio $F_1 : F_2$ will be:

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

5 The displacement of a particle executing simple harmonic motion is given by, $y = A_0 + A\sin\omega t + B\cos\omega t$. Then the amplitude of its oscillation is given by:

1.	$A + B$	2.	$A_0 + \sqrt{A^2 + B^2}$
3.	$\sqrt{A^2 + B^2}$	4.	$\sqrt{A_0^2 + (A + B)^2}$

6 Two particles A and B are moving in a uniform circular motion in concentric circles of radii r_A and r_B with speeds v_A and v_B respectively. Their time periods of rotation are the same. The ratio of the angular speed of A to that of B will be:

1.	1 : 1	2.	$r_A : r_B$
3.	$v_A : v_B$	4.	$r_B : r_A$

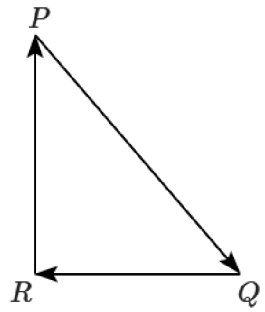
7 A soap bubble, having a radius of 1 mm, is blown from a detergent solution having a surface tension of 2.5×10^{-2} N/m . The pressure inside the bubble equals at a point Z_0 below the free surface of the water in a container. Taking $g = 10$ m/s^2, the density of water $= 10^3$ kg/m^3, the value of Z_0 is:

1. 0.5 cm
2. 100 cm
3. 10 cm
4. 1 cm

8 A 800 turn coil of effective area $0.05\ \text{m}^2$ is kept perpendicular to a magnetic field 5×10^{-5} T. When the plane of the coil is rotated by 90°around any of its coplanar axis in 0.1 s, the emf induced in the coil will be:

1.	0.02 V	2.	2 V
3.	0.2 V	4.	2×10^{-3} V

9 A particle moving with velocity $\vec{v}$ is acted by three forces shown by the vector triangle PQR. The velocity of the particle will:



1.	change according to the smallest force $\overrightarrow{QR}$
2.	increase
3.	decrease
4.	remain constant

10 Which colour of the light has the longest wavelength?

1.	violet	2.	red
3.	blue	4.	green

11 The total energy of an electron in the orbit of an atom is -3.4 eV. Its kinetic and potential energies are, respectively:

1.	3.4 eV, 3.4 eV
2.	-3.4 eV, -3.4 eV
3.	-3.4 eV, -6.8 eV
4.	3.4 eV, -6.8 eV

12 Two point charges A and B, having charges $+Q$ and $-Q$ respectively, are placed at a certain distance apart and the force acting between them is F. If 25% charge of A is transferred to B, then the force between the charges becomes:

1.	$\frac{4F}{3}$	2.	F
3.	$\frac{9F}{16}$	4.	$\frac{16F}{9}$

13 At point A on the earth's surface, the angle of dip is, $\delta = +25^{\circ}$. At a point B on the earth's surface, the angle of dip is, $\delta = -25^{\circ}$. We can interpret that:

1.	A and B are both located in the southern hemisphere.
2.	A and B are both located in the northern hemisphere.
3.	A is located in the southern hemisphere and B is located in the northern hemisphere.
4.	A is located in the northern hemisphere and B is located in the southern hemisphere.

14 Ionized hydrogen atoms and α-particles with the same momenta enter perpendicular to a constant magnetic field, B. The ratio of their path radii $r_H : r_\alpha$ will be:

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

15 Which of the following acts as a circuit protection device?

1.	Fuse	2.	Conductor
3.	Inductor	4.	Switch

16 The speed of a swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make his strokes with respect to the north is given by:

1.	45° west of north	2.	30° west of north
3.	0° west of north	4.	60° west of north

17 For a p-type semiconductor, which of the following statements is true?

1.	Electrons are the majority carriers and pentavalent atoms are the dopants.
2.	Electrons are the majority carriers and trivalent atoms are the dopants.
3.	Holes are the majority carriers and trivalent atoms are the dopants.
4.	Holes are the majority carriers and pentavalent atoms are the dopants.

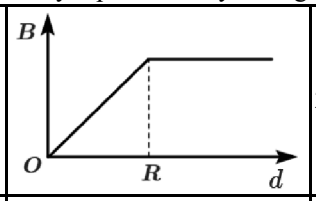
18 Two parallel infinite line charges with linear charge densities $+\lambda$ C/m and $+\lambda$ C/m are placed at a distance R. The electric field mid-way between the two line charges is:

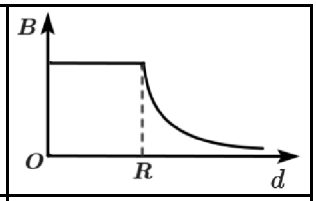
1.	$\frac{\lambda}{2\pi\varepsilon_0 R}$ N/C	2.	zero
3.	$\frac{2\lambda}{\pi\varepsilon_0 R}$ N/C	4.	$\frac{\lambda}{\pi\varepsilon_0 R}$ N/C

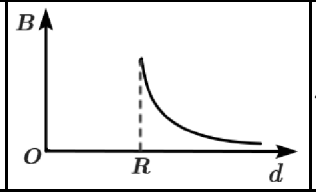
19 In an experiment, the percentage errors that occurred in the measurement of physical quantities A, B, C, and D are 1%, 2%, 3%, and 4% respectively. Then, the maximum percentage of error in the measurement of X, where $X = \frac{A^2 B^{\frac{1}{2}}}{C^{\frac{1}{3}} D^3}$, will be:

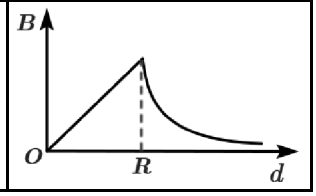
1. 10%
2. $\frac{3}{13}\%$
3. 16%
4. -10%

20 A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field B with the distance d from the centre of the conductor is correctly represented by the figure:

1. 

2. 

3. 

4. 

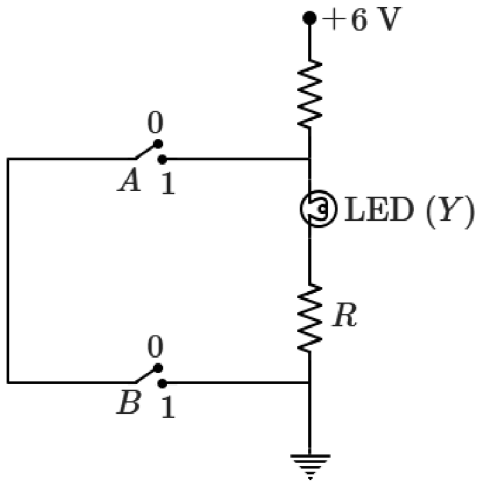
21 In total internal reflection when the angle of incidence is equal to the critical angle for the pair of media in contact, what will be the angle of refraction?

1.	90°
2.	180°
3.	0°
4.	equal to the angle of incidence

22 A solid cylinder of mass 2 kg and radius 4 cm is rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is:

1. 2×10^6 N-m
2. 2×10^{-6} N-m
3. 2×10^{-3} N-m
4. 12×10^{-4} N-m

23 The correct Boolean operation represented by the circuit diagram given above is:



1. NOR
2. AND
3. OR
4. NAND

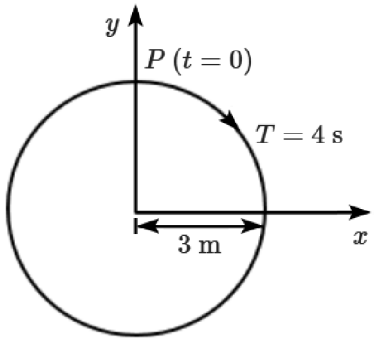
24 The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is:

1. $\frac{3}{2}mgR$
2. mgR
3. $2mgR$
4. $\frac{1}{2}mgR$

25 A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre:

1.	decreases as r increases for $r < R$ and for $r > R$.
2.	increases as r increases for $r < R$ and for $r > R$.
3.	is zero as r increases for $r < R$, decreases as r increases for $r > R$.
4.	is zero as r increases for $r < R$, increases as r increases for $r > R$.

26 The radius of the circle, the period of revolution, initial position and direction of revolution are indicated in the figure.



The y-projection of the radius vector of rotating particle P will be:

1. $y(t) = 3\cos\left(\frac{\pi t}{2}\right)$, where y in m
2. $y(t) = -3\cos 2\pi t$, where y in m
3. $y(t) = 4\sin\left(\frac{\pi t}{2}\right)$, where y in m
4. $y(t) = 3\cos\left(\frac{3\pi t}{2}\right)$, where y in m

27 When a block of mass M is suspended by a long wire of length L, the length of the wire becomes $(L + l)$. The elastic potential energy stored in the extended wire is:

1. $\frac{1}{2}MgL$
2. Mgl
3. MgL
4. $\frac{1}{2}Mgl$

28 A block of mass 10 kg is in contact with the inner wall of a hollow cylindrical drum of radius 1 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder, which is vertical and rotating about its axis, will be:

$\left(g = 10\ \text{m/s}^2\right)$

1. 10 π rad/s
2. $\sqrt{10}\ \pi$ rad/s
3. $\frac{10}{2\pi}$ rad/s
4. 10 rad/s

29 In which of the following processes, the heat is neither absorbed nor released by a system?

1.	isochoric	2.	isothermal
3.	adiabatic	4.	isobaric

30 A small hole of an area of cross-section 2 mm^2 is present near the bottom of a fully filled open tank of height 2 m. Taking $(g = 10\ \text{m/s}^2)$, the rate of flow of water through the open hole would be nearly:

1. $6.4 \times 10^{-6}\ \text{m}^3/\text{s}$
2. $12.6 \times 10^{-6}\ \text{m}^3/\text{s}$
3. $8.9 \times 10^{-6}\ \text{m}^3/\text{s}$
4. $2.23 \times 10^{-6}\ \text{m}^3/\text{s}$

31 The unit of thermal conductivity is:

1.	$\text{W m}^{-1}\ \text{K}^{-1}$	2.	J m K^{-1}
3.	$\text{J m}^{-1}\ \text{K}^{-1}$	4.	W m K^{-1}

32 In which of the following devices, the eddy current effect is not used?

1. Electric heater
2. Induction furnace
3. Magnetic braking in train
4. Electromagnet

33 An electron is accelerated through a potential difference of 10, 000 V. Its de-Broglie wavelength is, (nearly):

$(m_e = 9 \times 10^{-31}\ \text{kg})$

1. 12.2 nm
2. 12.2×10^{-13} m
3. 12.2×10^{-12} m
4. 12.2×10^{-14} m

34 When an object is shot from the bottom of a long, smooth inclined plane kept at an angle of 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object is shot with the same velocity, it can travel x_2 distance. Then $x_1 : x_2$ will be:

1. $1 : 2\sqrt{3}$
2. $1 : \sqrt{2}$
3. $\sqrt{2} : 1$
4. $1 : \sqrt{3}$

35 A force $F = (20 + 10y)$ acts on a particle in the y-direction where F is in Newton and y is in metre. The work done by this force to move the particle from $y = 0$ to $y = 1$ m is:

1. 20 J
2. 30 J
3. 5 J
4. 25 J

36 A mass m is attached to a thin wire and whirled in a vertical circle. The wire is most likely to break when:

1.	inclined at an angle of 60° from vertical.
2.	the mass is at the highest point.
3.	the wire is horizontal.
4.	the mass is at the lowest point.

37 A copper rod of 88 cm and an aluminium rod of an unknown length have an equal increase in their lengths independent of an increase in temperature. The length of the aluminium rod is:

$\left(\alpha_{Cu} = 1.7 \times 10^{-5}\ \text{K}^{-1} \text{ and } \alpha_{Al} = 2.2 \times 10^{-5}\ \text{K}^{-1}\right)$

1. 68 cm
2. 6.8 cm
3. 113.9 cm
4. 88 cm

38 A body weighs 200 N on the surface of the earth. How much will it weigh halfway down the centre of the earth?

1.	100 N	2.	150 N
3.	200 N	4.	250 N

39 α-particle consists of:

1.	2 protons only.
2.	2 protons and 2 neutrons only.
3.	2 electrons, 2 protons, and 2 neutrons.
4.	2 electrons and 4 protons only.

40 The average velocity of a particle executing SHM in one complete vibration is:

1. zero
2. $\frac{A\omega}{2}$
3. $A\omega$
4. $\frac{A(\omega)^2}{2}$

41 In a double-slit experiment, when the light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1 m away, was found to be 0.2°. What will be the angular width of the first minima, if the entire experimental apparatus is immersed in water? $\left(\mu_{\text{water}} = \frac{4}{3}\right)$

1. 0.1°
2. 0.266°
3. 0.15°
4. 0.05°

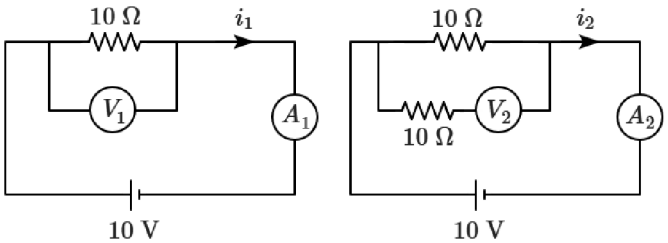
42 Pick the wrong statement in the context with a rainbow.

1.	Rainbow is a combined effect of dispersion, refraction, and reflection of sunlight.
2.	When the light rays undergo two internal reflections in a water drop, a secondary rainbow is formed.
3.	The order of colors is reversed in the secondary rainbow.
4.	An observer can see a rainbow when his front is towards the sun.

43 An increase in the temperature of a gas-filled container would lead to:

1.	decrease in intermolecular distance.
2.	increase in its mass.
3.	increase in its kinetic energy.
4.	decrease in its pressure.

44 In the circuits shown below, the readings of the voltmeters and the ammeters will be:



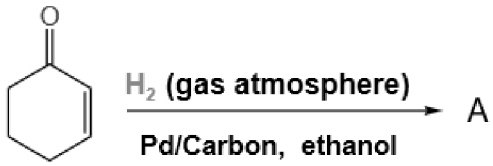
1.	$V_2 > V_1$ and $i_1 = i_2$	2.	$V_2 = V_1$ and $i_1 > i_2$
3.	$V_2 = V_1$ and $i_1 = i_2$	4.	$V_2 > V_1$ and $i_1 > i_2$

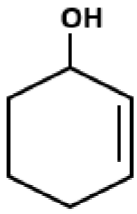
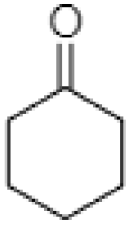
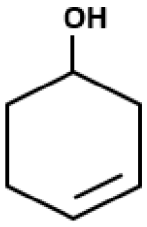
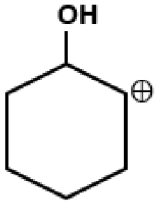
45 A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor would be, respectively:

1.	zero, zero	2.	zero, 60 μA
3.	60 μA, 60 μA	4.	60 μA, zero

CHEMISTRY

46 In the below reaction, the structure of "A" is:



1.		2.	
3.		4.	

47 The incorrect statement among the following is:

1. SnF_4 is ionic in nature.
2. PbF_4 is covalent in nature.
3. $SiCl_4$ is easily hydrolysed.
4. GeX_4 (X = F, Cl, Br, I) is more stable than GeX_2

48 Which of the following species is not stable?

1. $[SiCl_6]^{2-}$
2. $[SiF_6]^{2-}$
3. $[GeCl_6]^{2-}$
4. $[Sn(OH)_6]^{2-}$

49 The correct statement regarding a carbonyl compound with a hydrogen atom on its alpha-carbon is:

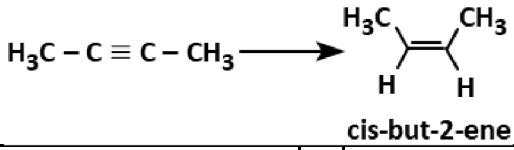
1.	A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.
2.	A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.
3.	A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.
4.	A carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.

50 For a cell involving one electron $E^{\ominus}_{cell} = 0.59$ V at 298 K. The equilibrium constant for the cell reaction is :

[Given that $\frac{2.303\,RT}{F} = 0.059$ V at T = 298K]

1.	1.0×10^{30}	2.	1.0×10^{2}
3.	1.0×10^{5}	4.	1.0×10^{10}

51 The most suitable reagent for the following conversion is-



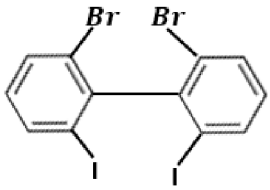
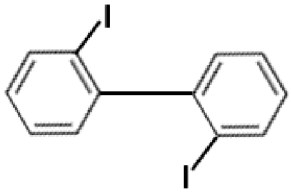
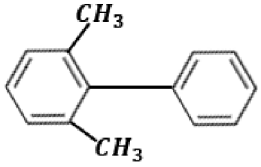
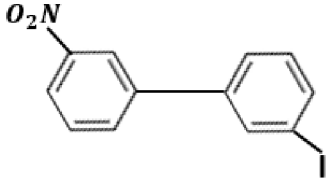
cis-but-2-ene

1.	$Hg^{2+}/H^{+}, H_2O$	2.	Na/liquid NH_3
3.	H_2, Pd/C, quinoline	4.	Zn/HCl

52 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:

1.	5f > 6p > 4d > 5p	2.	5f > 6p > 5p > 4d
3.	6p > 5f > 5p > 4d	4.	6p > 5f > 4d > 5p

53 Which of the following biphenyls is optically active?

1.	
2.	
3.	
4.	

54 Match the Xenon compounds in Column I with their structure in Column II and assign the correct code:

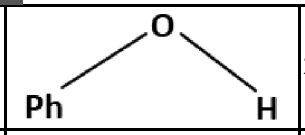
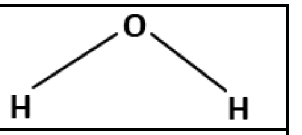
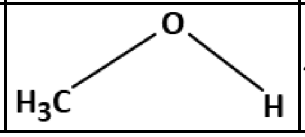
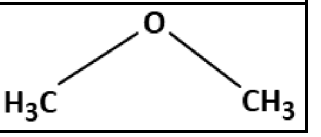
	Column I		**Column II**
(a)	XeF_4	(i)	Pyramidal
(b)	XeF_6	(ii)	Square planar
(c)	$XeOF_4$	(iii)	Distorted octahedral
(d)	XeO_3	(iv)	Square pyramidal

Code:

	(a)	**(b)**	**(c)**	**(d)**
1.	(iii)	(iv)	(i)	(ii)
2.	(i)	(ii)	(iii)	(iv)
3.	(ii)	(iii)	(iv)	(i)
4.	(ii)	(iii)	(i)	(iv)

55 A process among the following shows decrease in entropy is :
1. $2H\,(g) \rightarrow H_2\,(g)$
2. Evaporation of water
3. Expansion of a gas at a constant temperature
4. Sublimation of solid to gas

56 The compound that is most difficult to protonate is:

1.		2.	
3.		4.	

57 To produce 20 moles of ammonia via Haber's process, how many moles of hydrogen molecules are required?

1.	40 mol	2.	10 mol
3.	20 mol	4.	30 mol

58 The species/pair among the following that have sp^3 hybridization is:
1. SiF_4, BeH_2
2. NF_3,H_2O
3. NF_3,BF_3
4. H_2S, BF_3

59 Disproportionation reactions are:
(a) $2\,Cu^{+} \rightarrow Cu^{2+} + Cu^{0}$
(b) $3\,MnO_4^{2-} + 4H^{+} \rightarrow 2\,MnO_4^{-} + MnO_2 + 2H_2O$
(c) $2\,KMnO_4 \xrightarrow{\Delta} K_2\,MnO_4 + MnO_2 + O_2$
(d) $2\,MnO_4^{-} + 3\,Mn^{2+} + 2H_2O \rightarrow 5\,MnO_2 + 4H^{\oplus}$
1. (a) and (d) only
2. (a) and (b) only
3. (a), (b) and (c)
4. (a), (c) and (d)

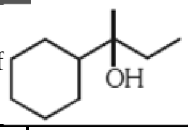
60 The correct thermal stability order for H_2E, $E = O, S, Se, Te$ and Po among the following is:
1. $H_2Se < H_2Te < H_2Po < H_2O < H_2S$
2. $H_2\,S < H_2O < H_2Se < H_2Te < H_2Po$
3. $H_2O < H_2\,S < H_2Se < H_2Te < H_2PO$
4. $H_2Po < H_2Te < H_2Se < H_2\,S < H_2O$

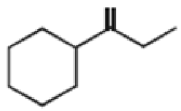
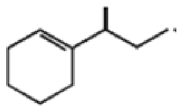
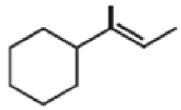
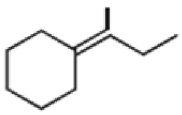
61 Given the following cell reaction:
$2Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + I_2(aq)$
$E^{o}_{cell} = 0.24\ V$ at 298 K.
The standard Gibbs energy $\Delta_rG^{\ominus}$ of the cell reaction is:
[Given: $F = 96500\ C\ mol^{-1}$]
1. $23.16\ kJ\ mol^{-1}$
2. $-46.32\ kJ\ mol^{-1}$
3. $-23.16\ kJ\ mol^{-1}$
4. $46.32\ kJ\ mol^{-1}$

62 Which of the following series of transitions in the spectrum of hydrogen atoms falls in the visible region?
1. Brackett series
2. Lyman series
3. Balmer series
4. Paschen series

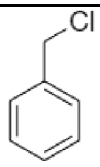
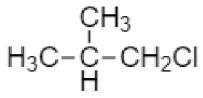
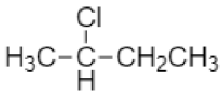
63 For the chemical reaction $N_2(g)+3H_2(g) \rightleftharpoons 2\,NH_3(g)$ the correct option is:

1.	$3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$	2.	$-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
3.	$-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$	4.	$-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

64 Which of the following is not the product of dehydration of  ?

1.		2.	
3.		4.	

65 When hydrolyzed with aqueous KOH, compounds that undergoes racemization are:

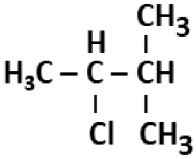
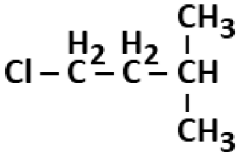
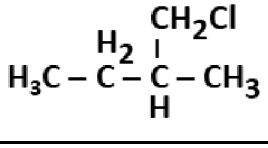
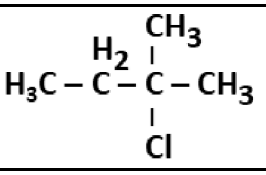
(i)		(ii)	$CH_3CH_2CH_2Cl$
(iii)		(iv)	

1.	(i) and (ii)	2.	(ii) and (iv)
3.	(iv) only	4.	(i) and (iv)

66 If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by:

1. t = 2.303/k
2. t = 0.693/k
3. t = 6.909/k
4. t = 4.606/k

67 An alkene "A" on reaction with O_3 and $Zn - H_2O$ gives propanone and ethanal in equimolar ratio. The addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:

1.		2.	
3.		4.	

68 The manganate and permanganate ions are tetrahedral, due to:

1.	The π-bonding involves the overlap of d-orbitals of oxygen with d-orbitals of manganese.
2.	The π-bonding involves the overlap of p-orbitals of oxygen with d-orbitals of manganese.
3.	Absence of π-bonding.
4.	The π-bonding involves the overlap of p-orbitals of oxygen with p-orbitals of manganese.

69 Under the isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is:

1. 30 J
2. −30 J
3. 5 kJ
4. 25 J

70 Match the name of process given in Column I with the name of compound given in Column II and mark the correct option.

	Column I		**Column II**
(a)	Pure nitrogen	(i)	Chlorine
(b)	Haber process	(ii)	Sulphuric acid
(c)	Contact process	(iii)	Ammonia
(d)	Deacon's process	(iv)	Sodium azide or Barium azide

	(a)	**(b)**	**(c)**	**(d)**
1.	(iv)	(iii)	(ii)	(i)
2.	(i)	(ii)	(iii)	(iv)
3.	(ii)	(iv)	(i)	(iii)
4.	(iii)	(iv)	(ii)	(i)

71 For an ideal solution, the correct option is:

1. Δ_{mix} G = 0 at constant T and P
2. Δ_{mix} S = 0 at constant T and P
3. Δ_{mix} V ≠ 0 at constant T and P
4. Δ_{mix} H = 0 at constant T and P

72 For the second-period elements, the correct increasing order of first ionisation enthalpy is:

1.	Li < Be < B < C < O < N < F < Ne
2.	Li < Be < B < C < N < O < F < Ne
3.	Li < B < Be < C < O < N < F < Ne
4.	Li < B < Be < C < N < O < F < Ne

73 The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne are:

1. 13 σ bonds and no π bond
2. 10 σ bonds and 3 π bonds
3. 8 σ bonds and 5 π bonds
4. 11 σ bonds and 2 π bonds

74 The conjugate bases of Bronsted acids H_2O and HF are respectively:

1. H_3O^+ and H_2F^+, respectively.
2. OH^- and H_2F^+, respectively.
3. H_3O^+ and F^-, respectively.
4. OH^- and F^-, respectively.

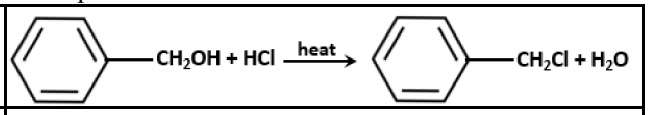
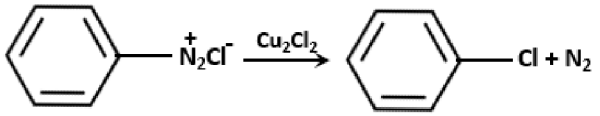
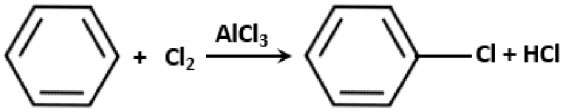
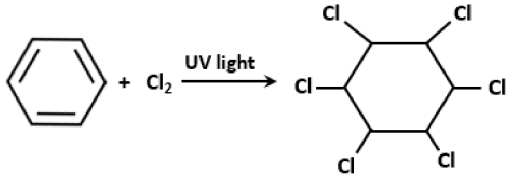
75 What is the correct order of the methyl-substituted amines' basic strength in an aqueous solution?

1. $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
2. $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$
3. $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$
4. $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$

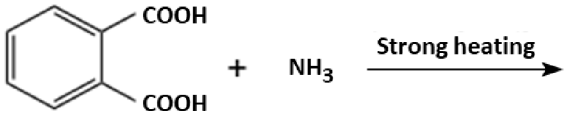
76 A diatomic molecule, among the following species, that only has π bonds according to the Molecular Orbital Theory (MOT) is:

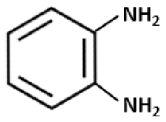
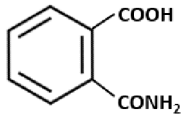
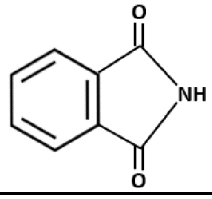
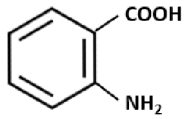
1.	Be_2	2.	O_2
3.	N_2	4.	C_2

77 The reaction among the following that proceeds through an electrophilic substitution reaction is:

1.	
2.	
3.	
4.	

78 The product of the below-mentioned reaction is:



1.		2.	
3.		4.	

79 False statement regarding PCl_5 is:

1.	PCl_5 molecule is non-reactive.
2.	Three equatorial P-Cl bonds make an angle of 120° with each other.
3.	Two axial P-Cl bonds make an angle of 180° with each other.
4.	Axial P-Cl bonds are longer than equatorial P-Cl bonds.

80 Which composition will make the basic buffer?

1.	100 mL of 0.1 M HCl+100 mL of 0.1 M NaOH
2.	50 mL of 0.1 M NaOH+25 mL of 0.1 M CH_3COOH
3.	100 mL of 0.1 M CH_3COOH+100 mL of 0.1 M NaOH
4.	100 mL of 0.1 M HCl+200 mL of 0.1 M NH_4OH

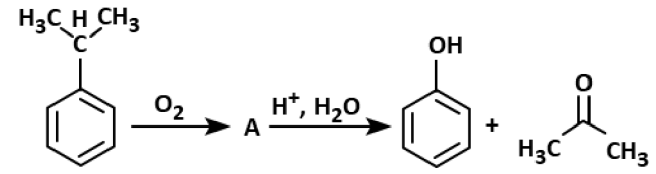
81 The non-essential amino acid among the following is:

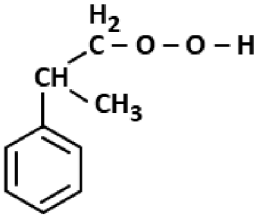
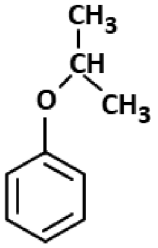
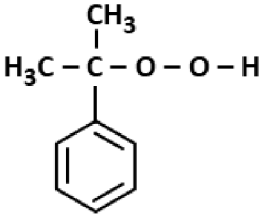
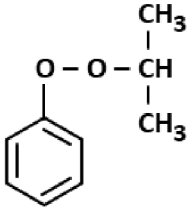
1.	Lysine	2.	Valine
3.	Leucine	4.	Alanine

82 What is the correct electronic configuration of the central atom in K_4FeCN_6 based on crystal field theory:

1. $e^4t_{2g}^2$
2. $t_{2g}^4e_g^2$
3. $t_{2g}^6e_g^0$
4. $e^3t_{2g}^3$

83 The structure of intermediate A in the following reaction is:



1.		2.	
3.		4.	

84 An electron-deficient compound among the following is:

1.	$(SiH_3)_2$	2.	$(BH_3)_2$
3.	PH_3	4.	$(CH_3)_2$

85 Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (M) as the cofactor. M is:

1.	Sr	2.	Be
3.	Mg	4.	Ca

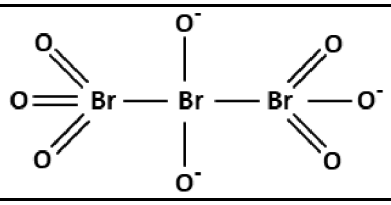
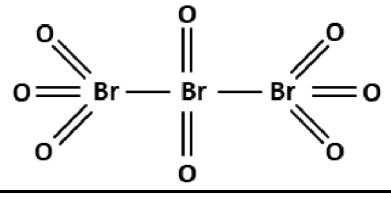
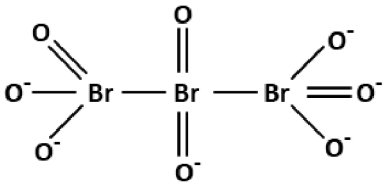
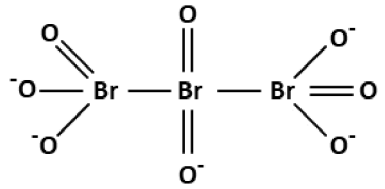
86 Which of the following mixtures forms the maximum boiling azeotrope?

1.	Heptane + Octane	2.	Water + Nitric acid
3.	Ethanol + Water	4.	Acetone + Carbon disulphide

87 In which orbital is the pair of electrons located in the provided carbanion, $CH_3C{\equiv}C^-$?

1. sp^3
2. sp^2
3. sp
4. 2p

88 The correct structure of tribromo octoxide is:

1.	
2.	
3.	
4.	

89 The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase?

1. $Ar < K^+ < Ca^{2+}$
2. $Ca^{2+} < Ar < K^+$
3. $Ca^{2+} < K^+ < Ar$
4. $K^+ < Ar < Ca^{2+}$

90 pH of a saturated solution of $Ca(OH)_2$ is 9. The solubility product (K_{sp}) of $Ca(OH)_2$ is:

1. 0.5×10^{-10}
2. 0.5×10^{-15}
3. 0.25×10^{-10}
4. 0.125×10^{-15}

BIOLOGY

91 Which one of the following statements regarding post-fertilization development in flowering plants is incorrect?

1.	Ovules develop into an embryo sac
2.	Ovary develops into fruit
3.	Zygote develops into an embryo
4.	Central cell develops into endosperm

92 Which of the following statements is not correct?

1.	Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
2.	Lysosomes have numerous hydrolytic enzymes
3.	The hydrolytic enzyme of lysosomes are active under acidic pH
4.	Lysosomes are membrane bound structure.

93 In *Antirrhinum* (Snapdragon), a red flower was crossed with a white flower and in F_1 generation, pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red, and pink flowers. Choose the incorrect statement from the following:

1.	Law of Segregation does not apply in this experiment.
2.	This experiment does not follow the Principle of Dominance.
3.	The pink colour in F_1 is due to incomplete dominance.
4.	Ratio of F_2 is 1/4(red):2/4(pink):1/4(white).

94 Cells in G_0 phase:

1. terminate the cell cycle
2. exit the cell cycle
3. enter the cell cycle
4. suspend the cell cycle

95 Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by:

1. Phosphofructokinase
2. Aldolase
3. Hexokinase
4. Enolase

96 Placentation, in which ovules develop on the inner wall of the ovary or in peripheral part, is:

1. Free central
2. basal
3. Axile
4. Parietal

97 The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by:

1.	Sutton Boveri	2.	T.H. Morgan
3.	Gregor J. Mendel	4.	Alfred Sturtevant

98 From an evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in:

1.	Gymnosperms	2.	Liverworts
3.	Mosses	4.	Pteridophytes

99 Purines found both in DNA and RNA are:

1.	Cytosine and thymine	2.	Adenine and thymine
3.	Adenine and guanine	4.	Guanine and cytosine

100 Which of the following statements is incorrect?

1.	Yeasts have filamentous bodies with long thread-like hyphae.
2.	Morels and truffles are edible delicacies.
3.	*Claviceps* is a source of many alkaloids and LSD.
4.	Conidia are produced exogenously and ascospores endogenously.

101 Match the Column-I with Column-II

	Column-I		**Column-II**
(a)	Saprophyte	(i)	Symbiotic association of fungi with plant roots
(b)	Parasite	(ii)	Decomposition of dead organic materials
(c)	Lichens	(iii)	Living on living plants or animals
(d)	Mycorrhiza	(iv)	Symbiotic association of algae and fungi

Choose the correct answer from the options given below:

Options:	**(a)**	**(b)**	**(c)**	**(d)**
1.	(ii)	(iii)	(iv)	(i)
2.	(i)	(ii)	(iii)	(iv)
3.	(iii)	(ii)	(i)	(iv)
4.	(ii)	(i)	(iii)	(iv)

102 Which of the following features of genetic code does allow bacteria to produce human insulin by recombinant DNA technology?

1. Genetic code is specific
2. Genetic code is not ambiguous
3. Genetic code is redundant
4. Genetic code is nearly universal

103 Select the correct group of biocontrol agents:

1. *Nostoc*, *Azospirillum*, *Nucleopolyhedrovirus*
2. *Bacillus thuringiensis*. Tobacco mosaic virus, Aphids
3. *Trichoderma*, Baculovirus, *Bacillus thuringiensis*
4. *Oscilatoria*, *Rhizobium*, *Trichoderma*

104 Persistent nucellus in the seed is known as:

1.	Tegmen	2.	Chalaza
3.	Perisperm	4.	Hilum

105 Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following :
1. Tyloses in vessels
2. Closure of stomata
3. Flaccidity of bulliform cells
4. Shrinkage of air spaces in spongy mesophyll

106 Phloem in gymnosperms lacks:
1. Both sieve tubes and companion cells
2. Albuminous cells and sieve cells
3. Sieve tubes only
4. Companion cells only

107 Which of the statements given below is not true about the formation of Annual Rings in trees?

1.	Annual rings are not prominent in trees of temperate regions.
2.	Annual rings are a combination of spring wood and autumn wood produced in a year.
3.	Differential activity of cambium causes light and dark bands of tissue - early and late wood respectively.
4.	Activity of cambium depends upon variation in climate.

108 Expressed Sequence Tags (ESTs) refers to:
1. Novel DNA sequence
2. Genes expressed as RNA
3. Polypeptide expression
4. DNA polymorphism

109 Which of the following is the most important cause for animals and plants being driven to extinction?
1. Alien species invasion
2. Habitat loss and fragmentation
3. Drought and floods
4. Economic exploitation

110 Match the following genes of the *lac* operon with their respective products:

(a)	i gene	(i)	β -galactosidase
(b)	Z gene	(ii)	Permease
(c)	A gene	(iii)	Repressor
(d)	Y gene	(iv)	transacetylase

Select the correct option

Options:	(a)	(b)	(c)	(d)
1.	(iii)	(iv)	(i)	(ii)
2.	(i)	(iii)	(ii)	(iv)
3.	(iii)	(i)	(ii)	(iv)
4.	(iii)	(i)	(iv)	(ii)

111 *Pinus* seeds cannot germinate and establish without fungal association. This is because:
1. its seeds contain inhibitors that prevent germination.
2. its embryo is immature.
3. it has an obligate association with mycorrhizae.
4. it has a very hard seed coat.

112 What is the fate of the male gametes discharged in the synergid?

1.	One fuses with the egg and the other fuses with central cell nuclei
2.	One fuses with the egg and the other(s) degenerate(s) in the synergid
3.	All fuse with the egg
4.	One fuses with the egg and the other(s) fuse(s) with a synergid nucleus

113 In photosynthesis, the light-independent reactions take place at?
1. Thylakoid lumen
2. photosystem I
3. photosystem II
4. Stromal matrix

114 Which of the following statements is incorrect?

1.	Prions consist of abnormally folded proteins
2.	Viroids lack a protein coat
3.	Viruses are obligate parasites
4.	Infective constituent in viruses is the protein coat

115 It takes a very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?
1. Cytokinin and Abscisic acid
2. Auxin and Ethylene
3. Gibberellin and Cytokinin
4. Gibberellin and Abscisic acid

116 Which of the following statements regarding mitochondria is incorrect?

1.	Mitochondrial matrix contains single circular DNA molecule and ribosomes.
2.	Outer membrane is permeable to monomers of carbohydrates, fats, and proteins.
3.	Enzymes of electron transport are embedded in the outer membrane.
4.	Inner membrane is convoluted with infoldings.

117 What is the site of perception of photoperiod necessary for induction of flowering in plants?
1. Leaves
2. Lateral buds
3. Pulvinus
4. Shoot apex

118 The Earth Summit held in Rio de Janeiro in 1992 was called:

1.	for immediate steps to discontinue the use of CFCs that were damaging the ozone layer
2.	to reduce CO_2 emissions and global warming
3.	for the conservation of biodiversity and sustainable utilization of its benefits
4.	to assess the threat posed to native species by invasive weed species

119 What map unit (Centimorgan) is adopted in the construction of genetic maps?

1.	A unit of distance between genes on chromosomes, representing 50% cross-over.
2.	A unit of distance between two expressed genes, representing 10% cross-over.
3.	A unit of distance between two expressed genes, representing 100% cross-over.
4.	A unit of distance between genes on chromosomes. representing 1% cross-over.

120 Which of the following can be used as biocontrol agent in the treatment of plant disease?
1. *Lactobacillus*
2. *Trichoderma*
3. *Chlorella*
4. *Anabaena*

121 Under which of the following conditions will there be no change in the reading frame of the following mRNA?
5'AACAGCGGUGCUAUU 3'

1.	Deletion of GGU from 7th, 8th and 9th positions
2.	Insertion of G at the 5th position
3.	Deletion of G from the 5th position
4.	Insertion of A and G at the 4th and the 5th positions respectively

122 Select the correctly written complete scientific name of Mango which was first described by Carolus Linnaeus:
1. Mangifera Indica
2. *Mangifera indica* Car. Linn.
3. *Mangifera indica* Linn.
4. *Mangifera indica*

123 Which one of the following is not a method of in situ conservation of biodiversity?
1. Sacred Grove
2. Biosphere Reserve
3. Wildlife Sanctuary
4. Botanical Garden

124 Which of the following ecological pyramids is generally inverted?

1.	Pyramid of biomass in a sea
2.	Pyramid of numbers in grassland
3.	Pyramid of energy
4.	Pyramid of biomass in a forest

125 Respiratory Quotient (RQ) value of tripalmitin is:

1.	0.09	2.	0.9
3.	0.7	4.	0.007

126 The shorter and longer arms of submetacentric chromosome are referred to as:
1. m-arm and n-arm respectively
2. s-arm and l-arm respectively
3. p-arm and q-arm respectively
4. q-arm and p-arm respectively

127 A plant in your garden avoids photorespiratory losses, has improved water use efficiency, shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilization. In which of the following physiological groups would you assign this plant?

1.	C_4	2.	CAM
3.	Nitrogen –fixer	4.	C_3

128 Match the following :

(a)	Lactobacillus	(i)	Cheese
(b)	*Saccharomyces* cerevisiae	(ii)	Curd
(c)	*Aspergillus* niger	(iii)	Citric Acid
(d)	Acetobacter aceti	(iv)	Bread
		(v)	Acetic acid

Select the correct option:

Options:	(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iii)	(v)
2.	(ii)	(iv)	(v)	(iii)
3.	(ii)	(iv)	(iii)	(v)
4.	(iii)	(iv)	(v)	(i)

129 The correct sequence of phases in cell cycle is:

1. $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$
2. $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
3. $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$
4. $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

130 Which of the following pair of organelles does not contain DNA?

1. Nuclear envelope and Mitochondria
2. Mitochondria and Lysosomes
3. Chloroplast and Vacuoles
4. Lysosomes and vacuoles

131 Select the incorrect statement:

1.	Human males have one of their sex-chromosome much shorter than the other.
2.	Male fruit fly is heterogametic.
3.	In male grasshoppers, 50% of sperms have no sex chromosome.
4.	In domesticated fowls, the sex of progeny depends on the type of sperm rather than the egg.

132 In some plants, the female gamete develops into an embryo without fertilization. This phenomenon is known as:

1.	Parthenogenesis	2.	Autogamy
3.	Parthenocarpy	4.	Syngamy

133 Which of the following is a commercial blood cholesterol-lowering agent?

1.	Lipase	2.	Cyclosporin A
3.	Statin	4.	Streptokinase

134 The concept of "*Omnis cellula-e-cellula*" regarding cell division was first proposed by:

1. Aristotle
2. Rudolf Virchow
3. Theodor Schwann
4. Schleiden

135 What is the genetic disorder in which an individual has an overall masculine development gynaecomastia, and is sterile?

1. Down's syndrome
2. Turner's syndrome
3. Klinefelter's syndrome
4. Edward syndrome

136 Which of the following is true for Golden rice?

1.	It has yellow grains, because of gene introduced from a primitive variety of rice
2.	It is Vitamin A enriched, with a gene from daffodil
3.	It is pest resistant, with a gene from *Bacillus thuringiensis*
4.	It is drought tolerant, developed using Agrobacterium vector

137 Which group of animals belongs to the same phylum?

1. Earthworm, Pinworm, Tapeworm
2. Prawn, Scorpion, *Locusta*
3. Sponge, Sea anemone, Starfish
4. Malarial parasite, *Amoeba*, Mosquito

138 Which of the following Bt crops is being grown in India by the farmers?

1.	Cotton	2.	Brinjal
3.	Soybean	4.	Maize

139 Which of the following sexually transmitted diseases is not completely curable?

1. Chlamydiosis
2. Gonorrhoea
3. Genital warts
4. Genital herpes

140 Match the following organism with their respective characteristics:

Column I		**Column II**	
(a)	*Pila*	(i)	Flame cells
(b)	*Bombyx*	(ii)	Comb plates
(c)	*Pleurobrachia*	(iii)	Radula
(d)	*Taenia*	(iv)	Malpighian tubules

Select the correct option from the following:

Options:	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(iv)	(i)
2.	(iii)	(ii)	(i)	(iv)
3.	(iii)	(iv)	(ii)	(i)
4.	(ii)	(iv)	(iii)	(i)

141 The drug called 'Heroin' is synthesized by:

1. nitration of morphine
2. methylation of morphine
3. acetylation of morphine
4. glycosylation of morphine

142 One of the representatives of the phylum Arthropoda is:

1. Silverfish
2. Pufferfish
3. Flying fish
4. Cuttlefish

143 Choose the correctly matched pair:

1. Inner lining of salivary ducts- Ciliated epithelium
2. Moist surface of buccal cavity- Glandular epithelium
3. Tubular parts of nephrons- Cuboidal epithelium
4. Inner surface of bronchioles- Squamous epithelium

144 Most animals are tree dwellers in a:

1. coniferous forest
2. thorn woodland
3. temperate deciduous forest
4. tropical rainforest

145 Concanavalin A is:

1. a pigment
2. an alkaloid
3. an essential oil
4. a lectin

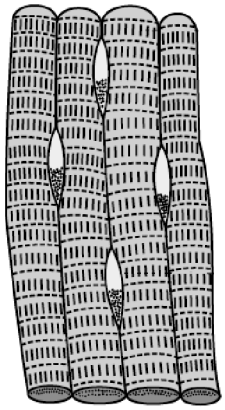
146 Select the correct sequence for the transport of sperm cells in the male reproductive system:

1.	Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus
2.	Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra
3.	Seminiferous tubules → Rete testis → Vasa efferentia → Epididymus → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus
4.	Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

147 Which of the following equipment is essentially required for growing microbes on a large scale for the industrial production of enzymes?

1.	Bioreactor	2.	BOD incubator
3.	Sludge digester	4.	Industrial oven

148 Identify the tissue shown in the diagram and match with its characteristics and its location:



1.	Smooth muscles, show branching, found in the walls of the heart
2.	Cardiac muscles, unbranched muscles, found in the walls of the heart
3.	Striated muscles, tapering at both ends attached to the bones of the ribs
4.	Skeletal muscle, shows striations and is closely attached to the bones of the limbs

149 Golden rice is a genetically modified crop plant where the incorporated gene is meant for the biosynthesis of:

1.	Vitamin-B	2.	Vitamin-C
3.	Omega 3	4.	Vitamin-A

150 Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the incorrect statement:

1.	The enzyme recognizes a specific palindromic nucleotide sequence in the DNA
2.	The enzyme cuts DNA molecules at an identified position within the DNA
3.	The enzyme binds DNA at specific sites and cuts only one of the two strands
4.	The enzyme cuts the sugar-phosphate backbone at specific sites on each strand

151 Colostrum, the yellowish fluid, secreted by the mother during the initial days of lactation is very essential to impart immunity to newborn infants because it contains:

1.	Immunoglobulin A	2.	Natural killer cells
3.	Monocytes	4.	Macrophages

152 Match the hominids with their correct brain size:

	Column I		**Column II**
(a)	*Homo habilis*	(i)	900 cc
(b)	Homo neanderthalensis	(ii)	1350 cc
(c)	*Homo erectus*	(iii)	650-800 cc
(d)	*Homo sapiens*	(iv)	1400 cc

Select the correct option.

Options:	(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(i)	(ii)
2.	(iv)	(i)	(iv)	(ii)
3.	(iii)	(ii)	(i)	(iv)
4.	(iii)	(iv)	(i)	(ii)

153 Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth:

1.	Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum
2.	Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
3.	Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum
4.	Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum

154 Which of the following immune responses is responsible for the rejection of kidney graft?

1.	Cell-mediated immune response
2.	Auto-immune response
3.	Humoral immune response
4.	Inflammatory immune response

155 Variations caused by mutation, as proposed by Hugo de Vries, are:
1. small and directionless
2. random and directional
3. random and directionless
4. small and directional

156 Select the hormone-releasing Intra-Uterine Devices.
1. Lippes Loop, Multitoad 375
2. Vaults, LNG-20
3. Multiload 375, Progestasert
4. Progestasert, LNG-20

157 DNA precipitation, out of a mixture of biomolecules, can be achieved by treatment with:
1. Chilled chloroform
2. Isopropanol
3. Chilled ethanol
4. Methanol at room temperature

158 Which of the following contraceptive methods involve the role of hormones?

1.	Pills, Emergency contraceptives, barrier methods
2.	Lactational amenorrhea, Pills, Emergency contraceptives
3.	Barrier method, Lactational amenorrhea, pills
4.	CuT, Pills, barrier methods

159 A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?

1.	0.16 (AA); 0.36 (Aa); 0.48 (aa)
2.	0.36 (AA); 0.48 (Aa); 0.16 (aa)
3.	0.16 (AA); 0.24 (Aa); 0.36 (aa)
4.	0.16 (AA); 0.48 (Aa); 0.36 (aa)

160 How does steroid hormone influence the cellular activities?

1.	Using aquaporin channels as second messenger
2.	Changing the permeability of the cell membrane
3.	Binding the DNA and forming a gene-hormone complex
4.	Activating cyclic AMP located on the cell membrane

161 The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in:

1.	Bronchioles and Fallopian tubes
2.	Bile duct and Bronchioles
3.	Fallopian tubes and Pancreatic duct
4.	Eustachian tube and salivary duct

162 Consider the following statements:

A:	A coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group
B:	A complete catalytic enzyme with its bound prosthetic group is called apoenzyme

Select the correct option
1. **(A)** is false but **(B)** is true
2. Both **(A)** and **(B)** are true
3. **(A)** is true but **(B)** is false
4. Both **(A)** and **(B)** are false

163 Use of an artificial kidney during hemodialysis may result in:

(a)	Nitrogenous waste build-up in the body
(b)	Non-elimination of excess potassium ions
(c)	Reduced absorption of calcium ions from gastro-intestinal tract
(d)	Reduced RBC production

Which of the following options is the most appropriate?
1. **(a)** and **(d)** are correct
2. **(a)** and **(b)** are correct
3. **(b)** and **(c)** are correct
4. **(c)** and **(d)** are correct

164 Presence of plants arranged into well-defined vertical layers depending on their height can be seen best in:
1. Tropical Rain Forest
2. Grassland
3. Temperate Forest
4. Tropical Savannah

165 Which of the following muscular disorders is inherited?
1. Botulism
2. Tetany
3. Muscular dystrophy
4. Myasthenia gravis

166 Due to increasing air-borne allergens and pollutants, many people in urban areas are suffering from respiratory disorder causing wheezing due to:

1.	reduction in the secretion of surfactants by pneumocytes
2.	benign growth on mucous lining of nasal cavity
3.	inflammation of bronchi and bronchioles
4.	proliferation of fibrous tissues and damage of the alveolar walls

167 Match the Column I and Column II:

	Column I		**Column II**
(a)	P-waves	(i)	Depolarisation of ventricles
(b)	QRS complex	(ii)	Repolarisation of ventricles
(c)	T-wave	(iii)	Coronary ischemia
(d)	Reduction in the size of T-wave	(iv)	Depolarisation of atria
		(v)	Repolarisation of atria

Select the correct option:

Options:	**(a)**	**(b)**	**(c)**	**(d)**
1.	(ii)	(iii)	(v)	(iv)
2.	(iv)	(i)	(ii)	(iii)
3.	(iv)	(i)	(ii)	(v)
4.	(ii)	(i)	(v)	(iii)

168 What would be the heart rate of a person if the cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?

1.	125 beats per minute	2.	50 beats per minute
3.	75 beats per minute	4.	100 beats per minute

169 Extrusion of the second polar body from the egg nucleus occurs:

1.	simultaneously with the first cleavage
2.	after entry of sperm but before fertilization
3.	after fertilization
4.	before entry of sperm into the ovum

170 Consider the following features:

A:	Organ system level of organisation
B:	Bilateral symmetry
C:	True coelom with segmentation of body

Select the correct option of animal groups that possess all the above characteristics:

1.	Annelida, Mollusca and Chordata
2.	Annelida, Arthropoda and Chordata
3.	Annelida, Arthropoda and Mollusca
4.	Arthropoda, Mollusca and Chordata

171 Which of the following statements is correct?

1.	Cornea consists of dense matrix of collagen and is the most sensitive portion of the eye.
2.	Cornea is an external, transparent and protective proteinaceous ring of the eyeball
3.	Cornea consists of dense connective tissue of elastin and can repair itself
4.	The Cornea is convex, transparent layer which is highly vascularised

172 Select the correct option.

1.	There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.
2.	8^{th}, 9^{th} and 10^{th} pairs of ribs articulate directly with the sternum.
3.	11^{th} and 12^{th} pairs of ribs are connected to the sternum with the help of hyaline cartilage.
4.	Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

173 In a species, the weight of a newborn ranges from 2 to 5 kg. 97% of the newborns with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 kg or 4.5 kg to 5 kg die. Which type of selection process is taking place?
1. Cyclical selection
2. Directional selection
3. Stabilizing selection
4. Disruptive selection

174 Which part of the brain is responsible for thermoregulation?
1. Medulla oblongata
2. Cerebrum
3. Hypothalamus
4. Corpus callosum

175 Match the following hormones with the respective disease:

(a)	Insulin	(i)	Addison's disease
(b)	Thyroxin	(ii)	Diabetes insipidus
(c)	Corticoids	(iii)	Acromegaly
(d)	Growth Hormone	(iv)	Goitre
		(v)	Diabetes mellitus

Select the correct option.

	(a)	(b)	(c)	(d)
1.	(ii)	(iv)	(i)	(iii)
2.	(v)	(i)	(ii)	(iii)
3.	(ii)	(iv)	(iii)	(i)
4.	(v)	(iv)	(i)	(iii)

176 Which of the following factors is responsible for the formation of concentrated urine?

1.	Hydrostatic pressure during glomerular filtration.
2.	Low levels of antidiuretic hormone.
3.	Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.
4.	Secretion of erythropoietin by Juxtaglomerular complex.

177 What triggers the activation of protoxin to active Bt toxin of *Bacillus thuringiensis* in bollworms?
1. Acidic pH of the stomach
2. Body temperature
3. Moist surface of midgut
4. Alkaline pH of the gut

178 Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL?

1.	2700 mL	2.	1500 mL
3.	1700 mL	4.	2200 mL

179 Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.
1. *Salmonella typhi*/Widal test
2. *Plasmodium* vivax/UTI test
3. *Streptococcus pneumoniae*/Widal test
4. *Salmonella typhi*/Anthrone test

180 Which of the following glucose transporters is insulin-dependent?
1. GLUT IV
2. GLUT I
3. GLUT II
4. GLUT III

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