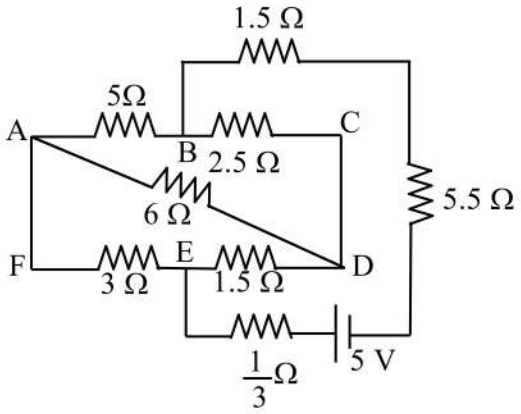
## PHYSICS

1. The current passing through the battery in the given circuit.




1) 1.5 A
2) 2.0 A
3) 0.5 A
4) 2.5 A

2. The electric field in a plane electromagnetic wave is given by $E_z = 60 \cos (5x + 1.5 \times 10^9 t)$V/m. Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field)

1) $B_y = 60 \sin (5x + 1.5 \times 10^9 t)$T
2) $B_y = 2 \times 10^{-7} \cos (5x + 1.5 \times 10^9 t)$T
3) $B_x = 2 \times 10^{-7} \cos (5x + 1.5 \times 10^9 t)$T
4) $B_z = 60 \cos (5x + 1.5 \times 10^9 t)$T

3. A pipe open at both ends has a fundamental frequency 'f' in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to

1) 2 f
2) $\frac{f}{2}$
3) f
4) $\frac{3f}{2}$

4. An electron (mass $9 \times 10^{-31}$kg and charge $1.6 \times 10^{-19}$C) moving with speed $\frac{c}{100}$ (c = speed of light) is injected into a magnetic field $\vec{B}$ of magnitude $9 \times 10^{-4}$T perpendicular to its direction of motion. We wish to apply an uniform electric field $\vec{E}$ together with the magnetic field so that the electron does not deflect from its path. Then (speed of light $c = 3 \times 10^8$ ms$^{-1}$)

1) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is $27 \times 10^4$ Vm$^{-1}$
2) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is $27 \times 10^4$ Vm$^{-1}$
3) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is $27 \times 10^2$ Vm$^{-1}$
4) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is $27 \times 10^2$ Vm$^{-1}$

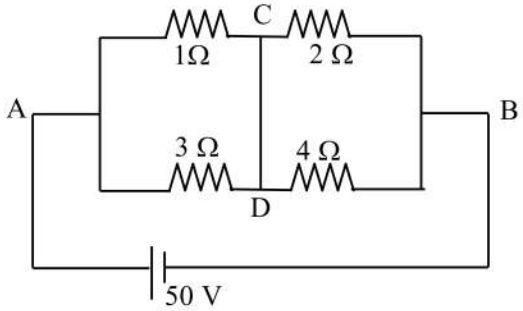
5. In a certain camera, a combination of four similar thin convex lenses are arranged axially in contact. Then the power of the combination and the total magnification in comparison to the power (p) and magnification (m) for each lens will be respectively

1) $p^4$ and $m^4$
2) 4p and 4m
3) $p^4$ and 4m
4) 4p and $m^4$

6. A 2 amp current is flowing through two different small circular copper coils having radii ratio 1 : 2. The ratio of their respective magnetic moments will be

1) 4 : 1
2) 1 : 4
3) 1 : 2
4) 2 : 1

7. A constant voltage of 50 V is maintained between the points A and B of the circuit shown in the figure. The current through the branch CD of the circuit is




1) 3.0 A
2) 1.5 A
3) 2.0 A
4) 2.5 A

8. Two gases A and B are filled at the same pressure in separate cylinders with movable pistons of radius $r_A$ and $r_B$ respectively. On supplying an equal amount of heat to both the systems reversibly under constant pressure, the pistons of gas A and B ae displaced by 16 cm and 9 cm, respectively. If the change in their internal energy is the same, then the ratio $\frac{r_A}{r_B}$ is equal to

1) $\frac{\sqrt{3}}{2}$ 2) $\frac{4}{3}$

3) $\frac{3}{4}$ 4) $\frac{2}{\sqrt{3}}$

9. A container has two chambers of volumes $V_1 = 2$ litres and $V_2 = 3$ litres separated by a partition made of a thermal insulator. The chambers contains $n_1 = 5$ and $n_2 = 4$ moles of ideal gas at pressures $p_1 = 1$ atm and $p_2 = 2$ atm, respectively. When the partition is removed, the mixture attains an equilibrium pressure of

1) 1.8 atm 2) 1.3 atm

3) 1.6 atm 4) 1.4 atm

10. The radius of Martian orbit around the sun is about 4 times the radius of the orbit of Mercury. The Martian year is 687 Earth days. Then which of the following is the length of 1 year on Mercury?

1) 124 earth days 2) 88 earth days

3) 225 earth days 4) 172 earth days

11. To an ac power supply of 220 V at 50 Hz, a resistor of 20 Ω a capacitor of reactance 25 Ω and an inductor of reactance 45 Ω are connected in series. The corresponding current in the circuit and the phase angle between the current and the voltage is respectively

1) 15.6 A and 45° 2) 7.8 A and 30°

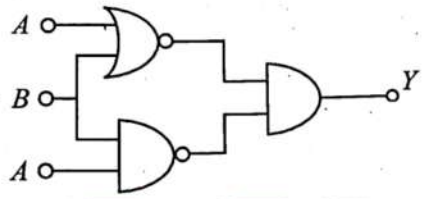
3) 7.8 A and 45° 4) 15.6 A and 30°

12. A wire of resistance R is cut into 8 equal pieces. From these pieces two equivalent resistances are made by adding four of these together in parallel. Then these two sets are added in series. The net effective resistance of the combination is

1) $\frac{R}{8}$ 2) $\frac{R}{64}$

3) $\frac{R}{32}$ 4) $\frac{R}{16}$

13. The output (Y) of the given logic implementation is similar to the output of an/a ____ gate.




1) NOR 2) AND

3) NAND 4) OR

14. Two identical charged conducting spheres A and B have their centres separated by a certain distance. Charge on each sphere is 'q' and the force of repulsion between them is F. A third identical uncharged conducting sphere is brought in contact with sphere A first and then with B and finally removed from both. New force of repulsion between spheres A and B (Radii of A and B are negligible compared to the distance of separation so that for calculating force between them they can be considered as point charged) is best given as

1) $\frac{3F}{8}$ 2) $\frac{3F}{5}$

3) $\frac{2F}{3}$ 4) $\frac{F}{2}$

15. Consider the diameter of a spherical object being measured with the help of a Vernier calipers. Suppose its 10 Vernier scale divisions (VSD) are equal to its 9 Main scale division (MSD). The least division in the MS is 0.1 cm and the zero of VS is at x = 0.1 cm when the jaws of Vernier calipers are closed. If the main scale reading for the diameter is M = 5 cm and the number of coinciding Vernier division is 8, the measured diameter after zero correction, is

1) 5.00 cm 2) 5.18 cm

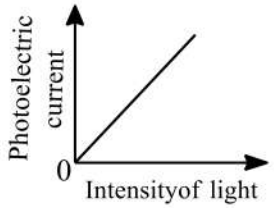
3) 5.08 cm 4) 4.98 cm

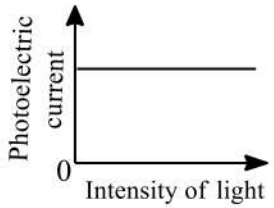
16. In some appropriate units, time (t) and position (x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is

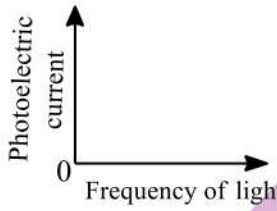
1) $+\frac{2}{2x+1}$ 2) $-\frac{2}{(x+2)^3}$

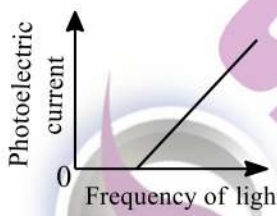
3) $-\frac{2}{(2x+1)^3}$ 4) $-\frac{2}{(x+1)^3}$

17. Which of the following options represent the variation of photoelectric current with property of light shown on the x-axis?

A) 


B) 


C) 


D) 


1) B and D 2) A only

3) A and C 4) A and D

18. A particle of mass 'm' is moving around the origin with a constant force F pulling it towards the origin. If Bohr model is used to describe its motion, the radius 'r' of the $n^{th}$ orbit and the particle is speed 'v' in the orbit depend on 'n' as

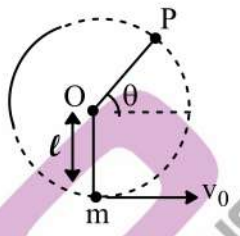
1) $r \propto n^{4/3}$; $v \propto n^{-1/3}$

2) $r \propto n^{1/3}$ ; $v \propto n^{1/3}$

3) $r \propto n^{1/3}$ ; $v \propto n^{2/3}$

4) $r \propto n^{2/3}$ ; $v \propto n^{1/3}$

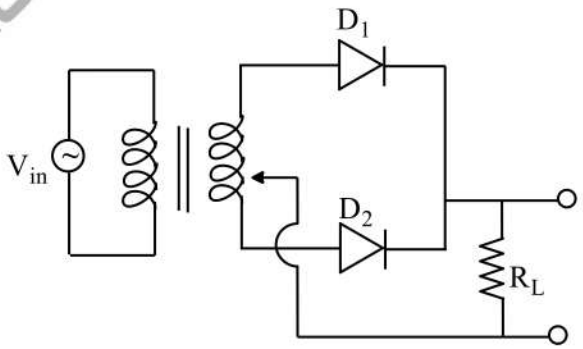
19. A bob of heavy mass 'm' is suspended by a light string of length $\ell$. The bob is given a horizontal velocity $v_0$ as shown in figure. If the string gets slack at some point P making an angle $\theta$ from the horizontal, the ratio of the speed 'v' of the bob at point P to its initial speed $v_0$ is




1) $\left(\frac{\sin\theta}{2+3\sin\theta}\right)^{1/2}$ 2) $(\sin\theta)^{1/2}$

3) $\left(\frac{1}{2+3\sin\theta}\right)^{1/2}$ 4) $\left(\frac{\cos\theta}{2+3\sin\theta}\right)^{1/2}$

20. A full wave rectifier circuit with diodes ($D_1$) and ($D_2$) is shown in the figure. If put supply voltage $V_{in} = 220 \sin(100\ \pi t)$ volt, then at t = 15 m sec




1) $D_1$ and $D_2$ both are reverse biased

2) $D_1$ is forward biased, $D_2$ is reverse biased

3) $D_1$ is reverse biased, $D_2$ is forward biased

4) $D_1$ and $D_2$ both are forward biased

21. A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A. If is filled with a gas of density $\rho$ and takes a spherical shape of radius R. When the gas is allowed to flow freely out of it, its radius 'r' changes from R to 0 (zero) in time T. If the speed v(r) of gas coming out of the balloon depends on r as $r^a$ and $T \propto S^\alpha A^\beta \rho^\gamma R^\delta$ then

1) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -\frac{1}{2}, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$

2) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -1, \gamma = +1, \delta = \frac{3}{2}$

3) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = -\frac{1}{2}, \delta = \frac{5}{2}$

4) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$

**22.** A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye is 25 cm, the magnification in the microscope is

1) 250 2) 100

3) 125 4) 150

**23.** Two identical point masses P and Q, suspended from two separate massless springs of spring constants $k_1$ and $k_2$ respectively, oscillate vertically. If their maximum speeds are the same, the ratio $\left(\frac{A_Q}{A_P}\right)$ of the amplitude $A_Q$ of mass Q to the amplitude $A_P$ of mass P is

1) $\sqrt{\frac{k_1}{k_2}}$

2) $\frac{k_2}{k_1}$

3) $\frac{k_1}{k_2}$

4) $\sqrt{\frac{k_2}{k_1}}$

**24.** A parallel plate capacitor made of circular plate is being charged such that the surface charge density on its plates is increasing at a constant rate with time. The magnetic field arising due to displacement current it

1) zero between the plates and non-zero outside

2) zero at all places

3) constant between the plates and zero outside the plates

4) non-zero everywhere with maximum at the imaginary cylindrical surfaces connecting peripheries of the plates.

**25.** An electric dipole with dipole moment 5 x $10^{-6}$Cm is aligned with the direction of a uniform electric field of magnitude 4 x $10^5$ N/C. The dipole is then rotated through an angle of $60^o$ with respect to the electric field. The change in the potential energy of the dipole is

1) 1.5 J 2) 0.8 J

3) 1.0 J 4) 1.2 J

**26.** There are two inclined surfaces of equal length (L) and same angle of inclination $45^o$ with the horizontal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface that on the smooth surface. The coefficient of kinetic friction ($\mu_k$) between the object and rough surface is close to

1) 0.75 2) 0.25

3) 0.40 4) 0.5

**27.** De-Broglie wavelength of an electron orbiting in the n = 2 state of hydrogen atom is close to (Given Bohr radius = 0.052 nm)

1) 2.67 nm

2) 0.067 nm

3) 0.67 nm

4) 1.67 nm

**28.** The Sun rotates around its centre once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without any external influence? Assume the Sun to be a sphere of uniform density.

1) 108 days 2) 100 days

3) 10 5 days 4) 115 days

**29.** A physical quantity P is related to four observations a, b, c and d as follows :

$P = \frac{a^3b^2}{c\sqrt{d}}$. The percentage errors of measurement in a, b, c and d are 1%, 3%, 2 % and 4 % respectively. The percentage error in the quantity P is

1) 15 %

2) 10 %

3) 2 %

4) 13 %

30. The plates of a parallel plate capacitor are separated by d. Two slabs of different dielectric constant $K_1$ and $K_2$ with thickness $\frac{3}{8}d$ and $\frac{d}{2}$, respectively are inserted in the capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates. If $K_1 = 1.25\ K_2$, the value of $K_1$ is

1) 1.33 **2) 2.66**
3) 2.33 4) 1.60

31. A ball of mass 0.5 kg is dropped from a height of 40m. The ball hits the ground and rises to a height of 10m. The impulse imparted to the ball during its collision with the ground is (Take $g = 9.8\ m/s^2$)

1) 84 NS **2) 21 NS**
3) 7 NS 4) 0

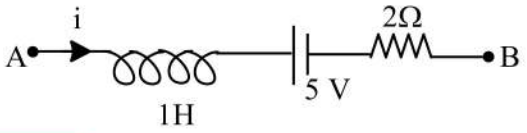
32. Two cities X and Y are connected by a regular bus service with a bus leaving in either direction every T min. A girl is driving scooty with a speed of 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for the period T of the bus service and the speed (assumed constant) of the buses.

**1) 15 min, 120 km/h** 2) 9 min, 40 km/h
3) 25 min, 100 km/h 4) 10 min, 90 km/h

33. An oxygen cylinder of volume 30 litre has 18.20 moles of oxygen. After some oxygen is withdrawn from the cylinder, its gauge pressure drops to 11 atmospheric pressure at temperature 27°C. The mass of the oxygen withdrawn from the cylinder is nearly equal to (Given $R = \frac{100}{12}\ J\ mol^{-1}K^{-1}$ and molecular mass of $O_2 = 32$, 1 atm pressure = $1.01 \times 10^5$ N/m)

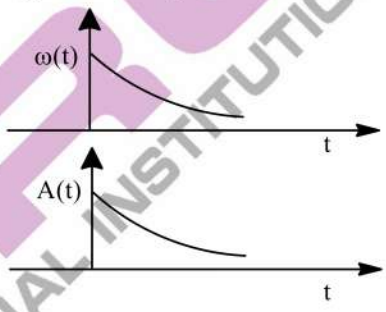
1) 0.156 kg 2) 0.125 kg
3) 0.144 kg **4) 0.116 kg**

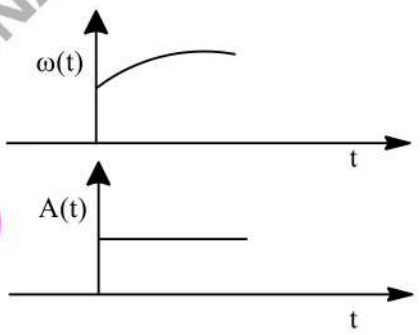
34. AB is a part of an electrical circuit (see figure). The potential difference $V_A - V_B$ at the instant when current i = 2A and is increasing at a rate of 1 amp/ second is

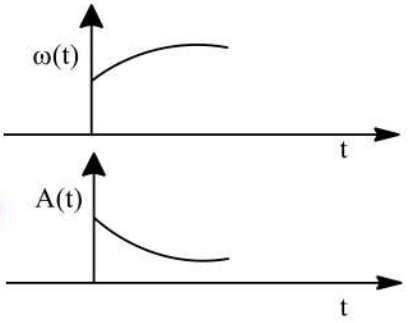


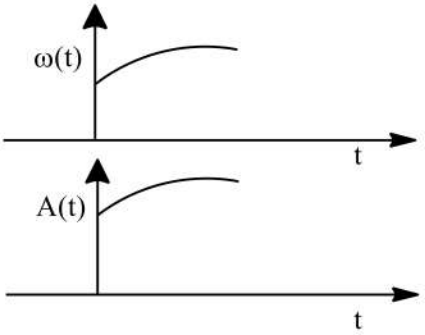

**1) 10 volt** 2) 5 volt
3) 6 volt 4) 9 volt

35. In an oscillating spring mass system, a spring is connected to a box filled with sand. As the box oscillates, sand leaks slowly out of the box vertically so that the average frequency ω(t) and average amplitude A(t) of the system change with time 't'. Which one of the following options schematically depicts these changes correctly?

1)



**2)**



3)



4)


**36.** A model for quantized motion of an electron in a uniform magnetic field B states that the flux passing through the orbit of the electron is $n\left(\frac{h}{e}\right)$ where 'n' is the integer, h is Planck's constant and 'e' is the magnitude of electron's charge. According to the model, the magnetic moment of an electron in its lowest energy state will be (m is the mass of the electron)

1) $\frac{heB}{2\pi m}$ 2) $\frac{he}{\pi m}$

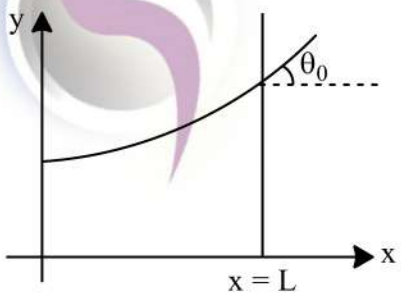
3) $\frac{he}{2\pi m}$ 4) $\frac{heB}{\pi m}$

**37.** A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to one-third the radius of the earth from its surface is

1) 36 N 2) 16 N

3) 27 N 4) 32 N

**38.** Consider a water tank shown in the figure. It has one wall at x = L and can be taken to be very wide in the z-direction. When filled with a liquid of surface tension S and density ρ, the liquid surface makes angle $\theta_0$ ($\theta_0 << 1$) with the x-axis at x = L. If y(x) is the height of the surface then the equation for y(x) is (take $\theta(x) = \sin\theta(x) = \tan\theta(x) = \frac{dy}{dx}$, g is the acceleration due to gravity)




1) $\frac{dy}{dx} = \sqrt{\frac{\rho g}{S}}x$ 2) $\frac{d^2y}{dx^2} = \frac{\rho g}{S}x$

3) $\frac{d^2y}{dx^2} = \frac{\rho g}{S}y$ 4) $\frac{d^2y}{dx^2} = \sqrt{\frac{\rho g}{S}}$

**39.** The intensity of transmitted light when a polaroid sheet, placed between two crossed polaroids at 22.5° from the polarization axis of one of the polaroid, is ($I_0$ is the intensity of polarized light after passing through the first polaroid)

1) $\frac{I_0}{16}$ 2) $\frac{I_0}{2}$

3) $\frac{I_0}{4}$ 4) $\frac{I_0}{8}$

**40.** A photon and an electron (mass m) have the same energy E. The ratio $\left(\frac{\lambda_{photon}}{\lambda_{electron}}\right)$ of their de-broglie wavelength is (c is the speed of light)

1) $\frac{1}{c}\sqrt{\frac{E}{2m}}$

2) $\sqrt{\frac{E}{2m}}$

3) $c\sqrt{2mE}$

4) $c\sqrt{\frac{2m}{E}}$

**41.** An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then

1) transmitted light is completely polarized with angle of refraction close to 30°

2) reflected light is completely polarized and the angle of reflection is close to 60°

3) reflected light is partially polarized and the angle of reflection is close to 30°

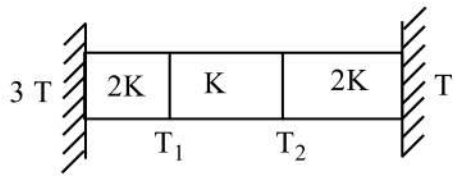
4) both reflected and transmitted light are perfectly polarized with angles of reflection and refraction close to 60° and 30°, respectively

**42.** A uniform rod of mass 20 kg and length 5m leans against a smooth vertical wall making an angle of 60° with it. The other end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is (take g = 10 m/s²)

1) $200\sqrt{3}$ N 2) 100 N

3) $100\sqrt{3}$ N 4) 200 N

43. Three identical heat conducting rods are connected in series as shown in the figure. The rods on the sides have thermal conductivity 2K while that in the middle has thermal conductivity K. The left end of the combination is maintained at temperature 3T and the right end at T. The rods are thermally insulated from outside. In steady state, temperature at the left junction is $T_1$ and that at the right junction is $T_2$. The ratio $\frac{T_1}{T_2}$ is




1) $\frac{5}{4}$ 2) $\frac{3}{2}$

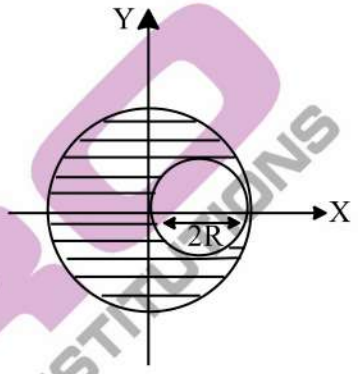
3) $\frac{4}{3}$ 4) $\frac{5}{3}$

44. The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying breaks, car A stops after 1000 m and car 3 stops after 1500 m. If $F_A$ and $F_B$ are the forces applied by the breaks on cars A and B, respectively, then the ratio $\frac{F_A}{F_B}$ is

1) $\frac{1}{2}$ 2) $\frac{3}{2}$

3) $\frac{2}{3}$ 4) $\frac{1}{3}$

45. A sphere of radius R is cut from a larger solid sphere of radius 2R as shown in the figure. The ratio of the moment of inertia of the smaller sphere to that of the rest part of the sphere about the Y-axis is




1) $\frac{7}{64}$ 2) $\frac{7}{8}$

3) $\frac{7}{40}$ 4) $\frac{7}{57}$

## CHEMISTRY

46. If the molar conductivity ($\Lambda_m$) of a 0.050 mol $L^{-1}$ solution of a monobasic weak acid is 90 S $cm^2$ $mol^{-1}$, its extent (degree) of dissociation will be

[Assume $\Lambda^0_+ = 349.6$ S $cm^2$ $mol^{-1}$ and $\Lambda^0_- = 50.4$ S $cm^2$ $mol^{-1}$]

1) 0.215 2) 0.115

3) 0.125 4) 0.225

47. Given below are two statements :

**Statement I :** A hypothetical diatomic molecule with bond order zero is quite stable.

**Statement II :** As bond order increases, the bond length increases.

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

1) Statement I is false but Statement II is true

2) Both Statement I and Statement II are true

3) Both statement I and Statement II are false

4) Statement I is true but Statement II is false

48. The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes $n = 2 \rightarrow n = 3$ and $n = 4 \rightarrow n = 6$ transitions, respectively is

1) $\frac{1}{4}$ 2) $\frac{1}{36}$

3) $\frac{1}{16}$ 4) $\frac{1}{9}$

**49.** The correct order of the wavelength of light absorbed by the following complexes is

A) $[Co(NH_3)_6]^{3+}$ B) $[Co(CN)_6]^{3-}$

C) $[Cu(H_2O)_4]^{2+}$ D) $[Ti(H_2O)_6]^{3+}$

Choose the correct answer from the options given below

1) C < A < D < B 2) B < D < A < C

3) B < A < D < C 4) C < D < A < B

**50.** If the rate constant of a reaction is 0.03 $s^{-1}$, how much time does it take for 7.2 mol $L^{-1}$ concentration of the reactant to get reduced to 0.9 mol $L^{-1}$?

(Given : log 2 = 0.301)

1) 21.0 s 2) 69.3 s

3) 23.1 s 4) 210 s

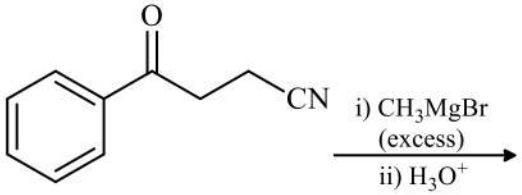
**51.** Match List I with List II.

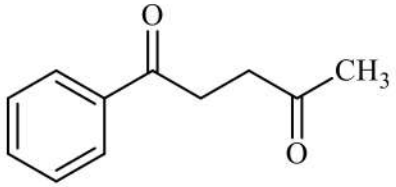
| List I (Mixture) | | List II (Method of separation) | |
|---|---|---|---|
| A | $CHCl_3 + C_6H_5NH_2$ | I | Distillation under reduced pressure |
| B | Crude oil in petroleum industry | II | Steam distillation |
| C | Glycerol from spent-lye | III | Fractional distillation |
| D | Aniline-water | IV | Simple distillation |

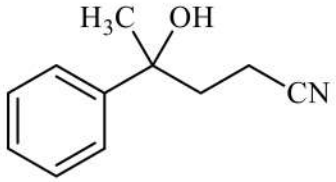
Choose the correct answer from the options given below

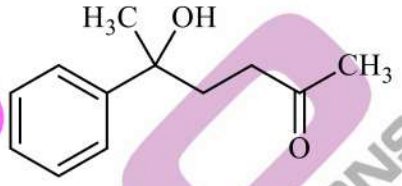
| | A | B | C | D |
|---|---|---|---|---|
| 1) | III | IV | II | I |
| 2) | IV | III | I | II |
| 3) | IV | III | II | I |
| 4) | III | IV | I | II |

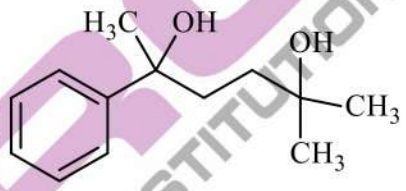
**52.** The major product of the following reaction is




1) 


2) 


3) 


4) 


**53.** Which one of the following compounds can exist as cis-trans isomers?

1) 1,2-Dimethylcyclohexane

2) Pent-1-ene

3) 2-Methylhex-2-ene

4) 1,1-Dimethylcyclopropane

**54.** Among the following, choose the ones with equal number of atoms.

A) 212 g of $Na_2CO_{3\,(s)}$ [Molar mass = 106 g]

B) 248 g of $Na_2O_{\,(s)}$ [Molar mass = 62 g]

C) 240 g of $NaOH_{\,(s)}$ [Molar mass = 40 g]

D) 12 g of $H_{2\,(g)}$ [Molar mass = 2 g]

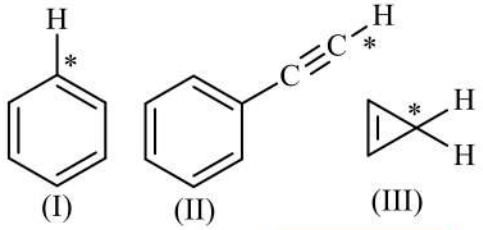
E) 220 g of $CO_{2\,(g)}$ [Molar mass = 44 g]

Choose the correct answer from the options given below

1) B, D and E only 2) A, B and C only

3) A, B and D only 4) B, C and D only

**55.** Among the given compounds I-III, the correct order of bond dissociation energy of C-H bond marked with * is




1) II > III > I 2) II > I > III

3) I > II > III 4) III > II > I

**56.** The standard heat of formation, in kcal/mol of $Ba^{2+}$ is

[Given : Standard heat of formation of $SO_4^{-2}$ ion (aq) = –216 kcal/mol, standard heat of crystallization of $BaSO_{4(s)}$ = –4.5 kcal/mol, standard heat of formation of $BaSO_{4(s)}$ = –349 kcal/mol]

1) +220.5 **2) –128.5**

3) –133.0 4) +133.0

**57.** Consider the following compounds :

$\underline{K}O_2.H_2\underline{O}_2$ and $H_2\underline{S}O_4$

The oxidation states of the underlined elements in them are respectively

1) +4, –4 and +6 **2) +1, –1 and +6**

3) +2, –2 and +6 4) +1, –2 and +4

**58.** Out of the following complex compounds, which of the compound will be having the minimum conductance in solution?

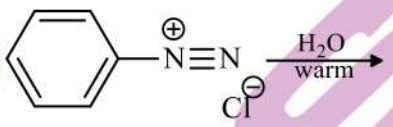
1) $[Co(NH_3)_5Cl]Cl$

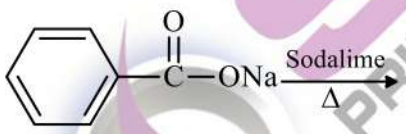
**2) $[Co(NH_3)_3Cl_3]$**

**3) $[Co(NH_3)_4Cl_2]$**

4) $[Co(NH_3)_6]Cl_3$

**59.** Which one of the following reactions does not give benzene as the product?

**1)** 


2) 


3) 


4) 


**60.** Which of the following are paramagnetic?

A) $[NiCl_4]^{2-}$ B) $Ni(CO)_4$

C) $[Ni(CN)_4]^{2-}$ D) $[Ni(H_2O)_6]^{2+}$

E) $Ni(PPh_3)_4$

Choose the correct answer from the options given below

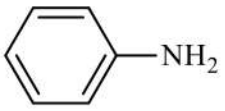
1) A, D and E only

2) A and C only

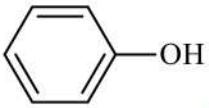
3) B and E only

**4) A and D only**

**61.** Which one of the following compounds does not decolourize bromine water?

1) 


**2)** 

3) 


4) 


**62.** Match List I with List II.

| | **List I** | | **List II** |
|---|---|---|---|
| A | Haber process | I | Fe catalyst |
| B | Wacker oxidation | II | $PdCl_2$ |
| C | Wilkinson catalyst | III | $[(PPh_3)_3RhCl]$ |
| D | Ziegler catalyst | IV | $TiCl_4$ with $Al(CH_3)_3$ |

Choose the correct answer from the options given below

| | A | B | C | D |
|---|---|---|---|---|
| 1) | I | IV | III | II |
| 2) | I | II | IV | III |
| 3) | II | III | I | IV |
| **4)** | **I** | **II** | **III** | **IV** |

**63.** Match List I with List II.

| **List I (Name of Vitamin)** | | **List II (Deficiency disease)** | |
|---|---|---|---|
| A | Vitamin $B_{12}$ | I | Cheilosis |
| B | Vitamin D | II | Convulsions |
| C | Vitamin $B_2$ | III | Rickets |
| D | Vitamin $B_6$ | IV | Pernicious anaemia |

Choose the correct answer from the options given below

| | A | B | C | D |
|---|---|---|---|---|
| 1) | IV | III | II | I |
| 2) | I | III | II | IV |
| 3) | IV | III | I | II |
| 4) | II | III | I | IV |

64. Given below are two statements :

**Statement I :** Ferromagnetism is considered as an extreme form of paramagnetism.

**Statement II :** The number of unpaired electrons in a $Cr^{2+}$ ion (Z = 24) is the same as that of $Nd^{3+}$ ion (Z = 60)

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

1) Statement I is false but Statement II is true
2) Both Statement I and Statement II are true
3) Both statement I and Statement II are false
4) Statement I is true but Statement II is false

65. If the half-life ($t_{1/2}$) for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closest to

1) 10 minutes
2) 2 minutes
3) 4 minutes
4) 5 minutes

66. The correct order of decreasing basic strength of the given amines is

1) Benzenamine > Ethanamine > N-methylaniline > N-ethylethanamine
2) N-methylaniline > Benzenamine > Ethanamine > N-ethylethanamine
3) N-ethylethanamine > Ethanamine > Benzenamine > N-methylaniline
4) N-ethylethanamine > Ethanamine > N-methylaniline > Benzenamine

67. Match List I with List II.

| | List I (Ion) | | List II (Group number in cation analysis) |
|---|---|---|---|
| A | $Co^{2+}$ | I | Group I |
| B | $Mg^{2+}$ | II | Group III |
| C | $Pb^{2+}$ | III | Group IV |
| D | $Al^{3+}$ | IV | Group VI |

Choose the correct answer from the options given below

| | A | B | C | D |
|---|---|---|---|---|
| 1) | III | II | I | IV |
| 2) | III | IV | II | I |
| 3) | III | IV | I | II |
| 4) | III | II | IV | I |

68. Phosphoric acid ionizes in three steps with their ionization constant values.

$K_{a_1}$, $K_{a_2}$ and $K_{a_3}$ respectively, while K is the overall ionization constant. Which of the following statements are true?

A) $\log K = \log K_{a_1} + \log K_{a_2} + \log K_{a_3}$

B) $H_3PO_4$ is a stronger acid than $H_2PO_4^-$ and $HPO_4^{2-}$

C) $K_{a_1} > K_{a_2} > K_{a_3}$

D) $K_{a_1} = \frac{K_{a_3} + K_{a_2}}{2}$

Choose the correct answer from the options given below

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

69. Which of the following statements are true?

A) Unlike Ga that has a very high melting point Cs has a very low melting point.
B) On Pauling scale the electronegativity values of N and Cl are not the same.
C) Ar, $K^+$, $Cl^-$, $Ca^{2+}$ and $S^{2-}$ are all isoelectronic species.
D) The correct order of the first ionization enthalpies of Na, Mg, Al and Si is Si > Al > Mg > Na
E) The atomic radius of Cs is greater than that of Li and Rb.

Choose the correct answer from the options given below

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

70. Given below are two statements :

**Statement I :** Like nitrogen that can form ammonia, arsenic can form arsine.

**Statement II :** Antimony cannot form antimony pentoxide.

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

1) Statement I is incorrect but Statement II is correct
2) Both Statement I and Statement II are correct
3) Both statement I and Statement II are incorrect
4) Statement I is correct but Statement II is incorrect

71. Which of the following aqueous solution will exhibit highest boiling point?

1) 0.015M $C_6H_{12}O_6$
2) 0.01 M Urea
3) 0.01 M $KNO_3$
4) 0.01 M $Na_2SO_4$

72. Given below are two statements :

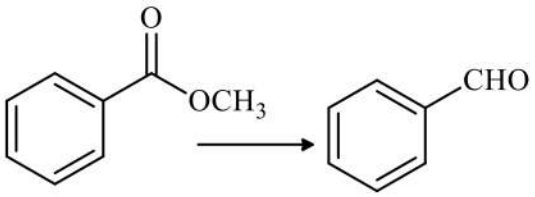
**Statement I :** Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273-278K. It decomposes easily in the dry state.

**Statement II :** Insertion of iodine into the benzene ring is difficult and hence iodobenzene is prepared through the reaction of benzene diazonium salt with KI.

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

1) Statement I is incorrect but Statement II is correct
2) Both Statement I and Statement II are correct
3) Both statement I and Statement II are incorrect
4) Statement I is correct but Statement II is incorrect

73. Identify the suitable reagent for the following conversion.




1) $H_2/Pd\text{-}BaSO_4$
2) i) $LiAlH_4$, ii) $H^+/H_2O$
3) i) $AlH(iBu)_2$, ii) $H_2O$
4) i) $NaBH_4$, ii) $H^+/H_2O$

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

**Assertion (A) :**  undergoes $S_N2$ reaction faster than 

**Reason (R) :** Iodine is a better leaving group because of its large size.

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

1) A is false but R is true
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 true but R is false

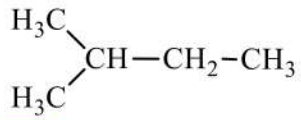
75. The correct order of decreasing acidity of the following aliphatic acids is

1) $HCOOH > (CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH$
2) $(CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH > HCOOH$
3) $CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH > HCOOH$
4) $HCOOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$

76. Which one of the following reactions does not belong to "Lassaigne's test"?

1) $2CuO + C \xrightarrow{\Delta} 2Cu + CO_2$
2) $Na + C + N \xrightarrow{\Delta} NaCN$
3) $2Na + S \xrightarrow{\Delta} Na_2S$
4) $Na + X \xrightarrow{\Delta} + NaX$

77. How many products (including stereoisomers) are expected from monochlorination of the following compound?



1) 6 2) 2
3) 3 4) 5

78. Sugar 'X'
A) is found in honey
B) is a keto sugar
C) exists in α and β -anomeric forms
D) is laevorotatory.
X is
1) Sucrose 2) D-Glucose
3) D-Fructose 4) Maltose

79. Dalton's Atomic theory could not explain which of the following?
1) Law of gaseous volume
2) Law of conservation of mass
3) Law of constant proportion
4) Law of multiple proportion

80. Higher yield of NO in
$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ can be obtained at
[$\Delta H$ of the reaction = +180.7 kJ $mol^{-1}$]
A) higher temperature
B) lower temperature
C) higher concentration of $N_2$
D) higher concentration of $O_2$
Choose the correct answer from the options given below
1) A, C, D only 2) A, D only
3) B, C only 4) B, C, D only

81. Match List I with List II.

| List I | | List II | |
|---|---|---|---|
| A | $XeO_3$ | I | $sp^3d$; linear |
| B | $XeF_2$ | II | $sp^3$; pyramidal |
| C | $XeOF_4$ | III | $sp^3d^3$; distorted octahedral |
| D | $XeF_6$ | IV | $sp^3d^2$; square pyramidal |

Choose the correct answer from the options given below

| | A | B | C | D |
|---|---|---|---|---|
| 1) | IV | II | I | III |
| 2) | II | I | IV | III |
| 3) | II | I | III | IV |
| 4) | IV | II | III | I |

82. Match List I with List II.

| List I (Example) | | List II (Type of solution) | |
|---|---|---|---|
| A | Humidity | I | Solid in solid |
| B | Alloys | II | Liquid in gas |
| C | Amalgams | III | Solid in gas |
| D | Smoke | IV | Liquid in solid |

Choose the correct answer from the options given below

| | A | B | C | D |
|---|---|---|---|---|
| 1) | III | II | I | IV |
| 2) | II | IV | I | III |
| 3) | II | I | IV | III |
| 4) | III | I | IV | II |

83. Energy and radius of first Bohr orbit of $He^+$ and $Li^{2+}$ are
[Given $R_H = 2.18 \times 10^{-18}$J, $a_0 = 52.9$ pm]
1) $E_n(Li^{2+}) = -8.72 \times 10^{-16}$J;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -19.62 \times 10^{-16}$J;
$r_n(He^+) = 17.6$ pm
2) $E_n(Li^{2+}) = -19.62 \times 10^{-18}$J;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -8.72 \times 10^{-18}$J;
$r_n(He^+) = 26.4$ pm
3) $E_n(Li^{2+}) = -8.72 \times 10^{-18}$J;
$r_n(Li^{2+}) = 26.4$ pm
$E_n(He^+) = -19.62 \times 10^{-18}$J;
$r_n(He^+) = 17.6$ pm
4) $E_n(Li^{2+}) = -19.62 \times 10^{-16}$J;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -8.72 \times 10^{-16}$J;
$r_n(He^+) = 26.4$ pm

**84.** Which among the following electronic configurations belong to main group elements?

A) $[Ne]3s^1$ B) $[Ar]3d^3 4s^2$

C) $[Kr]4d^{10}5s^2 5p^5$ D) $[Ar]3d^{10}4s^1$

E) $[Rn]5f^0 6d^2 7s^2$

Choose the correct answer from the options given below

1) A, C and D only

2) B and E only

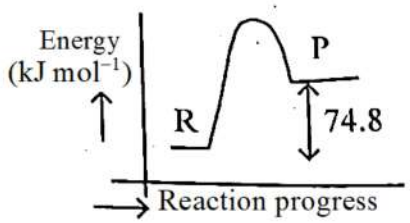
3) A and C only

4) D and E only

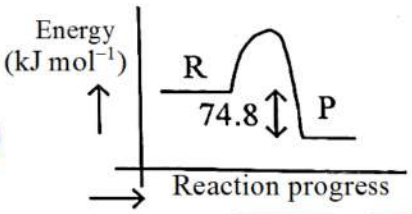
**85.** $C_{(s)} + 2H_{2(g)} \rightarrow CH_{4(g)}$; $\Delta H = -74.8$ kJ mol$^{-1}$ which of the following diagrams gives an accurate representation of the above reaction?

[R → reactants; P → products]

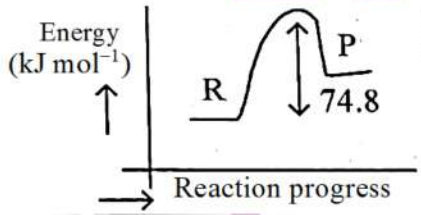
1)



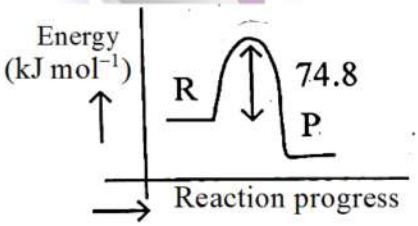

2)



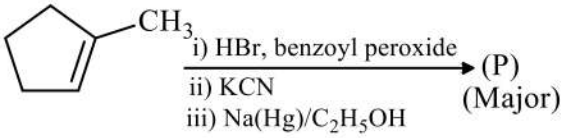

3)

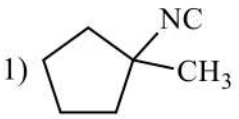


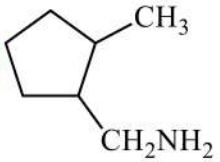

4)

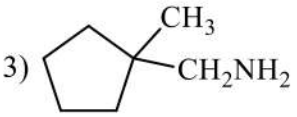


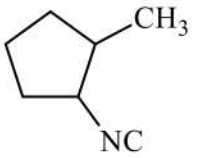

**86.** Predict the major product 'P' in the following sequence of reactions




1) 


2) 


3) 


4) 


**87.** Identify the correct orders against the property mentioned

A) $H_2O > NH_3 > CHCl_3$ – dipole moment

B) $XeF_4 > XeO_3 > XeF_2$ – number of lone pairs on central atom

C) O-H > C-H > N-O - bond length

D) $N_2 > O_2 > H_2$ – bond enthalpy

Choose the correct answer from the options given below

1) B, C only 2) A, D only

3) B, D only 4) A, C only

**88.** Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula $C_4H_8O$ is

1) 11 2) 6

3) 8 4) 10

**89.** For the reaction, $A_{(g)} \rightleftharpoons 2B_{(g)}$, the backward reaction rate constant is higher than the forward reaction rate constant by a factor of 2500, at 1000K.

[Given : R = 0.0831 L atm mol$^{-1}$ K$^{-1}$]

$K_p$ for the reaction at 1000 K is

1) 0.021 2) 83.1

3) $2.077 \times 10^5$ 4) 0.033

**90.** 5 moles of liquid X and 10 moles of liquid Y make a solution having a vapour pressure of 70 torr. The vapour pressures of pure X and Y are 63 torr and 78 torr respectively. Which of the following is true regarding the described solution?

1) The solution has volume greater than the sum of individual volumes

2) The solution shows positive deviation

3) The solution shows negative deviation

4) The solution is ideal

**91.** Which of the following is the unit of productivity of an Ecosystem?

1) (KCal $m^{-2}$) $yr^{-1}$ 2) $gm^{-2}$

3) KCal $m^{-2}$ 4) KCal $m^{-3}$

**92.** The first menstruation is called

1) Ovulation 2) Menopause

3) Menarche 4) Diapause

**93.** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A) :** All vertebrates are chordates but all chordates are not vertebrates.

**Reason (R) :** The members of subphylum vertebrata possess notochord during the embryonic period, the notochord is replaced by a cartilaginous or bony vertebral column in adults.

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

1) A is false but R is true

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 true but R is false

**94.** Genes R and Y following independent assortment. If RRYY produce round yellow seeds and rryy produce wrinkled green seeds, what will be the phenotypic ratio of the $F_2$ generation?

1) Phenotypic ratio – 9 : 7

2) Phenotypic ratio – 1 : 2 : 1

3) Phenotypic ratio – 3 : 1

4) Phenotypic ratio – 9 : 3 : 3 : 1

**95.** Given below are two statements

**Statement – I :** The DNA fragments, extracted from gel electrophoresis can be used in construction of recombinant DNA.

**Statement – II :** Smaller size DNA fragments, are observed near anode while larger fragments are found near the wells in an agarose gel.

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

1) Statement I is incorrect but statement II is correct

2) Both statement I and statement II are correct

3) Both statement I and statement II are incorrect

4) Statement I is correct but statement II is incorrect

**96.** What is the main function of the spindle fibres during mitosis?

1) To regulate cell growth

2) To separate the chromosomes

3) To synthesize new DNA

4) To repair damaged DNA

**97.** How many meiotic and mitotic divisions need to occur for the development of a mature female gametophyte from the megaspore mother cell in an angiosperm plant?

1) No Meiosis and 2 Mitosis

2) 2 Meiosis and 3 Mitosis

3) 1 Meiosis and 2 Mitosis

4) 1 Meiosis and 3 Mitosis

**98.** Identify the statement that is **NOT** correct

1) Constant region of heavy and light chains are located at C-terminus of antibody molecules

2) Each antibody has two light and two heavy chains

3) The heavy and light chains are held together by distulfide bonds

4) Antigen binding site is located at C-terminal region of antibody molecules.

**99.** Consider the following

A) The reductive division for the human female gametogenesis starts earlier than that of the male gametogenesis

B) The gap between the first meiotic division and the second meiotic division is much shorter for males compared to females

C) The first polar body is associated with the formation of the primary oocyte.

D) Luteinizing hormone (LH) surge leads to disintegration of the endometrium and onset of menstrual bleeding.

Choose the correct answer from the options given below.

1) B and C are true
2) A and B are true
3) A and C are true
4) B and D are true

**100.** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A) :** Cells of the Tapetum possess dense cytoplasm and generally have more than one nucleus.

**Reason (R) :** Presence of more than one nucleus in the Tapetum increases the efficiency of nourishing the developing microspore mother cells.

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

1) A is false but R is true
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 true but R is false

**101.** The blue and white selectable markers have been developed which differentiate recombinant colonies from non-recombinant colonies on the basis of their ability to produce colour in the presence of a chromogenic substrate.

Given below are two statements about this method.

**Statement – I :** The blue coloured colonies have DNA insert in the plasmid and they are identified as recombinant colonies.

**Statement – II :** The colonies without blue colour have DNA insert in the plasmid and are identified as recombinant colonies.

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

1) Statement I is incorrect but statement II is correct
2) Both statement I and statement II are correct
3) Both statement I and statement II are incorrect
4) Statement I is correct but statement II is incorrect

**102.** In bryophytes, the gemmae help in which one of the following?

1) Gaseous exchange
2) Sexual reproduction
3) Asexual reproduction
4) Nutrient absorption

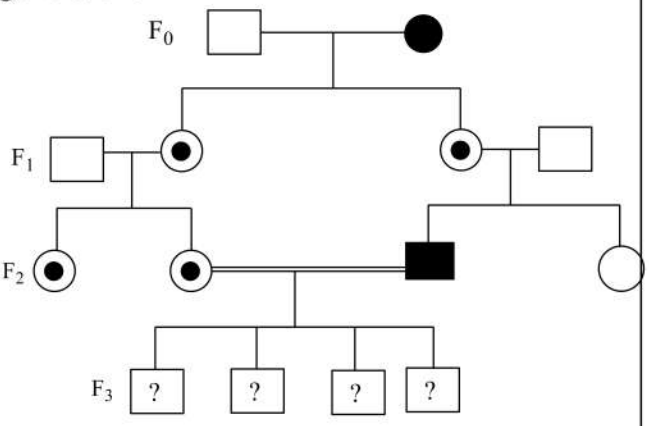
**103.** Match List I with List II.

| List – I | | Lisy – II | |
|---|---|---|---|
| A) | Adenosine | I) | Nitrogen base |
| B) | Adenylic acid | II) | Nucleotide |
| C) | Adenine | III) | Nucleoside |
| D) | Alanine | IV) | Amino acid |

Choose the option with all **correct** matches

1) A – II, B – III, C – I, D – IV
2) A – III, B – IV, C – II, D – I
3) A – III, B – II, C – IV, D – I
4) A – III, B – II, C – I, D – IV

**104.** With the help of given pedigree, find out the probability for the birth of a child having no disease being a carrier (has the disease mutation in one allele of the gene) in $F_3$ generation.



Unaffected male

Affected male

Carrier female

Unaffected female

Affected female

1) Zero
2) 1/4
3) 1/2
4) 1/8

**105.** Consider the following statements regarding function of adrenal medullary hormones.

A) It causes pupillary constriction

B) It is a hyperglycemic hormone

C) It causes piloerection

D) It increases strength of hear contraction

Choose the **correct** answer from the options given below

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

**106.** Which of the following is an example of a zygomorphic flower?

1) Chilli
2) Petunia
3) Datura
4) Pea

**107.** Who proposed that the genetic code for amino acids should be made up of three nucleotides?

1) Franklin stahl
2) George Gamow
3) Francis Crick
4) Jacque Monod

**108.** Given below are two statements

**Statement – I :** In ecosystem, there is unidirectional flow of energy of sun from producers to consumers.

**Statement – II :** Ecosystems are exempted from 2nd law of thermodynamics.

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

1) Statement I is incorrect but statement II is correct
2) Both statement I and statement II are correct
3) Both statement I and statement II are incorrect
4) Statement I is correct but statement II is incorrect

**109.** Sweet potato and potato represent a certain type of evolution. Select the correct combination of terms to explain the evolution.

1) Analogy, divergent
2) Analogy, convergent
3) Homology, divergent
4) Homology, convergent

**110.** All living members of the class Cyclostomata are

1) Ectoparasite
2) Free living
3) Endoparasite
4) Symbiotic

**111.** Histones are enriched with

1) Phenylalanine and arginine
2) Lysine and Arginine
3) Leucine and Lysine
4) Phenylalanine and Leucine

**112.** Which one of the following equations represents the verhulst – Pearl Logistic growth of population?

1) $\frac{dN}{dt} = N\left(\frac{r-k}{K}\right)$
2) $\frac{dN}{dt} = r\left(\frac{K-N}{K}\right)$
3) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$
4) $\frac{dN}{dt} = rN\left(\frac{N-K}{N}\right)$

**113.** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A) :** The primary function of the Golgi apparatus is to package the materials made by the endoplasmic reticulum and deliver it to intracellular targets and outside the cell.

**Reason (R) :** Vesicles containing materials made by the endoplasmic reticulum fuse with the cis face of the Golgi apparatus, and they are modified and released from the trans face of the golgi apparatus.

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

1) A is false but R is true
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 true but R is false

114. Which of the following statements about RuBisCO is true?

1) It catalyzes the carboxylation of RuBP
2) It is active only in the dark
3) It has higher affinity for oxygen than carbon dioxide
4) It is an enzyme involved in the photolysis of water

115. Match List – I with List – II

| List – I | | List – II | |
|---|---|---|---|
| A) | Progesterone | I) | Pars intermedia |
| B) | Relaxin | II) | Ovary |
| C) | Melanocyte stimulating hormone | III) | Adrenal Medulla |
| D) | Catecholamines | IV) | Corpus luteum |

Choose the correct answer from the options given below.

1) A – III, B – II, C – IV, D – I
2) A – IV, B – II, C – I, D – III
3) A – IV, B – II, C – III, D – I
4) A – II, B – IV, C – I, D – III

116. The protein portion of an enzyme is called

1) Prosthetic group
2) Cofactor
3) Coenzyme
4) Apoenzyme

117. Which of the following enzyme(s) are **NOT** essential for gene cloning?

A) Restriction enzymes
B) DNA ligase
C) DNA mutase
D) DNA recombinase
E) DNA polymerase

Choose the **correct** answer from the options given below.

1) B and C only
2) C and D only
3) A and B only
4) D and E only

118. Which of the following type of immunity is present at the time of birth and is a non-specific type of defence in the human body?

1) Humoral immunity
2) Acquired immunity
3) Innate immunity
4) Cell – mediated immunity

119. Which factor is important for termination of transcription?

1) γ (gamma)
2) α (alpha)
3) σ (Sigma)
4) ρ (rho)

120. Which of the following hormones released from the pituitary is actually synthesized in the hypothalamus?

1) Adenocorticotrophic hormone (ACTH)
2) Luteinizing hormone (LH)
3) Anti-diuretic homone (ADH)
4) Follicle – stimulating hormone (FSII)

121. Which of the following microbes is **NOT** involved in the preparation of household products?

A) *Aspergillus niger*
B) *Lactobacillus*
C) *Trichoderma polysporum*
D) *Saccharomyces cerevisiae*
E) *Propionibacterium sharmanii*

Choose the **correct** answer from the options given below.

1) C and E only
2) A and B only
3) A and C only
4) C and D only

122. Given below are two statements

**Statement – I :** Fig fruit is a non-vegetarian fruit as it has enclosed fig wasps in it

**Statement – II :** Fig wasp and fig tree exhibit mutual relationship as fig wasp completes its life cycle in fig fruit and fig fruit gets pollinated by fig wasp.

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

1) Statement I is incorrect but statement II is correct
2) Both statement I and statement II are correct
3) Both statement I and statement II are incorrect
4) Statement I is correct but statement II is incorrect

123. Role of the water vascular system in Echinoderms is
A) Respiration and locomotion
B) Excretion and locomotion
C) Capture and transport of food
D) Digestion and respiration
E) Digestion and excretion
Choose the **correct** answer from the options given below
1) B, D and E only
2) A and B only
3) A and C only
4) B and C only

124. After maturation, in primary lymphoid organs, the lymphocytes migrate for interaction with antigens to secondary lymphoid organ(s) / tissue(s) like:
A) Thymus
B) Bone marrow
C) Spleen
D) Lymph nodes
E) Peyer's patches
Choose the **correct** answer from the options given below.
1) C, D, E only
2) B, C, D only
3) A, B, C only
4) E, A, B only

125. Match List – I with List – II.

| List – I | | List – II | |
|---|---|---|---|
| A) | The Evil Quartet | I) | Cryopreservation |
| B) | Ex – situ | II) | Alien species invasion |
| C) | Lantana camara | III) | Causes of biodiversity losses |
| D) | Dodo | IV) | Extinction |

Choose the option with all **correct** matches.
1) A – III, B – II, C – IV, D – I
2) A – III, B – II, C – I, D – IV
3) A – III, B – I, C – II, D – IV
4) A – III,B – IV, C – II, D – I

126. Read the following statements on plant growth and development.
A) Parthenocarpy can be induced by auxins.
B) Plant growth regulators can be involved in promotion as well as inhibition of growth.
C) Dedifferentiation is a pre-requisite for redifferentiation.
D) Abscisic acid is a plant growth promoter.
E) Apical dominance promotes the growth of lateral buds.
Choose the option with all **correct** statemnts.
1) B, D, E only
2) A, B, C only
3) A, C, E only
4) A, D, E only

127. Match List – I with List – II.

| List – I | | List – II | |
|---|---|---|---|
| A) | Pteridophyte | I) | *Salvia* |
| B) | Bryophyte | II) | *Ginkgo* |
| C) | Angiosperm | III) | *Polytrichum* |
| D) | Gymnosperm | IV) | *Salvinia* |

Choose the option with all **correct** matches.
1) A – IV, B – III, C – II, D – I
2) A – III, B – IV, C – II, D – I
3) A – IV, B – III, C – I, D – II
4) A – III, B – IV, C – I, D – II

128. Why can't insulin be given orally to diabetic patients?
1) It bioavailability will be increased
2) Human body will elicit strong immune response
3) It will be digested in Gastro-Intestinal (GI) tract
4) Because of structural variation

129. Which one of the following is the characteristic feature of gymnosperms?
1) Gymnosperms have flowers for reproduction
2) Seeds are enclosed in fruits
3) Seeds are naked
4) Seeds are absent

130. Frogs respire in water by skin and buccal cavity and on land by skin, buccal cavity and lungs.
Choose the correct answer from the following
1) The statement is false for both the environment
2) The statement is true for water but false for land
3) The statement is true for both the environment
4) The statement is false for water but true for land

131. Silencing of specific mRNA is possible via RNAi because of
1) Non – complementary ssRNA
2) Complementary dsRNA
3) Inhibitory ssRNA
4) Complementary tRNA

132. Twins are born to a family that lives next door to you. The twins are a boy and a girl. Which of the following must be true?
1) They have 75% identical genetic content
2) They are monozygotic twins
3) They are fraternal twins.
4) They were conceived through in vitro fertilization

133. Match List – I with List – II.

| List – I | | List – II | |
|---|---|---|---|
| A) | Scutellum | I) | Persistant nucellus |
| B) | Non-albuminous seed | II) | Cotyledon of monocot seed |
| C) | Epiblast | III) | Groundnut |
| D) | Perisperm | IV) | Rudimentary cotyledon |

Choose the option with all **correct** matches.
1) A – II, B – IV, C – III, D – I
2) A – II, B – III, C – IV, D – I
3) A – IV, B – III, C – II, D – I
4) A – IV, B – III, C – I, D – II

134. In frog, the renal portal system is a special venous connection that acts to link
1) Kidney and lower part of body
2) Liver and intestine
3) Liver and kidney
4) Kidney and intestine

135. Match List – I with List – II.

| List – I | | List – II | |
|---|---|---|---|
| A) | Heart | I) | Erythropoietin |
| B) | Kidney | II) | Aldosterone |
| C) | Gastro-intestinal tract | III) | Atrial natriuretic factor |
| D) | Adrenal cortex | IV) | Secretin |

Choose the option with all correct matches.
1) A – III, B – I, C – IV, D – II
2) A – II, B – I, C – III, D – IV
3) A – IV, B – III, C – II, D – I
4) A – I, B – III, C – IV, D – II

136. Cardiac activities of the heart are regulated by
A. Nodal tissue
B. A special neural centre in the medulla oblongata
C. Adrenal medullary hormones
D. Adrenal cortical hormones
Choose the correct answer from the options given below
1) A, B and D only
2) A, B and C only
3) A, B, C and D
4) A, C and D only

137. Streptokinase produced by *bacterium Streptococcus* is used for
1) removing clots from blood vessels
2) curd production
3) ethanol production
4) liver disease treatment

138. Who is known as the father of ecology in India?
1) Birbal Sahni
2) S.R. Kashyap
3) Ramdeo Misra
4) Ram Udar

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

**Assertion (A):** A typical unfertilized angiosperm embryo sac at maturity is 8 nucleate and 7 celled.

**Reason (R):** The egg apparatus has 2 polar nuclei.

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

1) A is false but R is true
2) Both A and R are true and R is the correct explanation of A
3) Both A and R are true and R is NOT the correct explanation of A
4) A is true but R is false

140. Neoplastic characteristics of cells refer to

A. A mass of proliferating cell
B. Rapid growth of cells
C. Invasion and damage to the surrounding tissue
D. Those confined to original location

Choose the correct and answer from the options given below.

1) B, C, D only
2) A, B only
3) A, B, C only
4) A, B, D only

141. Given below are the stages in the life cycle of pteridophytes. Arrange the following stages in the **correct** sequence.

A. Prothallus stage
B. Meiosis in spore mother cells
C. Fertilization
D. Formation of archegonia and antheridia in gametophyte
E. Transfer of antherozoids to the archegonia in presence of water

Choose the correct answer from the options given below.

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

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

**Assertion (A):** Both wind and water pollinated flowers are not very colourful and do not produce nectar.

**Reason (R):** The flowers produce enormous amount of pollen grains in wind and water pollinated flowers.

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

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

143. Which one of the following enzymes contains 'Haem' as the prosthetic group?

1) Catalase
2) RuBisCo
3) Carbonic anhydrase
4) Succinate dehydrogenase

144. Match list I with list II.

| List - I | List - II |
|---|---|
| A) Emphysema | I) Rapid spasms in muscle due to low $Ca^{++}$ in body fluid |
| B) Angina pectoris | II) Damaged alveolar walls and decreased respiratory surface |
| C) Glomerulonephritis | III) Acute chest pain when not enough oxygen is reaching to heart muscle |
| D) Tetany | IV) Inflammation of glomeruli of kidney |

Choose the correct answer from the options given below.

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

**145.** Find the statement that is **NOT correct** with regard to the structure of monocot stem.
1) Phloem parenchyma is absent
2) Hypodermis is parenchymatous
3) Vascular bundles are scattered
4) Vascular bundles are conjoint and closed

**146.** Which of the following statement is correct about location of the male frog copulatory pad?
1) First digit of the fore limb
2) First and second digit of forelimb
3) First digit of hind limb
4) Second digit of fore limb

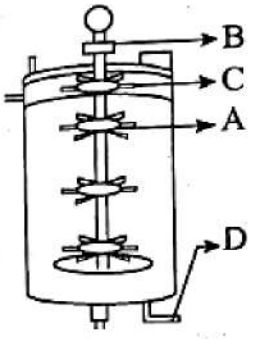
**147.** Given below are two statements.

**Statement-I:** The primary source of energy in an ecosystem is solar energy.

**Statement-II:** The rate of production of organic matter during photosynthesis in an ecosystem is called net primary productivity (NPP).

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

**148.** Identify the part of a bio-reactor which is used as a foam braker form the given figure.




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

**149.** Polymerase chain reaction (PCR) amplifies DNA following the equation.
1) $2N^2$
2) $N^2$
3) $2^n$
4) $2n + 1$

**150.** Match list I with list II.

| List - I | List - II |
|---|---|
| A) Head | I) Enzymes |
| B) Middle piece | II) Sperm motility |
| C) Acrosome | III) Energy |
| D) Tail | IV) Genetic material |

Choose the correct answer from the options given below.
1) A - III, B - II, C - I, D - IV
2) A - IV, B - III, C - I, D - II
3) A - IV, B - III, C - II, D - I
4) A - III, B - IV, C - II, D - I

**151.** Given below are two statements.

**Statement-I:** In a floral formula ⊕ stands for zygomorphic nature of the flower and G stands for inferior ovary.

**Statement-II:** In a floral formula ⊕ stands for actinomorphic nature of the flower and G stands for superior ovary.

In the light of the above statements, choose the correct answer from the options given below.
1) Statement I is incorrect, statement II is correct
2) Both Statement I and statement II are correct
3) Both statement I and statement II are incorrect
4) Statement I is correct, Statement II is incorrect

**152.** From the statements given below choose the **correct** option.
A. The eukaryotic ribosomes are 80S and prokaryotic ribosomes are 70S.
B. Each ribosome has two sub-units
C. The two sub units of 80S ribosome are 60S and 40S while that of 70S are 50S and 30S.

D. The two sub-units of 80S ribosome are 60S and 20S and that of 70S are 50S and 20S.

E. The two sub-units of 80S are 60S and 30S and that of 70S are 50S and 30S.

1) B, D, E are true

2) A, B, C are true

3) A. B, D are true

4) A, B, E are true

**153.** Each of the following characteristics represent a Kingdom proposed by Whittaker. Arrange the following in increasing order of complexity of body organization.

A. Multicellular heterotrophs with cell wall made of chitin

B. Heterotrophs with tissue / organ / organ system level of body organization.

C. Prokaryotes with cell wall made of polysaccharides and amino acids

D. Eukaryotic autotrophs with tissue/ organ level of body organization

E. Eukaryotes with cellular body organization

Choose the **correct** answer from the options given below.

1) C, E, A, B, D

2) A, C, E, B, D

3) C, E, A, D, B

4) A, C, E, D, B

**154.** The **correct** sequence of events in the life cycle of bryophytes is

A. Fusion of antherozoid with egg

B. Attachment of gametophyte to substratum

C. Reduction division to produce haploid spores

D. Formation of sporophyte

E. Release of antherozoids into water

Choose the correct answer from the options given below.

1) D, E, A, B, C

2) D, E, A, C, B

3) B, E, A, C, D

4) B, E, A, D, C

**155.** Which are correct.

A. Computed tomography and magnetic resonance imaging detect cancers of internal organs.

B. Chemotherapeutic drugs are used to kill non – cancerous cells

C. α-interferon activate the cancer patients immune system and helps in destroying the tumour.

D. Chemotherapeutic drugs are biological response modifiers

E. In the case of leukaemia blood cells counts are decreased.

Choose the **correct** answer from the options given below.

1) A and C only

2) B and D only

3) D and E only

4) C and D only

**156.** Name the class of enzyme that usually catalyze the following reaction

$S - G + S^{\#} \rightarrow S + S^{\#} - G$

Where, G → a group other than hydrogen

S → a substrate

$S^{\#}$ → another substrate

1) Ligase

2) Hydrolase

3) Lyase

4) Transferase

**157.** Find the **correct** statements.

A. In human pregnancy, the major organ systems are formed at the end of 12 weeks

B. In human pregnancy the major organ systems are formed at the end of 8 weeks.

C. In human pregnancy heart is formed after one month of gestation.

D. In human pregnancy, limbs and digits develop by the end of second month.

E. In human pregnancy the appearance of hair is usually observed in the fifth month

Choose the correct answer from the options given below.

1) A, C, D and E only

2) A and E only

3) B and C only

4) B, C, D and E only

158. Which of the following is an example of non-distilled alcoholic beverage produced by yeast?

1) Rum 2) Whisky
3) Brandy 4) Beer

159. Given below are two statements.

**Statement-I:** In the RNA world, RNA is considered the first genetic material evolved to carry out essential life processes. RNA acts as a genetic material and also as a catalyst for some important biochemical reactions in living systems. Being reactive, RNA is unstable.

**Statement-II:** DNA evolved from RNA and is a more stable genetic material. Its double helical strands being complementary, resist changes by evolving repairing mechanism.

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

1) Statement I is incorrect but statement II is correct
2) Both Statements I and II are correct
3) Both statements I and II are incorrect
4) Statement I is correct but Statement II is incorrect

160. Given below are two statements.

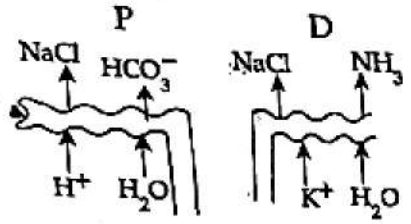
**Statement-I:** Transfer RNAs and ribosomal RNA do not interact with mRNA.

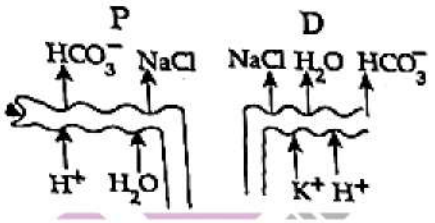
**Statement-II:** RNA interference (RNAi) takes place in all eukaryotic organisms as a method of cellular defence.

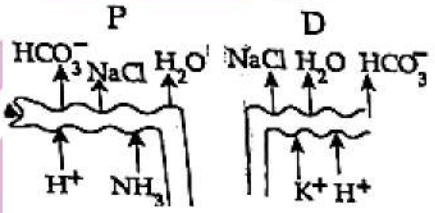
In the light of the above statements, choose the **most appropriate** answer from the options given below.

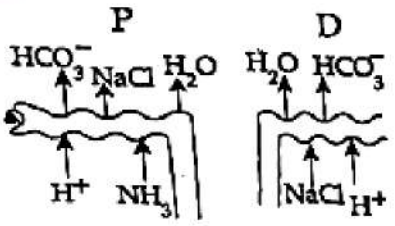
1) Statement I is incorrect but statement II is correct
2) Both Statement I and statement II are correct
3) Both statements I and statement II are incorrect
4) Statement I is correct but Statement II is incorrect

161. Which of the following diagrams is correct with regard to the proximal (P) and distal (D) tubule of the nephron?

1) 


2) 


3) 


4) 


162. What is the pattern of inheritance for polygenic trait?

1) X –linked recessive inheritance pattern
2) Mendelian inheritance pattern
3) Non-mendelian inheritance pattern
4) Autosomal dominant pattern

163. In the seeds of cereals, the outer covering of endosperm separates the embryo by a protein rich layer called :

1) Aleurone layer 2) Coleoptile
3) Coleorhiza 4) Integument

164. Match list I with list II.

| List - I | List - II |
|---|---|
| A) Chlorophyll a | I) Yellow green |
| B) Chlorophyll b | II) Yellow |
| C) Xanthophylls | III) Blue – green |
| D) Carotenoids | IV) Yellow to yellow – orange |

Choose the **correct** answer from the options given below.

1) A - I, B - IV, C - III, D - II

2) A - III, B - IV, C - II, D - I

3) A - III, B - I, C - II, D - IV

4) A - I, B - II, C - IV, D - III

**165.** Which of the following genetically engineered organisms was used by Eli Lilly to prepare human insulin?

1) Phage 2) Bacterium

3) Yeast 4) Virus

**166.** Which of the following are the post transcriptional events in an eukaryotic cell?

A. Transport of pre-mRNA to cytoplasm prior to splicing

B. Removal of introns and joining of exons.

C. Addition of methyl group at 5′ end of hnRNA.

D. Addition of adenine residues at 3′ end of hnRNA

E. Base pairing of two complementary RNAs

Choose the **correct** answer from the options given below.

1) C, D, E only

2) A, B, C only

3) B, C, D only

4) B, C, E only

**167.** Match list I with list II.

| List - I | List - II |
|---|---|
| A) Centromere | I) Mitochondrion |
| B) Cilium | II) Cell division |
| C) Cristae | III) Cell movement |
| D) Cell membrane | IV) Phospholipid Bilayer |

Choose the **correct** answer from the options given below.

1) A - II, B - III, C - I, D - IV

2) A - I, B - II, C - III, D - IV

3) A - II, B - I, C - IV, D - III

4) A - IV, B - II, C - III, D - I

**168.** Match List I with List II.

| List - I | List - II |
|---|---|
| A) Alfred Hershey and Martha Chase | I) Streptococcus pneumoniae |
| B) Euchromatin | II) Densely packed and dark - stained |
| C) Frederick Griffith | III) Loosely packed and light - stained |
| D) Heterochromatin | IV) DNA as genetic material confirmation |

Choose the **correct** answer from the options given below.

1) A – III, B - II, C - IV, D - I

2) A - II, B - IV, C - I, D - III

3) A - IV, B - II, C - I, D - III

4) A - IV, B - III, C - I, D - II

**169.** Which chromosome in the human genome has the highest number of genes?

1) Chromosome 10 2) Chromosome X

3) Chromosome Y 4) Chromosome 1

**170.** What are the potential drawbacks in adoption of the IVF method?

A. High fatality risk to mother

B. Expensive instruments and reagents

C. Husband/wife necessary for being donors

D. Less adoption of orphans

E. Not available in India

F. Possibility that the early embryo does not survive

Choose the **correct** answer from the options given below.

1) A, B, C, E, F only

2) B, D, F only

3) A, C, D, F only

4) A, B, C, D only

**171.** Which one of the following is an example for ex-situ conservation?

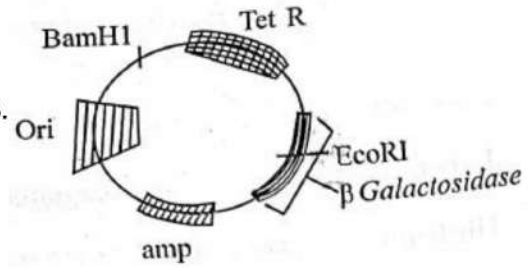
1) Protected areas

2) National park

3) Wild life sanctuary

4) Zoos and botanical gardens

172. A specialised membranous structure in a prokaryotic cell which helps in cell wall formation, DNA replication and respiration is :
1) Endoplasmic Reticulum 2) Mesosome
3) Chromatophores 4) Cristae

173.



In the above represented plasmid an alien piece of DNA is inserted at EcoRI site. Which of the following strategies will be chosen to select the recombinant colonies?
1) Blue colour colonies grown on ampicillin plates can be selected
2) Using ampicillin and tetracyclin containing medium plate
3) Blue color colonies will be selected
4) White color colonies will be selected

174. What is the name of the blood vessel that carries deoxygenated blood from the body to the heart in a frog?
1) Vena cava 2) Aorta
3) Pulmonary artery 4) Pulmonary vein

175. Which of the following organisms *cannot* fix nitrogen?
A. *Azotobacter* B. *Oscillatoria*
C. *Anabaena* D. *Volvox*
E. *Nostoc*
Choose the **correct** answer from the options given below:
1) E only 2) A only
3) D only 4) B only

176. While trying to find out the characteristic of a newly found animal, a researcher did the histology of adult animal and observed a cavity with presence of mesodermal tissue towards the body wall but no mesodermal tissue was observed towards the alimentary canal. What could be the possible coelome of that animal?
1) Spongocoelomate 2) Acoelomate
3) Pseudocoelomate 4) Schizocoelomate

177. Which one of the following statements refers to Reductionist biology?
1) Behavioural approach to study and understand living organisms
2) Physico-chemical approach to study and understand living organisms
3) Physiological approach to study and understand living organisms
4) Chemical approach to study and understand living organisms

178. Epiphytes that are growing on a mango branch is an example of which of the following?
1) Amensalism 2) Commensalism
3) Mutualism 4) Predation

179. Which one of the following phytohormones promotes nutrient mobilization which helps in the delay of leaf senescence in plants?
1) Cytokinin 2) Ethylene
3) Abscisic acid 4) Gibberellin

180. The complex II of mitochondrial electron transport chain is also known as
1) NADH dehydrogenase
2) Cytochrome $bc_1$
3) Succinate dehydrogenase
4) Cytochrome c oxidase