02/04/2026

Code-A

Aakash
Medical | IIT-JEE | Foundations

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Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 Final Test Series(P1)_NEET2026_Test-06A **Time : 180 Min.**

PHYSICS

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CHEMISTRY

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ZOOLOGY

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180. (3)

Hints and Solutions

PHYSICS

(1) **Answer :** (2)
Solution:
$M = I\ell^2$
$\ell = \sqrt{\frac{M}{I}}$
$\ell_1 = 4\ell$
$\ell_1 = 4\sqrt{\frac{M}{I}}$

(2) **Answer :** (2)
Solution:
$R = \frac{\rho\ell}{A}$
Let density be *d*
$\therefore \ \frac{m}{A\ell} = d$
$A = \frac{m}{\ell d}$
$\Rightarrow \ R \propto \frac{\ell^2}{m}$
Ratio = $\frac{1}{5}$: $\frac{16}{3}$: $\frac{64}{1}$
= 3 : 80 : 960

(3) **Answer :** (1)
Solution:
In presence of uniform magnetic field charged particle can move in circle.

(4) **Answer :** (2)
Solution:
$V = IR \Rightarrow I = \frac{V}{R} \qquad \ldots(\mathrm{i})$
Also $\frac{dq}{dt} = I \Rightarrow \int dq = \int I dt$
$Q = \int \frac{V}{R} dt \Rightarrow \frac{1}{R}\int V dt$
Therefore, $Q = \frac{1}{R} \times$ Area under $V - t$ curve
$Q = \frac{1}{5} \times \frac{1}{2} \times 10 \times 2 = 2\ \mathrm{C}$

(5) **Answer :** (1)
Solution:
The property possessed by only ferromagnetic substance is hysteresis.

(6) **Answer :** (4)
Solution:
Self induction of a coil is independent of rate of change of current through it, rather it depends on the shape and other geometrical parameters.

(7) **Answer :** (1)
Solution:
$B = 2B_S + B_C$
$= 2 \times \frac{\mu_0}{4\pi}\frac{i}{R} + \frac{\mu_0 \times \frac{1}{2}i}{2R}$
$= \frac{\mu_0}{2\pi}\frac{i}{R} + \frac{\mu_0 i}{4R}$

(8) **Answer :** (3)
Solution:
As in parallel potential will be same
$C_1\theta_1 = n_1\frac{V}{R_1}A_1B$
$C_2\theta_2 = n_2\frac{V}{R_2}A_2B$

$\Rightarrow \frac{\theta_1}{\theta_2} = \frac{n_1 A_1 C_2 R_2}{n_2 A_2 C_1 R_1}$

(9) **Answer :** (2)
Solution:
Increase in temperature results in reduction of relaxation time (τ).
$v_d = \frac{eE\tau}{m} \Rightarrow v_d \propto \tau$
Also, resistivity/resistance of a metallic wire increases with temperature, hence current will decrease according to $V = IR$.

(10) **Answer :** (3)
Solution:
Given *N* = 100 turns, *r* = 10 cm, *i* = 5 A
$\vec{B} = \left(-\hat{i} + \hat{k}\right)\text{T}$
Magnetic dipole moment :
$\mu = NiA = 100 \times 5 \times \pi\left(10 \times 10^{-2}\right) = 5\pi \text{ Am}^2$
Direction of the dipole moment is along the area vector i.e., along positive *z*-axis.
$\vec{\tau} = \vec{\mu} \times \vec{B} = 5\pi\left(\hat{k}\right) \times \left(-\hat{i} + 2\hat{k}\right)$
$\vec{\tau} = 5\pi\left(-\hat{j}\right)$
Net force on a current loop placed in a uniform magnetic field is always zero.

(11) **Answer :** (4)
Solution:
As velocity of rod is parallel to its length, it will not cut any magnetic flux due to its motion so no EMF will be induced in it across its length.

(12) **Answer :** (2)
Solution:
For paramagnetic materials, $\chi = \frac{C}{T}$

(13) **Answer :** (3)
Solution:
$r = \frac{\sqrt{2Km}}{qB}$
$\frac{r_p}{r_\alpha} = \sqrt{\frac{m_p}{m\alpha}}\frac{q_\alpha}{q_p} = \sqrt{\frac{1}{4}} \cdot \frac{2}{1} = \frac{1}{1}$
$r_P \ : \ r_\alpha = 1 \ : \ 1$

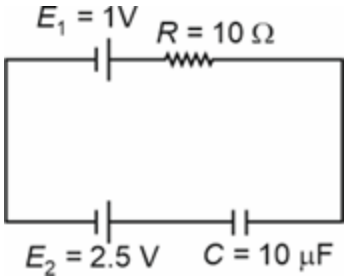
(14) **Answer :** (3)
Solution:
For diamagnetic materials, $\mu_d = 0$

(15) **Answer :** (4)
Solution:
As the 3 Ω and 1 Ω resistors are short circuited by the wire in parallel with them hence no current passes through them.

(16) **Answer :** (4)
Solution:
$V_B - V_A = -5 \times 1 - 15 - 5 \times 10^{-3} \times 10^3$
= – 25 V

(17) **Answer :** (3)
Solution:
Time period is independent of speed
$T = \frac{2\pi m}{qB}$

(18) **Answer :** (1)
Solution:
At steady state, there will be no current in the circuit.



Applying Kirchhoff's loop rule:

$E_2 - \frac{Q}{C} - E_1 = 0 \Rightarrow 2.5 - 1 = \frac{Q}{C} \Rightarrow Q = 10 \times 1.5$

$\therefore Q = 15\ \mu C$

(19) **Answer :** (2)

Solution:

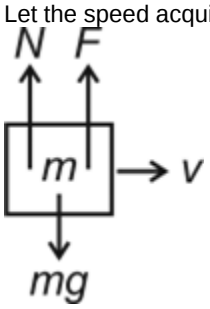
$M = K\sqrt{L_1 L_2}$

In case of perfect coupling $K = 1$

(20) **Answer :** (1)

Solution:

Let the speed acquired by the block due to impulse be v, then



$N + F = mg$ ...(i)

$F = QvB$ ...(ii)

For $N = 0$

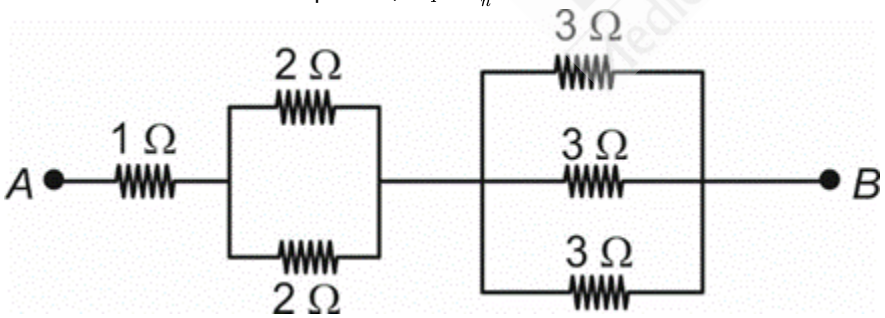
$QvB = mg \Rightarrow v = \frac{mg}{QB}$

Impulse $I = mv \Rightarrow I = \frac{m^2 g}{QB}$

(21) **Answer :** (3)

Solution:

For *n* identical resistances in parallel, $R_P = \frac{R}{n}$



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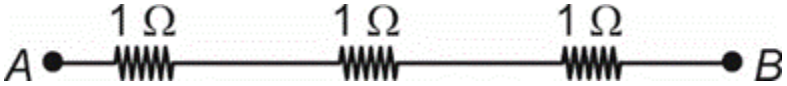


$\therefore \quad R_{AB} = 3\Omega$

(22) **Answer :** (3)

Solution:

- In a moving coil galvanometer a strong horse shoe permanent magnet is used to produce radial uniform magnetic field.
- Soft iron is a ferromagnetic material and hence it allows a larger number of magnetic field lines to pass through it.

(23) **Answer :** (1)

Solution:

$\left|e\right| = \frac{d\phi}{dt}$

$d\Phi = i\,R\,dt$

$\Delta\phi = R \cdot \int i dt = R \cdot (\text{area under } i - t \text{ curve})$

$= 100 \times 10 \times \frac{0.8}{2} = 400\,\text{Wb}$

(24) **Answer :** (1)
Solution:

$F = \frac{\mu_0}{2\pi}\frac{i_1 i_2 L}{r} = \frac{2 \times 10^{-7} \times 30 \times 10 \times 0.1}{5 \times 10^{-2}} = 1.2 \times 10^{-4}\text{N}$

(25) **Answer :** (4)
Solution:
Work done by a magnetic force on a moving charged particle is always zero, hence kinetic energy will remain same.
All the other statements can be true for certain conditions but not always.

(26) **Answer :** (3)
Solution:
Magnetic field lines always form closed loop and hence magnetic flux through a closed surface is always zero, this is the statement of Gauss's law in magnetism.

(27) **Answer :** (1)
Solution:

In velocity selector mechanism, $\vec{v}$, $\vec{E}$ and $\vec{B}$ are mutually perpendicular to each other, where charged particle move undeflected because electric force and magnetic forces cancel each other.

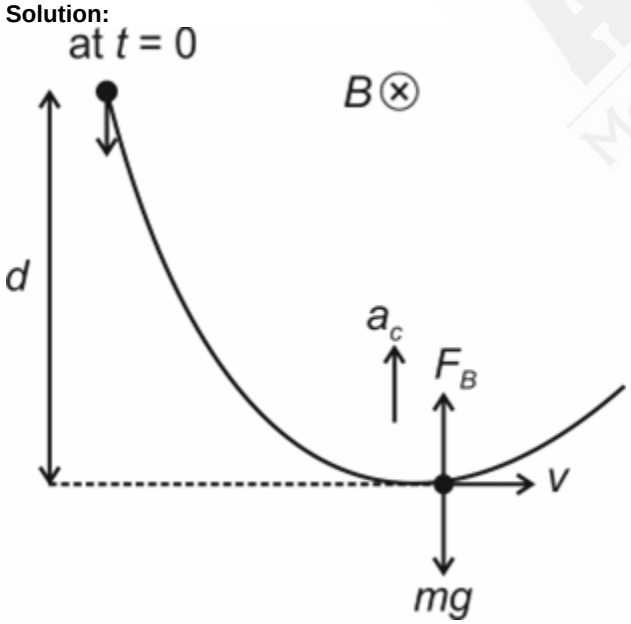
(28) **Answer :** (3)
Solution:

Since, $\oint \vec{B} . \vec{dl} = \mu_0 I_{en}$, therefore statement (3) is correct.

(29) **Answer :** (3)
Solution:
Magnetic braking is based on eddy current.

(30) **Answer :** (3)
Solution:
Inside the magnet field will be south to north outside the magnet field will be north to south

(31) **Answer :** (2)
Solution:



Magnetic field does no work on the particle

$\therefore \quad mgd = \frac{1}{2}mv^2 \Rightarrow v = \sqrt{2gd} \quad ...(\text{i})$

Magnetic force at the point of maximum depth :

$F_B = qvB = qB\sqrt{2gd}$

$F_{net} = m \times a \Rightarrow qB\sqrt{2gd} - mg = m \times a$

$a = \frac{qB}{m}\sqrt{2gd} - g$

Radius of auvature :

$R = \frac{v^2}{a} = \frac{2dg}{\frac{qB}{m}\sqrt{2gd} - g}$

$R = \frac{2mgd}{qB\sqrt{2gd} - mg}$

(32) **Answer :** (3)
Solution:

$\frac{\mu_0 I}{2R} = B$

$\Rightarrow \frac{2\pi \times 10^{-7} \times I}{10 \times 10^{-2}} = \pi \times 10^{-5}$

I = 5 A

(33) **Answer :** (4)
Solution:

$\vec{\mu} = Ni\vec{A}$, hence magnetic moment depends upon current. Area vector is always perpendicular to the plane of the loop and its direction is determined by right hand rule.

(34) **Answer :** (3)
Solution:

At *t* = 0, inductor acts as open circuit

$\therefore\ i_1 = \frac{10}{10} = 1\ \text{A}$

At $t \to \infty$, inductor acts as a wire of zero resistance.

$\therefore\ i_2 = \frac{10}{4} = \frac{5}{2}\ \text{A}$

Hence, $\frac{i_2}{i_1} = \frac{\frac{5}{2}}{1} = \frac{5}{2}$

(35) **Answer :** (4)
Solution:

$\varepsilon = -\frac{d\phi}{dt}$

$\varepsilon = -\frac{\mathrm{d}}{\mathrm{dt}}\left(3\mathrm{t}^2 - 2\mathrm{t} + 4\right)$

ε = –6t + 2

ε = –12 + 2

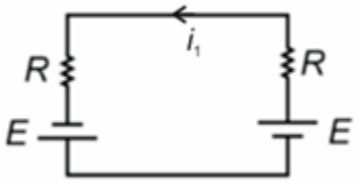
$\boxed{|\varepsilon| = 10\ \text{V}}$

(36) **Answer :** (4)
Solution:

From $V = IR$, R is the slope of V vs I curve. If slope is constant, it means R is constant. Other two graphs shows R to be constant, hence all the given graphs are correct.

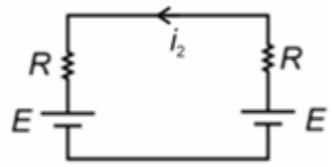
(37) **Answer :** (3)
Solution:

Effective circuit for case 1:



$i_1 = \frac{E+E}{2R} = \frac{E}{R}$

Effective circuit for case 2:

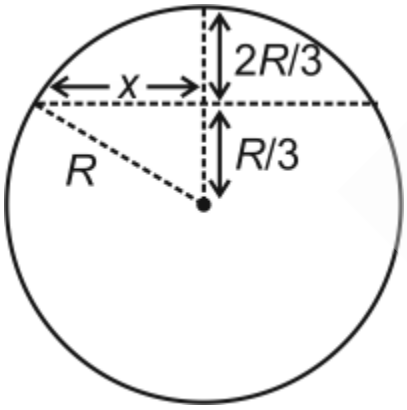


$i_2 = \frac{E-E}{2R} = 0$

(38) Answer : (1)
Solution:
Magnetic flux $\varphi = BA\cos\theta$
Also $E = \left|\frac{d\varphi}{dt}\right|$
$E = \frac{d}{dt}\left(BA\cos\theta\right)$

- $E = A\cos\theta\frac{dB}{dt} = A\cos\theta K\left\{\text{Let } \frac{dB}{dt} = K\right\}$
  It gives constant emf.
- $E = B\cos\theta \times \frac{d}{dt}\left(\pi r^2\right) = B\cos\theta\pi \times 2r\frac{dr}{dt}$
  Let $\frac{dr}{dt} = K$, then
  E depends on time
- $E = BA\frac{d}{dt}\left(\cos\theta\right) = BA\omega\left(-\sin\omega t\right)$
  {Let $\theta = \omega t$}
  E is dependent on time.

(39) Answer : (4)
Solution:

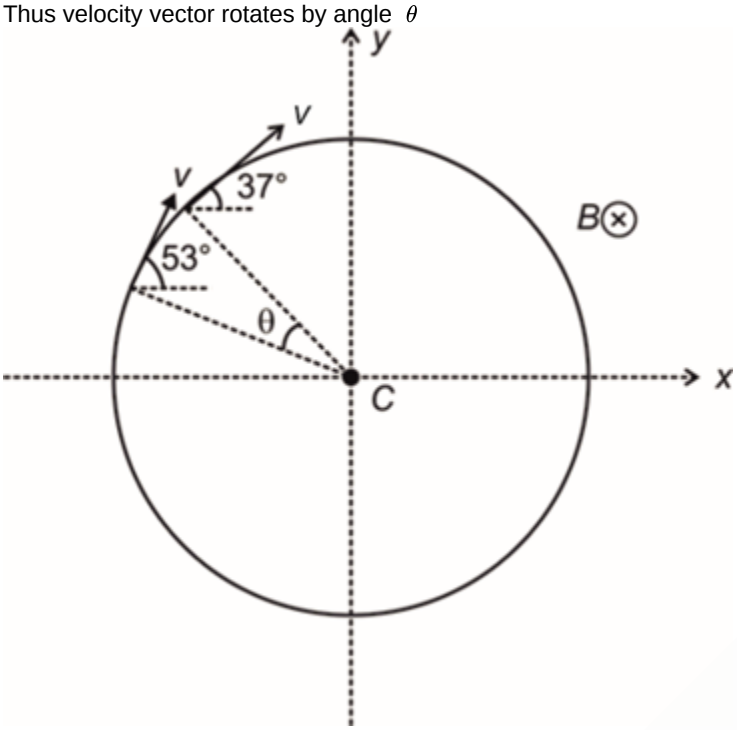


$x = \sqrt{R^2 - \frac{R^2}{9}} = \frac{2\sqrt{2}R}{3}$
$l = 2x = \frac{4\sqrt{2}R}{3}$
Weight of ring is balanced by magnetic force on $l_{effective}$ part i.e 2*x*.
$\therefore \quad mg = il_{eff}B$
$mg = i \times \frac{4\sqrt{2}\,RB}{3}$
$i = \frac{3\,mg}{4\sqrt{2}\,RB}$

(40) Answer : (2)
Solution:
Let power rating of each bulb is *P*, then maximum power can be achieved is 2*P* in parallel combination.
$\therefore 2P = P_0 \Rightarrow P = \frac{P_0}{2}$

(41) Answer : (4)
Solution:
Only magnetic force acts it means uniform circular motion with constant $\omega = \frac{qB}{m}$
So, velocity vector rotates with constant ω

Thus velocity vector rotates by angle θ



$\theta = 53^\circ - 37^\circ = 16^\circ = 16 \times \frac{\pi}{180}$ radian

$\text{Angular velocity } \omega = \frac{2\pi}{T} = \frac{2\pi qB}{2\pi m} = \frac{qB}{m}$

Since ω is constant, we can write

$\theta = \omega t \Rightarrow \frac{4\pi}{45} = \frac{qB}{m}t \Rightarrow t = \frac{4\pi m}{45qB}$

(42) **Answer :** (2)
Solution:

$R_2 = \frac{V}{I} = \tan\left(90 - \theta\right) = \cot\theta$

$R_1 = \frac{V}{I} = \tan\theta$

$R_2 - R_1 = \cot\theta - \tan\theta$

$R_0\left(1 + \alpha T_2\right) - R_0\left(1 + \alpha T_1\right) = \frac{\cos^2\theta - \sin^2\theta}{\cos\theta \sin\theta}$

$R_0\alpha\left(T_2 - T_1\right) = \frac{2\cos 2\theta}{\sin 2\theta}$

$(T_2 - T_1) \propto \cot 2\theta$

(43) **Answer :** (2)
Solution:

$\chi = \mu_r - 1$

For diamagnetic materials $\mu_r < 1$

(44) **Answer :** (1)
Solution:

$\frac{2y}{(2+y)\times 20} = \frac{4}{80}$

$\Rightarrow \quad \frac{2y}{2+y} = 1$

$2y = y + 2$

$y = 2\ \Omega$

(45) **Answer :** (4)
Solution:

Volume of the magnet

$V = \frac{M}{\rho} = \frac{8\times 10^{-3}}{7.9\times 10^3} = \frac{8}{7.9} \times 10^{-6}$

Intensity of magnetisation

$I = \frac{\mu}{V} = \frac{4\times 7.9}{8\times 10^{-6}} = 3.95 \times 10^6\ \text{A m}^{-1}$

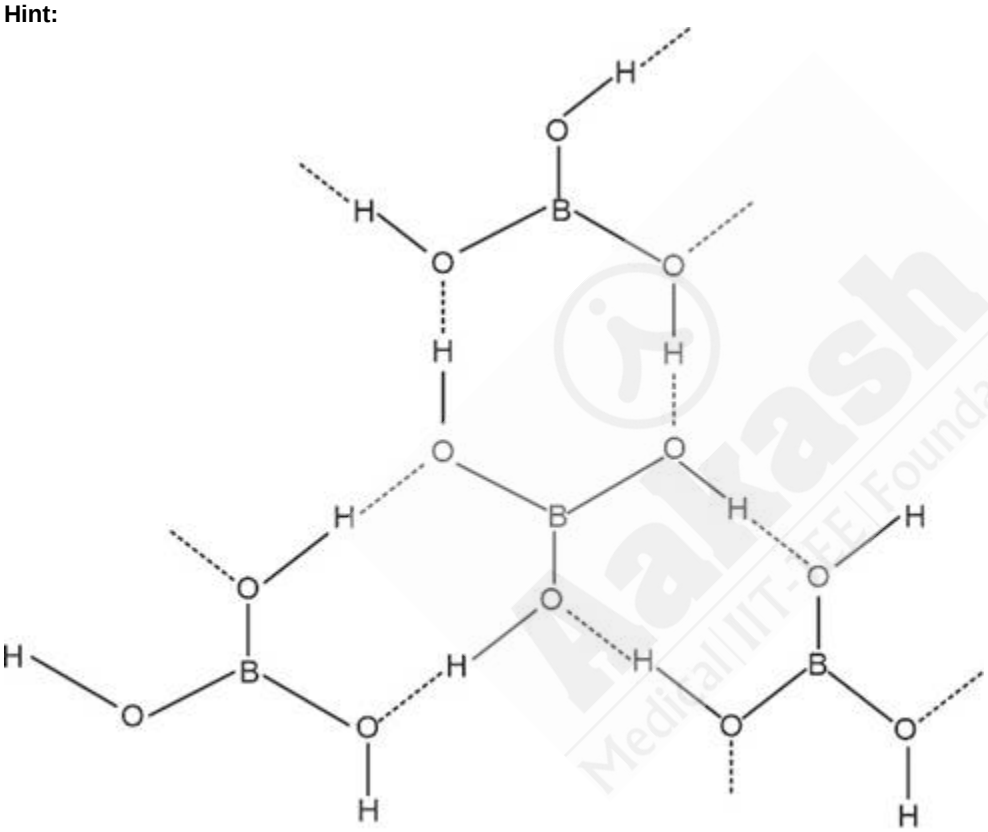
CHEMISTRY

(46) **Answer :** (1)
Solution:
The correct order of atomic radii is
B < Ga < Al < In

(47) **Answer :** (2)
Hint:
Diborane catches fire spontaneously upon exposure to air.
Solution:
$B_2H_6 + 3O_2 \rightarrow B_2O_3 + 3H_2O$

$\Delta H = -1976 \text{ kJ mol}^{-1}$

(48) **Answer :** (3)
Hint:



(Structure of boric acid)

Solution:
$Na_2B_4O_7 + 2HCl + 5H_2O \rightarrow 2NaCl + 4H_3BO_3$

$H_3BO_3 \xrightarrow{\Delta} \underset{(\text{metaboric acid})}{HBO_2} \xrightarrow{\Delta} B_2O_3$

Boric acid is a weak monobasic Lewis acid.

(49) **Answer :** (1)
Hint:
$B_3N_3H_6$ is known as inorganic benzene

(50) **Answer :** (4)
Hint:
$2Al(s) + 2NaOH(aq) + 6H_2O(l) \rightarrow 2Na^+[Al(OH)_4]^-(aq) + 3H_2(g)$
Solution:

$AlCl_3$ in acidified aqueous solution forms octahedral $[Al(H_2O)_6]^{3+}$ ion.

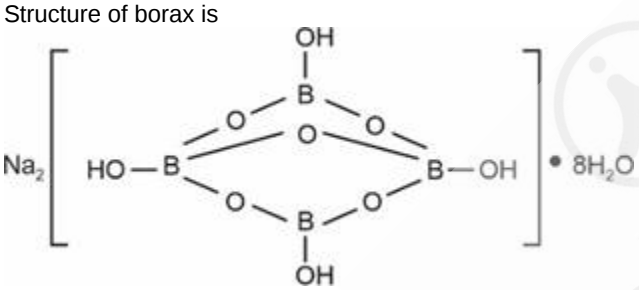
(51) Answer : (2)
Solution:

Borax + CoO $\xrightarrow[\text{Pt wire}]{\Delta}$ $\underset{\text{Blue bead}}{Co(BO_2)_2}$

(52) Answer : (1)
Hint:
Back donation of electrons in BF_3 is maximum.
Solution:
As the size of orbital of halogens increases, back donation of electrons to B atom decreases. Hence Lewis acidity order is $BF_3 < BCl_3 < BBr_3$.

(53) Answer : (4)
Hint:
Lead compounds in +2 state are stable and in +4 oxidation state are strong oxidising agent because of the inert pair effect.
Solution:
$[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ is not because six large chloride ions cannot be accommodated around Si^{4+} due to limitation of its size.
• In graphite, each carbon atom makes three sigma bonds with three neighbouring carbon atoms and fourth electron forms a π bond therefore each carbon atom is sp^2 hybridized.

(54) Answer : (1)
Hint:
Structure of borax is



Solution:
Number of hydrated water = 8
Number of B–O–B bonds = 5
Number of sp^2 boron atoms = 2
Number of B–OH bonds = 4

(55) Answer : (4)
Hint:
Graphite is thermodynamically most stable allotrope of carbon

(56) Answer : (2)
Hint:

$K_c = \frac{[B]^2[C]}{[A]}$

Solution:

	$A(g)$	$\rightleftharpoons$	$2B(g)$	$+$	$C(g)$
$t = 0$	10		0		0
eq.	$10 - x$		$2x$		x

Given: $\frac{x}{10} = 0.08$, x = 0.8

so, $K_c = \frac{(0.08)(0.16)^2}{(0.92)}$

(57) Answer : (3)
Hint:
CO + H_2 is syn gas
Solution:

$CO + N_2$ is producer gas

(58) **Answer :** (3)
Hint:
Due to inert pair effect, +1 oxidation state is most preferred in Tl.
Solution:
Due to inert pair effect, +1 oxidation state is most preferred in Tl.

(59) **Answer :** (3)
Hint:
CO is colourless, odourless toxic gas.
Solution:
CO combines with blood and forms carboxyhaemoglobin which is more stable than oxyhaemoglobin.

(60) **Answer :** (1)
Hint:
Central atom must have an empty orbital to get hydrolysed.
Solution:
Since carbon atom does not have empty orbital in outermost shell hence CCl_4 will be most difficult to get hydrolysed.

(61) **Answer :** (4)
Hint:
Sum of the oxidation numbers of all elements in a compound is zero.
Solution:
$X(YZ_4)_3$
X = –3
Y = +5
Z = –1
$-3+\{5+(-1\times 4)\}\times 3=0$
∴ Formula of compound = $X(YZ_4)_3$.

(62) **Answer :** (3)
Hint:
$Cr_2O_7^{2-}$ is oxidising agent and Fe^{2+} is reducing agent.
Solution:

$$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$$

(63) **Answer :** (3)
Hint:
In disproportionation reaction, reduction and oxidation of same element takes place
Solution:

(1) $KClO_3 \xrightarrow{\Delta} KCl + \frac{3}{2}O_2$ (reduction: $KClO_3 \rightarrow KCl$; oxidation: $KClO_3 \rightarrow \frac{3}{2}O_2$)

(2) $2H_2 + O_2 \longrightarrow 2H_2O$ (reduction: $O_2 \rightarrow 2H_2O$; oxidation: $2H_2 \rightarrow 2H_2O$)

(3) $Cl_2 + 2NaOH \longrightarrow NaOCl + NaCl + H_2O$ (oxidation: $Cl_2 \rightarrow NaOCl$; reduction: $Cl_2 \rightarrow NaCl$)

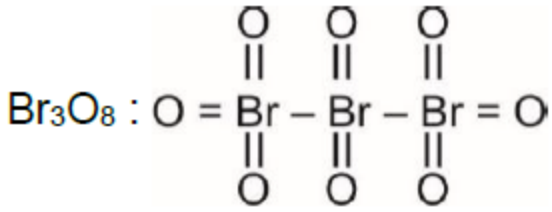
Hence (3) is disproportionation reaction.

(64) **Answer :** (1)
Hint:
Cl_2O_7 → 2x + 7(–2) = 0, x = +7
Solution:
$NaClO_3$ → 1 + x + 3(–2) = 0, x = +5
Cl_2O → 2x – 2 = 0, x = +1
ClO_2 → x + 2(–2) = 0, x = +4

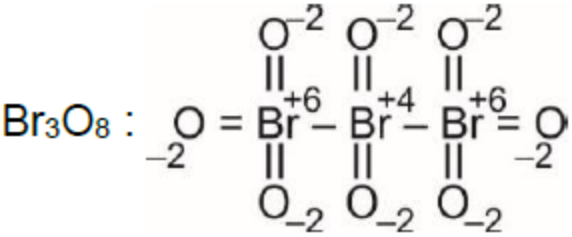
(65) **Answer :** (3)
Solution:
Lesser is the value of standard reduction potential, more will be the reducing power of the metal.

(66) **Answer :** (4)
Solution:
Only the ions are exchanged in the reaction.

(67) **Answer :** (3)
Hint:



Solution:



(68) **Answer :** (2)
Solution:

- A negative standard reduction potential means that the redox couple is stronger reducing agent than the H^+/H_2 couple
- A positive standard reduction potential means that the redox couple is weaker reducing agent than the H^+/H_2 couple.

(69) **Answer :** (4)
Solution:
In liquid $\rightleftharpoons$vapour equilibrium, the vapour pressure is constant at given temperature.

(70) **Answer :** (2)
Solution:

$$K_C = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{(4\times10^{-2})^2}{2\times10^{-2}\times(1\times10^{-2})^3} = 8\times10^2$$

(71) **Answer :** (3)
Solution:

$H_2(g) + I_2(g) \rightleftharpoons 2\,HI(g)\ \frac{K_p}{K_c} = (RT)^0 = 1$

$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)\ \frac{K_p}{K_c} = (RT)^1 = RT$

$N_2(g) + 3H_2(g) \rightleftharpoons 2\,NH_3(g)\ \frac{K_p}{K_c} = (RT)^{-2}$

$PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)\ \frac{K_p}{K_c} = (RT)^{-1}$

(72) **Answer :** (2)
Solution:
If $K_c < 10^{-3}$, reactants predominates over products.

(73) **Answer :** (4)
Solution:
$PV = nRT$
$P\times1 = \frac{27.6}{92}\times0.083\times400 = 9.96\ \text{bar}$

$$\begin{array}{lll} & N_2O_4(g) & \rightleftharpoons \quad 2NO_2(g) \\ t=0 & 9.96\ bar & \\ t=equi & 9.96-x & 2x \end{array}$$

Total $P = 9.96 + x = 18.30 \Rightarrow x = 8.34$

$P_{N_2O_4} = 9.96 - 8.34 = 1.62,\ P_{NO_2} = 16.68$

$K_p = \frac{P_{NO_2}^2}{P_{N_2O_4}} = \frac{(16.68)^2}{1.62} = 171.74$

(74) Answer : (4)
Solution:
High pressure and low temperature favored reaction in forward direction.

(75) Answer : (4)
Solution:
NH_4^+ and H_3O^+ are conjugate acids of NH_3 and H_2O respectively.

(76) Answer : (1)
Solution:
$K_a \times K_b = 10^{-14}$

$K_b = \frac{10^{-14}}{1.8\times10^{-4}}$

$= \frac{1}{1.8} \times 10^{-10}$

$pK_b = -\log\left(\frac{1}{1.8} \times 10^{-10}\right)$

$= -\left(\log 1 - \log 1.8 + \log 10^{-10}\right)$

$= -(0 - 0.255 - 10)$

$= 10.255$

(77) Answer : (1)
Solution:
While comparing the elements in same group of periodic table, bond strength is more important factor in determining acidity.
H_2S is stronger acid than H_2O because $H-S$ bond is weaker than $H-O$ bond.

(78) Answer : (3)
Solution:
Total $OH^- = 10^{-8} + 10^{-7} = 1.1 \times 10^{-7} M$

$pOH = 14 - pH$

$pH = 14 - pOH$

$= 14 - \log\left(1.1 \times 10^{-7}\right)$

$= 7.04$

(79) Answer : (2)
Solution:
Catalyst increases the rate of a chemical reaction by making available a new low energy pathway for conversion of reactant into products.

(80) Answer : (2)
Solution:
Salt of weak base and strong acid will have pH less than 7.

(81) Answer : (1)
Solution:
$Ag_2C_2O_4 \rightleftharpoons 2Ag^+ + C_2O_4^{2-}$

$Ksp = \left[Ag^+\right]\left[C_2O_4^{2-}\right]$

$= 2.4 \times 10^{-4} \times 2.4 \times 10^{-4} \times 1.2 \times 10^{-4}$

$=6.912 \times 10^{-12}$

(82) Answer : (4)
Solution:
$N_2 + O_2 \rightleftharpoons 2NO \quad K_1$ …(i)

$2NO + O_2 \rightleftharpoons 2NO_2 \quad K_2$ …(ii)

(i) + (ii) we get $N_2 + 2O_2 \rightleftharpoons 2NO_2$, $K' = K_1K_2$

For $NO_2 \rightleftharpoons \frac{1}{2}N_2 + O_2(g)$, $K = \left(\frac{1}{K_1K_2}\right)^{1/2}$

(83) Answer : (1)
Solution:

$K_a = \frac{C\alpha^2}{1-\alpha}$
$\alpha << 1$
$K_a = C.\alpha\alpha$
$1.8 \times 10^{-5} = 2 \times 10^{-4}\alpha$
$\alpha = 0.9 \times 10^{-1}$

$H^+ = C\ \alpha$

$2 \times 10^{-4} = C \times 9 \times 10^{-2}$
$C = \frac{2\times10^{-4}}{9\times10^{-2}}$
$= 0.22 \times 10^{-2}$
$= 2.2 \times 10^{-3}$

(84) Answer : (3)
Solution:
$HClO_4$ and $NaClO_4$ is not acidic buffer.

(85) Answer : (1)
Solution:
Ag_2CrO_4 will precipitate last.

(86) Answer : (2)
Solution:
$pH = 7 + \frac{1}{2}(pK_a + \log C)$
$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
40 × 0.1 10 × 0.4 $CH_3COONa + H_2O$
(4m mol) (4m mol) – –
0 0 (4m mol)
$pH = 7 + \frac{1}{2}(pK_a + \log c)$
$= 7 + \frac{1}{2}(4.76 + \log 0.08)$
= 8.85

(87) Answer : (3)
Solution:
$pH = pKa + \log\frac{[X^-]}{[HX]}$
$pH = 5$

(88) Answer : (3)
Solution:
$NaCl \rightarrow$ no hydrolysis
$NH_4Cl \rightarrow \sqrt{\frac{K_w}{K_b \times c}}$
$CH_3COONa \rightarrow \sqrt{\frac{K_w}{K_a \times c}}$
$NH_4CN \rightarrow \sqrt{\frac{K_w}{K_a \times K_b}}$

(89) Answer : (3)
Solution:
$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
$0.1V$ $0.05V$
$0.1V - 0.05V$ LR $0.05V$ $0.05V$
$= 0.05V$
As it is mixture of salt of weak acid and strong base, so it is buffer solution.

(90) **Answer :** (2)
Solution:
NH_4^+ undergoes cationic hydrolysis.

BOTANY

(91) **Answer :** (2)
Solution:
Reserve material in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies. These are not bound by any membrane system and lie free in the cytoplasm.

(92) **Answer :** (4)
Solution:
Cytoskeleton helps in motility, provides mechanical support and maintains the shape of a cell.

(93) **Answer :** (3)
Solution:
Theodore Schwann, studied different types of animal cells and reported that cells had a thin outer layer which is known as the plasma membrane. The cytoplasm is the main arena of cellular activities in all the living cells.

(94) **Answer :** (4)
Solution:
Centrosomes and ribosomes are not surrounded by any membrane.
Ribosomes are found in both eukaryotes and prokaryotes. Centrosome helps in the formation of basal bodies and forms spindle fibres that give rise to spindle apparatus during cell division.

(95) **Answer :** (4)
Solution:
Processes like secretion and endocytosis are functions associated with plasma membrane.

(96) **Answer :** (2)
Solution:
Proteins are more than lipids.
The human erythrocyte has approximately 52% of proteins and 40% of lipids.

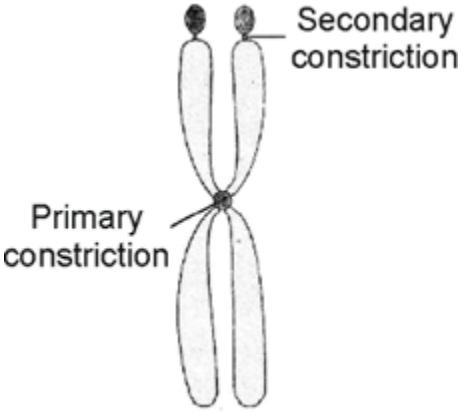
(97) **Answer :** (2)
Solution:
Mesosome represents infoldings of cell membrane in prokaryotes.

(98) **Answer :** (1)
Solution:
Cell wall determines the shape of the cell.

(99) **Answer :** (3)
Solution:
Plasmodesmata is living connection between plant cells.

(100) **Answer :** (1)
Solution:
Several ribosomes attach to a single mRNA to form a chain called polysome.

(101) **Answer :** (4)
Solution:



(102) Answer : (3)
Solution:
The activity of recombinase enzyme is observed during pachytene stage of prophase I.

(103) Answer : (3)
Solution:
Number of meiotic divisions required to produce 100 seeds in a typical flowering plant = n + n/4 = 100 + 100/4 = 125

(104) Answer : (3)
Solution:
Desynapsis occurs during diplotene stage. Long phase of this stage in some vertebrates is also known as dictyotene.

(105) Answer : (1)
Solution:
Best stage to study morphology of chromosomes is metaphase.

(106) Answer : (2)
Solution:
At anaphase-II, centromere of each chromosome splits.

(107) Answer : (3)
Solution:
In cell cycle, G_1 and G_2 phases are separated by S phase while M phase separates G_2 and G_1 phases.

(108) Answer : (2)
Solution:
70S ribosomes are present in cytoplasm of prokaryotes and in chloroplasts and mitochondria.

(109) Answer : (1)
Hint:
Centriole gives a cartwheel appearance.
Solution:
(i) Mitochondria – Possess oxysomes
(ii) Lysosomes – Also known as Suicidal bag
(iii) Microfilaments – Involve in cytoplasmic streaming

(110) Answer : (3)
Solution:

In chromoplast fat soluble carotenoid pigments are found. In animal cell Na^+/K^+ pump facilitates transport of molecule against the concentration gradient.

(111) Answer : (2)
Solution:
Interphase of cell cycle is called the resting phase and during this phase, cell remains metabolically active. DNA replicates during the S-phase.

(112) Answer : (4)
Solution:
Interkinesis is a short-lived stage between meiosis I and meiosis II.

(113) Answer : (1)
Solution:

The daughter cells formed after meiosis-II are usually not identical to each other.

(114) Answer : (4)
Solution:
Organelle 'X' represents lysosome.
A – ER provides precursors of the enzymes.
C – Golgi body packages and forms lysosomes.
B – H^+ ions are pumped into lysosome to maintain the acidic pH.

(115) Answer : (1)
Solution:
Centrioles are found in animal cell but not in plant and bacterial cells.

(116) Answer : (1)
Solution:
ATP synthesis in chloroplasts occurs within the thylakoid membrane. In mitochondria, oxygen does not evolve as byproduct, rather it is consumed.

(117) Answer : (3)
Solution:
In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

(118) Answer : (1)
Solution:
Figure A and B represent prophase-II and anaphase-I respectively. Anaphase promoting complex regulates the cell cycle by facilitating the transition from metaphase to anaphase. During interkinesis chromosome elongate but do not form chromatin fibres.

(119) Answer : (1)
Solution:
If no cross over occurs, two types of genetically different egg cells can be formed each containing one chromatid of the homologous pair of chromosomes.

(120) Answer : (1)
Solution:
Two X chromosomes or one X and one Y chromosome would be present in normal zygote *i.e.,* where eggs and sperms are formed without non disjunction.

(121) Answer : (2)
Solution:

b	$\rightarrow$	c	$\rightarrow$	a
(1838)		(1879)		(1898)

(122) Answer : (3)
Solution:
The endomembrane system includes ER, golgi complex, lysosome and vacuole.

(123) Answer : (3)
Solution:
Fimbriae do not play a role in motility.

(124) Answer : (2)
Solution:
Plant cell wall is made up of cellulose, hemicellulose, pectins and protein. Algae have cell wall made of cellulose, galactans, mannans and mineral like calcium carbonate.

(125) Answer : (4)
Solution:
Asters are microtubule array that form around the centrosome. The chromosomal material becomes untangled during the process of chromatin condensation.

(126) Answer : (4)
Solution:
Human red blood cells are about $7.0\ \mu\text{m}$ in diameter. Mycoplasma are only $0.3\ \mu\text{m}$ in length. PPLO is 0.1 μm in diameter.

(127) Answer : (3)
Solution:

Structure A, B, C and D represent peroxisome, nucleolus, ribosome and rough endoplasmic reticulum respectively. Ribosomes are attached to the ER by their larger subunit. ER helps in the transport of substances and synthesis of proteins.

(128) Answer : (2)
Solution:
The complete disintegration of the nuclear envelope marks the start of the second phase of mitosis, *i.e.,* metaphase.

(129) Answer : (3)
Solution:
During pachytene, the four chromatids of each bivalent chromosome becomes distinct and clearly appear as tetrad. The beginning of diplotene is recognised by the dissolution of synaptonemal complex.

(130) Answer : (3)
Solution:
In S phase, the amount of genetic material doubles but the number of chromosomes remains the same.

(131) Answer : (1)
Solution:
The kinetochores present around the centromere forms the site of attachment of spindle fibre.

(132) Answer : (4)
Solution:
The homologous chromosomes separate during anaphase-I.

(133) Answer : (4)
Solution:
The shape of the bacterium that causes cholera (*Vibrio cholerae*) is comma shaped.

(134) Answer : (4)
Solution:
In prokaryotic cell, 70S type of ribosomes are present. In the figure, A and B respectively represent larger (50S) and smaller (30S) subunits of ribosome.

(135) Answer : (3)
Solution:
Rod-shaped proteinaceous mass known as hub is not found in cilia and flagella. It is found in centriole.

ZOOLOGY

(136) Answer : (2)
Solution:
According to the Medical termination of Pregnancy (Amendement) Act, 2017, a pregnancy may be terminated on certain grounds within the first 12 weeks of pregnancy on the opinion of one registered medical practitioner. If the pregnancy has lasted for more than 12 weeks, but fewer than 24 weeks, two registered medical practitioners must be of the opinion, formed in good faith, that the required ground exists.

(137) Answer : (3)
Solution:
Genital herpes is caused by Herpes Simplex Virus (HSV) type 2.

(138) Answer : (4)
Hint:
Less than 60 million
Solution:

Nearly 45 to 50 million MTPs are performed in a year all over the world which accounts to $1/5^{th}$ of the total number of conceived pregnancies in a year.

(139) Answer : (1)
Solution:
IUI involves transfer of semen into the uterus. In ICSI, sperm is directly injected into the ovum.

(140) Answer : (4)
Solution:
In vasectomy, an incision is made with a scalpel. The ductus deferens/vas deferens are located and cut, each is tied in two places with stitches and the portion between the ties is removed. Although spermatogenesis continues, sperms can no longer reach the exterior. Also, there is no effect on the testosterone levels, hence, sexual desire/performance remains unaffected.

(141) Answer : (2)
Solution:
The combined pills are taken for 21 days, starting preferably within the first five days of menstrual cycle.

(142) Answer : (3)
Solution:
LNG-20 is a hormone-releasing IUD.

(143) Answer : (2)
Solution:
The first cellular form of life did not possibly originate till 2 bya.

(144) Answer : (3)
Hint:
Pre-historic cave art developed about 18,000 years ago.
Solution:
The skull of baby chimpanzee is more like the adult human skull than the adult chimpanzee skull.

(145) Answer : (3)
Solution:
Administration of progestogens or progestogen-estrogen combinations or IUDs within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to rape or casual unprotected intercourse.

(146) Answer : (2)
Hint:
Homo erectus probably ate meat.
Solution:

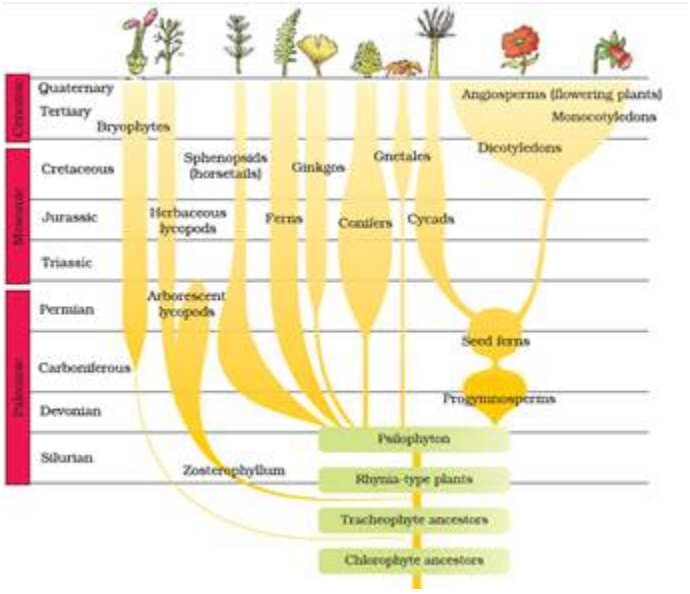
Ramapithecus	–	Was more man-like
Australopithecines	–	Hunted with stone weapons but essentially ate fruits
Homo erectus	–	Probably ate meat
Homo sapiens neanderthalensis	–	Buried their dead

(147) Answer : (4)
Solution:
Mutations are pre-adaptive, implying that antibiotic or pesticide resistant strains were already existing in nature. They were 'selected' by nature when environmental stress appeared.

(148) Answer : (4)
Solution:
Given that 36% = $\frac{36}{100}$ = 0.36 are homozygous recessive (aa).
So, frequency of a = $\sqrt{0.36}$ = 0.6
Because A + a = 1, therefore, A = 1 – a = 1 – 0.6 = 0.4
Frequency of heterozygous would be
2 Aa = 2 × 0.4 × 0.6 = 0.48
% of heterozygous population $\Rightarrow$100×0.48 = 48%

(149) Answer : (4)
Solution:
Evolution is a non-directed process in the sense of determinism.
Evolution is a stochastic process.

(150) Answer : (3)
Solution:



(151) Answer : (3)

Solution:

Barrier methods include condom (Nirodh), fem shield (female condom), diaphragm, cervical cap and vault. CuT, Multiload-375 and Lippes loop are IUDs.

(152) Answer : (3)

Hint:

Different organisms evolved in different Era.

Solution:

The geological history of Earth closely correlates with the biological history of the Earth. The common ancestors of present living organisms were present at different periods in the history of the Earth.

(153) Answer : (2)

Hint:

Ramification of genetic drift

Solution:

The Founder effect is a type of genetic drift that occurs when a new population is started by a few individuals (called founders), carrying only a small fraction of the genetic variation of the original population.

Single step large mutation is called saltation. Gene flow occurs due to frequent migrations.

(154) Answer : (1)

Solution:

Homo habilis had a cranial capacity around 650 – 800 cc.

(155) Answer : (4)

Solution:

Darwin's finches represent adaptive radiation, divergent evolution, geographical isolation and founder effect.

(156) Answer : (3)

Solution:

The most accepted line of descent in human evolution is

Ramapithecus $\rightarrow$ *Australopithecus* $\rightarrow$ *Homo habilis* $\rightarrow$ *Homo erectus* $\rightarrow$ *Homo sapiens sapiens*

(157) Answer : (3)

Solution:

Ernst Haeckel proposed the embryological support for evolution based upon the observation of certain features during the embryonic stage common to all vertebrates but absent in adult.

(158) Answer : (2)

Solution:

Industrial melanism shows that both light and dark moths existed before industrialisation. When tree trunks darkened due to soot, predators picked out the more visible light colored moths.

The pre-existing dark variants survived and reproduced more, increasing their frequency. Thus, it demonstrates natural selection acting on existing variation, not new mutation.

(159) Answer : (1)

Solution:

Lamarck proposed that acquired characters are inherited, but experiments showed that somatic changes do not affect genetic material of germ-cells.
Hence, such acquired traits cannot be transmitted to offspring, making the theory invalid.

(160) Answer : (4)
Solution:
In test tube baby programme, ova from the wife/donor female and sperms from husband/donor male are collected and are induced to form zygote under simulated conditions in the laboratory.

(161) Answer : (4)
Solution:
The development of thick-shelled eggs in reptiles prevented desiccation and allowed embryonic development independent of water.
This adaptation enabled reptiles to complete their entire life cycle on land, unlike amphibians.

(162) Answer : (4)
Solution:
Presence of natural selection alters equilibrium. Natural selection promotes selective mating where advantageous traits increase attractiveness to mate and ensures the propagation of beneficial genes.

(163) Answer : (3)
Solution:
Hugo deVries proposed the mutation theory of evolution, where large, sudden mutations could produce new life forms.
He believed such saltational changes were sufficient to gradual new species in a single step, without gradual accumulation.

(164) Answer : (3)
Solution:
The reducing atmosphere of early Earth allowed simple inorganic molecules to form organic compounds. Energy inputs like lightning and UV radiation provided the energy necessary for these chemical reactions.

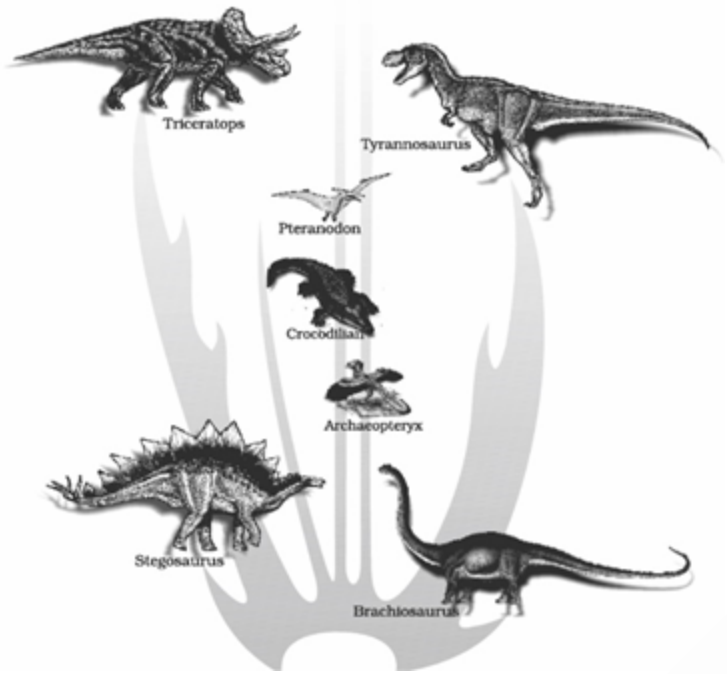
(165) Answer : (4)
Hint:
Cause of transmission of STDs
Solution:
Unprotected sexual intercourse may lead to increase in population growth.

(166) Answer : (1)
Solution:
The conditions on Earth were high temperatures' volcanic storms, reducing atmosphere' containing CH_4, NH_3, *etc*. In 1953, S.L. Miller, an American scientist created similar conditions in a laboratory scale.
A fish caught in South Africa that was thought to be extinct was discovered in 1938.

(167) Answer : (2)
Solution:
Forelimbs of mammals have similar anatomical structure as all of them have humerus, radius, ulna, carpals, metacarpals and phalanges in their forelimbs. Hence in these animals, the same structure developed along different directions due to adaptations to different needs. This is divergent evolution and thus, these structures are homologous.

(168) Answer : (4)
Solution:
Natural selection can lead to stabilisation (in which more individuals acquire mean character value), directional change (more individuals acquire peripheral character value other than mean character value), disruptive change (more individuals acquire peripheral character value) at both ends of the distribution curve.

(169) Answer : (3)
Solution:



(170) Answer : (2)

Solution:

Among the stories of evolution of individual species, the story of evolution of modern man is most interesting and appears to parallel evolution of human brain and language.

(171) Answer : (4)

Solution:

Natural methods include withdrawal method, periodic abstinence and lactational amenorrhea.
Barrier methods include condoms, diaphragm, cervical caps and vaults
Both of these methods prevent physical meeting of gametes.

(172) Answer : (1)

Solution:

Lactational amenorrhea method is based on the fact that ovulation ceases during the release of high levels of prolactin therefore the cycle do not occur during the period of intense lactation following parturition. Therefore, as long as the mother breast feeds the child, chances of conception are nil due to antigonadotropic effect of prolactin.

(173) Answer : (2)

Solution:

Amniocentesis involves withdrawal of amniotic fluid to analyse foetal cells and dissolved substances for genetic disorders such as down syndrome, haemophilia and sickle cell anaemia. The statutory ban applies only to its misuse for sex determination, not to its diagnostic purpose.

(174) Answer : (4)

Solution:

In IUI, semen from the husband or donor is processed and introduced into the uterus, enabling *in-vivo* fertilisation, unlike IUT or ICSI where fertilisation occurs outside the body.

(175) Answer : (2)

Solution:

Oral contraceptive pills contain synthetic estrogen and progesterone that exert negative feedback on the pituitary gland, thereby inhibiting FSH and LH release and preventing ovulation. Copper releasing IUDs act locally in the uterus by releasing copper ions that impair sperm motility and enhance sperm phagocytosis without suppressing ovulation.

(176) Answer : (2)

Solution:

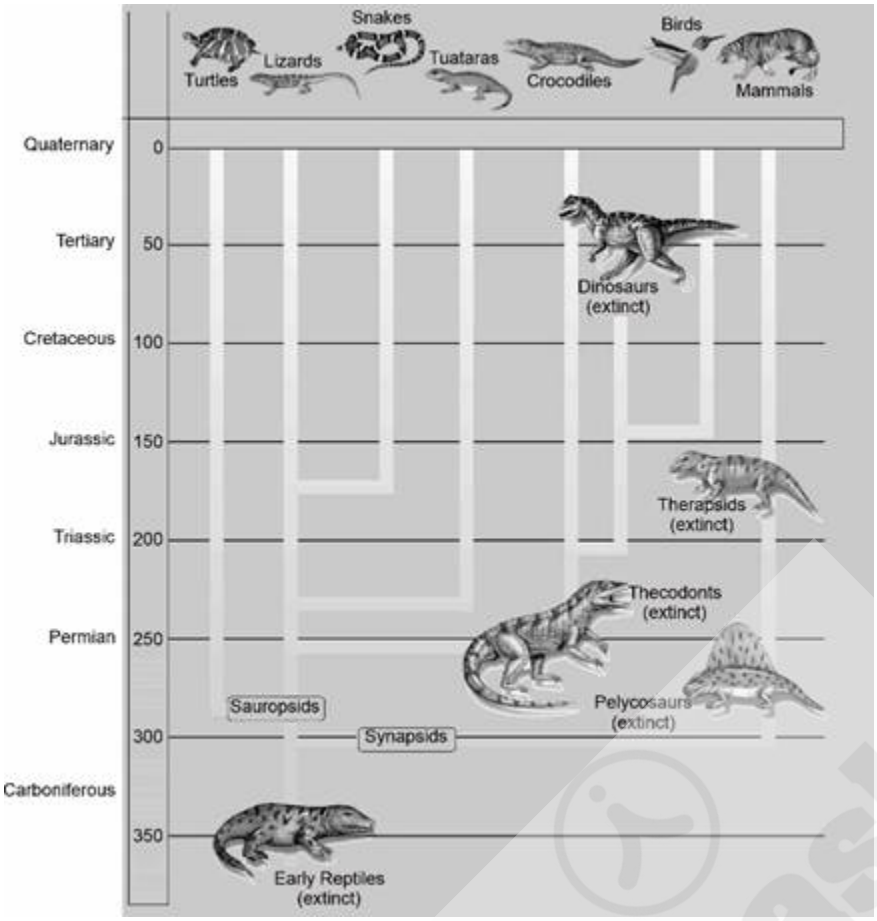
Saheli is a non-steroidal oral contraceptive pill that does not suppress ovulation or gonadotropin secretion. It prevents pregnancy by functionally antagonising estrogen receptors in the endometrium leading to delayed endometrial maturation preventing implantation.

(177) Answer : (4)

Hint:

Mammals are descendants of synapsids, pelycosaurs and therapsids.

Solution:



(178) Answer : (2)

Solution:

Removal of gonads permanently abolishes gamete formation and sex hormone secretion, leading to profound physiological and secondary sexual effects. Contraception, as defined in reproductive health, aims at temporary and reversible prevention of pregnancy.

(179) Answer : (4)

Solution:

Periodic abstinence is a natural method where couples avoid intercourse during the fertile period. Its effectiveness depends on accurate tracking of the menstrual cycle and does not protect against STIs.

(180) Answer : (3)

Solution:

Injections and implants are hormone containing contraceptives that causes anovulation and makes uterus unsuitable for implantation.