PHYSICS

1 The current in an inductor of self-inductance 4 H changes from 4 A to 2 A in 1 s. The emf induced in the coil is:
1. -2 V
2. 2 V
3. -4 V
4. 8 V

2 The correct statement about the variation of viscosity of fluids with an increase in temperature is:

1.	viscosity of gases decreases.
2.	viscosity of both liquids and gases increases.
3.	viscosity of liquids increases.
4.	viscosity of liquids decreases.

3 The de-Broglie wavelength of the thermal electron at $27°C$ is λ. When the temperature is increased to $927°C$, its de-Broglie wavelength will become:
1. 2λ
2. 4λ
3. $\frac{\lambda}{2}$
4. $\frac{\lambda}{4}$

4 Assuming the earth to be a sphere of uniform density, its acceleration due to gravity acting on a body:

|	
1.	increases with increasing altitude.
2.	increases with increasing depth.
3.	is independent of the mass of the earth.
4.	is independent of the mass of the body.

5 A particle of mass $4M$ at rest splits into two particles of mass M and $3M$. The ratio of the kinetic energies of mass M and $3M$ would be:
1. $3:1$
2. $1:4$
3. $1:1$
4. $1:3$

6 During simple harmonic motion of a body, the energy at the extreme position is:

1.	both kinetic and potential
2.	is always zero
3.	purely kinetic
4.	purely potential

7 A fluid of density ρ is flowing in a pipe of varying cross-sectional area as shown in the figure. Bernoulli's equation for the motion becomes:
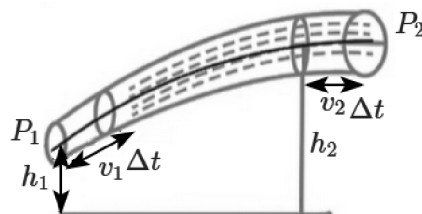
1. $p + \frac{1}{2}\rho v^2 + \rho gh = $ constant
2. $p + \frac{1}{2}\rho v^2 = $ constant
3. $\frac{1}{2}\rho v^2 + \rho gh = $ constant
4. $p + \rho gh = $ constant

8 The ratio of the moments of inertia of two spheres, about their diameters, having the same mass and their radii being in the ratio of $1:2$, is:

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

9 Given below are two statements:

Assertion (A):	A standing bus suddenly accelerates. If there was no friction between the feet of a passenger and the floor of the bus, the passenger would move back.
Reason (R):	In the absence of friction, the floor of the bus would slip forward under the feet of the passenger.

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

10 A linearly polarized monochromatic light of intensity 10 lumen is incident on a polarizer. The angle between the direction of polarization of the light and that of the polarizer such that the intensity of output light is 2.5 lumen is:

1.	$60°$	2.	$75°$
3.	$30°$	4.	$45°$

11 The ratio of the radii of two circular coils is $1:2$. The ratio of currents in the respective coils such that the same magnetic moment is produced at the centre of each coil is:

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

12 A gas undergoes an isothermal process. The specific heat capacity of the gas in the process is:

| 1.	infinity	2.	0.5
3.	zero	4.	1

13 A hollow metal sphere of radius R is given $+Q$ charges to its outer surface. The electric potential at a distance $\dfrac{R}{3}$ from the centre of the sphere will be:

1.	$\dfrac{1}{4\pi\varepsilon_0}\dfrac{Q}{9R}$	2.	$\dfrac{3}{4\pi\varepsilon_0}\dfrac{Q}{R}$
3.	$\dfrac{1}{4\pi\varepsilon_0}\dfrac{Q}{3R}$	4.	$\dfrac{1}{4\pi\varepsilon_0}\dfrac{Q}{R}$

14 The dimensions of mutual inductance (M) are:

1.	$[M^2LT^{-2}A^{-2}]$	2.	$[MLT^{-2}A^2]$
3.	$[M^2L^2T^{-2}A^2]$	4.	$[ML^2T^{-2}A^{-2}]$

15 The plot of current I (A) flowing through a metallic conductor versus the applied voltage V (volt) across the ends of a conductor is:
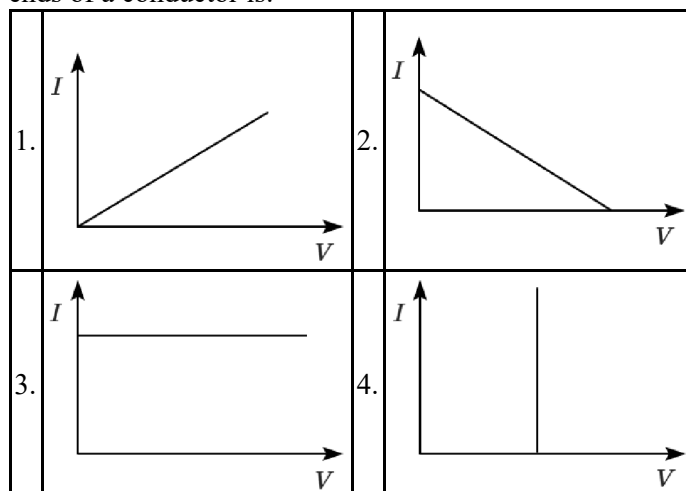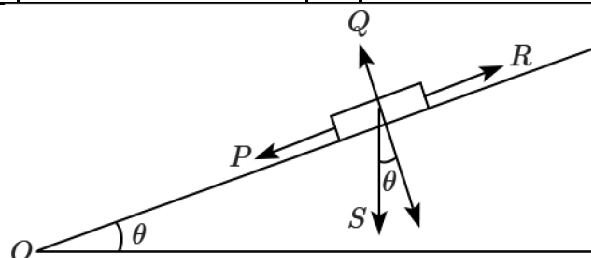

16 A network of resistors is connected across a 10 V battery with an internal resistance of $1\ \Omega$ as shown in the circuit diagram. The equivalent resistance of the circuit is:
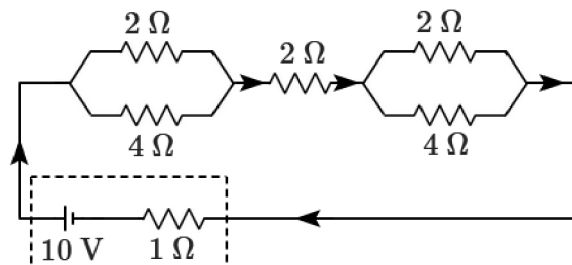
1.	$\dfrac{17}{3}\ \Omega$	2.	$\dfrac{14}{3}\ \Omega$
3.	$\dfrac{12}{7}\ \Omega$	4.	$\dfrac{14}{7}\ \Omega$

17 When a body of mass m just begins to slide as shown, match **List-I** with **List-II**:

	List-I		List-II
(a)	Normal reaction	(i)	P
(b)	Frictional force (f_s)	(ii)	Q
(c)	Weight (mg)	(iii)	R
(d)	$mg\sin\theta$	(iv)	S

Choose the correct answer from the options given below:

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

18 An inductor coil of self-inductance $10\ H$ carries a current of $1\ A$. The magnetic field energy stored in the coil is:

1.	10 J	2.	2.5 J
3.	20 J	4.	5 J

19 A concave lens with a focal length of -25 cm is sandwiched between two convex lenses, each with a focal length of 40 cm. The power (in diopters) of the combined lens system would be:


1.	55	2.	9
3.	1	4.	0.01

20 When the circular scale of a screw gauge completes 2 rotations, it covers 1 mm over the pitch scale. The total number of circular scale divisions is 50. The least count of the screw gauge in metres is:
1. 10^{-4}
2. 10^{-5}
3. 10^{-2}
4. 10^{-3}

21 A block of mass m is moving with initial velocity u towards a stationary spring of stiffness constant k attached to the wall as shown in the figure. Maximum compression of the spring is:
(The friction between the block and the surface is negligible).
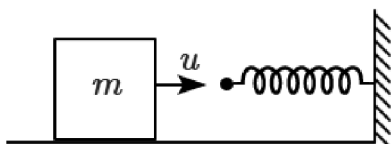
1.	$u\sqrt{\frac{m}{k}}$	2.	$4u\sqrt{\frac{m}{k}}$
3.	$2u\sqrt{\frac{m}{k}}$	4.	$\frac{1}{2}u\sqrt{\frac{k}{m}}$

22 If $\lambda_X, \lambda_I, \lambda_M$ and λ_γ are the wavelengths of X-rays, infrared rays, microwaves and γ-rays respectively, then:

| 1.	$\lambda_\gamma < \lambda_X < \lambda_I < \lambda_M$
2.	$\lambda_M < \lambda_I < \lambda_X < \lambda_\gamma$
3.	$\lambda_X < \lambda_\gamma < \lambda_M < \lambda_I$
4.	$\lambda_X < \lambda_I < \lambda_\gamma < \lambda_M$

23 Twelve point charges each of charge q C are placed at the circumference of a circle of radius r m with equal angular spacing. If one of the charges is removed, the net electric field (in N/C) at the centre of the circle is:
(ε_0-permittivity of free space)

1.	$\dfrac{13q}{4\pi\varepsilon_0 r^2}$	2.	zero
3.	$\dfrac{q}{4\pi\varepsilon_0 r^2}$	4.	$\dfrac{12q}{4\pi\varepsilon_0 r^2}$

24 Let L_1 and L_2 be the orbital angular momentum of an electron in the first and second excited states of the hydrogen atom, respectively. According to Bohr's model, the ratio $L_1 : L_2$ is:
1. 1 : 2
2. 2 : 1
3. 3 : 2
4. 2 : 3

25 The output of the logic circuit shown is equivalent to a/an:
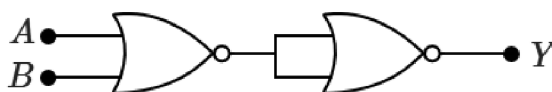
1. OR gate
2. NOR gate
3. AND gate
4. NAND gate

26 A strong magnetic field is applied along the direction of the velocity of an electron. The electron would move along:

| 1.	a parabolic path
2.	the original path
3.	a helical path
4.	a circular path

27 A string is wrapped along the rim of a wheel of the moment of inertia 0.10 kg-m^2 and radius 10 cm. If the string is now pulled by a force of 10 N, then the wheel starts to rotate about its axis from rest. The angular velocity of the wheel after 2 s will be:

1.	40 rad/s	2.	80 rad/s
3.	10 rad/s	4.	20 rad/s

28 A stone is thrown vertically downwards with an initial velocity of 40 m/s from the top of a building. If it reaches the ground with a velocity of 60 m/s, then the height of the building is: (take $g = 10$ m/s^2)

1.	120 m	2.	140 m
3.	80 m	4.	100 m

29 Rain is falling vertically downward with a speed of 35 m/s. The wind starts blowing after some time with a speed of 12 m/s in the east to the west direction. The direction in which a boy standing at the place should hold his umbrella is:
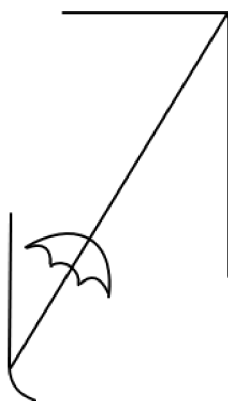
1.	$\tan^{-1}\left(\frac{12}{37}\right)$ with respect to rain
2.	$\tan^{-1}\left(\frac{12}{37}\right)$ with respect to wind
3.	$\tan^{-1}\left(\frac{12}{35}\right)$ with respect to rain
4.	$\tan^{-1}\left(\frac{12}{35}\right)$ with respect to wind

30 An electromagnetic wave is moving along negative $z(-z)$ direction and at any instant of time, at a point, its electric field vector is $3\hat{j}$ V/m. The corresponding magnetic field at that point and instant will be: (Take $c = 3 \times 10^8$ ms^{-1})

| 1.	$10\hat{i}$ nT	2.	$-10\hat{i}$ nT
3.	$\hat{i}$ nT	4.	$-\hat{i}$ nT

31 In a photoelectric experiment, blue light is capable of ejecting a photoelectron from a specific metal while green light is not able to eject a photoelectron. Ejection of photoelectrons is also possible using light of the colour:

1.	yellow	2.	red
3.	violet	4.	orange

32 Three capacitors, each of capacitance $0.3\ \mu$F are connected in parallel. This combination is connected with another capacitor of capacitance $0.1\ \mu$F in series. Then the equivalent capacitance of the combination is:
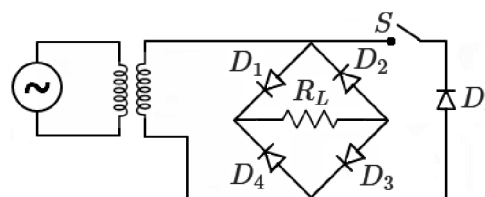1. $0.9\ \mu$F
2. $0.09\ \mu$F
3. $0.1\ \mu$F
4. $0.01\ \mu$F

33 A string of length l is fixed at both ends and is vibrating in second harmonic. The amplitude at antinode is 2 mm. The amplitude of a particle at a distance $l/8$ from the fixed end is:
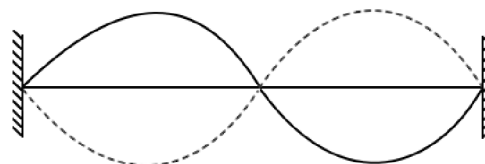
1. $2\sqrt{2}$ mm
2. 4 mm
3. $\sqrt{2}$ mm
4. $2\sqrt{3}$ mm

34 The circuit represents a full wave bridge rectifier when switch S is open. The output voltage (V_0) pattern across R_L when S is closed:

35 Given below are two statements:

Assertion (A):	Gauss's law for magnetism states that the net magnetic flux through any closed surface is zero.
Reason (R):	The magnetic monopoles do not exist. North and South poles occur in pairs, allowing vanishing net magnetic flux through the surface.

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

36 An AC source given by $V = V_m \sin(\omega t)$ is connected to a pure inductor L in a circuit and I_m is the peak value of the AC current. The instantaneous power supplied to the inductor is:

1.	$\dfrac{V_m I_m}{2}\sin(2\omega t)$	2.	$-\dfrac{V_m I_m}{2}\sin(2\omega t)$
3.	$V_m I_m \sin^2(\omega t)$	4.	$-V_m I_m \sin^2(\omega t)$

37 The figure given below shows the displacement and time, $(x\text{-}t)$ graph of a particle moving along a straight line:
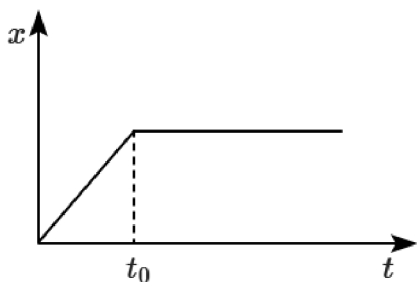
The correct statement, about the motion of the particle, is:

1.	the particle moves at a constant velocity up to a time t_0 and then stops.
2.	the particle is accelerated throughout its motion.
3.	the particle is accelerated continuously for time t_0 then moves with constant velocity.
4.	the particle is at rest.

38 Air is pushed carefully into a soap bubble of radius r to double its radius. If the surface tension of the soap solution is T, then the work done in the process is:

1.	$12\pi r^2 T$	2.	$24\pi r^2 T$
3.	$4\pi r^2 T$	4.	$8\pi r^2 T$

39 Select the correct option based on the statements:

Statement I:	The magnetic field of a circular loop at very far away point on the axial line varies with distance as like that of a magnetic dipole.
Statement II:	The magnetic field due to magnetic dipole varies inversely with the square of the distance from the centre on the axial line.

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

40 When a particle with charge $+q$ is thrown with an initial velocity v towards another stationary change $+Q$, it is repelled back after reaching the nearest distance r from $+Q$. The closest distance that it can reach if it is thrown with an initial velocity $2v$, is:

1.	$\dfrac{r}{4}$	2.	$\dfrac{r}{2}$
3.	$\dfrac{r}{16}$	4.	$\dfrac{r}{8}$

41 The determination of the value of acceleration due to gravity (g) by simple pendulum method employs the formula,

$$g = 4\pi^2 \frac{L}{T^2}$$

The expression for the relative error in the value of g is:

1. $\dfrac{\Delta g}{g} = \dfrac{\Delta L}{L} + 2\left(\dfrac{\Delta T}{T}\right)$

2. $\dfrac{\Delta g}{g} = 4\pi^2 \left[\dfrac{\Delta L}{L} - 2\dfrac{\Delta T}{T}\right]$

3. $\dfrac{\Delta g}{g} = 4\pi^2 \left[\dfrac{\Delta L}{L} + 2\dfrac{\Delta T}{T}\right]$

4. $\dfrac{\Delta g}{g} = \dfrac{\Delta L}{L} - 2\left(\dfrac{\Delta T}{T}\right)$

42 A monochromatic light of frequency 500 THz is incident on the slits of Young's double slit experiment. If the distance between the slits is 0.2 mm and the screen is placed at a distance 1 m from the slits, the width of 10 fringes will be:

1.	1.5 mm	2.	15 mm
3.	30 mm	4.	3 mm

43 In a meter bridge experiment, the null point is at a distance of 30 cm from A. If a resistance of 16 Ω is connected in parallel with resistance Y, the null point occurs at 50 cm from A. The value of the resistance Y is:
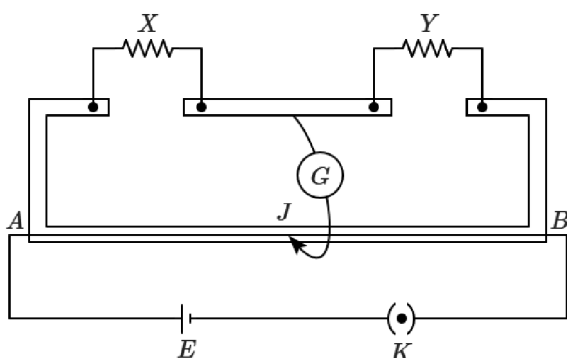

1.	$\frac{112}{3}\ \Omega$	2.	$\frac{40}{3}\ \Omega$
3.	$\frac{64}{3}\ \Omega$	4.	$\frac{48}{3}\ \Omega$

44 The temperature at which the RMS speed of atoms in neon gas is equal to the RMS speed of hydrogen molecules at 15°C is:
(the atomic mass of neon $= 20.2$ u, molecular mass of hydrogen $= 2$ u)
1. 2.9×10^3 K
2. 2.9 K
3. 0.15×10^3 K
4. 0.29×10^3 K

45 Two planets orbit a star in circular paths with radii R and $4R$, respectively. At a specific time, the two planets and the star are aligned in a straight line. If the orbital period of the planet closest to the star is T, what is the minimum time after which the star and the planets will again be aligned in a straight line?
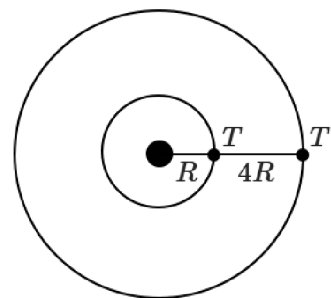
1.	$(4)^2 T$	2.	$(4)^{\frac{1}{3}} T$
3.	$2T$	4.	$8T$

CHEMISTRY

46 The correct order for boiling points of the following compounds is:

1.	$AsH_3 > PH_3 > NH_3 > SbH_3 > BiH_3$
2.	$BiH_3 > SbH_3 > NH_3 > AsH_3 > PH_3$
3.	$NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$
4.	$PH_3 > NH_3 > AsH_3 > SbH_3 > BiH_3$

47 Match List-I with List-II:

	List-I (Quantities)		List-II (Corresponding Values)
(a)	4.48 litres of O_2 at STP	(i)	0.2 mole
(b)	12.022×10^{22} molecules of H_2O	(ii)	12.044×10^{23} molecules
(c)	96 g of O_2	(iii)	6.4 g
(d)	88 g of CO_2	(iv)	67.2 litres at STP

(Given - Molar volume of a gas at STP - 22.4 L)
Choose the correct answer from the options given below:

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

48 Given below are two statements:

Statement I:	Aldehydes and ketones having at least one α-hydrogen undergo aldol condensation in the presence of dilute alkali as catalyst.
Statement II:	When aldol condensation is carried out between two different aldehydes, it is called cross aldol condensation. Ketones do not give this reaction.

In light of the above statements, choose the most appropriate answer from the options given below:

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

49 Match List-I with List-II:

	List-I Elements		List-II Atomic radii (pm)
(a)	Oxygen (O)	(i)	88
(b)	Carbon (C)	(ii)	74
(c)	Boron (B)	(iii)	66
(d)	Nitrogen (N)	(iv)	77

Choose the correct answer from the options given below:

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

50 The correct reaction among the following is:

1.	$CH_3CH_3Br + 2$
2.	
3.	$2CH_3CH_2Br \xrightarrow[\text{dry ether}]{\text{Mg}} CH_3CH_2CH_2CH_3$
4.	$2CH_3CH_2Br \xrightarrow[\text{Ethanol}]{\text{Na}} CH_3CH_2CH_2CH_3$

51 The number of bridging carbonyl groups in $[Co_2(CO)_8]$ and $[Mn_2(CO)_{10}]$, respectively are:

1.	2 and 0	2.	2 and 2
3.	2 and 4	4.	0 and 2

52 Which of the following is not a polydentate ligand?
1. Oxalate
2. Ethylenediamine
3. Thiocyanate
4. EDTA

53 For the reaction, $2A \rightarrow B$, rates= $k[A]^2$. If the concentration of reactant is doubled, then the:

(a)	rate of reaction will be doubled.
(b)	rate constant will remain unchanged, however rate of reaction is directly proportional to the rate constant.
(c)	rate constant will change since the rate of reaction and rate constant are directly proportional to each other.
(d)	rate of reaction will increase by four times.

Identify the set of correct statements & choose the correct answer from the options given below:

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

54 Match Compound/element in **Column-I** with uses in **Column-II** and select the best match from the codes given:

	Column-I (Compound/element)		Column-II (Uses)
A.	Lanthanoid oxide	I.	Petroleum cracking
B.	Lanthanoid	II.	Television screen
C.	Mischmetal	III.	Lanthanoid metal + iron
D.	Mixed oxides of lanthanoids are employed	IV.	Production of iron alloy

Options:	A	B	C	D
1.	II	I	IV	III
2.	I	II	III	IV
3.	II	IV	III	I
4.	IV	I	III	II

55 Which of the following is the correct statement?

1. Ga^+ is more stable than In^+.
2. Al^+ is more stable than In^+.
3. Ga^+ is more stable than Al^+.
4. Al^+ is more stable than Ga^+.

56 What is the correct increasing order of ionic radii for the ions Ce^{3+}, La^{3+}, Pm^{3+}, and Yb^{3+}?

1. $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$
2. $Ce^{3+} < Yb^{3+} < Pm^{3+} < La^{3+}$
3. $Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}$
4. $Pm^{3+} < La^{3+} < Ce^{3+} < Yb^{3+}$

57 One mole of sugar is dissolved in three moles of water at 298 K. The relative lowering of vapour pressure is:

1.	0.25	2.	0.15
3.	0.50	4.	0.33

58 Which one is not a D-sugar:

1.	CHO, HO—H, H—OH, CH₂OH	2.	CHO, H—OH, HO—H, CH₂OH
3.	CHO, H—OH, H—OH, CH₂OH	4.	CH₂OH, C=O, H—OH, CH₂OH

59 Match list-I with list-II:

	List-I (Amines)		List-II (pK_b values)
(a)	N-Methylmethanamine	(i)	9.30
(b)	Ammonia	(ii)	9.38
(c)	N-Methylaniline	(iii)	4.75
(d)	Benzenamine	(iv)	3.27

Choose the correct answer from the options given below:

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

60

I:	The product of the reaction of phenol with bromine depends on the nature of the solvent.
II:	The reaction of phenol with bromine in $CHCl_3$ gives a monosubstituted bromo derivative whereas the reaction of phenol with bromine water yields a trisubstituted bromo derivative of phenol.

In light of the above statements, choose the most appropriate answer from the options given below:

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

61 The work done when 1 mole of gas expands reversibly and isothermally from a pressure of 5 atm to 1 atm at 300 K is:

(Given $\log 5 = 0.6989$ and $R = 8.314$ J K^{-1} mol^{-1})

1. zero J
2. 150 J
3. +4014.6 J
4. -4014.6 J

62 A set of species capable of showing disproportionation reactions is:

1.	ClO_2^-, ClO_3^-, ClO_4^-, Cl_2
2.	Cl_2, ClO_2^-, ClO_3^-, S_8
3.	ClO_4^-, ClO^-, ClO_2^-, F_2
4.	ClO_3^-, ClO_4^-, H_2O_2, ClO^-

63 Match the bond line structures of hydrocarbons given in List I with the corresponding boiling points given in List II.

	List-I (Compound)		List II (Boiling point in K)
(a)	(bond line structure)	(i)	300.9
(b)	(bond line structure)	(ii)	282.5
(c)	(bond line structure)	(iii)	309.1
(d)	(bond line structure)	(iv)	341.9

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Choose the correct answer from the options given below:

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

64 At 373 K, the reaction shown below has an equilibrium constant, $K_c = 2.19 \times 10^{-10}$.

$$COCl_2(g) \rightleftharpoons CO(g) + Cl_2(g)$$

After placing a mixture of gases in the reaction vessel, the concentrations were measured to be $[COCl_2] = 3.50 \times 10^{-3}$M, $[CO] = 1.11 \times 10^{-5}$M, and $[Cl_2] = 3.25 \times 10^{-6}$M.

Which statement below accurately describes this reaction?
1. The reaction is at equilibrium.
2. The reaction is not at equilibrium and shifts left.
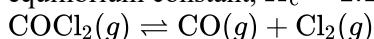3. The reaction is not at equilibrium and shifts right.
4. The reaction quotient is equal to K_c.

65 The element that does NOT show catenation among the following is :
1. Ge
2. Si
3. Sn
4. Pb

66 Match the statements given in List I with the corresponding element given in List II:

List-I (Characteristics)		List-II (Elements)	
(a)	Element that exhibits +3 oxidation state only.	(i)	Mn
(b)	An element that exhibits more number of oxidation states.	(ii)	Zn
(c)	Element which is a reducing agent in its +2 oxidation state.	(iii)	Sc
(d)	An element that is not considered as a transition element.	(iv)	Cr

Choose the correct answer from the options given below:

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

67 Which one of the following statements is true about the structure of CO_3^{2-} ion?

1.	It can be explained by considering sp^3 hybridization.
2.	Out of the three C–O bonds, two are longer and one is shorter.
3.	It has three sigma and three π-bonds.
4.	All three C–O bonds are equal in length with a bond order in between 1 and 2.

68 Which one of the following is the correct order of decreasing bond enthalpies for the given species?
1. $O_2^{2-} > O_2^- > O_2 > N_2$
2. $N_2 > O_2 > O_2^{2-} > O_2^-$
3. $N_2 > O_2 > O_2^- > O_2^{2-}$
4. $O_2 > N_2 > O_2^- > O_2^{2-}$

69 The three cells with their $E^\circ_{(cell)}$ values are given below:

	Cells	$E^\circ_{(cell)}/V$
(a)	Fe|Fe^{2+}||Fe^{3+}|Fe	0.404
(b)	Fe|Fe^{2+}||Fe^{3+}, Fe^{2+}|Pt	1.211
(c)	Fe|Fe^{3+}||Fe^{3+}, Fe^{2+}|Pt	0.807

The standard Gibbs free energy change values for three cells are, respectively:
(F represents the charge on 1 mole of electrons.)

1.	–1.212 F, –1.211 F, –0.807 F
2.	+2.424 F, +2.422 F, +2.421 F
3.	–0.808 F, –2.422 F, –2.421 F
4.	–2.424 F, –2.422 F, –2.421 F

70 Which one of the following electrons in the ground state will have least amount of energy?

1.	An electron in hydrogen atom.
2.	An electron in 2p orbital of carbon atom.
3.	The electron of copper atom present in 4s orbital.
4.	The outermost electron in sodium atom.

71 The increasing order of reactivity of the following compounds towards acid-catalyzed dehydration is:

1.	$CH_3 - CH_2 - OH$	2.	
3.		4.	$CH_3 - C(CH_3)_2 - OH$

1.	(II) < (III) < (I) < (IV)	2.	(II) < (I) < (III) < (IV)
3.	(I) < (III) < (IV) < (II)	4.	(III) < (I) < (II) < (IV)

72 The correct order of acidic strength of the following molecules is:

1.	$H_2O <$ $< C_2H_5OH < CH_3COOH$
2.	$C_2H_5OH < H_2O < CH_3COOH <$
3.	$C_2H_5OH < H_2O <$ $< CH_3COOH$
4.	$H_2O < C_2H_5OH <$ $< CH_3COOH$

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

	List-I		List-II
(a)	Separation of aniline-water mixture	(i)	Fractional distillation
(b)	Separation of aniline-chloroform mixture	(ii)	Distillation under reduced pressure
(c)	Separation of glycerol from spent-lye	(iii)	Distillation
(d)	Separation of different fractions of crude oil	(iv)	Steam distillation

Codes:

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

74 The product formed in the following reaction sequence is:
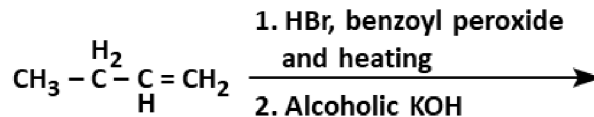
1.	
2.	$CH_3 - CH = CH - CH_3$
3.	$CH_3 - CH_2 - CH = CH_2$
4.	$CH_3 - CH_2 - CH_2 - CH_2 - OH$

75 The solubility product of $BaSO_4$ in water is 1.5×10^{-9}. The molar solubility of $BaSO_4$ in 0.1 M solution of $Ba(NO_3)_2$ in:

1. $2.0 \times 10^{-8} M$
2. $0.5 \times 10^{-8} M$
3. $1.5 \times 10^{-8} M$
4. $1.0 \times 10^{-8} M$

76 What is the correct order of melting points for hydrides in Group 16?
1. $H_2S < H_2Se < H_2Te < H_2O$
2. $H_2O < H_2S < H_2Se < H_2Te$
3. $H_2S < H_2Te < H_2Se < H_2O$
4. $H_2Se < H_2S < H_2Te < H_2O$

77 The plot of ln k vs $\frac{1}{T}$ for the following reaction $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ gives a straight line with the slope of the line equal to $-1.0 \times 10^4 K$.
The activation energy for the reaction in J mol^{-1} is:
(Given R = 8.3 J K^{-1} mol^{-1})

1.	4.0×10^2	2.	4.0×10^{-2}
3.	8.3×10^{-4}	4.	8.3×10^4

78 The correct IUPAC name of the following compound is:

1.	2-Ethylhex-3-en-4-one	2.	4-Methylhex-3-en-2-one
3.	4-Ethylpent-3-en-2-one	4.	3-Methylhex -3-en-4-one

79 $\wedge_m^o$ for NaCl, HCl and CH_3COONa are 126.4, 425.9, and 91.05 S cm^2 mol^{-1} respectively. If the conductivity of 0.001028 mol L^{-1} acetic acid solution is $4.95 \times 10^{-5} S\, cm^{-1}$, the degree of dissociation of the acetic acid solution is:

1.	0.01233	2.	1.00
3.	0.1233	4.	1.233

80 Consider the following reaction taking place in 1L capacity container at 300 K.
$A + B \rightleftharpoons C + D$
If one mole each of A and B are present initially and at equilibrium 0.7 mol of C is formed, then the equilibrium constant (K_c) for the reaction is:

1.	9.7	2.	1.2
3.	6.2	4.	5.4

81 The product(s) formed from the following reaction is/are:
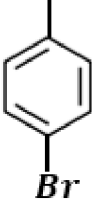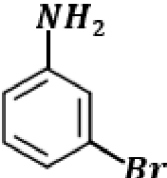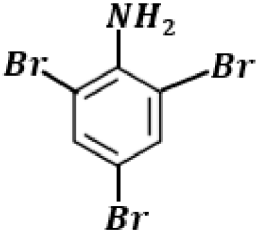
1.	RCOOH only
2.	RCH$_2$COOH only
3.	
4.	RCOOH and RCH$_2$COOH

82 A monochromatic infrared range finder of power 1milli watt emits photons with wavelength 1000 nm in 0.1 second. The number of photons emitted in 0.1 second is:
(Given: h = $6.626 \times 10^{-34} J\, s$, c = $3 \times 10^8 m\, s^{-1}$, Avogadro number = 6.022×10^{23})
1. 30×10^{37}
2. 5×10^{14}
3. 30×10^{34}
4. 5×10^{11}

83 The major product (P) formed in the following reaction sequence is :

84 The correct order of spin-only magnetic moment for the given complexes is:
1. $[Co(H_2O)_6]^{2+} > [MnCl_6]^{3-} > [Fe(CN)_6]^{3-}$
2. $[Fe(CN)_6]^{3-} > [Co(H_2O)_6]^{2+} > [MnCl_6]^{3-}$
3. $[MnCl_6]^{3-} > [Fe(CN)_6]^{3-} > [Co(H_2O)_6]^{2+}$
4. $[MnCl_6]^{3-} > [Co(H_2O_6]^{2+} > [Fe(CN)_6]^{3-}$

85 Match the overlapping of orbitals with the type of bond formed.
(Consider $x-$the axis as the internuclear axis.)

	Column I		Column II
(P)	$2s + 2p_x$	A.	π bond
(Q)	$2p_y + 2p_y$	B.	σ bond
(R)	$d_{xy} + p_z$	C.	No bond formation
(S)	$d_{xy} + p_y$		

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

86 Identify the pair of Lanthanoides with one strong oxidant and one strong reductant:

1.	Ce(IV), Tb(IV)	2.	Yb(II), Eu(II)
3.	Eu(IV), Lu(III)	4.	Ce(IV), Eu(II)

87 The compound obtained by addition of water to an alkyne having more than two carbons, in the presence of $HgSO_4$ and dilute H_2SO_4 at 333K, is:
1. A vicinal diol
2. An aldehyde
3. An alcohol
4. A ketone

88 Calcium reacts with element X to form an ionic compound. If the ground-state electron configuration of X is $1s^2 2s^2 2p^4$, what is the simplest formula for this compound?
1. CaX
2. CaX_2
3. Ca_4X_2
4. Ca_2X_2

89 The major products formed in the following reaction are:
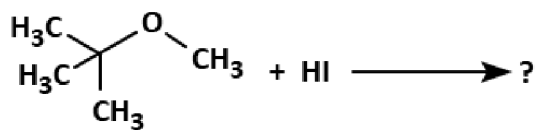
90 5 moles of an ideal gas at 100 K are allowed to undergo reversible compression till its temperature becomes 200 K. If $C_V = 28$ J K$^{-1}mol^{-1}$, calculate ΔU and $\Delta(pV)$ for this process. $\left(R = 8.0 \text{ J K}^{-1} \text{ mol}^{-1} \right)$
1. $\Delta U = 14$ kJ; $\Delta(pV) = 18$ kJ
2. $\Delta U = 14$ kJ; $\Delta(pV) = 0.8$ kJ
3. $\Delta U = 14$ kJ; $\Delta(pV) = 4$ kJ
4. $\Delta U = 14$ kJ; $\Delta(pV) = 8.0$ kJ

BIOLOGY

91 Match List -I with List-II:

	List - I		List - II
a.	*Cedrus*	(i)	Pteridophyte
b.	*Adiantum*	(ii)	Gymnosperm
c.	*Sphagnum*	(iii)	Liverwort
d.	*Marchantia*	(iv)	Moss

Choose the correct answer from the options given below:

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

92 The products of light reaction in photosynthesis are:
1. ATP, NADPH and O_2
2. ATP, NADPH, O_2 and H_2O
3. ATP, NADPH and H_2O
4. ATP, NADPH and CO_2

93 In prophase I of Meiosis, chromosomes start pairing together and synapsis takes place. This process occurs during which of the following stage?

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

94 Identify the correct statements related to the androecium in the flower.

(a)	The sterile stamens are called staminodes
(b)	When stamens are attached to petals they are called epipetalous
(c)	Monadelphy is seen in China-rose
(d)	Polyadelphy is seen in Pea
(e)	Variation in the length of anther filaments is seen in Mustard

Choose the correct answer from the options given below:
1. (a), (c), (d) and (e) only
2. (a) , (b), (c) and (e) only
3. (a) , (b) and (c) only
4. (b) , (c) and (d) only

95 Identify the correct set of statements with regard to the properties of humus.

(a)	Highly resistant to microbial action
(b)	Dark-colored amorphous substance
(c)	End product of detritus food chain
(d)	Reservoir of nutrients
(e)	Undergoes decomposition very fast

Choose the correct answer from the options given below:
1. (a), (b), and (d) only
2. (a),(b) and (e) only
3. (a) and (b) only
4. (b), (c), and (a)

96 Select the correct statements with respect to pleiotropism:

(a)	A gene is said to be pleiotropy if it affects more than one trait
(b)	Phenylketonuria is an example of pleiotropy
(c)	A condition where one gene has several alleles is referred to as pleiotropism
(d)	A trait is said to be pleiotropic if several genes control it

Choose the correct answer from the options given below:
1. (a) and (b) only
2. (a) and (d) only
3. (a), (b) and (c) only
4. (b), (c) and (d) only

97 The living differentiated cells, that lost the capacity to divide anymore, can regain the capacity of division under certain conditions. This phenomenon is termed as:

1.	Redifferentiation	2.	Maturation
3.	Differentiation	4.	Dedifferentiation

98 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A):	A father will never pass the gene for haemophilia to his sons
Reason (R):	Haemophilia is sex-linked (X-linked recessive trait).

In the light of the above statements, choose the correct answer from the options given below :

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

99 Which one of the following is not a criterion of genetic material?

1.	Should not provide the scope for changes for evolution
2.	Should be able to express itself in the form of Mendelian character
3.	Should be able to generate its replica
4.	Should be stable chemically and structurally

100 DNA replication is semi-conservative in nature was experimentally proved in eukaryotes by:
1. Hershey and Chase
2. Macleod and McCarty
3. Meselson and Stahl
4. Talyor and his colleagues

101 Which one of the following experiments of Frederick Griffith resulted in the discovery of bacterial transformation?

1.	S-stain(heat-killed) → injected in to Mice → Mice lived
2.	S-strain (heat killed) + R-strain(live) → injected in to Mice → Mice died
3.	S-stain → injected in to Mice → Mice died
4.	R-strain → injected in to Mice → Mice lived

102 Which of the following come under the "Evil Quarter"?
(a) Habitat loss and fragmentation
(b) Over-exploitation
(c) Alien species invasion
(d) Mortality
(e) Competition
Choose the correct answer from the options given below:

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

103 Given below are two statements:

Statement I:	Cellulose is a polymeric polysaccharide
Statement II:	The building blocks of cellulose are glucose molecules

In the light of the above statements , choose the correct answer from the options given below:

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

104 Which hormone is used to induce immediate stomatal closure in leaves?
1. Cytokinin
2. Gibberellin
3. Abscisic Acid
4. Auxin

105 Given below are two statements : One is labeled as Assertion (A) and the other is labeled as Reason (R)

Assertion (A):	The growth of the multicellular organism is due to mitosis
Reason (R):	Mitosis is also called as equational division and it offers genetic stability

In light of the above statements choose the correct answer from the options given below:

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

106 The given figure shows:
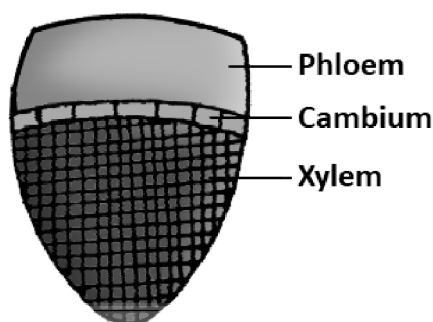
I: Radial vascular bundles.
II: Open vascular bundles
1. Only **I** is correct
2. Only **II** is correct
3. Both **I** and **II** are correct
4. Both **I** and **II** are incorrect

107 The process of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration is referred as:
1. Association
2. Emigration
3. Competition
4. Immigration

108 Match List-I with List-II

	List-I		List-II
(a)	Haemophilia	(i)	Inborn error of metabolism which lacks an enzyme that converts phenylalanine into tyrosine
(b)	Down's Syndrome	(ii)	Sex-linked recessive disorder; a defect in blood coagulation
(c)	Phenylketonuria	(iii)	Presence of additional copy of X-chromosome (44+XXY)
(d)	Klinefelter's Syndrome	(iv)	Additional copy of chromosome number 21

Choose the correct answer from the options given below:

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

109 Genetically engineered insulin for human is produced from:
1. *Escherichia coli*
2. *Psuedomonas putida*
3. *Bacillus thuringiensis*
4. *Rhizobium meliloti*

110 Removal of apical dominance by decapitation is utilised for:
1. Suppressing the activity of intercalary meristem
2. Early senescence
3. Hedge making
4. Preparing weed-free lawns

111 What will be the ploidy of endosperm of a seed produced after crossing tetraploid female plant with tetraploid male plant?
1. Pentaploid
2. Hexaploid
3. Diploid
4. Triploid

112 Which one of the following structures is haploid in its ploidy level?
1. Primary Endospore Nucleus
2. Microspore Mother cell
3. Protonemal cell of a moss
4. Primary endosperm nucleus in dicot

113 Select the correct statements related to the activity of cork cambium:

1.	The outer cells differentiate into phelloderm.
2.	The cork differentiated from cork cambium, is impervious to water due to deposition of tannins and resins.
3.	Cuts the cells only on the outer side.
4.	Cuts the cells on inner as well as outer side.

114 Match List-I with List II

	List-I		List-II
(a)	ETS complex-I	(i)	Cyt bc1
(b)	ETS complex-II	(ii)	Cyt a,a3 and 2 copper centres
(c)	ETS complex-III	(iii)	NADH dehydrogenase
(d)	ETS complex-IV	(iv)	Ubiquinone and $FADH_2$ dehydrogenase

Choose the correct answer from the options given below:

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

115 Species Area relationship is described by the following equation.

$\log S = \log C + Z \log A$

where Z is:
1. Area
2. Species richness
3. Slope of the line
4. Y-intercept

116 Choose the mismatched pair of leaf character with its example:
1. Palmately compound - *Alstonia*
2. Alternate Phyllotaxy - China-rose
3. Leaf tendril - Pea
4. Opposite phyllotaxy - *Calotropis*

117 Which of the following is the correct equation of exponential growth?
1. $N_t = N_0 \, e^{rnt}$
2. $N_t = N_0 \, e^{rpt}$
3. $N_t = N_0 \, e^{rst}$
4. $N_t = N_0 \, e^{rt}$

118 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A):	Restriction enzyme is a type of endonuclease
Reason (R):	Restriction enzyme cuts the two stands of DNA at specific positions within the DNA

In the light of the above statements, choose the correct answer from the options given below:

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

119 Identify the cytochrome which acts as a mobile carrier for the transfer of electrons between complex III and IV?

1.	Cytochrome a	2.	Cytochrome a_3
3.	Cytochrome b c_1	4.	Cytochrome c

120 Which of the following plants possesses the placentation of ovules borne on central axis with no septa?
1. Lemon
2. Pea
3. China-rose
4. *Primrose*

121 Which of the following is not correct regarding the decomposition of wastes?

(a)	Low temperature inhibits decomposition
(b)	Warm and moist environment favors the process
(c)	The process is anaerobic
(d)	It is slower if detritus is rich in proteins and carbohydrates
(e)	Detritus is degraded into simpler inorganic substance by fungal and bacterial enzymes

Choose the correct answer from the options given below:

1.	**(b)** and **(c)** only	2.	**(c), (a)** and **(d)** only
3.	**(c)** and **(d)** only	4.	**(c), (d)** and **(e)** only

122 The ratio of carbon dioxide fixation between C_4 plants and C_3 plants is :

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

123 Which of the following bond is formed as a result of reaction of carboxyl group of one amino acid with amino group of other amino acids with elimination of water?
1. Phosphodiester Bond
2. Hydrogen Bond
3. Glycosidic Bond
4. Peptide Bond

124 Following crops have been extensively cultivated in CO_2 rich atmosphere for higher yield:
1. Sugar beet and Cabbage
2. Carrots and Tomatoes
3. Wheat and Sugar beet
4. Tomatoes and Bell pepper

125 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A):	In rDNA technology, non-recombinants transformed bacteria grow on the medium containing ampicillin as well as the medium containing tetracycline.
Reason (R):	Recombinant plasmids contain the foreign gene of interest.

In the light of the above statements, choose the correct answer from the options given below:

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

126 Identify the fungi which do not belong to the group of other fungi among the following:

1.	Sac-fungi	2.	Puffballs
3.	Mushrooms	4.	Bracket Fungi

127 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A):	The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and formation of X shaped structures called chiasmata
Reason (R):	In oocytes of some vertebrates, diplotene can last for months or years.

In the light of the above statements, choose the correct answer from the options given below:

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

128 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A):	Semiconservative replication was experimentally proved by Mathew Meselson and Franklin Stahl (1958)
Reason (R):	Meselson and Stahl used radioactive isotope ^{15}N and equilibrium density gradient centrifugation technique.

In the light of the above statements, choose the correct answer from the options given below:

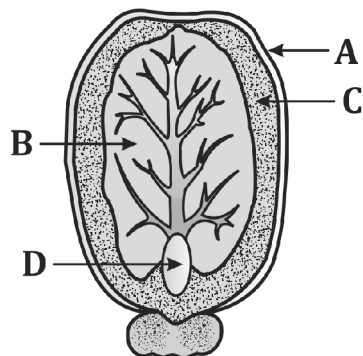| 1.	(A) is correct but (R) is not correct.
2.	(A) is not correct but (R) is correct.
3.	Both (A) and (R) are correct and (R) is the correct explanation of (A).
4.	Both (A) and (R) are correct but (R) is not the correct explanation of (A).

129 Which of the following set represents the correct labeling of A, B, C and D with respect to the given diagram?

1.	A- Seed Coat, B- Cotyledon, C- Endosperm, D - Hypocotyle
2.	A -Seed Coat, B- Scutellum, C- Endocarp, D - Mesocarp
3.	A- Seed Coat, B- Scutellum, C- Microphyle, D - Endocarp
4.	A-Pericarp, B - Coleoptile

130 Which of the following is not a character of collenchyma tissue?

1.	They provide mechanical support to the growing part of the plant
2.	They occur in layers below epidermis in dicotyledonous plants
3.	They consist of cells with thick corners due to cellulose deposition
4.	They are usually dead and without protoplasts

131 The construction of the first recombinant DNA emerged from the possibility of linking a gene encoding antibiotic resistance with a native plasmid of which of the following organism?
1. *Escherichia coli*
2. *Bacillus thuringiensis*
3. *Salmonella typhi*murium
4. Agrobacterium tumefaciens

132 Assuming that fur colour of an animal is dark, range of colour shade and white. A cross is made between a male (AABBCC) with dark fur colour and a female (aabbcc) with white fur colour. What would be the fur colour of F_1 generation?
1. All intermediate colour
2. Range of colour shade
3. All dark colour
4. All white colour

133 Which of the following disorders represents decrease in respiratory surface due to damaged alveolar walls?
1. Hypocapnia
2. Bronchitis
3. Asthma
4. Emphysema

134 The hormone releasing IUDs among the following are :

(a)	Multiload 375	(b)	LNG - 20
(c)	Progestasert	(d)	Lippe's loop
(e)	Vaults		

Choose the most appropriate answer from the options given below :
1. (a) and (d) only
2. (c) and (e) only
3. (a) and (b) only
4. (b) and (c) only

135 What role does the stroma in chloroplasts play in cellular function?

1.	It contains pigments responsible for trapping light energy.
2.	It houses enzymes required for the synthesis of carbohydrates and proteins.
3.	It serves as the primary site for ribosome assembly.
4.	It provides structural support to the chloroplast.

136 In Drosophila, the genes for color of body and color of eyes are situated on _____.
1. both the sex chromosomes
2. autosomes
3. Y-chromosome
4. X-chromosome

137 Which of the following is correct statement ?

1.	Actin and regulatory proteins are located in thin filament.
2.	Z-lines anchor myosin (thick) filament to the ends of the sarcomere.
3.	Sarcoplasmic reticulum stores acetylcholine.
4.	Myosin cross bridges contain calcium binding sites.

138 Given below are two statements:

Statement I:	Membrane-bound organelles of the endomembrane system coordinate cellular functions.
Statement II:	Mitochondria and chloroplasts are not considered a part of the endomembrane system.

In the light of the above statements, choose the most appropriate answer from the options given below :

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

139 With respect to nucleosome, which of the following statements is incorrect ?

1.	Nucleosome contains 120 bp of DNA helix.
2.	Nucleosomes are seen as 'beads' on string' under Electron Microscope.
3.	DNA is wrapped around positively charged histone octamer to form nucleosome.
4.	Nucleosome is the repeating unit of chromatin.

140 In a reaction catalyzed by an enzyme, which of the following statements is correct ?

1.	Enzymes decrease the activation energy for formation of transition state.
2.	Enzymes make transition form substrate to product more difficult.
3.	Enzymes increase the activation energy for formation of transition state.
4.	Enzyme-substrate complex formed during a reaction lasts for a very long time.

141 Which one of the following hormones reduces blood pressure?
1. Antidiuretic hormone
2. Atrial Natriuretic factor
3. Aldosterone
4. Angiotensin-II

142 Endemism refers to:
1. Species richness
2. Species evenness
3. Species confined to that region
4. Species diversity

143 In a cell, the separation of DNA strands is brought about by the enzyme DNA helicase, whereas in PCR, the separation of DNA strands is due to :
1. High temperature
2. Two sets of Primers
3. Taq DNA polymerase
4. Deoxynucleotides

144 A low frequency recombination indicates that the genes are:
1. Located far apart from each other
2. Located close to each other
3. Not linked
4. Present on different c

145 How many Y-chromosomes are present in the 2nd polar body in human beings?
1. 01
2. 00
3. 23
4. 02

146 A population with finite resources shows a logistic growth curve where the correct sequence of events will be:

1.	Stationary phase → Acceleration phase → Lag phase → Asymptote
2.	Acceleration phase → Deceleration → Asymptote
3.	Acceleration phase → Leg phase → Stationary phase
4.	Lag phase → Acceleration phase → Deceleration → Asymptote

147 Air bladder is found in:

1.	Osteichthyes	2.	Aves
3.	Cyclostomata	4.	Chondrichthyes

148 Which of the following hormones are secreted in women only during pregnancy?

(a)	Relaxin	(b)	Oxytocin
(c)	hCG	(d)	hPL
(e)	Progesterone		

Choose the most appropriate answer from the options given below:
1. (c), (d) and (e) only
2. (b) and (e) only
3. (b), (c) and (d) only
4. (a), (c) and (d) only

149 In the regulation of respiration, a chemosensitive area adjacent to the rhythm centre in the medulla region of the brain, is highly sensitive to:
1. HCO_3^-
2. CO_2
3. O_2
4. N_2

150 In the taxonomic hierarchy, which of the following ranks immediately follows 'Order'
[as one ascends from species to higher categories]?
1. Family
2. Genus
3. Class
4. Phylum

151 The oocytes of some vertebrates get arrested for years or months in:
1. Telophase - I
2. Diplotene
3. Diakinesis
4. Metaphase - I

152 Which of the following types of epithelium lines the walls of blood vessels?
1. Ciliated epithelium
2. Squamous epithelium
3. Cuboidal epithelium
4. Columnar epithelium

153 Select the correct sequence of events occurring during Prophase-I of Meiosis-I:

(a)	Nuclear envelope breakdown
(b)	Synaptonemal complex formation
(c)	Compaction of chromosomes
(d)	Terminalisation of chiasmata
(e)	Crossing over

Choose the most appropriate answer from the options given below:
1. (c) → (b) → (e) → (d) → (a)
2. (c) → (a) → (b) → (d) → (e)
3. (b) → (c) → (a) → (d) → (e)
4. (c) → (a) → (b) → (e) → (d)

154 One of the strands of double stranded DNA has base composition as follows: 15% A, 15% T, 40%G and 30%C. What will be the percentage of these bases in the complementary strand ?
1. 15% A, 15% T, 30% G , 40% C
2. 15% A, 30% T, 40% G , 15% C
3. 15% A, 15% T, 40% G , 30% C
4. 15% A, 40% T, 15% G , 30% C

155 Inadequate supply of oxygen to heart muscles leads to a symptom of acute chest pain. This disorder of the circulatory system is identified as:
1. Angina pectoris
2. Cardiac arrest
3. Heart failure
4. Coronary Heart Disease

156 Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R) .

Assertion (A):	With the help of several ommatidia, a cockroach can perceive several images of an object, i.e., mosaic vision.
Reason (R):	Mosaic vision gives more sensitivity but less resolution.

In the light of the above statements, choose the most appropriate answer from the options given below:

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

157 Given below are two statements:

I:	Amphibians and reptiles have a 3-chambered heart with two atria and a single ventricle, and are oviparous in nature
II:	Crocodiles possess a 4 chambered heart with two ventricles and two atria and are viviparous in nature

Select the most appropriate option:
1. **I** is correct but **II** is incorrect.
2. **I** is incorrect but **II** is correct.
3. Both **I** and **II** are correct.
4. Both **I** and **II** are incorrect.

158 Which one of the following is not an Assisted Reproductive Technology (ART) used by childless couples to have children?
1. ZIFT
2. IUD
3. IVF
4. IUT

159 Immuno-suppressants are administered to burn patients or during organ transplantation to suppress:
1. Innate immunity
2. Cytokine Storm
3. Humoral immunity
4. Cell-mediated immunity

160 The sodium-potassium pump maintains a polarized state in the resting neuron by transporting:
1. 2 Na^+ outwards for every 3 K^+ inwards
2. 2 Na^+ outwards for every 2 K^+ inwards
3. 2 K^+ outwards for every 3 Na^+ inwards
4. 3 Na^+ outwards for every 2 K^+ inwards

161 Arrange the following male sex accessory ducts in the correct sequence for the transport of sperms from the testis:
(a) Epididymis
(b) Ejaculatory duct
(c) Vasa efferentia
(d) Rete testis
(e) Vas deferens
Choose the most appropriate answer from the options given below:
1. (d), (a), (c), (e), (b)
2. (d), (c), (e), (a), (b)
3. (d), (c), (a), (e), (b)
4. (d), (e), (a), (c), (b)

162 Genetic Drift occurs due to :
1. Natural selection
2. Sudden population migration
3. Continuous gene migration
4. Mutation

163 Bee-keeping helps to improve the yield of following crops except _____.
1. Jowar
2. Sunflower
3. Apple
4. Mustard

164 Normal sleep-wake cycle in a human body is maintained by the secretion of:
1. Thyroid gland
2. Thymus gland
3. Pineal gland
4. Pituitary gland

165 An intestinal hormone that stimulates the pancreas to release a watery secretion that is rich in bicarbonate ions is:
1. Cholecystokinin
2. Gastric Inhibitory Peptide
3. Enterokinin
4. Secretin

166 Regarding pteridophytes:

I:	Evolutionarily, they are the first terrestrial plants to possess flowers.
II:	The dominant phase in the life cycle is the gametophytic plant body.

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

167 Terrestrial adaptations necessitated the production of :

1.	Highly toxic nitrogenous wastes like urea and uric acid
2.	Lesser toxic nitrogenous wastes like urea and uric acid
3.	Lesser toxic nitrogenous wastes like ammonia and urea
4.	Highly toxic nitrogenous wastes like ammonia and urea

168 Given below are two statements:

Statement I:	Pyramid of energy is always upright and is the most efficient.
Statement II:	Pyramid of biomass in sea is generally inverted.

In the light of the above statements, choose the most appropriate answer from the options given below:
1. **Statement I** is correct but **Statement II** is incorrect.
2. **Statement I** is incorrect but **Statement II** is correct.
3. Both **Statement I** and **Statement II** are correct.
4. Both **Statement I** and **Statement II** are incorrect.

169 Identify the properties of a good vector used in rDNA technology:

(a)	It should have origin of replication supporting a high copy number
(b)	It should have preferably more than '2' recognition sites
(c)	The restriction sites in vector should be in the antibiotic- resistant genes
(d)	It should have suitable marker genes
(e)	It should be easy to isolate and purify

Choose the most appropriate answer from the options given below:
1. (a), (c) and (e) only
2. (c), (d) and (e) only
3. (a), (b) and (c) only
4. (a), (c), (d) and (e) only

170 Select the correct match regarding adaptive radiation of Australian marsupials corresponding to placental mammals
1. Numbat-Flying Squirrel
2. Tasmanian Wolf - Bobcat
3. Marsupial mouse- Mole
4. Spotted Cuscus - Lemur

171 Match List - I with List - II

	List - I		List - II
(a)	Chromoplasts	(i)	Proteins
(b)	Amyloplasts	(ii)	Oil and fats
(c)	Elaioplasts	(iii)	Starch
(d)	Aleuroplasts	(iv)	Carotene

Choose the correct answer from the option given below

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

172 Corpus callosum:

I: is seen in all mammal brains except humans
II: connects pons with the rest of the brain
1. Only **I** is correct
2. Only **II** is correct
3. Both **I** and **II** are correct
4. Both **I** and **II** are incorrect

173 Which one of the following features are not true for chordates?
(a) Heart is dorsal.
(b) Pharynx is perforated by gill slits.
(c) Central nervous system is ventral, solid and single.
(d) Post-anal tail is present.
(e) Notochord is present.
Choose the most appropriate answer from the option given below:

1.	**(e)** only	2.	**(a)**, **(d)** and **(c)** only
3.	**(b)** and **(c)** only	4.	**(a)** and **(c)** only

174 Give below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A):	In human beings, insulin is synthesized as a pro-hormone which needs to be processed before it becomes fully mature and functional.
Reason (R):	The extra stretch of C-peptide is to be removed from A and B peptide chain of insulin.

In the light of the above statements, Choose the most appropriate answer from the option given below :

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

175 Give below are two statements :

Statement I:	When an infected female *Anopheles* mosquito bites, it releases gametocytes of plasmodium into the healthy person.
Statement II:	The female *Anopheles* mosquito takes up sporozoites of *Plasmodium* with blood meal from an infected person, suffering from malaria.

In light of the above statements, choose the most appropriate answer from the options given below :
1. **Statement I** is correct but **Statement II** is incorrect.
2. **Statement I** is incorrect but **Statement II** is correct.
3. Both **Statement I** and **Statement II** are correct.
4. Both **Statement I** and **Statement II** are incorrect.

176 Match List - I with List - II

List - I	List - II
(a) *Puccinia*	(i) Parasitic fungus on mustard
(b) *Neurospora*	(ii) Dead substrates
(c) Saprophytes	(iii) Wheat rust
(d) *Albugo*	(iv) Biochemical and Genetic Work

Choose the correct answer from the option given below :

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

177 What would be the proportions of light and hybrid density DNA molecule, respectively if Meselson and Stahl's experiment was continued for 60 minutes?
1. 50%, 50%
2. 25%, 75%
3. 75%, 25%
4. 100%, 0%

178 Match List-I with List-II:

	List-I		List-II
(a)	Adhering junctions	(i)	Establish a barrier that prevents leakage of extracellular things across a layer of cells
(b)	Tight junctions	(ii)	Functions like rivets and fasten cells together into strong sheets
(c)	Gap junctions	(iii)	Pass information through neurotransmitters from one cell to another
(d)	Synaptic junctions	(iv)	Provide cytoplasmic channels from one cell to an adjacent cell for communication

Choose the correct answer from the options given below

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

179 Given below are two statements: one is labeled as Assertion (A) and the other is labeled as Reason (R).

Assertion (A):	The nematode cannot survive in a transgenic host which expresses specific interfering RNA.
Reason (R):	Nematode-specific gene introduced in the host produces both sense and antisense complementary RNA which initiate RNA interference in the host cell.

In light of the above statement, choose the most appropriate answer from the option given below :

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

180 If a DNA molecule is shortened by 25 base pairs, how many helical turns will be reduced from its structure?
1. 1
2. 3
3. 2.5
4. 2