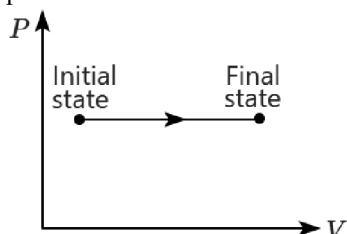


PHYSICS

1 The (P - V) diagram for an ideal gas in a piston-cylinder assembly undergoing a thermodynamic process is shown in the figure. The process is:

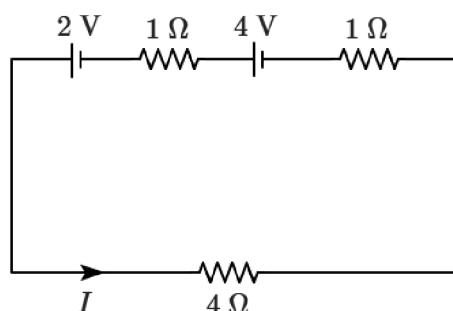


1.	adiabatic	2.	isochoric
3.	isobaric	4.	isothermal

2 The maximum power is dissipated for an AC in a/an:

1.	resistive circuit	2.	LC circuit
3.	inductive circuit	4.	capacitive circuit

3 For the circuit shown in the figure, the current I will be:



1.	0.75 A	2.	1 A
3.	1.5 A	4.	0.5 A

4 An intrinsic semiconductor is converted into an n-type extrinsic semiconductor by doping it with:

1. phosphorous
2. aluminium
3. silver
4. germanium

5 The EM wave with the shortest wavelength among the following is:

1. Ultraviolet rays
2. X-rays
3. Gamma-rays
4. Microwaves

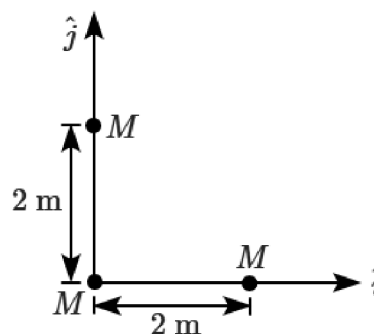
6 Time intervals measured by a clock give the following readings:

1.25 s, 1.24 s, 1.27 s, 1.21 s, 1.28 s.

What is the percentage relative error of the observations?

1. 2%
2. 4%
3. 16%
4. 1.6%

7 Three identical spheres, each of mass M , are placed at the corners of a right-angle triangle with mutually perpendicular sides equal to 2 m (see figure). Taking the point of intersection of the two mutually perpendicular sides as the origin, find the position vector of the centre of mass.



1. $2(\hat{i} + \hat{j})$
2. $\hat{i} + \hat{j}$
3. $\frac{2}{3}(\hat{i} + \hat{j})$
4. $\frac{4}{3}(\hat{i} + \hat{j})$

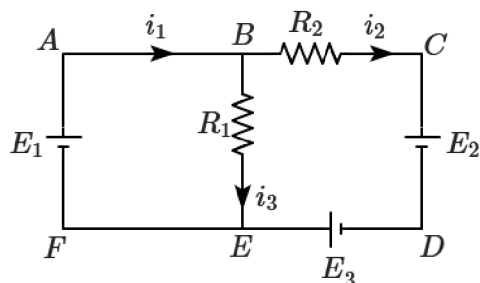
8 What is the depth at which the value of acceleration due to gravity becomes $\frac{1}{n}$ times it's value at the surface of the earth? (radius of the earth = R)

1.	$\frac{R}{n^2}$	2.	$\frac{R(n-1)}{n}$
3.	$\frac{Rn}{(n-1)}$	4.	$\frac{R}{n}$

9 A particle moves with a velocity $(5\hat{i} - 3\hat{j} + 6\hat{k}) \text{ ms}^{-1}$ horizontally under the action of a constant force $(10\hat{i} + 10\hat{j} + 20\hat{k}) \text{ N}$. The instantaneous power supplied to the particle is:

1.	200 W	2.	zero
3.	100 W	4.	140 W

- 10** For the circuit given below, Kirchhoff's loop rule for the loop $BCDEB$ is given by the equation:



1.	$-i_2 R_2 + E_2 - E_3 + i_3 R_1 = 0$
2.	$i_2 R_2 + E_2 - E_3 - i_3 R_1 = 0$
3.	$i_2 R_2 + E_2 + E_3 + i_3 R_1 = 0$
4.	$-i_2 R_2 + E_2 + E_3 + i_3 R_1 = 0$

- 11** An electron with 144 eV of kinetic energy has a de-Broglie wavelength that is very similar to?

- $102 \times 10^{-3} \text{ nm}$
- $102 \times 10^{-4} \text{ nm}$
- $102 \times 10^{-5} \text{ nm}$
- $102 \times 10^{-2} \text{ nm}$

- 12** Two solid conductors are made up of the same material and have the same length and the same resistance. One of them has a circular cross-section of area A_1 and the other one has a square cross-section of area A_2 . The ratio of A_1/A_2 is:

1.	1.5	2.	1
3.	0.8	4.	2

- 13** If the critical angle for total internal reflection from a medium to vacuum is 45° , the velocity of light in the medium is:

1.	$1.5 \times 10^8 \text{ m/s}$	2.	$\frac{3}{\sqrt{2}} \times 10^8 \text{ m/s}$
3.	$\sqrt{2} \times 10^8 \text{ m/s}$	4.	$3 \times 10^8 \text{ m/s}$

- 14** A barometer is constructed using a liquid (density = 760 kg/m^3). What would be the height of the liquid column, when a mercury barometer reads 76 cm? (the density of mercury = 13600 kg/m^3)

1.	1.36 m	2.	13.6 m
3.	136 m	4.	0.76 m

- 15** The acceleration of an electron due to the mutual attraction between the electron and a proton when they are $1.6 \text{ \AA}$ apart is:

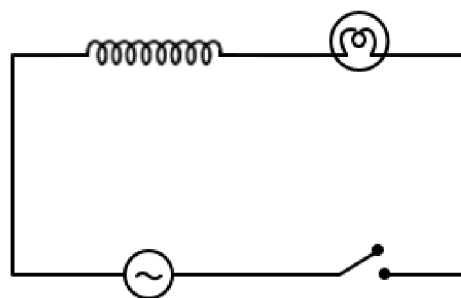
$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2} \right)$$

1.	10^{24} m/s^2	2.	10^{23} m/s^2
3.	10^{22} m/s^2	4.	10^{25} m/s^2

- 16** The angle of $1'$ (minute of an arc) in radian is nearly equal to:

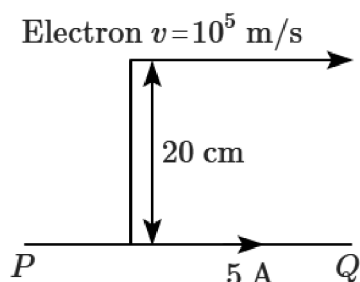
- $2.91 \times 10^{-4} \text{ rad}$
- $4.85 \times 10^{-4} \text{ rad}$
- $4.80 \times 10^{-6} \text{ rad}$
- $1.75 \times 10^{-2} \text{ rad}$

- 17** A light bulb and an inductor coil are connected to an AC source through a key as shown in the figure below. The key is closed and after some time an iron rod is inserted into the interior of the inductor. The glow of the light bulb:



1.	decreases
2.	remains unchanged
3.	will fluctuate
4.	increases

- 18** An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant.



1. $4\pi \times 10^{-20}$ N
2. 8×10^{-20} N
3. 4×10^{-20} N
4. $8\pi \times 10^{-20}$ N

- 19** A wire of length L meters carrying a current of I ampere is bent in the form of a circle. What is its magnetic moment?

1. $\frac{IL^2}{4}$ A-m²
2. $\frac{I \times \pi L^2}{4}$ A-m²
3. $\frac{2IL^2}{\pi}$ A-m²
4. $\frac{IL^2}{4\pi}$ A-m²

- 20** Out of the following which one is a forward-biased diode?

1.	
2.	
3.	
4.	

- 21** The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. The refractive index of the material of the lens is:

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

- 22** A point mass m is moved in a vertical circle of radius r with the help of a string. The velocity of the mass is $\sqrt{7gr}$ at the lowest point. The tension in the string at the lowest point is:

1.	6mg	2.	7mg
3.	8mg	4.	mg

- 23** Two coherent sources of light interfere and produce fringe patterns on a screen. For the central maximum, the phase difference between the two waves will be:

1.	zero	2.	π
3.	$\frac{3\pi}{2}$	4.	$\frac{\pi}{2}$

- 24** From the given functions, identify the function which represents a periodic motion:

1.	$e^{\omega t}$	2.	$\log_e(\omega t)$
3.	$\sin \omega t + \cos \omega t$	4.	$e^{-\omega t}$

- 25** A person sitting on the ground floor of a building notices through the window, of height 1.5 m, a ball dropped from the roof of the building crosses the window in 0.1 s. What is the velocity of the ball when it is at the topmost point of the window? ($g = 10 \text{ m/s}^2$)

1.	15.5 m/s	2.	14.5 m/s
3.	4.5 m/s	4.	20 m/s

- 26** Three stars A , B , and C have surface temperatures T_A , T_B and T_C respectively. Star A appears bluish, star B appears reddish and star C yellowish. Hence:

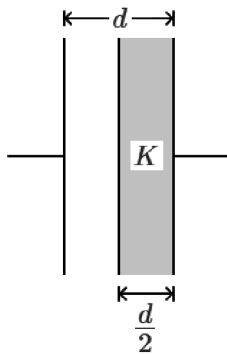
1. $T_A > T_B > T_C$
2. $T_B > T_C > T_A$
3. $T_C > T_B > T_A$
4. $T_A > T_C > T_B$

27 An ideal gas equation can be written as $P = \frac{\rho RT}{M_0}$

where ρ and M_0 are respectively:

1.	mass density, the mass of the gas.
2.	number density, molar mass.
3.	mass density, molar mass.
4.	number density, the mass of the gas.

28 A parallel plate capacitor with cross-sectional area A and separation d has air between the plates. An insulating slab of the same area but the thickness of $\frac{d}{2}$ is inserted between the plates as shown in the figure, having a dielectric constant, $K = 4$. The ratio of the new capacitance to its original capacitance will be:



1.	2 : 1	2.	8 : 5
3.	6 : 5	4.	4 : 1

29 The mean free path l for a gas molecule depends upon the diameter, d of the molecule as:

1.	$l \propto \frac{1}{d^2}$	2.	$l \propto d$
3.	$l \propto d^2$	4.	$l \propto \frac{1}{d}$

30 The length of the string of a musical instrument is 90 cm and has a fundamental frequency of 120 Hz. Where should it be pressed to produce a fundamental frequency of 180 Hz?

1.	75 cm	2.	60 cm
3.	45 cm	4.	80 cm

31 A plane-convex lens of unknown material and unknown focal length is given. With the help of a spherometer, we can measure the

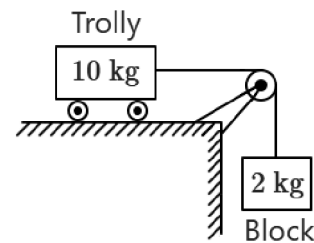
1.	focal length of the lens.
2.	radius of curvature of the curved surface.
3.	aperture of the lens.
4.	refractive index of the material.

32 The angular speed of the wheel of a vehicle is increased from 360 rpm to 1200 rpm in 14 seconds. Its angular acceleration will be:

1. $2\pi \text{ rad/s}^2$
2. $28\pi \text{ rad/s}^2$
3. $120\pi \text{ rad/s}^2$
4. 1 rad/s^2

33 Calculate the acceleration of the block and trolley system shown in the figure. The coefficient of kinetic friction between the trolley and the surface is 0.05.

($g = 10 \text{ m/s}^2$, the mass of the string is negligible and no other friction exists)



1.	1.25 m/s^2	2.	1.50 m/s^2
3.	1.66 m/s^2	4.	1.00 m/s^2

34 The total energy of an electron in the n^{th} stationary orbit of the hydrogen atom can be obtained by:

1. $E_n = \frac{13.6}{n^2} \text{ eV}$
2. $E_n = -\frac{13.6}{n^2} \text{ eV}$
3. $E_n = \frac{1.36}{n^2} \text{ eV}$
4. $E_n = -13.6 \times n^2 \text{ eV}$

35 A wheel with 20 metallic spokes, each 1 m long, is rotated with a speed of 120 rpm in a plane perpendicular to a magnetic field of 0.4 G. The induced emf between the axle and rim of the wheel will be:

- (1 G = 10^{-4} T)
1. $2.51 \times 10^{-4} \text{ V}$
 2. $2.51 \times 10^{-5} \text{ V}$
 3. $4.0 \times 10^{-5} \text{ V}$
 4. 2.51 V

36 Which of the following gate is called the universal gate?

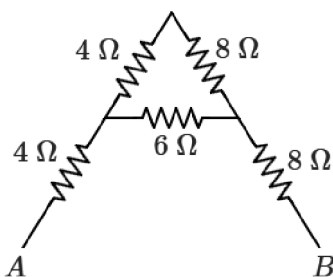
1. OR gate
2. AND gate
3. NAND gate
4. NOT gate

37 The electric field at a point on the equatorial plane at a distance r from the centre of a dipole having dipole moment $\vec{P}$ is given by:

($r \gg$ separation of two charges forming the dipole, $\epsilon_0 =$ permittivity of free space)

1.	$\vec{E} = \frac{\vec{P}}{4\pi\epsilon_0 r^3}$	2.	$\vec{E} = \frac{2\vec{P}}{\pi\epsilon_0 r^3}$
3.	$\vec{E} = -\frac{\vec{P}}{4\pi\epsilon_0 r^2}$	4.	$\vec{E} = -\frac{\vec{P}}{4\pi\epsilon_0 r^3}$

38 The equivalent resistance between A and B for the mesh shown in the figure is:



1.	7.2 Ω	2.	16 Ω
3.	30 Ω	4.	4.8 Ω

39 A liquid does not wet the solid surface if the angle of contact is:

1. equal to 45°
2. equal to 60°
3. greater than 90°
4. zero

40 What happens to the mass number and the atomic number of an element when it emits γ -radiation?

1.	mass number decreases by four and atomic number decreases by two.
2.	mass number and atomic number remain unchanged.
3.	mass number remains unchanged while the atomic number decreases by one.
4.	mass number increases by four and the atomic number increases by two.

41 An object is placed on the principal axis of a concave mirror at a distance of $1.5f$ (f is the focal length). The image will be at:

1.	$-3f$	2.	$1.5f$
3.	$-1.5f$	4.	$3f$

42 The magnetic field in a plane electromagnetic wave is given by:

$$B_y = 2 \times 10^{-7} \sin(\pi \times 10^3 x + 3\pi \times 10^{11} t) \text{ T}$$

The wavelength is:

1. $\pi \times 10^3 \text{ m}$
2. $2 \times 10^{-3} \text{ m}$
3. $2 \times 10^3 \text{ m}$
4. $\pi \times 10^{-3} \text{ m}$

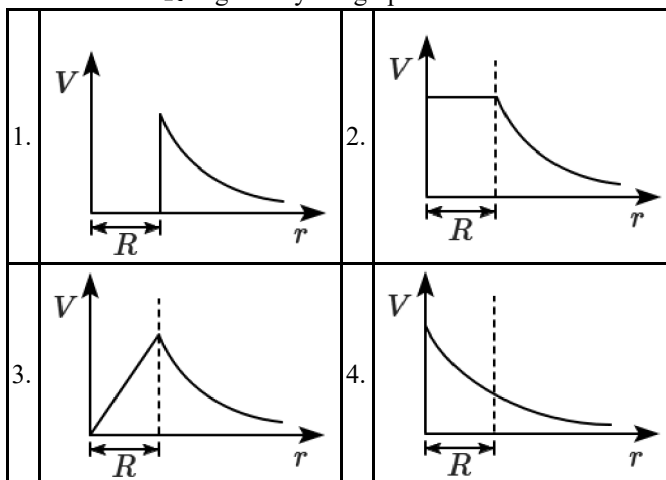
43 Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop:

1.	1520 V	2.	1980 V
3.	660 V	4.	1320 V

44 The magnetic flux linked with a coil (in Wb) is given by the equation $\phi = 5t^2 + 3t + 60$. The magnitude of induced emf in the coil at $t = 4 \text{ s}$ will be:

1. 33 V
2. 43 V
3. 108 V
4. 10 V

45 The variation of electrostatic potential with radial distance r from the centre of a positively charged metallic thin shell of radius R is given by the graph:



CHEMISTRY

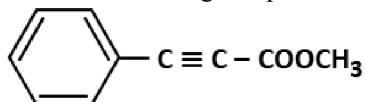
46 The correct statement among the following regarding $[\text{Mn}(\text{CN})_6]^{3-}$ is:

1. It is sp^3d^2 hybridized and tetrahedral.
2. It is d^2sp^3 hybridized and octahedral.
3. It is dsp^2 hybridised and square planar.
4. It is sp^3d^2 hybridised and octahedral.

47 The number of angular nodes and radial nodes in 3s orbital are :

1. 0 and 2, respectively
2. 1 and 0, respectively
3. 3 and 0, respectively
4. 0 and 1, respectively

48 How many (i) sp^2 hybridised carbon atoms and (ii) π bonds are present in the following compound?



1.	7, 5	2.	8, 6
3.	7, 6	4.	8, 5

49 In a particular isomer of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^0$, the Cl-Co-Cl angle is 90° , and the isomer is known as:

1. Optical isomer
2. Cis-isomer
3. Position isomer
4. Linkage isomer

50 Match Column I with Column II.

	Column-I		Column-II
(a)	Copper	(i)	Non-metal
(b)	Fluorine	(ii)	Transition metal
(c)	Silicon	(iii)	Lanthanoid
(d)	Cerium	(iv)	Metalloid

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

51 The salt solution that is basic in nature is:

1. Ammonium chloride.
2. Ammonium sulphate.
3. Ammonium nitrate.
4. Sodium acetate.

52 Match the coordination number and type of hybridization with the distribution of hybrid orbitals in space based on Valence bond theory.

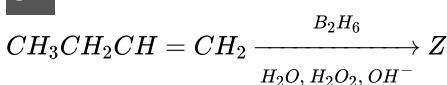
	Coordination number and type of hybridisation		Distribution of hybrid orbitals in space
(a)	4, sp^3	(i)	Trigonal bipyramidal
(b)	4, dsp^2	(ii)	Octahedral
(c)	5, sp^3d	(iii)	Tetrahedral
(d)	6, d^2sp^3	(iv)	Square planar

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

53 Which of the following is dependent on temperature?

1.	Molarity	2.	Mole fraction
3.	Weight percentage	4.	Molality

54 Identify Z in the following reaction:



1.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	2.	$\text{CH}_3\text{CH}_2\text{C}(\text{H})(\text{CH}_3)\text{OH}$
3.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$	4.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

55 From the following, identify the reaction having the top position in the EMF series (standard reduction potential) according to their electrode potential at 298 K.

1. $\text{Mg}^{2+} + 2e^- \rightarrow \text{Mg}_{(s)}$
2. $\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe}_{(s)}$
3. $\text{Au}^{3+} + 3e^- \rightarrow \text{Au}_{(s)}$
4. $\text{K}^+ + 1e^- \rightarrow \text{K}_{(s)}$

56 A liquid compound (x) can be purified by steam distillation only if it is:

1. Steam volatile, immiscible with water
2. Not steam volatile, miscible with water
3. Steam volatile, miscible with water
4. Not steam volatile, immiscible with water

57 Which one of the following reactions does not come under hydrolysis type reaction?

1. $\text{SiCl}_4(\text{l}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{SiO}_2(\text{s}) + 4\text{HCl}(\text{aq})$
2. $\text{Li}_3\text{N}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{NH}_3(\text{g}) + 3\text{LiOH}(\text{aq})$
3. $2\text{F}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{HF}(\text{aq}) + \text{O}_2(\text{g})$
4. $\text{P}_4\text{O}_{10}(\text{s}) + 6\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{H}_3\text{PO}_4(\text{aq})$

58 What is the correct order of electron gain enthalpy from least negative to most negative for the elements C, Ca, Al, F, and O?

1. $\text{Al} < \text{Ca} < \text{O} < \text{C} < \text{F}$
2. $\text{Al} < \text{O} < \text{C} < \text{Ca} < \text{F}$
3. $\text{C} < \text{F} < \text{O} < \text{Al} < \text{Ca}$
4. $\text{Ca} < \text{Al} < \text{C} < \text{O} < \text{F}$

59 One mole of carbon atom weights 12 g, the number of atoms in it is equal to:

(Mass of carbon – 12 is 1.9926×10^{-23} g)

1. 1.2×10^{23}
2. 6.022×10^{22}
3. 12×10^{22}
4. 6.022×10^{23}

60 The reaction of concentrated sulphuric acid with carbohydrates ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) is an example of:

1. Dehydration
2. Oxidation
3. Reduction
4. Sulphonation

61 The reaction of propanamide with ethanolic sodium hydroxide and bromine will give:

1.	Ethylamine	2.	Methylamine
3.	Propylamine	4.	Aniline

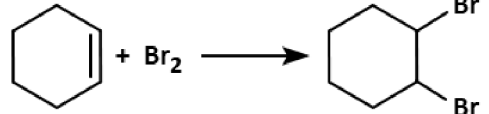
62 What does Z_{AB} represent in the collision theory of chemical reactions?

1.	The fraction of molecules with energies greater than E_a
2.	The collision frequency of reactants, A and B
3.	Steric factor
4.	The fraction of molecules with energies equal to E_a

63 Isotonic solutions have the same:

1. Vapour pressure
2. Freezing temperature
3. Osmotic pressure
4. Boiling temperature

64 A few reactions are given below:

i.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{KOH} \rightarrow \text{CH}_3\text{CH}=\text{CH}_2 + \text{KBr} + \text{H}_2\text{O}$
ii.	$\begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_3 \\ \quad \\ \text{C} \\ \\ \text{Br} \end{array} + \text{KOH} \longrightarrow \begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_3 \\ \quad \\ \text{C} \\ \\ \text{OH} \end{array} + \text{KBr}$
iii.	

Select the reaction type for the above reactions:

	(i)	(ii)	(iii)
1.	Elimination	Substitution	Addition
2.	Elimination	Substitution	Substitution
3.	Substitution	Addition	Addition
4.	Elimination	Elimination	Addition

65 A pair of d-orbitals having electron density along the axes is:

1. d_{z^2}, d_{xz}
2. d_{xz}, d_{zy}
3. $d_{z^2}, d_{x^2-y^2}$
4. $d_{xy}, d_{x^2-y^2}$

66 The half-life for a zero-order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in $\text{mol L}^{-1} \text{s}^{-1}$) for the reaction is:

1. 1.0×10^{-4}
2. 2.0×10^{-4}
3. 2.0×10^{-3}
4. 1.0×10^{-2}

67 A compound that does not undergo S_N1 reaction with OH^- is:

1.	$CH_2 = CH - CH_2Cl$	2.	$(CH_3)_3CCl$
3.		4.	

68 Which of the compounds given below will exhibit a linear structure?

1. NO_2
2. $HOCl$
3. O_3
4. N_2O

69 Deficiency of which vitamin causes osteomalacia ?

1.	Vitamin A	2.	Vitamin D
3.	Vitamin K	4.	Vitamin E

70 In a typical fuel cell, the reactants (R) and products (P) are:

1.	$R = H_2(g), O_2(g); P = H_2O_2(l)$
2.	$R = H_2(g), O_2(g); P = H_2O(l)$
3.	$R = H_2(g), O_2(g), Cl_2(g); P = HClO_4(aq)$
4.	$R = H_2(g), N_2(g); P = NH_3(aq)$

71 The most acidic compound among the following is:

1.		2.	
3.		4.	

72 If for a certain reaction $\Delta_r H$ is 30 kJ mol^{-1} at 450 K, the value of $\Delta_r S$ (in $\text{JK}^{-1} \text{mol}^{-1}$) for which the same reaction will be spontaneous at the same temperature is:

1.	70	2.	-33
3.	33	4.	-70

73

	List I Molecule	List II Shape or geometry of the molecule
a.	PCl_5	Trigonal
b.	SF_6	Octahedral
c.	$BeCl_2$	Linear
d.	NH_3	Trigonal pyramidal

Identify the wrong match in the above-given pair:

1.	b	2.	c
3.	d	4.	a

74 The solubility product for a salt of type AB is 4×10^{-8} .

The molarity of its standard solution will be:

1. $2 \times 10^{-4} \text{ mol/L}$
2. $16 \times 10^{-16} \text{ mol/L}$
3. $2 \times 10^{-16} \text{ mol/L}$
4. $4 \times 10^{-4} \text{ mol/L}$

75 The most reactive compound among the following for electrophilic aromatic substitution is:

1.		2.	
3.		4.	

76 Identify the incorrect statement from the following:

1.	Zirconium and Hafnium have identical radii of 160 pm and 159 pm, respectively as a consequence of lanthanoid contraction.
2.	Lanthanoids reveal only +3 oxidation state.
3.	The lanthanoid ions other than the f^0 type and the f^{14} type are all paramagnetic.
4.	The overall decrease in atomic and ionic radii from lanthanum to lutetium is called lanthanoid contraction.

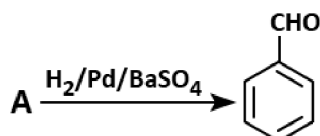
77 Which of the following statement is not true about glucose?

1. It is an aldohexose.
2. It contains five hydroxyl groups.
3. It is a reducing sugar.
4. It is an aldopentose.

78 An acid that forms an anhydride (X) on heating and an acid imide (Y) on strong heating with ammonia is:

1.		2.	
3.		4.	

79 The reactant 'A' in the below-mentioned reaction is:



1.	Benzoyl chloride	2.	Toluene
3.	Acetophenone	4.	Benzoic acid

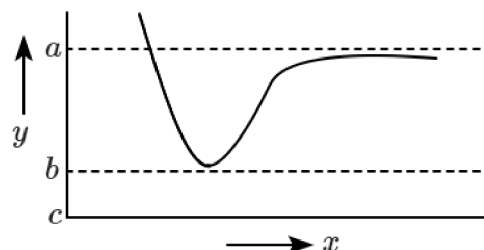
80 Which of the following is a free radical substitution reaction?

1. Benzene with $Br_2/AlCl_3$
2. Acetylene with HBr
3. Methane with $Br_2/h\nu$
4. Propene with $HBr/(C_6H_5COO)_2$

81 Which of the following oxide is amphoteric in nature?

1. SnO_2
2. SiO_2
3. GeO_2
4. CO_2

82 The potential energy (y) curve for H_2 formation as a function of internuclear distance (x) of the H atoms is shown below.



The bond energy of H_2 is:

1.	$(b - a)$	2.	$\frac{(c - a)}{2}$
3.	$\frac{(b - a)}{2}$	4.	$(c - a)$

83 The incorrect oxidation number of the underlined atom in the following species is:

1.	$Cu_2\underline{O}$ is -1	2.	$\underline{Cl}O_3^-$ is +5
3.	$K_2\underline{Cr}_2O_7$ is +6	4.	$H\underline{Au}Cl_4$ is +3

84 Nitrogen detection in an organic compound is carried out by Lassaigne's test. The blue colour formed corresponds to which of the following formulae:

1. $Fe_3[Fe(CN)_6]_2$
2. $Fe_4[Fe(CN)_6]_3$
3. $Fe_4[Fe(CN)_6]_2$
4. $Fe_3[Fe(CN)_6]_3$

85 Match the compounds of Xe in Column I with the molecular structure in Column II.

	Column-I		Column-II
(a)	XeF_2	(i)	Square planar
(b)	XeF_4	(ii)	Linear
(c)	XeO_3	(iii)	Square pyramidal
(d)	$XeOF_4$	(iv)	Pyramidal

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

86 If 8 g of a non-electrolyte solute is dissolved in 114 g of n-octane to reduce its vapor pressure to 80 %, the molar mass (in g mol^{-1}) of the solute is:

[Molar mass of n-octane is 114 g mol^{-1}]

1.	40	2.	60
3.	80	4.	20

87 Sc ($Z = 21$) is a transition element but Zn ($Z = 30$) is not because:

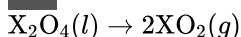
1.	Both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds
2.	In the case of Sc, 3d orbitals are partially filled but in Zn, these are fully filled.
3.	The last electron is assumed to be added to the 4s level in the case of Zn
4.	Both Sc and Zn do not exhibit variable oxidation states.

88 At standard conditions, if the change in the enthalpy for the following reaction is -109 kJ mol^{-1}

$\text{H}_{2(\text{g})} + \text{Br}_{2(\text{g})} \rightarrow 2\text{HBr}_{(\text{g})}$ and the bond energy of H_2 and Br_2 is 435 kJ mol^{-1} and 192 kJ mol^{-1} respectively, what is the bond energy (in kJ mol^{-1}) of HBr?

1.	368	2.	736
3.	518	4.	259

89 For the reaction:



with the given values $\Delta U = 2.1 \text{ kcal}$ and $\Delta S = 20 \text{ cal K}^{-1}$ at 300 K , what is the value of ΔG ?

- 2.7 kcal
- 2.7 kcal
- 9.3 kcal
- 9.3 kcal

90 Match the following aspects with the respective metal.

	Aspects		Metal
(a)	The metal which reveals the maximum number of oxidation states	(i)	Scandium
(b)	The metal although placed in a 3d block is not considered as a transition element	(ii)	Copper
(c)	The metal which does not exhibit variable oxidation states	(iii)	Manganese
(d)	The metal which in +1 oxidation state in aqueous solution undergoes disproportionation	(iv)	Zinc

Select the correct option:

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

BIOLOGY

91 As per ABO blood grouping system, the blood group of father is B^+ , mother is A^+ and child is O^+ . Their respective genotype can be

A.	$\text{I}^{\text{B}}\text{i} / \text{I}^{\text{A}}\text{i} / \text{ii}$
B.	$\text{I}^{\text{B}}\text{I}^{\text{B}} / \text{I}^{\text{A}}\text{I}^{\text{A}} / \text{ii}$
C.	$\text{I}^{\text{A}}\text{I}^{\text{B}} / \text{iI}^{\text{A}} / \text{I}^{\text{B}}\text{i}$
D.	$\text{I}^{\text{A}}\text{i} / \text{I}^{\text{B}}\text{i} / \text{I}^{\text{A}}\text{i}$
E.	$\text{iI}^{\text{B}} / \text{iI}^{\text{A}} / \text{I}^{\text{A}}\text{I}^{\text{B}}$

Choose the most appropriate answer from the options given below:

- B** only
- C** & **B** only
- D** & **E** only
- A** only

92 Given below are some statements about plant growth regulators:

A.	All GAs are acidic in nature.
B.	Auxins are antagonists to GAs.
C.	Zeatin was isolated from coconut milk.
D.	Ethylene induces flowering in Mango.
E.	Abscissic acid induces parthenocarpy.

Choose the correct set of statements from the ones given below:

1.	A,C,D	2.	B,E
3.	A,B,C	4.	B,D,E

93 Match the following events that occur in their respective phases of cell cycle and select the correct option:

	Column I		Column II
(a)	G ₁ phase	(i)	Cell grows and organelle duplication
(b)	S phase	(ii)	DNA replication and chromosome duplication
(c)	G ₂ phase	(iii)	Cytoplasmic growth
(d)	Metaphase in M-phase	(iv)	Alignment of chromosomes

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

94 Which of the following statements is incorrect about gymnosperms?

1. They are heterosporous
2. Male and female gametophytes are free-living
3. Most of them have narrow leaves with thick cuticles
4. Their seeds are not covered

95 Large, empty colourless cells of the adaxial epidermis along the veins of grass leaves are:

1. Lenticels	2. Guard cells
3. Bundle sheath cells	4. Bulliform cells

96 During non-cyclic photophosphorylation, when electrons are lost from the reaction center at PS II, what is the source which replaces these electrons?

1. Oxygen	2. Water
3. Carbon dioxide	4. Light

97 Match the following columns and select the correct option:-

	Column I		Column II
(a)	Dragonflies	(i)	Biocontrol agents of several plant pathogens
(b)	<i>Bacillus thuringiensis</i>	(ii)	Get rid of mosquitoes
(c)	Glomus	(iii)	Narrow spectrum insecticidal applications
(d)	Baculoviruses	(iv)	Biocontrol agents of lepidopteran plant pests
		(v)	Absorb phosphorus from soil

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

98 The rate of decomposition is faster in the ecosystem due to the following factors, except:

1.	Detritus rich in sugars
2.	Warm and moist environment
3.	Presence of aerobic soil microbes
4.	Detritus richer in lignin and chitin

99 During Meiosis 1, in which stage synapsis takes place?

1. Pachytene	2. Zygotene
3. Diplotene	4. Leptotene

100 Which of the following is the correct floral formula of Liliaceae?

1.	$\% \overset{\nearrow}{\underset{\searrow}{\text{♀}}} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
2.	$\oplus \overset{\nearrow}{\underset{\searrow}{\text{♂}}} \overset{\nearrow}{\underset{\searrow}{\text{♀}}} K_{(5)} \overset{\curvearrowright}{C}_{(5)} A_5 \underline{G}_{(2)}$
3.	$\text{Br} \oplus \overset{\nearrow}{\underset{\searrow}{\text{♀}}} P_{(3+3)} \overset{\curvearrowright}{A}_{3+3} G_{(3)}$
4.	$\oplus \overset{\nearrow}{\underset{\searrow}{\text{♀}}} K_{(5)} \overset{\curvearrowright}{C}_{(5)} A_5 \underline{G}_{(2)}$

101 In some plants, the thalamus contributes to fruit formation. Such fruits are termed as:

1. False fruits
2. Aggregate fruits
3. True fruits
4. Parthenocarpic fruits

102 In the following, in each set, a conservation approach and an example of a method of conservation are given.

(a)	<i>In-situ</i> conservation - Biosphere Reserve
(b)	<i>Ex-situ</i> conservation - Sacred groves
(c)	<i>In-situ</i> conservation - Seed bank
(d)	<i>Ex-situ</i> conservation - Cryopreservation

Select the option with the correct match of approach and method:

1.	(a) and (c)	2.	(a) and (d)
3.	(b) and (d)	4.	(a) and (b)

103 Which of the following statements is incorrect?

1.	RuBisCO is a bifunctional enzyme
2.	In C ₄ plants, the site of RuBisCO activity is mesophyll cell
3.	The substrate molecule for RuBisCO activity is a 5-carbon compound
4.	RuBisCO action requires ATP and NADPH

104 Match the following concerning the activity/function and the phytohormone involved:

	Column I		Column II
(a)	Fruit ripener	(i)	Absciscic acid
(b)	Herbicide	(ii)	GA 3
(c)	Bolting agent	(iii)	2, 4-D
(d)	Stress hormone	(iv)	Ethephon

Select the correct option from following:

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

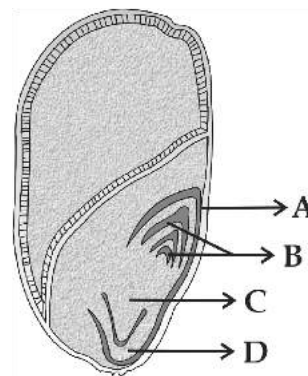
105 Which of the following is incorrect about Cyanobacteria?

1. They are photoautotrophs
2. They lack heterocysts
3. They often form blooms in polluted water bodies
4. They have chlorophyll similar to green plants

106 Correct position of floral parts over thalamus in the mustard plant is:

1.	Gynoecium occupies the highest position, while the other parts are situated below it.
2.	Margin of the thalamus grows upward, enclosing the ovary completely, and other parts arise below the ovary.
3.	Gynoecium is present in the center and other parts cover it partially.
4.	Gynoecium is situated in the center, and other parts of the flower are located at the rim of the thalamus, at the same level.

107 Identify the part of the seed from the given figure which is destined to form root when the seed germinates:



1.	B	2.	C
3.	D	4.	A

108 In the polynucleotide chain of DNA, a nitrogenous base is linked to the -OH of:

1.	2'C pentose sugar	2.	3'C pentose sugar
3.	5'C pentose sugar	4.	1'C pentose sugar

109 The impact of immigration on population density is:

1.	Negative
2.	Both positive and negative
3.	Neutralized by natality
4.	Positive

110 The size of Pleuro Pneumonia Like Organism (PPLO) is:

1. 0.02 μm
2. 1-2 μm
3. 10-20 μm
4. 0.1 μm

111 For the commercial and industrial production of Citric Acid, which of the following microbes is used?

1. *Aspergillus niger*
2. *Lactobacillus sp*
3. *Saccharomyces cerevisiae*
4. *Clostridium bretylium*

112 Which of the following statements is incorrect?

1.	Biomass decreases from first to fourth trophic level.
2.	Energy content gradually increases from first to fourth trophic level.
3.	Number of individuals decreases from first trophic level to fourth trophic level.
4.	Energy content gradually decreases from first to fourth trophic level.

113 What is the role of NAD^+ in cellular respiration?

1.	It functions as an enzyme
2.	It functions as an electron carrier
3.	It is a nucleotide source for ATP synthesis
4.	It is the final electron acceptor for anaerobic respiration

114 Which of the following is incorrect for wind-pollinated plants?

1. Well exposed stamens and stigma
2. Many ovules in each ovary
3. Flowers are small and not brightly colored
4. Pollen grains are light and non-sticky

115 Identify the correct features of Mango and Coconut fruits.

(i)	In both, fruit is a drupe
(ii)	Endocarp is edible in both
(iii)	Mesocarp in Coconut is fibrous, and in Mango, it is fleshy
(iv)	In both, the fruit develops from the monocarpellary ovary

Select the correct option from below:

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

116 Attachment of spindle fibers to kinetochores of chromosomes becomes evident in:

1.	Anaphase	2.	Telophase
3.	Prophase	4.	Metaphase

117 *E.coli* has only 4.6×10^6 base pairs and completes the process of replication within 18 minutes, then the average rate of polymerization is approximately:

1.	2000 base pairs/second	2.	3000 base pairs/second
3.	4000 base pairs/second	4.	1000 base pairs/second

118 Which of the following statements about cork cambium is incorrect?

1.	It forms a secondary cortex on its outside
2.	It forms a part of periderm
3.	It is responsible for the formation of lenticels
4.	It is a couple of layers thick

119 Which is the basis of genetic mapping of the human genome as well as DNA fingerprinting?

1. Polymorphism in the DNA sequence
2. Single nucleotide polymorphism
3. Polymorphism in the hnRNA sequence
4. Polymorphism in the RNA sequence

120 Inclusion bodies of blue-green, purple, and green photosynthetic bacteria are:

1. Contractile vacuoles
2. Gas vacuoles
3. Centrioles
4. Microtubules

121 Chromosomal theory of inheritance was proposed by:

1. Sutton and Boveri
2. Bateson and Punnet
3. T. H. Morgan
4. Watson and Crick

122 Phycoerythrin is the major pigment in:

1. Red algae
2. Blue-green algae
3. Green algae
4. Brown algae

123 Who coined the term 'Kinetin'?

1.	Skoog and Miller	2.	Darwin
3.	Went	4.	Kurosawa

124 Cyclosporin A, used as an immuno-suppression agent, is produced from:

1.	<i>Monascus purpureus</i>	2.	<i>Saccharomyces cerevisiae</i>
3.	<i>Penicillium notatum</i>	4.	<i>Trichoderma polysporum</i>

125 Match the following columns and select the correct option:

	Column-I		Column-II
(a)	Smooth endoplasmic reticulum	(i)	Protein synthesis
(b)	Rough endoplasmic reticulum	(ii)	Lipid synthesis
(c)	Golgi complex	(iii)	Glycosylation
(d)	Centriole	(iv)	Spindle formation

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

126 In a mitotic cycle, the correct sequence of phases is

1. S, G₁, G₂, M
2. G₁, S, G₂, M
3. M, G₁, G₂, S
4. G₁, G₂, S, M

127 After karyogamy followed by meiosis, spores are produced exogenously in?

1.	<i>Neurospora</i>	2.	<i>Alternaria</i>
3.	<i>Agaricus</i>	4.	<i>Saccharomyces</i>

128 What is incorrect about ecosystem?

1.	It can vary from small sized pond to large sized sea
2.	It may be anthropogenic in origin
3.	It may be temporary or Permanent
4.	It involves the function of flow of energy but not recycling of nutrients

129 Pyruvate dehydrogenase activity during aerobic respiration requires:

1.	Calcium	2.	Iron
3.	Cobalt	4.	Magnesium

130 Match the items in Column-I with those in Column-II:

	Column-I		Column-II
(a)	Herbivores-Plants	(i)	Commensalism
(b)	Mycorrhiza-Plants	(ii)	Mutualism
(c)	Sheep-Cattle	(iii)	Predation
(d)	Orchid-Tree	(iv)	Competition

Select the correct option from the following:

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

131 The best example of pleiotropy is:

1. Skin color
2. Phenylketonuria
3. Colour Blindness
4. ABO Blood group

132 The term 'Nuclein' for the genetic material was used by :

1. Franklin
2. Meischer
3. Chargaff
4. Mendel

133 The number of contrasting characters studied by Mendel for his experiments was:

1.	14	2.	4
3.	2	4.	7

134 The biosynthesis of ribosomal RNA occurs in:

1. Ribosomes
2. Golgi apparatus
3. Microbodies
4. Nucleolus

135 According to Alexander von Humboldt :

1.	Species richness decreases with increasing area of exploration
2.	Species richness increases with the increasing area, but only up to a limit
3.	There is no relationship between species richness and the area explored
4.	Species richness goes on increasing with increasing area of exploration

136 Select the correct statement:

1.	Atrial Natriuretic Factor increases the blood pressure.
2.	Angiotensin II is a powerful vasodilator.
3.	Counter current pattern of blood flow is not observed in vasa recta.
4.	Reduction in Glomerular Filtration Rate activates JG cells to release renin.

137 Match List I with List II:

	List I		List II
A.	GLUT-4	I.	Hormone
B.	Insulin	II.	Enzyme
C.	Trypsin	III.	Intercellular substance
D.	Collagen	IV.	Enables glucose transport into cells

Choose the correct answer from the options given below:

1. A-I, B-II, C-III, D-IV
2. A-II, B-III, C-IV, D-I
3. A-III, B-IV, C-I, D-II
4. A-IV, B-I, C-II, D-III

138 Which of the following joints would allow no movement?

1. Fibrous joint
2. Cartilaginous joint
3. Synovial joint
4. Ball and socket joint

139 A Hominid fossil discovered in Java in 1891, now extinct, having a cranial capacity of about 900 cc was:

1.	<i>Homo erectus</i>	2.	Neanderthal man
3.	<i>Homo sapiens</i>	4.	Australopithecus

140 The phenomenon of the evolution of different species in a given geographical area starting from a point and spreading to other habitats is called:

1.	Saltation	2.	Co-evolution
3.	Natural selection	4.	Adaptive radiation

141 Which of the following STDs are not curable?

1.	Genital herpes, Hepatitis B, HIV infection
2.	Chlamydia, Syphilis, Genital warts
3.	HIV, Gonorrhoea, Trichomoniasis
4.	Gonorrhoea, Trichomoniasis, Hepatitis B

142 Match List I and List II:

	List I		List II
1.	Lipase	I.	Peptide bond
2.	Nuclease	II.	Ester bond
3.	Protease	III.	Glycosidic bond
4.	Amylase	IV.	Phosphodiester bond

Choose the correct answer from the options given below:

1. A-III, B-II, C-I, D-IV
2. A-II, B-IV, C-I, D-III
3. A-IV, B-I, C-III, D-II
4. A-IV, B-II, C-III, D-I

143 Frog's heart when taken out of the body continues to beat for some time.

Select the best option from the following statements.

- (a) Frog is a poikilotherm.
 - (b) Frog does not have any coronary circulation.
 - (c) Heart is "myogenic" in nature
 - (d) Heart is autoexcitable
1. Only (d)
 2. (a) and (b)
 3. (c) and (d)
 4. Only (c)

144 Which of the following options correctly represent the characteristic features of phylum Annelida?

1.	Triploblastic, unsegmented body, and bilaterally symmetrical.
2.	Triploblastic, a segmented body, and bilaterally symmetrical.
3.	Triploblastic, flattened body, and acoelomate condition.
4.	Diploblastic, mostly marine and radially symmetrical.

145 The yellowish fluid "colostrum" secreted by mammary glands of the mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. This type of immunity is called as:

1.	Passive immunity	2.	Active immunity
3.	Acquired immunity	4.	Autoimmunity

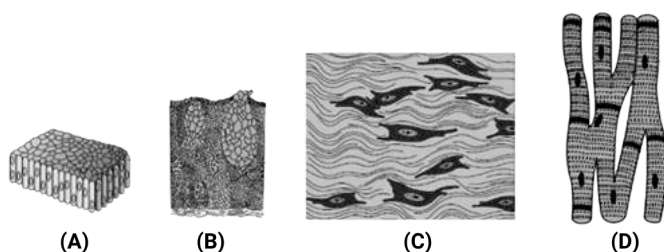
146 In human beings, at the end of 12 weeks (first trimester) of pregnancy, the following is observed:

1.	Eyelids and eyelashes are formed
2.	Most of the major organ systems are formed
3.	The head is covered with fine hair
4.	Movement of the fetus

147 Enzymes that catalyse the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds, are known as:

1. Transferases
2. Oxidoreductases
3. Dehydrogenases
4. Lyases

148 The four sketches (A, B, C, and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function?



		Tissue	Location	Function
1.	(C)	Collagen fibres	Cartilage	Attach skeletal muscles to bones
2.	(D)	Smooth muscle tissue	Heart	Heart contraction
3.	(A)	Columnar epithelium	Nephron	Secretion and absorption
4.	(B)	Glandular epithelium	Intestine	Secretion

149 Which of the following is commonly used as a vector for introducing a DNA fragment in human Lymphocytes?

1. Retrovirus
2. Ti plasmid
3. λ phage
4. pBR 322

150 The increase in osmolarity from outer to inner medullary interstitium is maintained due to:

(i)	Close proximity between Henle's loop and vasa recta
(ii)	Counter current mechanism
(iii)	Selective secretion of HCO_3^- and hydrogen ions in PCT
(iv)	Higher blood pressure in glomerular capillaries

1.	Only (ii)	2.	(iii) and (iv)
3.	(i), (ii) and (iii)	4.	(i) and (ii)

151 Select the correct option of haploid cells from the following groups :

1.	Primary oocyte, Secondary oocyte, Spermatid
2.	Secondary spermatocyte, First polar body, Ovum
3.	Spermatogonia, Primary spermatocyte, Spermatid
4.	Primary spermatocyte, Secondary spermatocyte, Second polar body

152 In recombinant DNA technology antibiotics are used:

1. to keep medium bacteria-free
2. to detect alien DNA
3. to impart disease-resistance to the host plant
4. as selectable markers

153 RNA interference is used for which of the following purposes in the field of biotechnology?

1.	to develop a plant tolerant to abiotic stresses
2.	to develop a pest-resistant plant against infestation by nematode
3.	to enhance the mineral usage by the plant
4.	to reduce post-harvest losses

154 Match the following columns and select the correct option:

	Column-I		Column-II
(a)	Pituitary hormone	(i)	Steroid
(b)	Epinephrine	(ii)	Neuropeptides
(c)	Endorphins	(iii)	Peptides, proteins
(d)	Cortisol	(iv)	Biogenic amines

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

155 The Total Lung Capacity (TLC) is the total volume of air accommodated in the lungs at the end of forced inspiration. This includes:

1.	RV; IC (Inspiratory Capacity); EC (Expiratory Capacity); and ERV
2.	RV; ERV; IC and EC
3.	RV; ERV; VC (Vital Capacity) and FRC (Functional Residual Capacity)
4.	RV (Residual Volume); ERV (Expiratory Reserve Volume); TV (Tidal Volume); and IRV (Inspiratory Reserve Volume)

156 After about how many years of the formation of the earth, life appeared on this planet?

1. 500 billion years
2. 50 million years
3. 500 million years
4. 50 billion years

157 Select the correct statement from the following:

1.	Gel electrophoresis is used for the amplification of a DNA segment.
2.	The polymerase enzyme joins the gene of interest and the vector DNA.
3.	Restriction enzyme digestions are performed by incubating purified DNA molecules with the restriction enzymes of optimum conditions.
4.	PCR is used for the isolation and separation of genes of interest.

158 Match the following columns and select the correct option :

	Column I		Column II
(a)	<i>Aptenodytes</i>	(i)	Flying fox
(b)	<i>Pteropus</i>	(ii)	Angel fish
(c)	<i>Pterophyllum</i>	(iii)	Lamprey
(d)	<i>Petromyzon</i>	(iv)	Penguin

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

159 Match the following columns and select the correct option:

	Column I		Column II
(i)	Typhoid	(a)	<i>Haemophilus influenzae</i>
(ii)	Malaria	(b)	<i>Wuchereria bancrofti</i>
(iii)	Pneumonia	(c)	<i>Plasmodium vivax</i>
(iv)	Filariasis	(d)	<i>Salmonella typhi</i>

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

160 Match the following columns and select the correct option:

	Column I		Column II
(a)	Pneumotaxic Centre	(i)	Alveoli
(b)	O ₂ Dissociation curve	(ii)	Pons region of the brain
(c)	Carbonic Anhydrase	(iii)	Haemoglobin
(d)	Primary site of exchange of gases	(iv)	R.B.C.

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

161 Match the following:

Column I		Column II	
(a)	Aquaporin	(i)	Amide
(b)	Asparagine	(ii)	Polysaccharide
(c)	Abscisic acid	(iii)	Polypeptide
(d)	Chitin	(iv)	Carotenoids

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

162 The laws and rules to prevent unauthorized exploitation of bio-resources are termed as:

1. Biopatenting
2. Bioethics
3. Bioengineering
4. Biopiracy

163 In a mixture, DNA fragments are separated by-

1. Bioprocess engineering
2. Restriction digestion
3. Electrophoresis
4. Polymerase chain reaction

164 Viruses have:

1. DNA enclosed in a protein coat
2. Prokaryotic nucleus
3. Single chromosome
4. Both DNA and RNA

165 In cockroach, identify the parts of the foregut in correct sequence:

1.	Mouth → Oesophagus → Pharynx → Crop → Gizzard
2.	Mouth → Crop → Pharynx → Oesophagus → Gizzard
3.	Mouth → Gizzard → Crop → Pharynx → Oesophagus
4.	Mouth → Pharynx → Oesophagus → Crop → Gizzard

166 Spooling is:

1.	Amplification of DNA
2.	Cutting of separated DNA bands from the agarose gel
3.	Transfer of separated DNA fragments to synthetic membranes
4.	Collection of isolated DNA

167 Which of the following conditions causes erythroblastosis fetalis?

1. Mother Rh⁺ and fetus Rh^{-ve}
2. Mother Rh^{-ve} and fetus Rh⁺
3. Both mother and fetus Rh^{-ve}
4. Both mother and fetus Rh⁺

168 Match the following columns and select the correct option:

	Column I		Column II
(a)	Gout	(i)	Decreased levels of estrogen
(b)	Osteoporosis	(ii)	Low Ca ⁺⁺ ions in the blood
(c)	Tetany	(iii)	Accumulation of uric acid crystals
(d)	Muscular dystrophy	(iv)	Autoimmune disorder
		(v)	Genetic disorder

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

169 Match the following columns with reference to cockroach and select the correct option:

Column - I	Column - II
(a) Grinding of	(i) Hepatic caeca the food particles
(b) Secrete gastric	(ii) 10th segment juice
(c) 10 pairs	(iii) Proventriculus
(d) Anal cerci	(iv) Spiracles
	(v) Alary muscles

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

170 All vertebrates are chordates but all chordates are not vertebrates, why?

1.	Notochord is replaced by a vertebral column in the adults of some chordates.
2.	The ventral hollow nerve cord remains throughout life in some chordates.
3.	All chordates possess a vertebral column.
4.	All chordates possess notochords throughout their lives.

171 Identify the statement which is incorrect.

1.	Sulphur is an integral part of cysteine.
2.	Glycine is an example of lipids.
3.	Lecithin contains a phosphorus atom in its structure.
4.	Tyrosine possesses an aromatic ring in its structure.

172 Match the following techniques or instruments with their usage:

(a)	Bioreactor	(i)	Separation of DNA fragments
(b)	Electrophoresis	(ii)	Production of large quantities of products
(c)	PCR	(iii)	Detection of pathogen, based on antigen-antibody reaction
(d)	ELISA	(iv)	Amplification of nucleic acids

Select the correct option from the following:

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

173 First discovered restriction endonuclease that always cuts DNA molecules at a particular point by recognizing a specific sequence of six base pairs is:

1. *EcoRI*
2. Adenosine deaminase
3. Thermostable DNA polymerase
4. *Hind II*

174 Which of the following is associated with a decrease in cardiac output?

1. Sympathetic nerves
2. Parasympathetic neural signals
3. Pneumotaxic center
4. Adrenal medullary hormones

175 Progestogens alone or in combination with estrogens can be used as a contraceptive in the form of:

1. Implants only
2. Injections only
3. Pills, injections and implants
4. Pills only

176 Embryological support for evolution was proposed by:

1.	Ernst Haeckel	2.	Karl Ernst von Baer
3.	Charles Darwin	4.	Alfred Wallace

177 Match the following group of organisms with their respective distinctive characteristics and select the correct option:

	Organisms		Characteristics
(a)	Platyhelminthes	(i)	Cylindrical body with no segmentation
(b)	Echinoderms	(ii)	Warm blooded animals with direct development
(c)	Hemichordates	(iii)	Bilateral symmetry with incomplete digestive system
(d)	Aves	(iv)	Radial symmetry with indirect development

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

178 Hormones stored and released from neurohypophysis are:

1. Thyroid-stimulating hormone and Oxytocin
2. Oxytocin and Vasopressin
3. Follicle-stimulating hormone and luteinizing hormone
4. Prolactin and Vasopressin

179 Match the following columns and select the correct option:

	Column I		Column II
(a)	Ovary	(i)	Human chorionic gonadotropin
(b)	Placenta	(ii)	Estrogen & Progesterone
(c)	Corpus luteum	(iii)	Androgens
(d)	Leydig cells	(iv)	Progesterone only

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

180 Select the incorrectly matched pair from the following:

1. Chondrocytes - Smooth muscle cells
2. Neurons - Nerve cells
3. Fibroblast - Areolar tissue
4. Osteocytes - Bone cells