

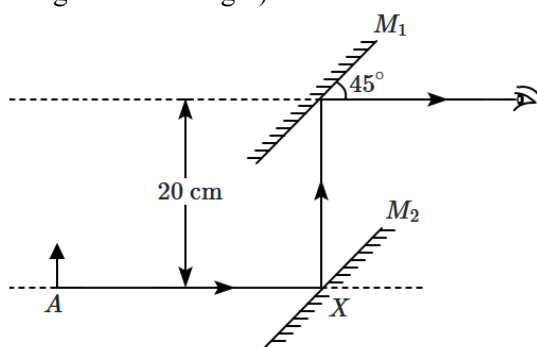
# Physics

1. Given below are two statements:

<b>Statement I:</b>	If the absolute temperature of a star is doubled, then the total rate of radiation from the star increases four times.
<b>Statement II:</b>	The rate of radiation from a blackbody, per unit area, depends only on its absolute temperature.

1.	<b>Statement I</b> is incorrect and <b>Statement II</b> is correct.
2.	Both <b>Statement I</b> and <b>Statement II</b> are correct.
3.	Both <b>Statement I</b> and <b>Statement II</b> are incorrect.
4.	<b>Statement I</b> is correct and <b>Statement II</b> is incorrect.

2. A pair of parallel mirrors inclined at  $45^\circ$  to the horizontal are placed with a vertical separation of 20 cm. An object ( $A$ ) is reflected by  $M_2$  and then by  $M_1$  and its image is viewed in  $M_1$ , horizontally. The object is at horizontal distance of  $AX = 30$  cm from  $M_2$ . The final image is observed to be at a distance (behind  $M_1$  along the line of sight) of:



1.	30 cm	2.	50 cm
3.	60 cm	4.	100 cm

3. The SI unit of current density is:

1.	$A/m^3$	2.	$A/m^2$
3.	$A/m$	4.	$A\cdot m$

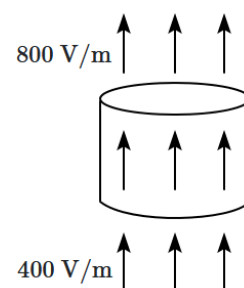
4. A non-ideal coil, a capacitor, and an AC-source of RMS voltage 24 V are connected in series. By varying the frequency of the source, a maximum RMS current of 6 A is observed. If the coil is connected to a DC-battery of EMF 12 V and internal resistance  $2\ \Omega$ , the current in it in steady-state will be:

1.	1 A	2.	1.5 A
3.	2 A	4.	2.4 A

5. An electron accelerated under a potential difference  $V$  volt has a certain wavelength  $\lambda$ . Mass of proton is some 2000 times of the mass of the electron. If the proton has to have the same wavelength  $\lambda$ , then it will have to be accelerated under a potential difference of:

1.	$V$ volts	2.	$2000V$ volts
3.	$\frac{V}{2000}$ volts	4.	$\sqrt{2000V}$ volts

6. A cylinder is placed in a vertical electric field, which varies in magnitude across its curved surface. The electric field is uniform on the cylinder's top and bottom surfaces. Based on this, the cylinder:

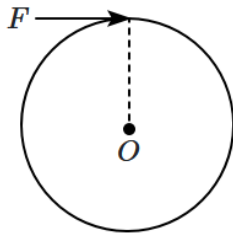


1.	encloses no net charge.
2.	encloses a net positive charge.
3.	encloses a net negative charge.
4.	it does not provide sufficient information to determine the presence of a net charge inside the cylinder.

7. A pair of equal and opposite charges of magnitude  $Q$  are placed a distance  $d$  apart. At the mid-point of these charges, is placed a dipole of dipole moment  $p$ . The maximum possible torque on the dipole is:

1.	$p \cdot \frac{2kQ}{(d/2)^2}$	2.	$p \cdot \frac{2kQ}{(d/2)}$
3.	$p \cdot \frac{kQ}{(d/2)^2}$	4.	$p \cdot \frac{kQ}{(d/2)}$

8. A uniform disc of mass  $M$  and radius  $R$  is fixed, so that it is free to rotate in its own plane, about the centre  $O$ . A force  $F$  is applied tangentially to the disc, continuously, for one complete revolution, starting from rest.



The angular acceleration ( $\alpha$ ) of the disc is:

1.	$\frac{F}{2MR}$	2.	$\frac{F}{MR}$
3.	$\frac{2F}{MR}$	4.	$\frac{3F}{2MR}$

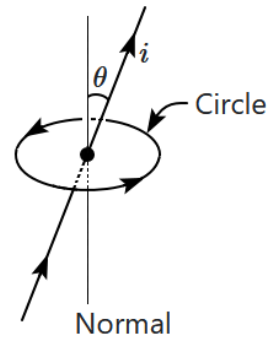
9. A rectangular block of mass  $m$  and cross-sectional area  $A$  is floating in a liquid of density  $\rho$ . When given a small vertical displacement from its equilibrium position, it undergoes oscillations with a time period  $T$ . Assume negligible damping due to the liquid's viscosity. Which of the following relationships correctly describes the proportional dependence of the time period  $T$ ?

(A)	$T \propto \sqrt{m}$	(B)	$T \propto \sqrt{\rho}$
(C)	$T \propto \frac{1}{\sqrt{A}}$	(D)	$T \propto \frac{1}{\sqrt{\rho}}$

Choose the correct option from the given ones:

1.	(A) and (B) only
2.	(C) and (B) only
3.	(A), (C) and (D) only
4.	(B) and (D) only

10. A very long straight current ( $i$ ) carrying wire passes through the centre of a circle, making an angle  $\theta$  with the normal to its plane. The integral  $\oint \vec{B} \cdot d\vec{l}$  around the circle, equals: ( $\vec{B}$  is the magnetic field)

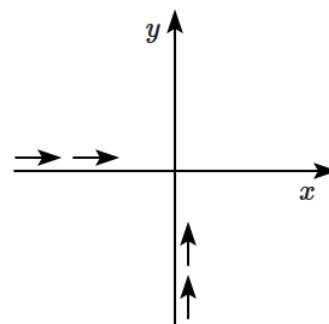


1.	$\mu_0 i$	2.	$\mu_0 i \cos \theta$
3.	$\mu_0 i \sin \theta$	4.	$\mu i \tan \theta$

11. If  $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$  and  $\vec{r} = 3\hat{i} + 2\hat{j} - 2\hat{k}$ , then the scalar and vector products of  $\vec{F}$  and  $\vec{r}$  have the magnitudes, respectively, as:

- 5,  $\sqrt{3}$
- 4,  $\sqrt{5}$
- 10,  $\sqrt{2}$
- 10, 2

12. Sinusoidal sound waves of the same frequency travelling in air along the  $x$ -axis and the  $y$ -axis arrive in phase with each other at the origin. Their amplitudes are equal to  $A$  (each). The amplitude of the vibration at the origin is:



- $A$
- $\sqrt{2}A$
- $2A$
- $(2 + \sqrt{2})A$

13. A cylinder of height 20 m is completely filled with water. The velocity of efflux of water (in  $\text{ms}^{-1}$ ) through a small hole on the side wall of the cylinder near its bottom, is:

1. 10 m/s
2. 20 m/s
3. 25.5 m/s
4. 5 m/s

14. If  $v_e$  is the escape velocity and  $v_o$  is the orbital velocity of a satellite for orbit close to the earth's surface, then these are related by:

1.	$v_o = v_e$	2.	$v_e = \sqrt{2}v_o$
3.	$v_e = \sqrt{2} v_o$	4.	$v_o = \sqrt{2} v_e$

15. A p-n junction diode is connected in a series circuit with a battery (internal resistance  $0.5 \Omega$ ) and a  $5 \Omega$  resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed, the current drops to almost zero. This is because the resistance in the circuit is:

1.  $5 \Omega$
2.  $5.5 \Omega$
3.  $10 \Omega$
4. infinite

16. The induced circulating currents produced in the metal itself due to change in magnetic flux linked with metal are called:

1. Displacement current
2. Conduction current
3. Foucault currents
4. Alternating currents

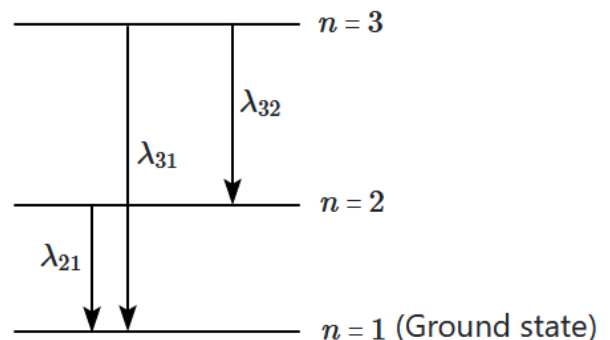
17. The side of a cube is measured by vernier calipers (20 divisions of the vernier scale coincide with 19 divisions of the main scale, where 1 division of the main scale is 1 mm). The main scale reads 10 mm and the first division of the vernier scale coincides with the main scale. The side length of a cube is:

1. 10.02 mm
2. 10.05 mm
3. 10.04 mm
4. 10.06 mm

18. The pressure of an ideal gas ( $\gamma = \frac{3}{2}$ ) is increased by 1% in an adiabatic process. The temperature of the gas:

1.	increases by 1.5%
2.	decreases by 1.5%
3.	increases by $\frac{1}{3}\%$
4.	increases by $\frac{2}{3}\%$

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



The energy levels are not drawn to scale.

Which of the following is true?

1.  $\lambda_{31} = \lambda_{32} + \lambda_{21}$
2.  $\frac{1}{\lambda_{31}} = \frac{1}{\lambda_{32}} + \frac{1}{\lambda_{21}}$
3.  $2\lambda_{32} = \lambda_{31} + \lambda_{21}$
4.  $\lambda_{31} = 2(\lambda_{32} + \lambda_{21})$

20. An EM wave is propagating in a medium with a velocity  $\vec{v} = v\hat{i}$ . The instantaneous oscillating electric field of this EM wave is along the  $+y$  axis. The direction of the oscillating magnetic field of the EM wave will be along:

1.  $-z$ -direction
2.  $+z$ -direction
3.  $-y$ -direction
4.  $+y$ -direction

21. A steady current  $I$  flows in a small square loop of wire of side  $L$  in a horizontal plane. The loop is now folded about its middle such that half of its lies in a vertical plane. Let  $\mu_1$  and  $\mu_2$  (vectors) denote the magnetic moment due to the current loop before and after folding, respectively. Then:

1.  $\frac{|\mu_1|}{|\mu_2|} = 1$
2.  $\mu_1$  and  $\mu_2$  are in the same direction
3.  $\frac{|\mu_1|}{|\mu_2|} = \sqrt{2}$
4.  $\frac{|\mu_1|}{|\mu_2|} = \frac{1}{\sqrt{2}}$

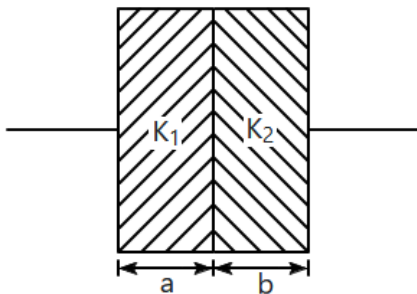
22. The angular momentum of an electron moving in an orbit of a hydrogen atom is  $1.5 \left( \frac{h}{\pi} \right)$ . The energy in the same orbit is nearly:

1. -1.5 eV	2. -1.6 eV
3. -1.3 eV	4. -1.4 eV

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

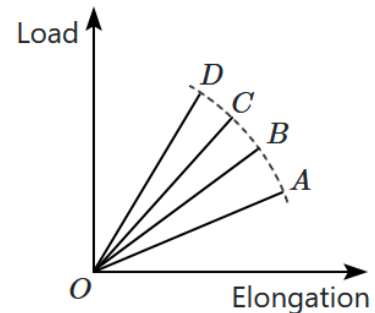
1. capacitive reactance remains constant
2. capacitive reactance decreases.
3. displacement current increases.
4. displacement current decreases.

24. Two dielectric slabs are inserted between plates of a parallel plate capacitor as shown in the figure. When connected to a battery, the ratio of the potential difference across the two layers is:



1.  $\frac{K_1 b}{K_2 a}$
2.  $\frac{K_1 a}{K_2 b}$
3.  $\frac{K_2 b}{K_1 a}$
4.  $\frac{K_2 a}{K_1 b}$

25. The load versus elongation graph for four wires, all of the same length and made from the same material, is shown in the figure. One of the lines corresponds to the



thinnest wire.

Which line represents the thinnest wire?

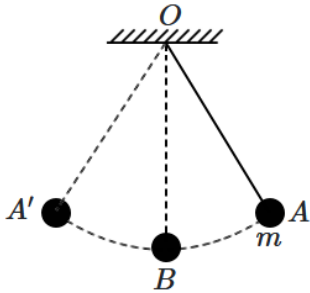
1. OC
2. OD
3. OA
4. OB

26. Match Column I and Column II with appropriate relations.

	Column I		Column II
(A)	Drift Velocity	(P)	$\frac{m}{ne^2 \rho}$
(B)	Electrical Resistivity	(Q)	$nev_d$
(C)	Relaxation Period	(R)	$\frac{eE}{m} \tau$
(D)	Current Density	(S)	$\frac{E}{J}$

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

27. A simple pendulum consists of a bob of mass  $m$  attached to a suspension point  $O$  by means of a light string of length  $l$ . It is set oscillating, as shown in the figure. The tension in the string, when the bob is at its lowest point, is (i.e. at  $B$ ):



1.  $mg$
2.  $\frac{mg}{2}$
3. less than  $mg$
4. greater than  $mg$

28. A particle is projected vertically upwards with a speed  $u$  and moves under the force of gravity. The distance travelled by the particle during its entire motion (until it returns) is  $d_1$ . If the force of gravity were to be switched off, and the particle travelled for the same length of time, then the distance travelled is  $d_2$ . Then,

1.  $d_2 = d_1$
2.  $d_2 = 2d_1$
3.  $d_2 = 3d_1$
4.  $d_2 = 4d_1$

29. A nucleus of mass number 189 splits into two nuclei having mass numbers 125 and 64. The ratio of the radius of two daughter nuclei respectively is:

1. 25 : 16
2. 1 : 1
3. 4 : 5
4. 5 : 4

30. The width of the central maximum of the diffraction pattern of a single slit of width 1 mm equals the width of the slit itself, when the screen is 1 m away from it. The wavelength of light used equals:

1. 250 nm	2. 500 nm
3. 1000 nm	4. 2000 nm

31. The speed of sound in a medium depends on:

1.	the elastic property but not the inertial property
2.	the inertial property but not the elastic property
3.	both the elastic and inertial properties
4.	neither the elastic property nor the inertial property

32. The power of an equi-convex lens is  $P$ . After cutting it in different ways, the combination of lenses is listed in **Column I**, along with their effective powers in **Column II**. Match the items in the two columns.

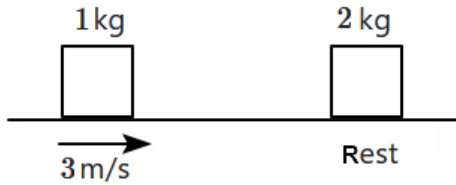
Column I		Column II	
(A)		(P)	zero
(B)		(Q)	$P$
(C)		(R)	$2P$
(D)		(S)	$\frac{P}{2}$

1.	$A \rightarrow Q, B \rightarrow P, C \rightarrow S, D \rightarrow R$
2.	$A \rightarrow S, B \rightarrow R, C \rightarrow Q, D \rightarrow P$
3.	$A \rightarrow Q, B \rightarrow S, C \rightarrow Q, D \rightarrow R$
4.	$A \rightarrow S, B \rightarrow R, C \rightarrow Q, D \rightarrow Q$

33. The atomic mass of  ${}^7N^{15}$  is 15.000108 a.m.u. and that of  ${}^8O^{16}$  is 15.994915 a.m.u. Given that the mass of a proton is 1.007825 a.m.u., what is the minimum energy required to remove the least tightly bound proton?

1. 0.013018 MeV
2. 12.13 MeV
3. 13.018 MeV
4. 12.13 eV

34. The 1 kg–block strikes the 2 kg–block, and the first block is brought to rest immediately after impact. The coefficient of restitution is:



1. 1
2.  $\frac{1}{2}$
3.  $\frac{1}{3}$
4.  $\frac{1}{6}$

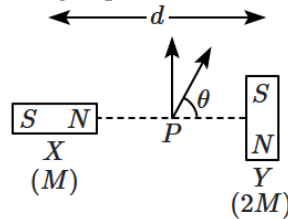
35. If the permeability of a paramagnetic substance is  $\mu$  and the permeability of free space is  $\mu_0$ , then:

1.  $\mu > \mu_0$
2.  $\mu \gg \mu_0$
3.  $\mu < \mu_0$
4.  $\mu = \mu_0$

36. When p – n junction diode is forward biased, then:

1.	the depletion region is reduced and barrier height is increased.
2.	the depletion region is widened and barrier height is reduced.
3.	both the depletion region and barrier height are reduced.
4.	both the depletion region and barrier height are increased.

37. Two magnetic dipoles,  $X$  and  $Y$ , are separated by a distance  $d$ , with their axes oriented perpendicular to each other. The dipole moment of  $Y$  is twice that of  $X$ . A charged particle with charge  $q$  moves with velocity  $v$  through their midpoint  $P$ , which makes an angle  $\theta = 45^\circ$  with the horizontal axis, as shown in the diagram. Assuming  $d$  is much larger than the dimensions of the dipoles, the magnitude of the force acting on the charged particle at this instant is:



1. 0	2. $\left(\frac{\mu_0}{4\pi}\right) \frac{M}{\left(\frac{d}{2}\right)^3} \times qv$
3. $\sqrt{2} \left(\frac{\mu_0}{4\pi}\right) \frac{M}{\left(\frac{d}{2}\right)^3} \times qv$	4. $\left(\frac{\mu_0}{4\pi}\right) \frac{2M}{\left(\frac{d}{2}\right)^3} \times qv$

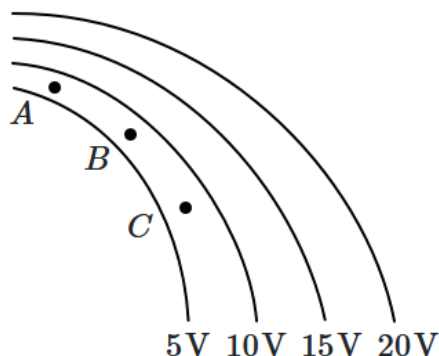
38. If a projectile is launched at an angle of  $15^\circ$  with the horizontal and achieves a range of 50 m, what will be the range when it is launched at an angle of  $45^\circ$  with the horizontal?

1.	50 m	2.	100 m
3.	80 m	4.	120 m

39. Which, of the following, is true for a simple pendulum undergoing small oscillations? (neglect all dissipative forces)

1.	Kinetic energy is conserved
2.	Momentum is conserved
3.	Potential energy is conserved
4.	Total energy is conserved

40. Equipotential surfaces are shown in the adjacent figure. The field has magnitudes  $E_A, E_B, E_C$  at  $A, B, C$  respectively. It can be concluded that:



1.  $E_A < E_B < E_C$
2.  $E_A > E_B > E_C$
3.  $E_A = E_B = E_C$
4.  $E_A < E_B = E_C$

41. When a standard Young's double-slit experiment is conducted with monochromatic light of wavelength  $\lambda = 600$  nm, the fringe width is observed to be 0.3 mm. The same experiment is now conducted in water (refractive index =  $\frac{4}{3}$ ). The fringe width becomes:

1.	0.2 mm	2.	0.4 mm
3.	0.45 mm	4.	0.225 mm

42. If  $n_1$  moles of a monoatomic and  $n_2$  moles of a diatomic gas are mixed, then the equivalent value of the adiabatic exponent ( $\gamma_{\text{mix}}$ ) will be:

1.  $\frac{5n_1 + 7n_2}{2(n_1 + n_2)}$
2.  $\frac{5n_1 + 7n_2}{3n_1 + 5n_2}$
3.  $\frac{5n_1 + 3n_2}{2(n_1 + n_2)}$
4.  $\frac{3n_1 + 5n_2}{2(n_1 + n_2)}$

43. The maximum velocity of the photoelectrons emitted by a metal surface is  $1.2 \times 10^6$  ms<sup>-1</sup>. Assuming the specific charge of the electron is  $1.8 \times 10^{11}$  C kg<sup>-1</sup>, the value of the stopping potential (in volts) will be:

1. 2
2. 3
3. 4
4. 6

44. The flux linked with a coil at any instant  $t$  is given by  $\phi = ct^2 - 20t + 3$ . If the induced emf at  $t = 2$  s is zero, then value of  $c$  is:

1. 2
2. 3
3. 5
4. 10

45. The ratio of the magnitude of the magnetic field and electric field intensity of a plane electromagnetic wave in free space of permeability  $\mu_0$  and permittivity  $\epsilon_0$  is:

(Given that  $c =$  velocity of light in free space)

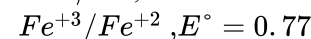
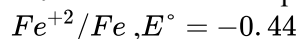
1.  $c$
2.  $\frac{1}{c}$
3.  $\frac{c}{\sqrt{\mu_0 \epsilon_0}}$
4.  $\frac{\sqrt{\mu_0 \epsilon_0}}{c}$

## Chemistry

46. The compound that gives p-cresol with p-methyl diazonium chloride is:

1.  $H_2O$
2.  $H_3PO_2$
3. HCOOH
4.  $C_6H_5OH$

47. Standard electrode potentials are:



Choose the correct observation when  $Fe^{+2}$ ,  $Fe^{+3}$ , and Fe (solid) are kept together:

1.  $Fe^{+3}$  increases
2.  $Fe^{+3}$  decreases
3.  $\frac{Fe^{+2}}{Fe^{+3}}$  remains unchanged
4.  $Fe^{+2}$  decreases

48. Which of the following solutions has the highest osmotic pressure?

1. 1% glucose solution
2. 1% urea solution
3. 1% sucrose solution
4. All of the above have the same osmotic pressure

49. The homoleptic complex among the following is:

1. $[\text{Co}(\text{en})_3]\text{Cl}_3$	2. $[\text{Co}(\text{en})(\text{ox})(\text{H}_2\text{O})_2]\text{Cl}$
3. $[\text{NiCl}_2\text{Br}_2]$	4. $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$

50. Given the reaction,  $A + B \rightarrow \text{Products}$ , when concentration of A is fixed and concentration of B is increased 3 times then rate of reaction increases 27 times. Now, when the concentration of A and B both are doubled, then the rate of reaction increases 8 times. The rate law for the reaction will be:

1.  $\text{Rate} = K[A]^2[B]$
2.  $\text{Rate} = K[B]^3$
3.  $\text{Rate} = K[A]^3[B]$
4.  $\text{Rate} = K[A]^3[B]^2$

51. The coloured ion among the following is :

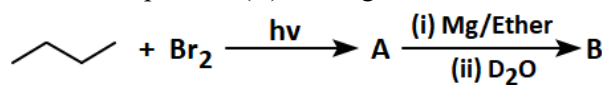
1.  $\text{Cu}^+$
2.  $\text{Cu}^{2+}$
3.  $\text{Ti}^{4+}$
4.  $\text{V}^{5+}$

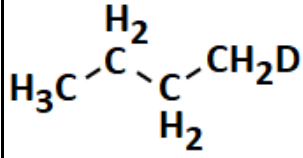
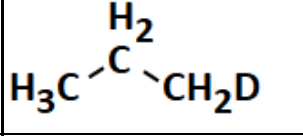
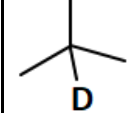
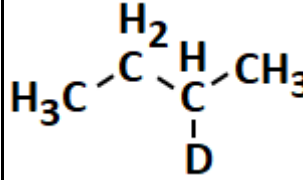
52. Given below are two statements:

<b>Statement I:</b>	Aniline does not undergo Friedel-Crafts alkylation reaction.
<b>Statement II:</b>	Aniline cannot be prepared through Gabriel synthesis.

1.	Both <b>Statement I</b> and <b>Statement II</b> are incorrect.
2.	<b>Statement I</b> is correct and <b>Statement II</b> is incorrect.
3.	<b>Statement I</b> is incorrect and <b>Statement II</b> is correct.
4.	Both <b>Statement I</b> and <b>Statement II</b> are correct.

53. The end product (B) in the given reaction is:



1.	
2.	
3.	
4.	

54. Give test to differentiate (Bromobenzene) Ph-Br and benzyl bromide ( $\text{PhCH}_2\text{Br}$ ).

- (1) (i) aq. KOH (ii) Na
- (2)  $\text{AgNO}_3$
- (3)  $\text{KMnO}_4$
- (4) All these

55. A cell is represented as:

$\text{Pt} | \text{H}_2(\text{g}, 0.1\text{bar}) | \text{H}^+(\text{aq}, \text{pH} = X) | \text{Cl}^-(\text{aq}, 1\text{M}) | \text{Hg}_2\text{Cl}_2 | \text{Hg} | \text{Pt}$ , This cell has an e.m.f of 0.5755 V at  $25^\circ\text{C}$ . The Standard Oxidation Potential (SOP) of the calomel electrode is -0.28 V. What is the pH of the solution?

1.	11	2.	4.5
3.	5.5	4.	8.5

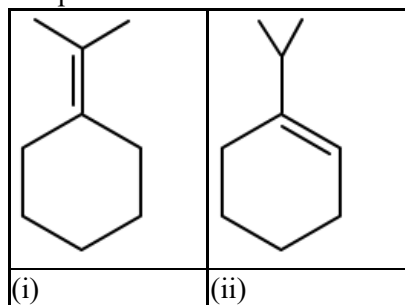
56. An organic compound X on treatment with acidified  $\text{K}_2\text{Cr}_2\text{O}_7$ , gives compound Y which reacts with  $\text{I}_2$ , and NaOH to form  $\text{CHI}_3$ . The compound X can be-

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

57. The reaction that does not produce nitrogen is:

1. Heating of  $\text{NH}_4\text{NO}_2$
2. Heating of  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$
3. Reaction of excess of  $\text{NH}_3$  with  $\text{Cl}_2$
4. Heating of  $\text{NH}_4\text{NO}_3$

58. Sum of number of  $\alpha$ -hydrogens in the following two compounds is :



1. 13
2. 14
3. 15
4. 16

59.

<b>Assertion (A):</b>	Nitrogen is unreactive at room temperature but becomes reactive at elevated temperatures (on heating) or in the presence of catalysts.
<b>Reason (R):</b>	In nitrogen molecules, there is extensive delocalization of electrons.

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

60. At 300 K, when a solute is added to a solvent, its vapour pressure over the mercury reduces from 50 mm to 45 mm. The value of the mole fraction of the solute will be:

1.	0.005	2.	0.010
3.	0.100	4.	0.900

61. Which of the following oxide is amphoteric in nature?

1.  $\text{SnO}_2$
2.  $\text{SiO}_2$
3.  $\text{GeO}_2$
4.  $\text{CO}_2$

62. What mass of copper will be deposited by passing 2 faraday of electricity through a solution of  $\text{Cu(II)}$  salt?

1. 35.6 g
2. 63.5 g
3. 6.35 g
4. 3.56 g

63. Which lanthanoid symbol is incorrectly matched with its atomic number?

1. Cerium(Ce) (Z =58)
2. Promethium(Pm) (Z= 61)
3. Europium(Eu) (Z= 64)
4. Dysprosium(Dy) (Z = 66)

64. Which of the following substitution of benzene is ortho-para in electrophilic substitution and ortho-para in nucleophilic substitution ?

- (1)  $-\text{NO}_2$
- (2)  $-\text{NO}$
- (3)  $-\text{SO}_3\text{H}$
- (4)  $-\text{SO}_2\text{Me}$

65. A basic radical among the following that cannot be precipitated by

$\text{H}_2\text{S}$  gas in the presence of  $\text{NH}_3$  is:

1.  $\text{Mn}^{2+}$
2.  $\text{Ni}^{2+}$
3.  $\text{Cd}^{2+}$
4.  $\text{Ca}^{2+}$

66. The basic structural unit of silicates is:

1.  $\text{SiO}_4^{4-}$
2.  $\text{SiO}_3^{2-}$
3.  $\text{SiO}_4^{2-}$
4.  $\text{SiO}$

67. What chemical changes occur when Mohr's salt is strongly heated?

1.	It decomposes into ferric oxide and ammonia gas.
2.	It sublimes directly into ferrous sulfate and ammonium sulfate.
3.	It forms a complex with water molecules.
4.	It undergoes a reversible reaction to form ferrous hydroxide and ammonium sulfide.

68. Consider the following statements for a carbonyl compound:

- (i) It gives addition reaction
- (ii) It gives condensation reaction
- (iii) It gives elimination reaction
- (iv) It gives oxidation reaction

Of these statements:

- (1) (i), (ii), (iii) and (iv) are correct
- (2) (i) and (ii) are correct
- (3) (i), (ii) and (iii) are correct
- (4) (i), (ii) and (iv) are correct

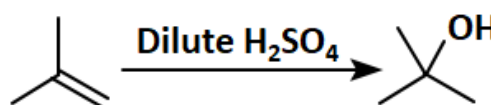
69. For a first-order reaction, a half-life ( $t_{1/2}$ ) is 50 min. The time  $t_{3/4}$  (in minutes) of the reaction is:

- 1. 75
- 2. 100
- 3. 125
- 4. 50

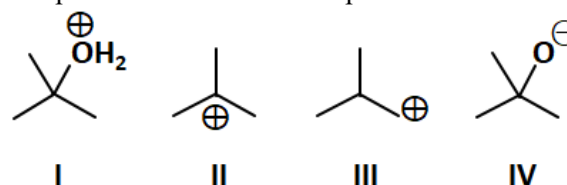
70. The pair of species that has the same bond order in the following is:

- 1.  $\text{CO}$ ,  $\text{NO}^+$
- 2.  $\text{NO}^-$ ,  $\text{CN}^-$
- 3.  $\text{O}_2$ ,  $\text{N}_2$
- 4.  $\text{O}_2$ ,  $\text{B}_2$

71. Consider the following acid-catalyzed hydration reaction:



Which of the following ion(s) is/are intermediates in the accepted mechanism for this process?



- 1. I, II and III
- 2. I and II
- 3. None of the above.
- 4. Only IV

72. Which of the following oxide is basic in nature?

- 1.  $\text{SiO}_2$
- 2.  $\text{CaO}$
- 3.  $\text{Al}_2\text{O}_3$
- 4.  $\text{SO}_2$

73. Which compound, when heated with alcoholic  $\text{AgNO}_3$ , produces a white precipitate and, upon oxidation, forms an acid ( $\text{C}_8\text{H}_6\text{O}_4$ ) capable of forming a cyclic anhydride upon heating?

1.		2.	
3.		4.	

74. The increasing order of -I effect is correctly associated with:

- 1.  $-\text{CN} > -\text{F} > -\text{CO}_2\text{H} > -\text{OH}$
- 2.  $-\text{CN} > -\text{CO}_2\text{H} > -\text{F} > -\text{OH}$
- 3.  $-\text{F} > -\text{CN} > -\text{CO}_2\text{H} > -\text{OH}$
- 4.  $-\text{F} > -\text{CO}_2\text{H} > -\text{CN} > -\text{OH}$

75. An ion, among the following, that has a magnetic moment of 2.84 BM is:

(At. no. Ni = 28, Ti = 22, Cr = 24, Co = 27)

1.  $\text{Ni}^{2+}$
2.  $\text{Ti}^{3+}$
3.  $\text{Cr}^{2+}$
4.  $\text{Co}^{2+}$

76. A ( $\text{C}_3\text{H}_9\text{N}$ ) reacts with benzenesulfonyl chloride to give an insoluble salt in alkali.

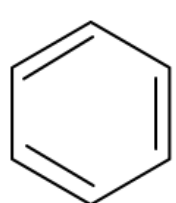
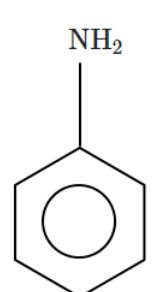
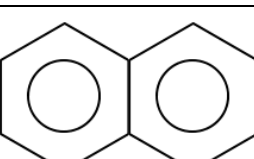
The structure of compound (A) will be:

1.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$	2.	$\text{CH}_3\text{NHCH}_2\text{CH}_3$
3.	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_3\text{C} - \text{N} - \text{CH}_3 \end{array}$	4.	None of the above

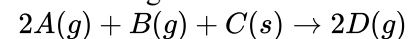
77. Among the following hormones, which one contains iodine?

1. Insulin
2. Testosterone
3. Adrenaline
4. Thyroxine

78. Which of the following is/are benzenoid aromatic compound(s)?

1.		2.	
3.		4.	All of these

79. For the given reaction:



$$\Delta U^\circ = -10.5 \text{ kJ and } \Delta S^\circ = -44.1 \text{ JK}^{-1}$$

The value of  $\Delta G^\circ$  for the above reaction at 25 °C will be :

1.	1.2 kJ	2.	0.16 kJ
3.	3.2 kJ	4.	1.6 kJ

80. The molar solubility of  $\text{Al}(\text{OH})_3$  in the presence of 0.2 M NaOH is:

(solubility product of  $\text{Al}(\text{OH})_3 = 2.4 \times 10^{-24}$ )

1.  $3 \times 10^{-19}$
2.  $12 \times 10^{-21}$
3.  $3 \times 10^{-22}$
4.  $12 \times 10^{-23}$

81. The correct statement regarding cellulose among the following is:

1.	Cellulose is not found in plants.
2.	Cellulose is a straight-chain polysaccharide composed only of $\beta$ -D-glucose units which are joined by glycosidic linkage between C1 of one glucose unit and C4 of the next glucose unit.
3.	Cellulose is a branched chain polysaccharide composed only of $\alpha$ -D-glucose units which are joined by glycosidic linkage between C1 of one glucose unit and C3 of the next glucose unit.
4.	Cellulose is the least abundant organic substance in the plant kingdom.

82. Among the following acids which has the lowest  $\text{pK}_a$  value?

1.  $\text{CH}_3\text{CH}_2\text{COOH}$
2.  $(\text{CH}_3)_2\text{CH}-\text{COOH}$
3.  $\text{HCOOH}$
4.  $\text{CH}_3\text{COOH}$

83.

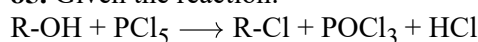
<b>Statement I:</b>	Displacement redox reactions can be classified into metal displacement and non-metal displacement.
<b>Statement II:</b>	The non-metal displacement redox reactions include hydrogen displacement but rarely oxygen displacement.

1.	Both <b>Statement I</b> and <b>Statement II</b> are correct.
2.	Both <b>Statement I</b> and <b>Statement II</b> are incorrect.
3.	<b>Statement I</b> is correct and <b>Statement II</b> is incorrect.
4.	<b>Statement I</b> is incorrect and <b>Statement II</b> is correct.

84. Which option correctly describes the shape and I-I-I bond angle of the  $I_3^-$  ion, respectively?

1. Distorted trigonal planar;  $135^\circ$  and  $90^\circ$
2. T-shaped;  $180^\circ$  and  $90^\circ$
3. Trigonal planar;  $120^\circ$
4. Linear;  $180^\circ$

85. Given the reaction:



The most reactive alcohol in the above reaction will be:

1.	1° Alcohol	2.	2° Alcohol
3.	3° Alcohol	4.	Cannot be predicted

86. The reaction, among the following, that is anticipated to have the highest change in entropy ( $\Delta S$ ) is:

1.  $Ca(S) + \frac{1}{2} O_2(g) \rightarrow CaO(S)$
2.  $C(S) + O_2(g) \rightarrow CO_2(g)$
3.  $N_2(g) + O_2(g) \rightarrow 2NO(g)$
4.  $CaCO_3(S) \rightarrow CaO(S) + CO_2(g)$

87. Select the correct option based on statements given below:

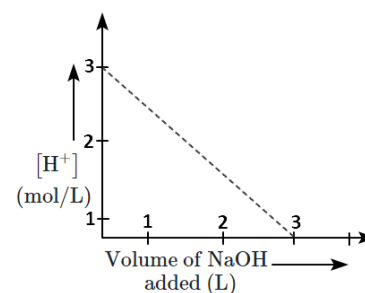
<b>Assertion (A):</b>	Vinyl chloride doesn't give a substitution reaction.
<b>Reason (R):</b>	Carbon chloride bond has double bond character due to resonance.

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

88. The number of d -electrons in  $Fe^{2+}$  (atomic number  $Z = 26$ ) is different from the number of:

1. s-electrons in Mg ( $Z = 12$ )
2. p-electrons in Cl ( $Z = 17$ )
3. d-electrons in Fe ( $Z = 26$ )
4. p-electrons in Ne ( $Z = 10$ )

89. 1 M NaOH solution was slowly added into 1000 mL of 183.75 g impure  $H_2SO_4$  solution and the following plot was obtained. The percentage purity of the sample and the slope of the curve respectively, are:



1.	75%, $-\frac{1}{3}$	2.	80%, $-\frac{1}{2}$
3.	80%, $-1$	4.	None of these

90. An acidic buffer cannot be formed by which of the following combinations is:

1.  $HClO_4$  and  $NaClO_4$
2.  $CH_3COOH$  and  $CH_3COONa$
3.  $H_2CO_3$  and  $Na_2CO_3$
4.  $H_3PO_4$  and  $Na_3PO_4$

# Biology

91. Match each item in **Column-I** with one in **Column-II** and select the correct match from the codes given:

	Column-I		Column-II
(a)	First stable product in C <sub>3</sub> plants	(i)	Mesophyll cells
(b)	First stable product in C <sub>4</sub> plants	(ii)	PGA
(c)	Site of Calvin cycle in C <sub>3</sub> plants	(iii)	OAA
(d)	Site of Calvin cycle fixation in C <sub>4</sub> plants	(iv)	Bundle sheath cells

Options:

- (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
- (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
- (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

92. What is the key concept behind plant tissue culture?

1.	Growing plants from seeds in a nutrient-rich solution.
2.	Growing whole plants from explants in a sterile nutrient medium.
3.	Reproducing plants by using their fruits and seeds in controlled conditions.
4.	Crossbreeding two different plant species to create hybrids.

93. Match the microbial processes in Column I with their primary benefits or products in Column II.

	Column I		Column II
A	Anaerobic digestion	1	Cleaning up oil spills
B	Fermentation by yeast	2	Enhancement of soil fertility
C	Nitrogen fixation by legume symbionts	3	Production of alcoholic beverages
D	Bioremediation by <i>Pseudomonas</i>	4	Generation of biogas

- A-3, B-1, C-4, D-2
- A-1, B-2, C-4, D-3
- A-2, B-4, C-1, D-3
- A-4, B-3, C-2, D-1

94. Given below are two statements:

<b>Assertion (A):</b>	<i>Petunia</i> and <i>Datura</i> show some similarities
<b>Reason (R):</b>	<i>Petunia</i> and <i>Datura</i> are placed in the same family Brassicaceae

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

95. Which of the following statements is incorrect about the epidermal tissue system in plants?

1.	It forms a single-layered outermost covering, often with a waxy cuticle to reduce water loss.
2.	Trichomes on the shoot are usually multicellular and may be glandular or non-glandular.
3.	The stomatal apparatus consists of guard cells, stomatal pores, and surrounding subsidiary cells for regulating transpiration and gaseous exchange.
4.	Root hairs arising from the epidermis are multicellular and enhance mineral absorption.

96. Which of the following would not be correct regarding vital capacity in human lungs?

1.	It is the maximum volume of air a person can breathe in after a forced expiration.
2.	It includes ERV, TV, RV and IRV
3.	It can also be defined as the maximum volume of air a person can breathe out after a forced inspiration.
4.	It can be calculated as the difference between total lung capacity and residual volume.

97. In mutualistic relationships, "cheaters" are a concern because:

1.	They reproduce too quickly, leading to overpopulation of the mutualistic partner.
2.	Cheaters exploit the benefits of the relationship without providing the necessary services in return, potentially destabilizing the mutualism.
3.	Cheaters eliminate their mutualistic partners over time, causing them to become parasitic instead.
4.	Cheaters ensure the mutualistic relationship remains strictly balanced and sustainable.

98. The genital pouch in female cockroach is formed by:

1. 7th, 8th and 9th tergites
2. 7th, 8th and 9th sternites
3. 8th, 9th and 10th tergites
4. 8th, 9th and 10th sternites

99. Genetically engineered insulin for human is produced from:

1. *Escherichia coli*
2. *Pseudomonas putida*
3. *Bacillus thuringiensis*
4. *Rhizobium meliloti*

100. The committee responsible for the appraisal of activities involving large-scale use of hazardous microorganisms and recombinants in research and industrial production from the environmental angle is the:

1. Genetic Engineering Appraisal Committee
2. Gene Technology Approval Committee
3. Department of Biotechnology [DBT]
4. Indian Council of Agricultural Research

101. If you examine the blood film of a normal person, which of the following WBCs is least likely to be seen?

1. neutrophils	2. eosinophils
3. basophils	4. lymphocytes

102. During the citric acid cycle, which of the following reactions is a substrate-level phosphorylation that results in the synthesis of GTP?

1.	Conversion of $\alpha$ -ketoglutaric acid to succinyl-CoA
2.	Conversion of succinyl-CoA to succinic acid
3.	Conversion of malate to oxaloacetate
4.	Conversion of fumarate to malate

103. Consider the given two statements:

<b>Assertion (A):</b>	The nucleus is the control centre of the cell and contains the genetic material (DNA).
<b>Reason (R):</b>	The nucleus directs protein synthesis through messenger RNA (mRNA) molecules.

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

104. Polio, diphtheria, pneumonia and tetanus:

1.	are all bacterial diseases
2.	are transmitted by arthropod vectors
3.	have been controlled to a large extent by the use of vaccines
4.	are invariably fatal

105. Consider the given two statements:

<b>Assertion (A):</b>	Evolution by natural selection, in a True sense would have started when cellular forms of life with differences in metabolic capability originated on earth.
<b>Reason (R):</b>	Natural selection is the differential survival and reproduction of individuals due to differences in phenotype.

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

106. Match the recently extinct species with their geographical locations:

Extinct Species	Location
A. Dodo	1. Australia
B. Quagga	2. Russia
C. Thylacine	3. Africa
D. Steller's Sea Cow	4. Mauritius

- A-1, B-2, C-3, D-4
- A-3, B-4, C-2, D-1
- A-2, B-1, C-4, D-3
- A-4, B-3, C-1, D-2

107. Chemosensitive areas that detect changes in  $CO_2$  and  $H^+$  concentration are located:

1.	In the lungs and diaphragm
2.	Adjacent to the respiratory rhythm centre in the medulla
3.	In the hypothalamus
4.	In the nasal cavity

108. Phenylketonuria (PKU) is a metabolic disorder caused by the mutation of a gene coding for the enzyme that converts phenylalanine into:

1.	Tyrosine	2.	Glycine
3.	Cysteine	4.	Valine

109. Filiform apparatus:

1.	is special cellular thickening present in the synergids which play an important role in guiding the pollen tubes into the synergid.
2.	is special cellular thickening present in the synergids which play an important role in guiding the pollen tubes into the egg cell.
3.	is special cellular thickening present in the egg cell which play an important role in guiding the pollen tubes into the synergid.
4.	is special cellular thickening present in the antipodals which play an important role in guiding the pollen tubes into the synergid.

110. The number of correct statements regarding anatomy of dicot stems is:

<b>Statement I:</b>	Hypodermis consists of a few layers of collenchymatous cells.
<b>Statement II:</b>	The cells of the endodermis are rich in protein granules.
<b>Statement III:</b>	Pericycle is in the form of semi-lunar patches of sclerenchyma.
<b>Statement IV:</b>	The 'ring' arrangement of vascular bundles is a characteristic of dicot stem.

- 1
- 2
- 3
- 4

111. Diatoms are known as "pearls of the ocean" due to their unique cell wall composition. Which of the following statements about diatoms is correct?

1.	Their cell walls are made of chitin, which provides rigidity and protection.
2.	They store food in the form of glycogen and reproduce sexually through conjugation.
3.	They are primarily found in freshwater habitats and lack photosynthetic pigments.
4.	Their cell walls are composed of silica, forming two overlapping halves which fit together as in a soap box.

112. Which of the following best describes why phytophagous insects pose a particular challenge for plants?

1.	Plants have limited ability to regenerate damaged tissues.
2.	Plants are unable to escape herbivores and therefore must rely on other species for protection.
3.	Unlike animals, plants cannot move to avoid herbivores, making them vulnerable to constant feeding.
4.	Plants depend on phytophagous insects for pollination, so they cannot defend themselves.

113. Consider the given two statements:

<b>Statement I:</b>	Ethylene promotes fruit ripening and is responsible for the climacteric rise in respiration in ripening fruits like bananas and tomatoes.
<b>Statement II:</b>	Ethylene enhances leaf senescence and abscission, and it is used in agriculture to synchronize fruit ripening in crops such as pineapples.

Which of the following is correct?

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

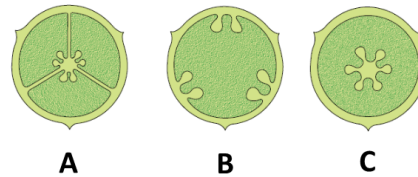
114. Uricotelism is found in:

1. Fishes and freshwater protozoans
2. Birds, reptiles, and insects
3. Frogs and toads
4. Mammals and birds

115. Select the correct statement with respect to disorders of muscles in humans.

1.	Failure of neuromuscular transmission in myasthenia gravis can prevent normal swallowing
2.	Accumulation of urea and creatine in the joints causes their inflammation
3.	An overdose of vitamin D causes osteoporosis
4.	Rapid contractions of skeletal muscles causes muscle dystrophy

116. Study the types of placentation and choose the correct match:



A.	Axile	<i>Argemone</i>
B.	Parietal	<i>Dianthus</i>
C.	Free central	China rose

1. C only
2. A and B only
3. A, B and C
4. None; all are incorrect match

117. Members of Phylum Platyhelminthes typically have bodies that are \_\_\_\_\_ compressed.

1. dorso-laterally
2. bilaterally
3. ventro-laterally
4. dorso-ventrally

118. Leydig cells, found adjacent to the seminiferous tubules in the testicle, secrete their hormones when stimulated by:

1. Androgens
2. LH
3. FSH
4. GnRH

119. Where does the Calvin cycle take place in  $C_4$  plants?

1.	Stroma of bundle sheath chloroplasts
2.	Grana of bundle sheath chloroplasts
3.	Mesophyll chloroplasts
4.	It does not occur in $C_4$ plants and $CO_2$ is fixed only by PEP

120. Consider the given two statements:

<b>Assertion (A):</b>	Glomerular filtration is considered as a process of ultra-filtration.
<b>Reason (R):</b>	The glomerular capillary blood pressure causes filtration through three layers.

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

121. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilisation:

1. Insulin
2. Glucagon
3. Secretin
4. Gastrin

122. For a species under a logistic growth model, as it approaches its carrying capacity  $K$ , what happens to the growth rate?

1. It remains constant.
2. It continues to grow exponentially.
3. It decreases and eventually approaches zero.
4. It becomes unpredictable.

123. Wind-pollinated flowers often produce a much larger quantity of pollen grains compared to water-pollinated flowers:

1.	to compensate for the unpredictability of wind currents
2.	because wind-pollinated flowers have multiple ovules
3.	because they are often brightly coloured and attract more pollinators
4.	due to the high stickiness of their pollen grains

124. Which of the following microbes, capable of fixing atmospheric nitrogen, is an important biofertilizer in paddy fields?

1. *Rhizobium*
2. *Frankia*
3. *Azotobacter*
4. *Anabaena*

125. Consider the given two statements:

<b>Statement I:</b>	Thick filaments within the myofibril are composed primarily of actin.
<b>Statement II:</b>	Thin filaments within the myofibril are composed primarily of myosin.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is correct; **Statement II** is incorrect
3. **Statement I** is incorrect; **Statement II** is correct
4. **Statement I** is incorrect; **Statement II** is incorrect

126. Match the phases of Prophase I in Column I with corresponding events in Column II and select the correct match from the codes given:

	Column I		Column II
A	Zygotene	P	Recombination
B	Pachytene	Q	Terminalisation of chiasmata
C	Diplotene	R	Synapsis
D	Diakinesis	S	Dissolution of synaptonemal complex

**Codes:**

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

127. The primary cause driving extinction of species in contemporary times is:

1. Habitat loss and fragmentation
2. Alien invasions
3. Over-exploitation
4. Co-extinction

128. How do frogs primarily excrete nitrogenous waste?

1.	As ammonia through the skin when submerged in water.
2.	As urea through the kidneys.
3.	As uric acid via the cloaca.
4.	As urea through the skin.

129. Citric acid, used in the food and beverage industry, is commercially produced with the help of:

1. *Saccharomyces cerevisiae*
2. *Lactobacillus*
3. *Aspergillus niger*
4. *Streptococcus thermophilus*

130. Select the answer with correct matching of the structure, its location and function:

	A	B	C
1.	Cerebellum	Mid brain	Controls respiration and gastric secretions
2.	Hypothalamus	Fore brain	Controls body temperature, urge for eating and drinking
3.	Blind spot	Near the place where optic nerve leaves the eye	Rods and cones are present but inactive here
4.	Eustachian tube	Anterior part of internal ear	Equalizes air pressure on either sides of tympanic membrane

131. In the preparation of recombinant DNA, the cut out 'gene of interest' from the source DNA and the cut vector with space are mixed and:

1.	ligase is added.
2.	the temperature of the apparatus is increased to 95 degree Celsius.
3.	a suitable host cell is incubated with the fragments.
4.	primers are added for annealing to DNA fragments.

132. Fibrinogen, globulins and albumins are the major proteins and their primary functions are:

1.	Fibrinogen – clotting of blood; Globulins – colloid osmotic pressure; Albumins – defence mechanisms
2.	Fibrinogen – clotting of blood; Globulins – defence mechanisms; Albumins – colloid osmotic pressure
3.	Fibrinogen – prevention of clotting of blood; Globulins – colloid osmotic pressure; Albumins – defence mechanisms
4.	Fibrinogen – prevention of clotting of blood; Globulins – defence mechanisms; Albumins – colloid osmotic pressure

133. The innermost layer of the wall of uterus

<b>I:</b>	is the perimetrium.
<b>II:</b>	has smooth muscles that help in parturition.

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

134. What was the significance of Mendel's large sampling size in his experiments?

1.	It increased the genetic diversity.
2.	It increased the accuracy of his results.
3.	It helped him create new species.
4.	It led to blending inheritance.

135. Match the Column I and Column II:

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

Select the correct option:

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

136. Any part of a plant taken out and grown in a test tube under sterile conditions in special nutrient media for generating new plants is called:

1.	Implant	2.	Explant
3.	Supplant	4.	Plantlet

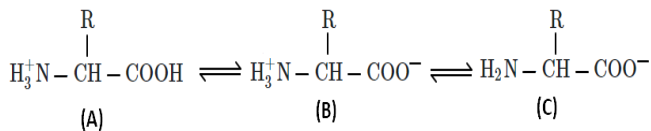
137. A post-transcriptional genetic mechanism of eukaryotes that suppresses gene expression and in which double-stranded RNA cleaved into small fragments initiates the degradation of a complementary messenger RNA sequence is called:

1. CRISPR	2. Genetic Engineering
3. Gene Splicing	4. RNA Interference

138. Glomerular filtration rate (GFR) is

- 125 mL/day
- 180 L/day
- 1.25 L/day
- 1.8 L/day

139. The zwitterion is shown by:



1. Only A	2. Only B
3. Both A and C	4. A, B and C

140. Glycolysis results in the production of:

- 2 ATP, 2 NADH, and 2 pyruvate molecules.
- 36 ATP and 2 NADH.
- 2 ATP and 6 carbon dioxide molecules.
- 18 ATP and 2 pyruvate molecules

141. Normally, microinjection and biolistics [gene gun] are used, respectively, to transform:

- plant cells and animal cells
- animal cells and plant cells
- animal cells and bacterial cells
- plant cells and bacterial cells

142. Eyes in a frog:

<b>I:</b>	are situated in the orbit in skull.
<b>II:</b>	are compound eyes possessing a large number of units.

- Only **I** is correct
- Only **II** is correct
- Both **I** and **II** are correct
- Both **I** and **II** are incorrect

143. What is the fate of a piece of DNA carrying only gene of interest which is transferred into an alien organism?

<b>A:</b>	The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
<b>B:</b>	It may get integrated into the genome of the recipient.
<b>C:</b>	It may multiply and be inherited along with the host DNA.
<b>D:</b>	The alien piece of DNA is not an integral part of chromosome.
<b>E:</b>	It shows ability to replicate.

Choose the correct answer from the options given below:

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

144. Match the following and select the correct option:

	Column I		Column II
(a)	Earthworm	(i)	Pioneer species
(b)	Succession	(ii)	Detrivore
(c)	Ecosystem service	(iii)	Natality
(d)	Population growth	(iv)	Pollination

- A-(i), B-(ii), C-(iii), D-(iv)
- A-(i), B-(ii), C-(iii), D-(iv)
- A-(iii), B-(ii), C-(iv), D-(i)
- A-(ii), B-(i), C-(iv), D-(iii)

145. How can tissue culture be used to produce virus-free plants from infected plants?

1.	By removing the infected leaves and growing them in sterile conditions.
2.	By isolating and growing the virus-free meristem from infected plants.
3.	By using pesticides in the growth medium to kill the virus.
4.	By exposing the infected plants to ultraviolet light to eliminate the virus.

146. Consider the given two statements:

<b>Assertion (A):</b>	Temperature and soil moisture are the most important climatic factors that regulate decomposition through their effects on the activities of soil microbes.
<b>Reason (R):</b>	Temperature and soil moisture affect the activities of soil microbes.

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

147. A healthy person acquires *Ascaris* infection through:

1.	Droplet
2.	Direct contact
3.	Contaminated water, vegetables, fruits, etc.
4.	Mosquito Vector

148. Second Trimester Medical Termination of Pregnancy in India

1.	is not allowed at all
2.	is allowed on the opinion of a single registered medical practitioner
3.	needs approval of two separate registered medical practitioners
4.	is easily carried out by non-surgical methods

149. The regions with high level of species richness, high degree of endemism and a loss of 70% of the species and habitat are identified as :

1. Natural Reserves
2. Sacred Groves
3. Biodiversity Hotspots
4. Biogeographical Regions

150. The repressor of the lac operon is synthesised:

1.	all the time
2.	only when lactose is present
3.	only when lactose is absent
4.	only when glucose is present in high amount

151. Consider the given statements:

<b>I:</b>	The pituitary gland is divided into anterior and posterior lobes.
<b>II:</b>	The anterior pituitary secretes growth hormone (GH).
<b>III:</b>	The posterior pituitary is the source of ADH and oxytocin, stored and released from hypothalamus.

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

152. Match the following reproductive health terms with their descriptions:

	Column I		Column II
A	Amniocentesis	P	A technique used for prenatal diagnosis
B	IVF	Q	Procedure involving the removal of a woman's fallopian tube
C	Surrogacy	R	A method where an embryo is fertilized outside the body
D	Tubectomy	S	An arrangement where another woman carries and gives birth to a child for a couple

Codes:

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

153. Consider the given two statements:

<b>Statement I:</b>	Cryopreservation or cryoconservation is a process where biological material - cells, tissues, or organs - are frozen to preserve the material for an extended period of time.
<b>Statement II:</b>	It is not possible to store pollen grains of angiosperms by cryopreservation.

1.	<b>Statement I</b> is correct; <b>Statement II</b> is correct
2.	<b>Statement I</b> is incorrect; <b>Statement II</b> is correct
3.	<b>Statement I</b> is correct; <b>Statement II</b> is incorrect
4.	<b>Statement I</b> is incorrect; <b>Statement II</b> is incorrect

154. The predominant site for the control of gene expression in prokaryotes is:

1. Transcription initiation
2. Processing of hnRNA
3. Translational level
4. Post translational modification

155. The physical basis of the genetic process of segregation is:

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

156. Which evolutionary advancement in angiosperms allows for the efficient transport of water, nutrients, and food, contributing to their dominance among terrestrial plants?

1. Presence of spores
2. Development of seeds
3. Complex vascular system
4. Formation of cones

157. What is the partial pressure of carbon dioxide in the alveoli of human lungs?

1. 40 mm Hg
2. 45 mm Hg
3. 95 mm Hg
4. 104 mm Hg

158. A steroid hormone when released increases blood glucose level, causes lipolysis and proteolysis, retards cellular uptake and utilization of amino acids by body cells and has a potent anti-inflammatory effect. This hormone is:

1. Thyroxin
2. Adrenaline
3. Growth hormone
4. Cortisol

159. Consider the two statements:

<b>Statement I:</b>	Gross primary productivity (GPP) minus respiration losses (R), is the net primary productivity (NPP).
<b>Statement II:</b>	GPP is available for consumption by herbivores.

1. **Statement I** is correct; **Statement II** is correct
2. **Statement I** is incorrect; **Statement II** is correct
3. **Statement I** is correct; **Statement II** is incorrect
4. **Statement I** is incorrect; **Statement II** is incorrect

160. Identify the incorrectly matched pair:

1.	de Vries, Correns and von Tschermak	Independently rediscovered Mendel's laws
2.	Walter Sutton and Theodore Boveri	Gave chromosomal theory of inheritance
3.	Sturtevant	Discovered the mechanism of sex determination in fruit flies
4.	T. H. Morgan	Demonstrated that genes are carried on chromosomes

161. How many of the given statements regarding leaves of angiosperms are true?

<b>I:</b>	Leaves originate from shoot apical meristems and are arranged in a basipetal order
<b>II:</b>	Pulvinus is seen in some leguminous plants
<b>III:</b>	Parallel venation is characteristic of most dicots
<b>IV:</b>	A bud is present in the axil of petiole of both simple and compound leaves
<b>V:</b>	Palmately compound leaves are seen in neem

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

162. Consider the following statements:

<b>Statement I:</b>	Species is the lowest taxonomic category in the hierarchy.
<b>Statement II:</b>	Genus includes multiple species that share common characteristics.

Which of the above statements is/are correct?

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

163. Consider the given two statements:

<b>Assertion (A):</b>	Gibberellins are used to promote bolting in plants with a rosette habit, such as cabbages and beets.
<b>Reason (R):</b>	Gibberellins increase the length of the internodes, causing stem elongation just before flowering.

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

164. The most important phagocytes in human body include:

1. Lymphocytes and Acidophils
2. Acidophils and Basophils
3. Neutrophils and Lymphocytes
4. Neutrophils and Monocytes

165. Which part of the human brain has a number of centers that control body temperature, urge for eating, and drinking?

1. Thalamus	2. Hypothalamus
3. Cerebellum	4. Cerebrum

166. Which of the following is a correct feature of metamerism?

1.	The body is externally segmented but lacks internal segmentation.
2.	It is present only in pseudocoelomates like Aschelminthes.
3.	Serial repetition of at least some organs occurs in each segment.
4.	It is limited to chordates and is absent in arthropods and annelids.

167. DNA does not contains:

1. Thiamine
2. Adenine
3. Cytosine
4. Guanine

168. Consider the given two statements:

<b>Assertion(A):</b>	The mitochondria, chloroplast and peroxisomes are not considered as part of the endomembrane system.
<b>Reason (R):</b>	The mitochondria, chloroplast and peroxisomes are single membrane bound organelles.

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

169. Almost all enzymes are proteins but a few may be:

1. nucleic acids	2. carbohydrates
3. lipids	4. metal ions

170. Air bladder is found in:

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

171. Match the following plant growth regulators with their chemical nature:

	Column I		Column II
A	Auxins	i	Indone compounds
B	Gibberellins	ii	Acidic growth hormone
C	Ethylene	iii	Gaseous hormone
D	Cytokinins	iv	Adenine derivatives

1. A-i, B-ii, C-iii, D-iv
2. A-iii, B-iv, C-ii, D-i
3. A-i, B-iii, C-iv, D-ii
4. A-iv, B-i, C-iii, D-ii

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

1. Cyclical selection
2. Directional selection
3. Stabilizing selection
4. Disruptive selection

173. The smallest, functional unit of contraction in a skeletal muscle is the:

1. muscle fiber	2. sarcomere
3. myofilament	4. myofibril

174. How many of the given pairs are correctly matched for Basidiomycetes?

A. Basidium	Bears spores
B. Basidiospores	Asexual Spores
C. Basidiocarp	Fruiting body

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

175. Which sexually transmitted infection (STI) is not curable, unlike other common STIs such as gonorrhoea and syphilis, and can be transmitted through both sexual contact and blood transfusion?

1. Gonorrhoea
2. Syphilis
3. Hepatitis-B
4. Trichomoniasis

176. Identify the basic amino acid from the following.

1. Glutamic Acid	2. Lysine
3. Valine	4. Tyrosine

177. Consider the given two statements:

<b>Assertion (A):</b>	Not all copulations lead to pregnancy.
<b>Reason (R):</b>	Fertilization can only occur if the ovum and sperm are transported simultaneously to the ampullary isthmic junction.

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

178. If you are asked to classify the various algae into distinct groups, which of the following characters you should choose?

1.	Types of pigments present in the cell
2.	Nature of stored food materials in the cell
3.	Structural organisation of thallus
4.	Chemical compositions of the cell wall

179. Consider the given two statements:

<b>Assertion (A):</b>	Fossils provide evidence of the past existence of life and support the theory of evolution.
<b>Reason (R):</b>	Fossils show a progression from simple to more complex organisms over geological time periods.

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

180. Match List-I with List-II

	List-I		List-II
(a)	Multipolar neuron	(i)	Somatic neural system
(b)	Bipolar neuron	(ii)	Cerebral cortex
(c)	Myelinated nerve fibre	(iii)	Retina of Eye
(d)	Unmyelinated nerve fibre	(iv)	Spinal nerves

Choose the correct answer from the options given below:

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