



Student's Solution Copy [CODE - 27647]

NEET PATTERN TEST Brahmastra Major Test-04

13th NEET - Phase 12

KOTA

Date: 26-Mar-2025

Duration: 3 Hours

Max Marks: 720

Physics - Section A

1. Answer: 2

Sol:

$$H = mS = \rho VS \Rightarrow \frac{H_1}{H_2} = \left(\frac{\rho_1}{\rho_2} \right) \left(\frac{S_1}{S_2} \right)$$

2. Answer: 1

Sol:

For an orbiting satellite.
K.E is half of P.E

3. Answer: 4

Sol:

Coefficient of restitution is

$$e = \frac{v_2 - v_1}{u_1 - u_2} = \frac{\sqrt{2gh_1}}{\sqrt{2gh}}$$

$$\therefore e = \sqrt{\frac{h_1}{h}}$$

Hence after first bouncing $h_1 = he^2$

After second $h_2 = he^4$

And so on after the nth bounce $h_n = he^{2n}$

4. Answer: 4

Sol:

For equal distance average speed

$$v_{avg} = \frac{2v_1 v_2}{v_1 + v_2} = \frac{2 \times 3 \times 5}{3 + 5} = \frac{15}{4} \text{ m/s}$$

5. Answer: 1

Sol:

As we know that

$$F = -kx$$

$$\text{So } mg = kx$$

$$\text{here, } x = l$$

$$mg = kl$$

and we know that

$$U = \frac{1}{2}kx^2$$

$$U = \frac{1}{2} \left(\frac{mg}{l} \right) l^2$$

$$U = \frac{mgl^2}{2l} = \frac{mgl}{2}$$

6. Answer: 3

Sol:

In a perpendicular magnetic field, the radius of circular path travelled by electron beam is

$$r = \frac{mv}{eB}$$

$$\therefore r = \frac{9 \times 10^{-31} \times 1.6 \times 10^7}{1.6 \times 10^{-19} \times 0.1} \\ = 9 \times 10^{-4} \text{ m}$$

7. Answer: 2

8. Answer: 2

Sol:

$$\text{Area of cube} = 6a^2 = 24 \text{ m}^2$$

$a \rightarrow$ side of cube

$$a^2 = 4 \Rightarrow a = 2$$

$$\Rightarrow V_0 = 2^3 = 8$$

$$\Delta T = 10^\circ\text{C}$$

$$\alpha = 5.0 \times 10^{-4} \frac{1}{^\circ\text{C}}$$

We know for solid materials $\gamma = 3\alpha$

$$\text{So } \gamma = 3 \times 5 \times 10^{-4}$$

$$= 15 \times 10^{-4} / ^\circ\text{C}$$

$$\Delta V = V_0 \gamma \cdot \Delta T$$

$$\Delta V = 8 \times 15 \times 10^{-4} \times 10$$

$$= 1200 \times 10^{-4} \text{ m}^3$$

$$= 12 \times 10^{-2} \times (10^2)^3 \text{ cm}^3$$

$$\Delta V = 12 \times 10^4 \text{ cm}^3$$

$$\Delta V = 1.2 \times 10^5 \text{ cm}^3$$

9. Answer: 1**Sol:**

$$r = \frac{mv}{Bq}$$

r is least when $\left(\frac{m}{q}\right)$ is least.

$\left(\frac{m}{q}\right)$ is least for electron, so electron will trace path with minimum radius i.e. track D

11. Answer: 2**Sol:**

Given : - moment of inertia (I) of wheel = 2kg-m^2 rate of rotation of wheel = 60 rpm

from kinematics equation for rotation

$$\omega_f = \omega_i - \alpha t$$

$$\Rightarrow 0 = \omega_i - \alpha t$$

$$\therefore \alpha = \frac{\omega_i}{t}, \text{ where } \alpha \text{ is retardation}$$

The torque on the wheel is given by

$$\tau = I\alpha = \frac{I\omega}{t} = \frac{I \cdot 2\pi}{t} = \frac{2 \times 2 \times \pi \times 60}{60 \times 60}$$

$$\tau = \frac{\pi}{15} \text{ N-m}$$

This is the torque required to stop the wheel in 1 min (or 60 sec.)

13. Answer: 2**Sol:**

The speed of water at section x and y should be equal.

Applying Bernoulli's equation-

$$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$$

$$= \frac{1}{2}\rho(v_2^2 - v_1^2) = P_1 - P_2 = h\rho g$$

$$v_2^2 = v_1^2 + 2gh$$

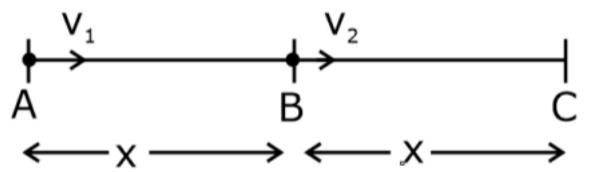
$$v_2 = \sqrt{v_1^2 + 2gh}$$

$$= \sqrt{(2)^2 + 2 \times 1000 \times 0.51}$$

$$= 32 \text{ cm/sec}$$

10. Answer: 2**Sol:**

Use the formula of gravitational potential and G.P. is formed

12. Answer: 3**Sol:**

Time taken between A & B

$$t_1 = \frac{x}{v_1}$$

Time taken between B & C

$$t_2 = \frac{x}{v_2}$$

$$\text{Average velocity (v)} = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{x+x}{t_1+t_2} = \frac{2x}{\frac{x}{v_1} + \frac{x}{v_2}}$$

$$v = \frac{2v_1v_2}{v_1+v_2}$$

$$\text{Or } \frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$$

14. Answer: 3

Sol:

$$q = 1.6 \times 10^{-19} C : m = 9.1 \times 10^{-31} \text{ kg}$$

$$q = 6.67 \times 10^{-11} : k = 9 \times 10^9$$

$$\therefore \frac{F_q}{F_c} = \frac{\frac{Gm^2}{r^2}}{\frac{kq^2}{r^2}} = \frac{6.67 \times 10^{-11} \times (9.1 \times 10^{-31})^2}{9 \times 10^9 \times (1.6 \times 10^{-19})^2}$$

$$= 10^{-42}$$

Sol:

According to Boyle's law $V \propto \frac{T}{P}$

The volume of a given amount of gas is proportional to the ratio of its Kelvin temperature and its pressure

$$\frac{PV}{T} = C$$

As the temperature goes up and vice versa.

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \text{ etc}$$

Using gas equation law;

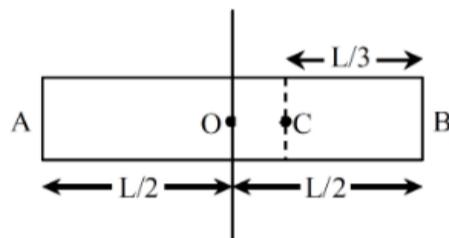
$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{1 \times 500}{300} = \frac{0.5 \times V_2}{270}$$

$$\Rightarrow V_2 = 900 \text{ m}^3$$

15. Answer: 3

Sol:



$$\text{The distance } OC = \frac{L}{2} - \frac{L}{3} = \frac{L}{6}$$

Applying the theorem of parallel axes.

$$I_C = I_o + M(OC)^2$$

$$= \frac{ML^2}{12} + M\left(\frac{L}{6}\right)^2 = \frac{ML^2}{9}$$

17. Answer: 1

Sol:

$$\hat{p} = \cos(kt)\hat{i} - \sin(kt)\hat{j}$$

$$\vec{F} = \frac{d\vec{p}}{dt}$$

$$\vec{F} = k \sin(kt)\hat{i} - k \cos(kt)\hat{j}$$

$$\cos\theta = \frac{\vec{F} \cdot \vec{p}}{|\vec{F}| |\vec{p}|}$$

$$= \frac{-k \sin(kt) \cos(kt) + k \sin(kt) \cos(kt)}{|\vec{F}| |\vec{p}|} = 0$$

$$\Rightarrow \theta = \pi/2$$

19. Answer: 3

16. Answer: 3

Sol:

$|\varepsilon| = Blv$ where l is the edge perpendicular to both B and \vec{v} i.e.c.

$$\therefore |\varepsilon| = Bvc$$

Now by right hand thumb rule magnetic force on a positive charge moving towards right is in downward

direction Hence end P will be positive.

$\therefore V_p - V_Q$ is positive.

$$\Rightarrow \varepsilon = +Bvc$$

18. Answer: 3

Sol:

Monoatomic gas \rightarrow 3 mole

Diatomeric gas \rightarrow 2 mole

$$\gamma_{\text{mix}} = 1 + \frac{2}{f_{\text{mix}}} \dots (1)$$

$$f_{\text{mix}} = \frac{n_1 f_1 + n_2 f_2}{n_1 + n_2} = \frac{3(3) + 2(5)}{5} = \frac{19}{5}$$

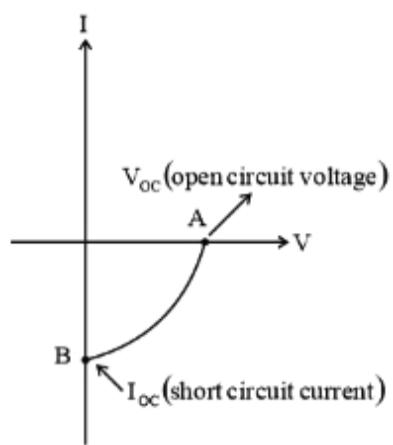
$$\gamma_{\text{mix}} = 1 + \frac{2}{19/5} = 1 + \frac{10}{19} = \frac{29}{19} = \frac{29}{19}$$

$$\gamma_{\text{mix}} = 1.53$$

20. Answer: 1

Sol:

It is V-I characteristic for solar cell where, point A represents open circuit voltage and point B short circuit current.



The V - I characteristic for a solar cell is as shown the figure.

It is V - I characteristic curve for a solar cell, where A represent open circuit voltage of solar cell and B represent short circuit current.

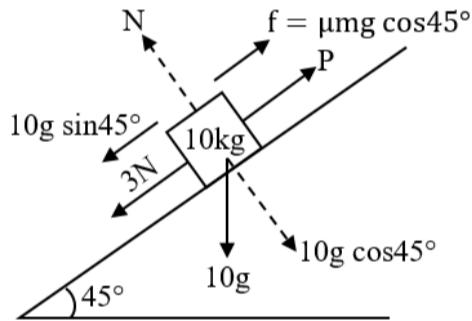
21. Answer: 2**Sol:**

Given :

$$m = 10 \text{ kg}$$

$$\mu = 0.6$$

FBD of the block



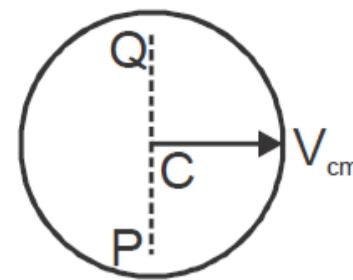
For equilibrium of block

$$10g \sin 45^\circ + 3 = P + 0.6 \times 10 \times g \cos 45^\circ$$

$$\Rightarrow \frac{100}{\sqrt{2}} + 3 = P + \frac{60}{\sqrt{2}}$$

$$\left\{ \begin{array}{l} \because \sin 45^\circ = \frac{1}{\sqrt{2}} \\ \cos 45^\circ = \frac{1}{\sqrt{2}} \end{array} \right\}$$

$$\Rightarrow P = 3 + \frac{40}{\sqrt{2}} = 3 + \frac{40}{1.4} \simeq 32 \text{ N.}$$

23. Answer: 3**Sol:**

$$V_C = V_{cm}$$

$$V_Q = V_{cm} + \omega R$$

$$V_P = V_{cm} - \omega R$$

22. Answer: 3**Sol:**

$$\begin{aligned} \text{Inductance } L &= 44 \text{ mH} = 44 \times 10^{-3} \text{ H}, V_{rms} \\ &= 220 \text{ V}, f = 50 \text{ Hz} \text{ Inductive reactance} \\ X_L &= 2\pi f L \\ &= 2 \times 3.14 \times 50 \times 44 \times 10^{-3} \\ &= 13.83 \Omega \end{aligned}$$

The rms value of current in the circuit

$$I_{rms} = \frac{V_{rms}}{X_L} = \frac{220}{13.83} = 15.9 \text{ A}$$

24. Answer: 4**Sol:**

in series combination

$$\frac{1}{K_{eq}} = \frac{1}{k_1} + \frac{1}{k_2}$$

$$k_{eq} = \frac{k_1 k_2}{k_1 + k_2}$$

Sol:

Initially, the focal length of equiconvex lens is

$$\frac{1}{f} = (\mu - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\frac{1}{f} = (\mu - 1) \left(\frac{1}{R} - \frac{1}{-R} \right) = \frac{2(\mu-1)}{R}$$

Case I : When lens is cut along XOX' then each half is again equiconvex with

$$R_1 = +R, R_2 = -R$$

$$\text{Thus, } \frac{1}{f'} = (\mu - 1) \left[\frac{1}{R} - \frac{1}{(-R)} \right]$$

$$= (\mu - 1) \left[\frac{1}{R} + \frac{1}{R} \right]$$

$$= (\mu - 1) \frac{2}{R} = \frac{1}{f'}$$

$$\Rightarrow f' = f$$

Case II : When lens is cut along YOY', then each half becomes Plano-convex with

$$R_1 = R, R_2 = \infty$$

$$\text{Thus, } \frac{1}{f''} = (\mu - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$= (\mu - 1) \left(\frac{1}{R} - \frac{1}{\infty} \right)$$

$$= \frac{(\mu-1)}{R} = \frac{1}{2f}$$

$$\text{Hence } f' = f, f'' = 2f$$

25. Answer: 1**Sol:**

Using

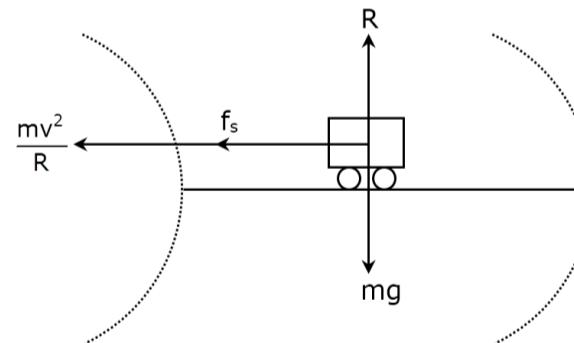
$$C = n^{1/3}$$

$$\Rightarrow c = \frac{C}{n^{1/3}} = \frac{C}{(8)^{1/3}} = \frac{C}{2} = \frac{1}{2}\mu F$$

26. Answer: 2**Sol:**

Using the relation

$$\frac{mv^2}{r} = \mu \cdot R,$$



$$\text{as } R = mg$$

$$\frac{mv^2}{r} = \mu \cdot mg$$

$$v^2 = \mu r g$$

$$v^2 = 0.6 \times 150 \times 10$$

$$\Rightarrow v = 30 \text{ m/s}$$

27. Answer: 1**Sol:**

$$\frac{1}{2} mv^2 = \frac{hc}{\lambda} - \frac{hc}{\lambda_0} \text{ for emission } \lambda < \lambda_0$$

28. Answer: 2**Sol:**

$$\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{300}{500} = \frac{2}{5}$$

29. Answer: 1**30. Answer: 4**

Sol:

The current density in the wire is

$$j = \frac{i}{A} = \frac{2.0\text{A}}{1\text{ mm}^2} = 2.0 \times 10^6 \text{ Am}^{-2}$$

The drift speed is

$$\begin{aligned} v &= \frac{j}{ne} = \frac{2.0 \times 10^6 \text{ Am}^{-2}}{6.0 \times 10^{28} \text{ m}^{-3} \times 1.6 \times 10^{-19} \text{ C}} \\ &= 2.1 \times 10^{-4} \text{ ms}^{-1} \end{aligned}$$

31. Answer: 2**Sol:**

Given, for, Li ++, Z = 3 and as the excitation is from first to third Bohr orbit, so $n_1 = 1$, $n_2 = 3$

Using the relation,

$$\begin{aligned} \frac{1}{\lambda} &= Z^2 R \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \\ &= (3)^2 R \left(\frac{1}{1^2} - \frac{1}{3^2} \right) = 8R \\ \Rightarrow \text{Wavelength, } \lambda &= \frac{1}{8R} = \frac{1}{8 \times 1.097 \times 10^7} = 0.11 \times 10^{-7} \\ &= 11.4 \text{ nm} \end{aligned}$$

33. Answer: 3**Sol:**

power is given by

$$P = \frac{V^2}{R}$$

now resistance

$$R_1 = \frac{V^2}{40}, R_2 = \frac{V^2}{60}, R_3 = \frac{V^2}{100}$$

$$\begin{aligned} R_1 : R_2 : R_3 &= \frac{1}{40} : \frac{1}{60} : \frac{1}{100} \\ &= 60 : 40 : 24 \end{aligned}$$

in parallel combination $P \propto \frac{1}{R}$

as the resistance of 100 watt is minimum therefore power dissipated through it is maximum

35. Answer: 4**Sol:**

Electromagnetic waves are created by the vibration of both electric field and magnetic field. These field are perpendicular to each other and at right angle to the direction of propagation of the wave.

Sol:

The given equation can be written as

$$y = \frac{1}{\sqrt{2}}(\sqrt{2}\sin \omega t + \sqrt{2}\cos \omega t)$$

$$y = \sqrt{2} \sin \left(\frac{\pi}{4} + \omega t \right)$$

Now recall with standard equation of SHM

$$y = A \sin (\omega t + \phi)$$

$$A = \sqrt{2} \text{ m}$$

When $t = 0$ then the amplitude is

$$y = \sqrt{2} \sin \frac{\pi}{4}$$

$$y = \sqrt{2} \times \frac{1}{\sqrt{2}} = 1 \text{ m}$$

32. Answer: 3**Sol:**

$$\omega = \frac{\mu_v - \mu_R}{\mu_y - 1}$$

$$\omega = \frac{1.64 - 1.52}{1.6 - 1} = \frac{0.12}{0.6} = 0.2$$

34. Answer: 1**Sol:**

Given :

$$y = 4 \sin \left(\frac{\pi x}{15} \right) \cos(96\pi t)$$

By comparing the standard equation with given equation as:

$$y = 2a \sin \left(\frac{2\pi x}{\lambda} \right) \cos \left(\frac{2\pi nt}{\lambda} \right)$$

$$\frac{2\pi}{\lambda} = \frac{\pi}{15}$$

$$\lambda = 30$$

We know that, distance between node and next antinode is: $\frac{\lambda}{4}$

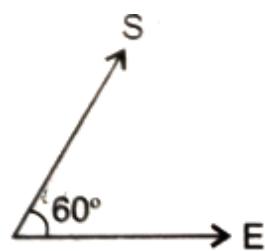
So, from the above, we get

$$\Rightarrow \frac{\lambda}{4} = \frac{30}{4} = 7.5$$

36. Answer: 2**Sol:**

$$3 \times 5 + 5 \times 3 = P (5 + 3)$$

$$P = \frac{30}{8} = 3.75 \text{ atm}$$

37. Answer: 2**Sol:**

Force acting on the charged particle = $q\vec{E}$

work done in moving a distance S ,

$$W = q\vec{E} \cdot \vec{S} = (qE) \times S \times \cos \theta$$

$$10 \text{ J} = (0.5 \text{ C}) \times E \times 2 \cos 60^\circ$$

$$\text{or } E = 10 \times 2 = 20 \text{ NC}^{-1} = 20 \text{ Vm}^{-1}$$

39. Answer: 3**Sol:**

From figure,

Voltage across all the three branches is the same

$$\therefore 10I_1 = 15I_2 = 30I_3 \dots (i)$$

$$\text{or } I_1 = 1.5I_2 \dots (i)$$

$$15 I_2 = 30 I_2$$

$$\text{or } I_3 = \frac{1}{2}I_2 \dots (ii)$$

$$\text{Also } I = I_1 + I_2 + I_3$$

$$1.2 = 1.5I_2 + I_2 + \frac{1}{2}I_2 \quad [\text{using (i) and (ii)}]$$

$$= \frac{3I_2 + 2I_2 + I_2}{2} = 3I_2 \Rightarrow I_2 = \frac{1.2}{3} \text{ A} = 0.4 \text{ A}$$

41. Answer: 3**Sol:**

Let the unknown frequency of the tuning fork be x

So, according to the given data when no waxed, its frequency must be,

$$x = 256 \pm 4 \text{ to produce a beat of 4 beats/sec}$$

We know, the frequency of a tuning fork decreases as it is waxed

So, to produce 6 beats/s, after being waxed, the frequency of the tuning fork must be

$$x = 256 - 4$$

$$x = 252 \text{ Hz}$$

Hence, the frequency of B is 252 Hz

43. Answer: 2**38. Answer: 3****Sol:**

$$\begin{aligned}\frac{\partial y}{\partial t} &= \frac{10}{\pi} \times 2000\pi \cos \left(2000\pi t \cdot \frac{\pi x}{17} \right) \\ &= 200 \text{ m/s}\end{aligned}$$

40. Answer: 2**Sol:**

As we know that the intensity is given by

$$I = I_{\max} \cos^2 \left(\frac{\phi}{2} \right)$$

$$\frac{I_{\max}}{2} = I_{\max} \cos^2 \left(\frac{\phi}{2} \right)$$

$$\cos^2 \left(\frac{\phi}{2} \right) = \frac{1}{2}$$

$$\text{or } \cos \left(\frac{\phi}{2} \right) = \frac{1}{\sqrt{2}}$$

$$\text{or } \frac{\phi}{2} = \frac{\pi}{4} \text{ or } \phi = \frac{\pi}{2}$$

$$\text{As path difference } \Delta x = \frac{\lambda\phi}{2\pi} = \frac{\lambda}{2\pi} \times \frac{\pi}{2} = \frac{\lambda}{4}$$

$$\text{or } \Delta x = \frac{yd}{D} = \frac{\lambda}{4}$$

$$= 0.125 \text{ mm}$$

42. Answer: 1**Sol:**

$$\text{NAND gate} \Rightarrow \overline{AB} = \overline{A} + \overline{B}$$

44. Answer: 2

Sol:

$$x = \frac{2\lambda D}{a}$$

$$D = 1\text{m}, x = 4 \times 10^{-3} \text{ m}, a = 3 \times 10^{-4} \text{ m}$$

$$4 \times 10^{-3} = \frac{2 \times \lambda \times 1}{3 \times 10^{-4}}$$

$$\lambda = 6 \times 10^{-7} \text{ m}$$

$$\lambda = 6000 \text{ \AA}$$

Sol:

$$x = \frac{t^4}{4}$$

$$\frac{dx}{dt} = V_x = \frac{4t^3}{4} = t^3$$

$$dw = \bar{F}, d\bar{x}$$

$$= m \bar{a}_x \cdot d\bar{x} \quad [\text{from equ}^n (\text{i})]$$

$$dw = 3t^5 dt$$

$$\int dw = 3 \int_0^1 t^5 dt$$

$$\Rightarrow w = 3 \frac{t^6}{6} \Big|_0^1$$

$$= \frac{3}{6} [1 - 0]$$

$$= \boxed{w = \frac{1}{2}}$$

45. Answer: 4

Sol:

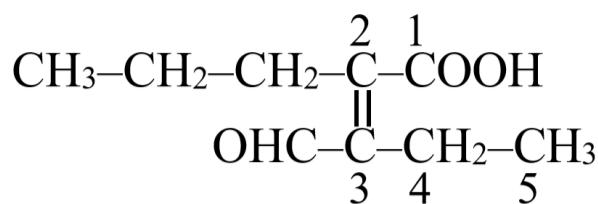
$$m \propto v^a r^p g^c$$

$$ML^0 T^0 \propto (LT^{-1})^a (ML^{-3})^b (LT^{-2})^c$$

Comparing the powers of M, L and T and solving,

we get b = 1, c = -3, a = 6

$$\Rightarrow m \propto v^6$$

46. Answer: 2**Sol:**

The number of carbon atoms in the principal chain of the given compound is five because the aldehyde group (here act as a substituent) and double bond has to be given the lowest number. Therefore, the numbering will start from the COOH group and ends in CH₃ which will include a CHO group also.

47. Answer: 1**Sol:**

As we move down the group atomic size increase. So, bond length also increase and bond strength decreases.

$$\text{bond energy} \propto \frac{1}{\text{bond length}} \propto \text{bond strength}$$

Bond energy is measure by bond length & bond strength in a chemical bond. C–C has maximum bond energy.

48. Answer: 1**Sol:**

Flot

$$\Delta E = q + w$$

$$(q=0)$$

$$\Delta E = w$$

During compresion

$$w = +ve$$

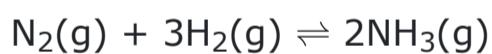
so

$$\Delta E = +ve$$

$$T_2 > T_1$$

49. Answer: 1**Sol:**

Haber's process



20 moles need to be produced

2 moles of NH₃ required 3 moles of H₂

$$\text{So, } 20 \text{ moles of NH}_3 \text{ required} = \frac{3 \times 20}{2}$$

$$= 30 \text{ moles of H}_2$$

50. Answer: 3**Sol:**

Lowering in weight of solution \propto solution pressure

Lowering in weight of solvent $P^0 - P_s$

($\because p^0$ = vapour pressure of pure solvent)

$$\frac{p^0 - P_s}{P_s} = \frac{\text{lowering in weight of solvent}}{\text{lowering in weight of solution}}$$

$$\frac{p^0 - P_s}{P_s} = \frac{w \times M}{m \times W}$$

$$\frac{0.05}{2.5} = \frac{10 \times 18}{90 \times m}$$

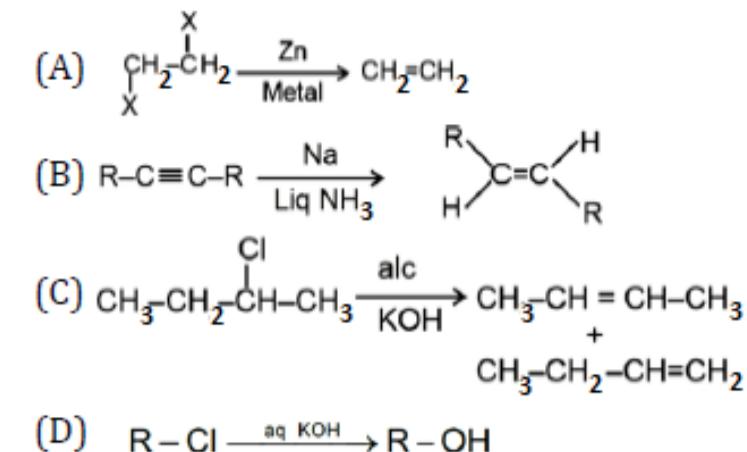
$$\Rightarrow m = \frac{2 \times 2.5}{0.05} = \frac{2 \times 250}{5} = 100$$

51. Answer: 2**Sol:**

$$\Delta H_{\text{comb.}} = \frac{-0.25}{0.4} \times 16 = -10 \text{ cals}$$

52. Answer: 4

Sol:



53. Answer: 4

Sol:

The Balmer series is characterized by the electron transferring from $n \geq 3$ to $n = 2$ where n is a principal quantum number.

The visible spectrum of light from hydrogen displays four wavelengths 910nm, 434nm, 486nm, 656nm, that corresponds to the emission of photons by electrons in an excited state.

So, Balmer series of transition in the spectrum of hydrogen atom fall in visible region.

54. Answer: 1

Sol:

$$M_2 = \frac{1000 K_f}{\Delta T_f} \frac{W_2}{W_1}$$

$$= \frac{1000 \times 1.86 \times 1}{0.168 \times 100}$$

$$= 110.71$$

As given

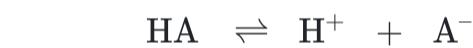
15.1 ml alkali neutralized acid = 0.2 gm

1 ml alkali neutralized acid = $\frac{0.2}{15.1}$

1000 ml alkali neutralized acid = $\frac{0.2}{15.1} \times 1000$

For 1 N = $\frac{0.2}{15.1} \times 1000 \times 10 = 132.45$ gm

$$i = \frac{132.45}{110.71} = 1.196$$



Initial 1 0 0

at eq $1-\alpha$ α α

$$\text{total} = 1 + \alpha$$

$$i = 1 + \alpha$$

$$\alpha = i - 1$$

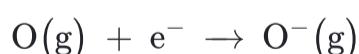
$$= 1.196 - 1$$

$$= 0.196$$

55. Answer: 4

Sol:

When an electron is added to a neutral gaseous atom, the energy is released.



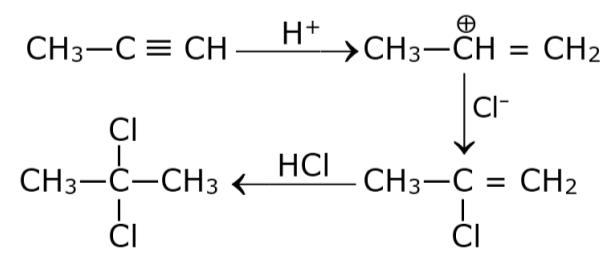
It represents the energy releasing process.

It represents the first electron gain enthalpy of oxygen which has value -141 kJ/mol.

57. Answer: 4

56. Answer: 4

Sol:



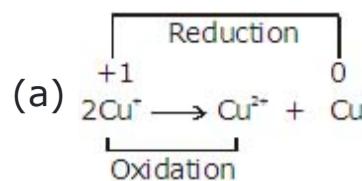
58. Answer: 3

Sol:

$$t = \frac{2.303}{0.082} \log \frac{0.15}{0.03}$$

$$t = 19.6 \text{ min}$$

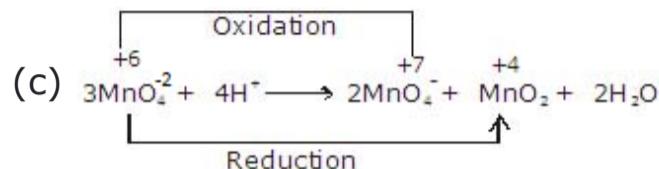
Sol:



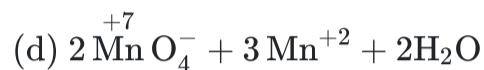
disproportionation reaction



Not a disproportionation reaction



disproportionation reaction



Not a disproportionation reaction

∴ (a) & (c) are disproportionation reaction.

59. Answer: 4

Sol:

$$\text{pH} = \text{pK}_a + \log \frac{[\text{Salt}]}{[\text{Acid}]}$$

60. Answer: 1

Sol:

(1) When an electron is removed in an atom, effective nuclear charge increase, as a result gradual decrease in ionic radii.

Therefore, ionic radii of $\text{Fe}^{+2} > \text{Fe}^{+3}$

(2) Second ionisation energy of oxygen is greater than nitrogen due to half fill stable configuration of oxygen.

(3) Atomic radius of Cu < Zn because when number of unpaired electrons increases, force of attraction increase and atomic radii decrease.

(4) First ionisation energy for Ti is greater than in due to lanthanoid contraction.

61. Answer: 2

Sol:

If both assertion and reason are true but reason is not the correct explanation of the assertion.

62. Answer: 4

Sol:

Not any alkyl halide can give exclusively 2-Methyl bute-2-ene.

63. Answer: 1

Sol:

$$\text{MX}_2 \text{M}^{2+} + 2\text{X}^- \\ K_{\text{sp}} = s \cdot (2s)^2 = 4s^3$$

$$\Rightarrow s = \sqrt[3]{\frac{K_{\text{sp}}}{4}} = \sqrt[3]{\frac{4 \times 10^{-12}}{4}} = 1 \times 10^{-4} \text{M}$$

64. Answer: 3

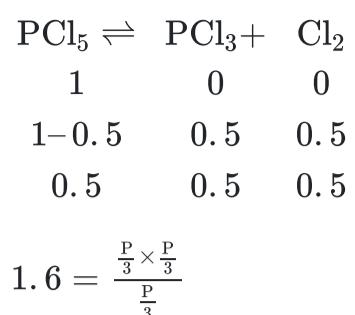
Sol:

Ionic bond is stronger than covalent bond.

65. Answer: 4

66. Answer: 4

Sol:

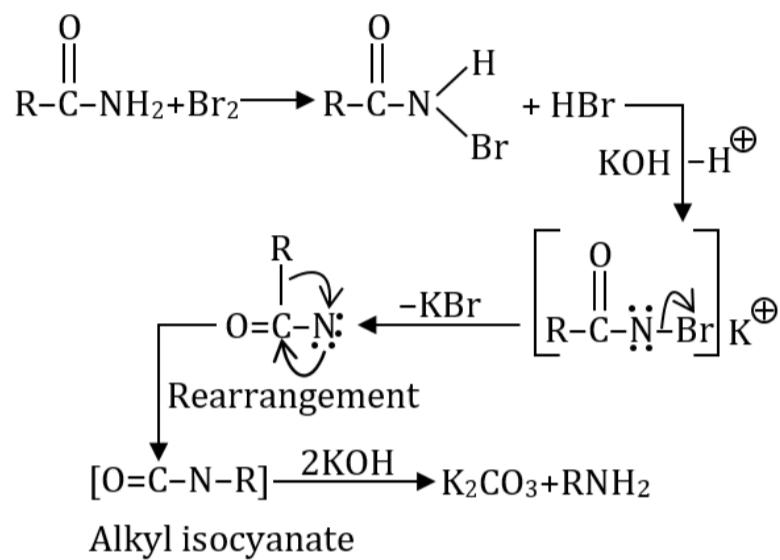


$$P/3 = 1.6$$

$$P = 4.8$$

77. Answer: 1

Sol:



79. Answer: 1

Sol:

Coordination number of Pt is 6 hence

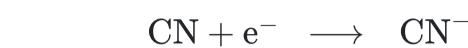
- I. $\text{K}_2[\text{PtCl}_6]$ - Three ions
- II. $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$ - Zero ions
- III. $[\text{Pt}(\text{NH}_3)_3\text{Cl}_3]\text{Cl}$ - Two ions
- IV. $[\text{Pt}(\text{NH}_3)_5\text{Cl}]\text{Cl}_3$ - Four ions

Conductivity \propto no. of ions

Sol:



$$\text{B.O.} = 2.5 \quad 3$$



$$\text{B.O.} = 2.5 \quad 3$$

78. Answer: 1

Sol:

High pressure favors the reaction showing the decrease in mole volume i.e. forward reaction. Also low temperature favors exothermic reaction, i.e. forward reaction.

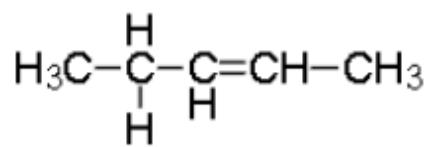
80. Answer: 4

Sol:

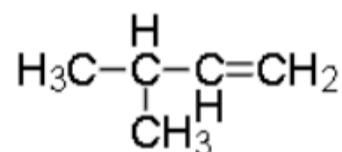
Molecules with chiral centers will exhibit optical isomerism.

Double bonded carbon atoms are always achiral.

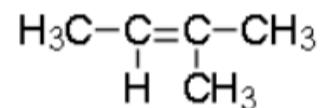
A) Pent-2-ene doesn't have any chiral center. So it will not have optical isomerism



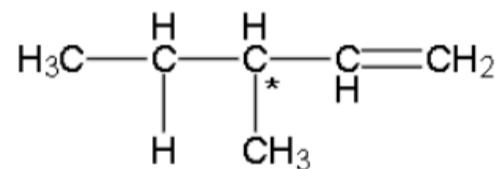
B) As this molecule do not have any chiral center, it will not show optical isomerism



C) As this molecule do not have any chiral center, it will show optical isomerism



D) As this molecule have a chiral centre, it will show optical isomerism

**81. Answer: 2****Sol:**

Copper sulphate dissolves in ammonia due to the formation of $[\text{Cu}(\text{NH}_3)_4] \text{SO}_4$.



$[\text{Cu}(\text{NH}_3)_4] \text{SO}_4$ contains complex cation $[\text{Cu}(\text{NH}_3)_4]^{2+}$

83. Answer: 3**Sol:**

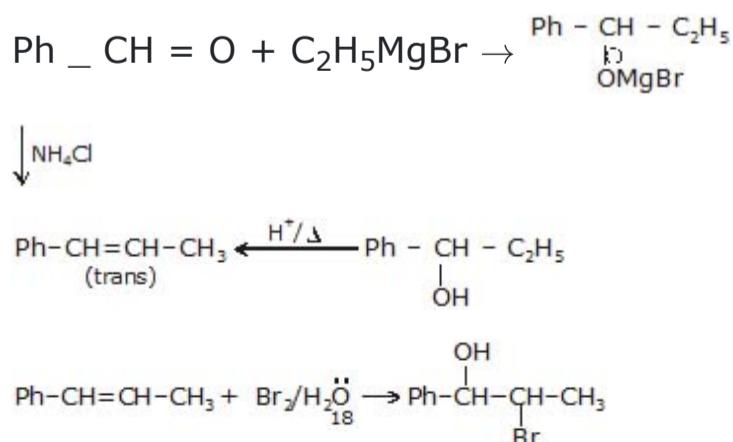
Factor due to number of ligands = $\frac{4}{6} = \frac{2}{3}$

Factor due to direction of approach = $\frac{2}{3}$

$$\therefore \Delta_t = \frac{2}{3} \times \frac{2}{3} . \Delta_t = \frac{4}{9} \Delta_0$$

82. Answer: 1**Sol:**

Tollens' reagent is an alkaline solution of ammoniacal silver nitrate and is used to test for aldehydes. Silver ions in the presence of hydroxide ions come out of the solution as a brown precipitate of silver(I) oxide, $\text{Ag}_2\text{O}_{(s)}$. This precipitate dissolves in aqueous ammonia, forming the diaminosilver(I) ion, $[\text{Ag}(\text{NH}_3)_2]^+$.

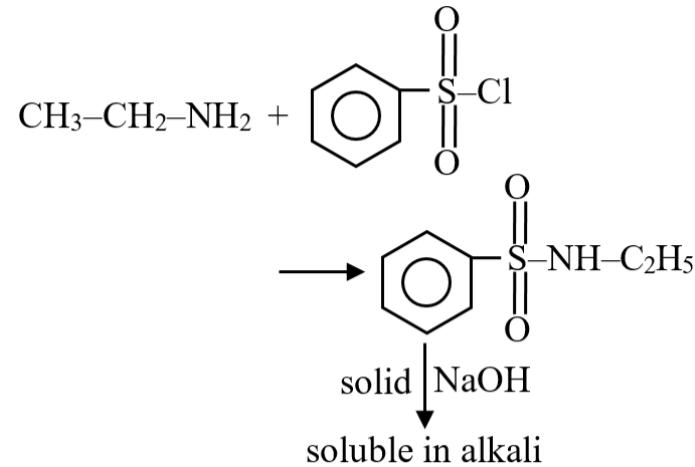
84. Answer: 2**Sol:****85. Answer: 3****86. Answer: 3**

Sol:

$[\text{Cu}(\text{H}_2\text{O})_4]^{2+}$ shows blue colour due to d-d transition.

Sol:

1° amine reaction with Hinsberg's reagent to give a solid which dissolves in alkali.



87. Answer: 4

Sol:

Lower oxidation states are shown by metals when they are attached to π -acceptors ligands.

88. Answer: 4

Sol:

Lead has been placed in group 1st and 2nd because lead chloride is slightly soluble in water and therefore lead is never completely precipitated by adding dilute HCl to samples, the rest of the lead ions are precipitated with H_2S in acidic medium

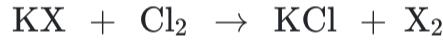
89. Answer: 4

Sol:



90. Answer: 3

Sol:



(X = Br^- or I^-)

91. Answer: 2

Sol:

NCERT 11th Page No. 213

93. Answer: 2

Sol:

The part from where flower arise is called bract. Malvaceae has Bracteate, pedicellate, complete, actinomorphic, hermaphrodite, pentamerous, hypogynous and showy.

Brassicaceae or Cruciferae is a medium-sized and economically important family of flowering plants.

The lily family, Liliaceae, consists of about 15 genera and 610 species of flowering plants within the order Liliales. They are monocotyledonous, perennial, herbaceous, often bulbous geophytes.

Papilionatae (family Leguminosae) One of the 3 subfamilies of Leguminosae, comprising plants in which the leaves are pinnate, trifoliate, or simple. Hence, Leafy or vegetative bract is characteristics of the flower of Malvaceae.

95. Answer: 3

Sol:

The female reproductive system consists of two ovaries, oviduct, uterus, cervix, vagina, accessory genital glands, and mammary glands.

Female external genitalia consists of:

- 1) Labium Minora - Fleshy folding which is small and is homologous to penile urethra.
- 2) Labium Majora - Fleshy folding which is large and has sebaceous glands and is homologous to the scrotum.
- 3) Clitoris - It has erectile tissues and is homologous to the glans penis.

Hence, the correct answer is option "3".

97. Answer: 3

92. Answer: 2

Sol:

11th New NCERT Page No. 227

94. Answer: 2

Sol:

Parasitism is a relationship between two living organisms of different species in which one organism, i.e. parasite obtains its food directly from the host. In this relationship the parasite is benefitted (+) and the host is harmed (-). So, this type of population interaction is represented by '+ '-'.

Parasitism + , - Mutualism + , +
Amensalism 0, - Commensalism +, 0

96. Answer: 4

Sol:

Each of the two strands at specific points in their sugar phosphate backbones

98. Answer: 1

Sol:

Homo sapiens (humans) belong to the **family Hominidae**, and **order primates** and the **phylum or division** is **chordata**. It is the most abundant species on earth under this order.

Housefly (*Musca domestica*) belong to the order **Diptera**.

Hence, the correct option is "3" - Primates.

99. Answer: 3**Sol:**

Protons accumulate inside the lumen of thylakoids due to the splitting of water.

The water-splitting complex is associated with PS-II and is located on the inner side of the thylakoid membrane. It helps in splitting the water. The splitting of water (photolysis of water) results in the release of protons, electrons, and oxygen. In the stroma of chloroplast, protons are utilized and NADPH is formed from NADP^+ .

As the lumen of thylakoids has a high concentration of protons and stroma has a low concentration of protons, a proton gradient is created. This proton gradient helps in the synthesis of ATP.

101. Answer: 2**Sol:**

Graminae

According to NTA Syllabus

103. Answer: 3**Sol:**

Rapid secretion of LH is maximum during the mid-cycle called LH surge induces rupture of Graafian follicle and thereby the release of ovum(ovulation)

Sol:

- I. Lymphatic system collects tissue fluid / interstitial fluid and drains it back to the major veins
- II. Interstitial fluid (tissue fluid) and lymph have almost similar composition
- III. Lymph and interstitial fluid have no larger proteins and RBC
- IV. Exchange of nutrients and gases, etc between the blood and cells always occurs through tissue fluid
- V. Interstitial fluid has the same mineral distribution as that in plasma
- VI. Lymph can be defined as blood minus RBC but has specialized lymphocytes

100. Answer: 3**Sol:****Class11th NCERT Page No. 236****102. Answer: 3****Sol:**

When the fertility rate is at the replacement level, a population will remain stable, neither growing nor shrinking. Fertility rates above the replacement level will cause the population to grow; fertility rates below the replacement level will cause the population to shrink. A stable population has an unchanging age structure and a constant exponential growth rate r ; both structure and growth rate are determined by vital rates (mortality, fertility).

104. Answer: 4

Sol:

Electrophoresis is a technique of separation of molecules such as DNA, RNA, or proteins under the influence of an electrical field so that they migrate in the direction of the electrode bearing the opposite charge, viz., positively charged molecules move towards the cathode (-ve electrode) and negatively charged molecules travel towards the anode (+ve electrode) through a medium or matrix.

Since DNA fragments are negatively charged molecules, they can be separated by allowing them to move towards the anode (the positive electrode) under an electric field through a matrix of agarose gel.

The DNA fragments separate according to their size through the agarose gel, with smaller fragments moving farther away as compared to larger ones.

The DNA fragments can be visualized by staining them with ethidium bromide, followed by exposure to UV radiation. Bright orange-colored bands of DNA can be observed.

105. Answer: 2**Sol:**

- (a) Poales – Order: Correct. Poales is an order of flowering plants that includes grasses, sedges, and bromeliads.
- (b) Hominidae – Class: Incorrect. Hominidae is a family, not a class. It includes great apes and humans.
- (c) Arthropoda – Phylum: Correct. Arthropoda is a phylum that includes insects, crustaceans, and arachnids.
- (d) Diptera – Family: Incorrect. Diptera is an order, not a family. It includes flies and mosquitoes.
- (e) Angiospermae – Division: Correct. Angiospermae is a division (or phylum) that includes flowering plants.

107. Answer: 1**Sol:**

Water stress can indirectly affect photosynthesis in plants by causing stomata to close, which reduces the amount of carbon dioxide available for photosynthesis. When stomata close, carbon dioxide can't enter the leaves, which slows down photosynthesis.

If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

106. Answer: 4**Sol:**

Class 11th Old NCERT Page No. 282

108. Answer: 4

Sol:

Parasympathetic nerves increases the mobility in small intestine, as it stimulates the peristalsis of the alimentary canal, contracts the muscles of urinary bladder for ejaculation of urine (Micturition), contracts circular muscles so constricts the pupil while it inhibits the rate of cardiac contraction i.e. retards heartbeat.

Sympathetic nerves increase the rate of cardiac contraction i.e. accelerates heartbeat.

109. Answer: 1**Sol:**

Monoadelphous, when all the filaments are united into a single bundle but anthers are free from each other. In this type of cohesion, a tube is formed around the gynoecium which is called staminal tube. For example- Gossypium.

Diadelphous, when the filaments are united in two bundles but the anther remains free. For example- gram, pea and bean.

Polyadelphous, when filaments are united into more than two bundles. For example- castor and citrus.

The stamen is called monothecous or one celled stamen as it consists of a single lobe. Hence, in Gossypium the type of cohesion is Monoadelphous.

111. Answer: 2**Sol:**

Class 12th NCERT Page No. 34, 35

110. Answer: 3**Sol:**

Low natality and high mortality

12th NCERT PAGE NO.- 196

113. Answer: 3**112. Answer: 2****Sol:**

Molecular weights of the fragments are different, Explanation: Gel electrophoresis is a technique used to separate DNA fragments (or other macromolecules, such as RNA and proteins) based on their size and charge. Electrophoresis involves running a current through a gel containing the molecules of interest. Based on their size and charge, the molecules will travel through the gel in different directions or at different speeds, allowing them to be separated from one another. During gel electrophoresis different fragments move at different distances due to difference in their molecular weight of the fragments. Smaller fragments move more towards anode.

114. Answer: 2**Sol:**

Class 11th Old NCERT Page No.297

Sol:

Basidiospores are produced by Basidiomycetes, also known as club fungi. Agaricus (a mushroom) is a Basidiomycete that produces basidiospores on a specialized structure called a basidium.

While other option are not:-

Yeasts → Belong to **Ascomycetes** and reproduce by **budding or ascospores**.

Diatoms → Are **unicellular algae**, not fungi, and reproduce by **binary fission**.

Aspergillus → Belongs to **Ascomycetes** and produces **conidia (asexual spores), not basidiospores**.

115. Answer: 4**Sol:**

11th NCERT, PAGE NO.- 160

116. Answer: 4**Sol:**

The pineal gland is located on the dorsal side of forebrain. Pineal secretes a hormone called melatonin. Melatonin plays a very important role in the regulation of a 24-hour (diurnal) rhythm of our body.

Ovary is the primary female sex organ which produces one ovum during each menstrual cycle. In addition, ovary also produces two groups of steroid hormones called estrogen and progesterone.

The adrenal medulla secretes two hormones called adrenaline or epinephrine and noradrenaline or norepinephrine. These are commonly called as catecholamines.

The thyroid gland is composed of follicles and stromal tissues. Each thyroid follicle is composed of follicular cells, enclosing a cavity. These follicular cells synthesise two hormones, tetraiodothyronine or thyroxine (T_4) and triiodothyronine (T_3).

117. Answer: 1**Sol:**

Collenchyma is a simple living tissue with thin non-lignified walls that provide support to the growing organs. Angular collenchyma has irregularly arranged cells with thickening at corners, where they contact with other cells.

118. Answer: 4**Sol:**

Mutualism is a kind of symbiosis in which both the involved organisms are benefited. Mycorrhizae are associations between fungi and the roots of higher plants. The fungi help the plant in the absorption of essential nutrients from the soil while the plant in turn provides the fungi with energy-yielding carbohydrates i.e. both of them are benefited.

119. Answer: 3**120. Answer: 1**

Sol:

Intentional or voluntary termination of pregnancy before full term is called medical termination of pregnancy (MTP) or induced abortion. MTPs are considered relatively safe during the first trimester, i.e., upto 12 weeks of pregnancy. Second trimester abortions are much more riskier.

121. Answer: 3**Sol:**

Chrysophytes includes diatoms and golden algae (desmids). They are found in fresh water as well as in marine environments. They are microscopic and float passively in water currents (plankton).

123. Answer: 3**Sol:**

Out of the statements given in the option, all statements are correct except that the intermediate compound which links glycolysis with Krebs' cycle is acetyl Co-A, not malic acid.

125. Answer: 3**Sol:**

11th New NCERT PAGE NO. 77, 74

127. Answer: 3**Sol:**

Lucy was found on November 24, 1974 by Donald Johnson. Lucy belongs to the species of Australopithecus, they have a characteristic feature of walking upright, they have a bipedal locomotion.

A fossilised skull of a young Australopithecus africanus is known as Taung baby and this species lived in East African grasslands about 2 million years ago.

But this Australopithecus is not a handy man as Homo habilis was considered as handy man.

129. Answer: 4**Sol:**

They are larger than virus.

11th NCERT, Page No.- 21

Sol:

Stirred-tank bioreactors use an **air compressor**. The **compressor generates air pressure** to force the air through the **filter's holes** and into the liquid, thereby ensuring a continuous supply of oxygen throughout the process.

122. Answer: 4**Sol:**

Class 11th Old NCERT Page No. 291

124. Answer: 2**Sol:**

NCERT 11th Page No.331

126. Answer: 2**Sol:**

Natural ecosystem

12th NCERT PAGE NO.- 205

128. Answer: 2**Sol:**

Bacillus thuringiensis (Bt) is a Gram-positive bacterium that produces crystals during sporulation. These crystals comprise ~130 kDa protoxins called as crystal proteins which are potent and highly specific insecticides. Once ingested by specific host, these crystals dissolve in the alkaline conditions of the gut thereby activating the protoxins. The active toxins then bind to receptors on midgut epithelial cells, become inserted into the plasma membrane where they form pores leading to cell death through osmotic lysis. This special feature of Bt toxin was explored in genetic engineering to produce genetically modified variety of cotton known as "Bt cotton" which produce the insecticide.

130. Answer: 2

Sol:

Malpighian corpuscles are the functional unit of nephrons. The Malpighian body is adapted for the process of **ultrafiltration** as follows: The afferent arteriole is wider than the efferent arteriole and so the blood in the glomerulus is at a high pressure. There is a **large filtration surface** due to the numerous capillaries that form the glomerulus.

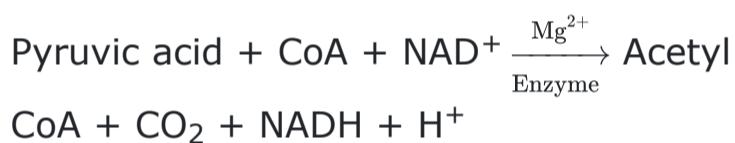
The principal function of the **loop of Henle** is in the recovery of water and sodium chloride from urine. This function allows production of urine that is **more concentrated than blood**, limiting the amount of water needed as intake for survival.

The **ureters** are two tubes that drain urine from the kidneys to the bladder. Each ureter is a muscular tube that drains into the bladder hence performs the function of **transportation**.

The **urinary bladder stores urine** until enough of it accumulates for removal from the body.

131. Answer: 4

Sol:



The enzyme pyruvate dehydrogenase brings about the decarboxylation of pyruvic acid to form two molecules of Acetyl CoA, which is further utilised in the Krebs cycle. The process is **aerobic respiration, or link reaction**, in which pyruvic acid is converted to acetyl coA.

133. Answer: 2

Sol:

11th New NCERT PAGE NO. 72, 73

132. Answer: 3

Sol:

Class 12th NCERT Page No.247

Gastrin → stimulates gastric gland secretion (HCl, pepsin)

GIP (gastric inhibitory peptide) → inhibits further gastric secretion/motility

Secretin → stimulates release of a bicarbonate-rich, watery pancreatic juice

Cholecystokinin (CCK) → stimulates secretion of pancreatic enzymes and bile

134. Answer: 2

Sol:

ECOSYSTEM:- It is defined as the association of living and non-living components existing together.

The natural ecosystem operates itself with the help of natural conditions without any interference from man. They are divided into two types:-

- 1) Terrestrial ecosystem
- 2) Aquatic ecosystem.

But the ultimate source of energy for all ecosystems is the Sun.

135. Answer: 2

136. Answer: 1

Sol:

The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats) is called **adaptive radiation**.

This happens particularly when a change in the environment makes new resource available or alters biotic interactions.

137. Answer: 3

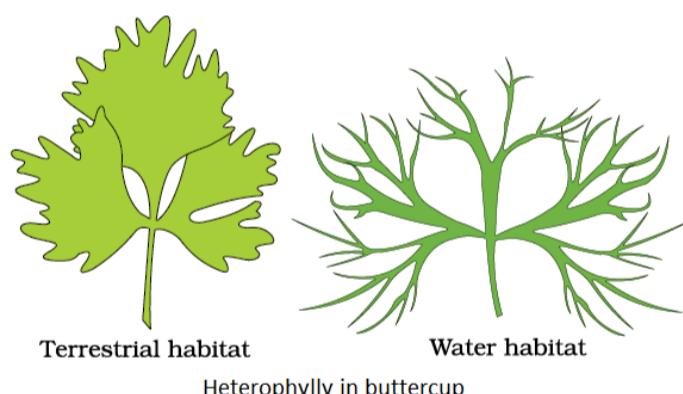
Sol:

Isogamy is found in Spirogyra in which both gametes are non-motile. In Chlamydomonas, all three conditions, isogamy, anisogamy and oogamy are found. Both motile and non-motile gametes are found. In volvox and Fucus, oogamy is present, where non-motile egg fuses with motile sperm. So, the correct option is B.

139. Answer: 2

Sol:

Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called plasticity. On the other hand, difference in shapes of leaves produced in air and those produced in water in buttercup also represent the heterophylous development due to environment. This phenomenon of heterophyly is an example of plasticity.



141. Answer: 3

Sol:

The **biosphere**, also known as the "**ecosphere**," is the worldwide sum of all ecosystems. It can also be called the "**zone of life on Earth**." The biosphere is **virtually a closed system** with regard to **matter**, with **minimal** inputs and **outputs**. The biosphere is made up of the **parts of Earth** where life exists—all ecosystems. The biosphere extends from the **deepest root systems of trees** to the dark environments of **ocean trenches, lush rain forests, high mountain tops, and transition zones** like this one, where **ocean** and **terrestrial** ecosystems meet.

Sol:

12th NCERT, Page No.- 184

138. Answer: 3

Sol:

Class 11th Old NCERT Page No. 273

140. Answer: 4

Sol:

Phenylketonuria is an autosomal recessive genetic disorder which results in an inborn error of metabolism. The affected individuals lack the enzyme that converts the amino acid phenylalanine to tyrosine. Phenylalanine accumulates in the brain as phenylpyruvic acid resulting in mental retardation.

142. Answer: 4

Sol:

RNAi, Explanation: FlavrSavr tomato is produced to increase its durability. For production of this tomato by genetic engineering the sense and antisense RNA hybridize. This technique is called as RNA interference that inhibit gene expression.

143. Answer: 2**Sol:**

Mosses and Lichens colonize the bare rock early than the other species, they belong to the pioneer community.

In bryophytes, the haploid gametophyte is dominant, while in pteridophytes, the diploid sporophyte is dominant.

In gymnosperms, male and female gametophytes are present within sporangia located on sporophytes. The male gametophyte is within the microsporangium, and the female gametophyte is within the megasporangium.

Genera like *Selaginella* and *Salvinia* produce two kinds of spores - macro (large) and micro (small) spores this is the reason why they are known as heterosporous pteridophytes. *Lycopodium* and *Equisetum* are homosporous pteridophytes. i.e. they produce only one type of spores.

Coralloid roots of *Cycas* harbor blue-green algae like *Nostoc*, *Anabaena*, and are not a type of VAM (vesicular-arbuscular mycorrhiza) which is a symbiotic association with fungus.

Hence, the correct answer is option "1" - a, d, and e.

145. Answer: 3**Sol:**

50%

12th NCERT PAGE NO.- 73

144. Answer: 3**Sol:**

Class 11th Old NCERT Page No. 273

147. Answer: 4**Sol:**

the apex of the food pyramid

12th NCERT PAGE NO.- 212

149. Answer: 2**146. Answer: 2****Sol:**

Auxin show apical dominance (In most higher plants, the growing apical bud inhibits the growth of the lateral (axillary) buds).

GA₃ helps rapid seed germination, and plant resistance to cold and disease in almost all vegetable, fruit and flowers.

Ethylene is a simple gaseous PGR. It is synthesised in large amounts by tissues undergoing senescence and ripening fruits.

Cytokinin helps to produce new leaves, chloroplasts in leaves, lateral shoot growth and adventitious shoot formation.

148. Answer: 2**Sol:**

Either ss RNA or ss DNA

12th NCERT, Page No.- 183

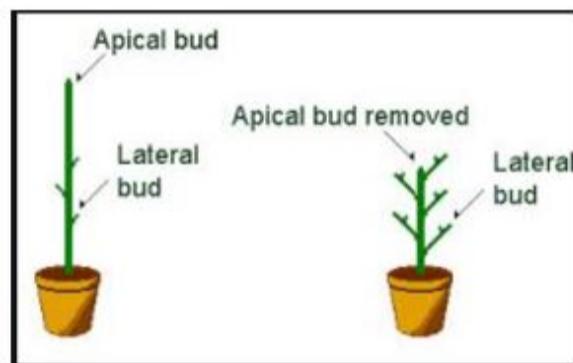
150. Answer: 2

Sol:

In gymnosperms, the ovule is naked because the ovary wall is absent and therefore the ovules stay unprotected and naked. Normally the ovules are bound to parts of the inner side of ovary walls known as the placentae.

Sol:

Pruning helps in making the hedge dense as it frees the axillary buds from apical dominance. When the shoot apex is cut down through pruning, the axillary buds grow and the hedge becomes dense. Pruning removes shade and allows germination of new seedlings to impart a dense growth.



Pruning of plant or shrub is done to remove crossed, damaged or diseased branches that will stress the plant. Pruning also improves air flow through the plant and can encourage better branch distribution which results in a healthier, more vigorous plant that is more disease tolerant.

151. Answer: 1**152. Answer: 3****Sol:**

The rivet popper hypothesis proposed by Paul Ehrlich states that an ecosystem is made by joining together several species like an airplane is made by joining several rivets.

The plane rivets are equivalent to species in ecosystem.

If passengers start popping out of plane, it will gradually stop functioning and will collapse.

So, extinction of different species will lead the collapse of the eco-system.

Hence, the correct option is "3" - Paul Ehrlich.

Sol:

Colour blindness is a X-linked recessive disorder. Son gets its X chromosome from the mother, hence the normal mother of a colour blind son will be carrier (X^cX). Among the children of a carrier female (X^cX) and colour blind man (X^cY), 50% sons and 50% daughters will be affected.

Parent generation : " X^cX " x " X^cY "

Gametes :		X^c	X
$X^cX \rightarrow$	X^c	X	
X^cY			
X^c	X^cX^c colour blind girl	X^cX carrier girl	
Y	X^cY colour blind boy	XY normal boy	

153. Answer: 2

Sol:

Secondary Metabolites are compounds that are not directly engaged in normal growth and development but do have some ecological functions within the body. Their are some secondary metabolites given below table :-

Pigments	Carotenoids, Anthocyanins, etc.
Alkaloids	Morphine, Codeine, etc
Terpenoids	Monoterpene, Diterpenes etc.
Essential oils	Lemon grass oil, etc.
Toxins	Abrin, Ricin
Lectins	Concanavalin A
Drugs	Vinblastin, Curcumin, etc.
Polymeric substances	Rubber, Gums, Cellulose

Therefore, according to table :- Alkaloid - Morphine, Toxin - Abrin, Lectin - Concanavalin A, and Drug - Vinblastin

155. Answer: 4

Sol:

The maximum number of cells in a mature male gametophyte of a Flowering plant is three: a tube cells and two sperm cells. The tube cells or vegetative cell forms the pollen tube while generative nucleus forms two male gametes known as sperm cell.

154. Answer: 4

Sol:

12th NCERT, Page No.- 153

156. Answer: 1

Sol:

An allele is one of two, or more, forms of a given gene variant. An allele is one of two, or more, versions of the same gene at the same place on a chromosome. It can also refer to different sequence variations for a several-hundred base-pair or more region of the genome that codes for a protein. Alleles can come in different extremes of size. Sometimes, different alleles can result in different observable phenotypic traits. A notable example of this is Gregor Mendel's discovery that the white and purple flower colors in pea plants were the result of "pure line" traits, that is a single gene with two alleles.

157. Answer: 3**Sol:**

Alexander Von Humboldt observed that within a region species richness increases with the increases in area.

159. Answer: 4**Sol:**

Triple fusion is a fusion that involves a sperm nucleus and two polar nuclei which occurs in the double fertilization in a seed-bearing plant that results in the endosperm formation. The fusion process occurs in the embryo sac of the angiosperms.

158. Answer: 2**Sol:**

12th NCERT, Page No.- 131

160. Answer: 1**Sol:**

- a. According to human genome project, Chromosome 1 has most genes (2968).
- b. The human genome contains an estimated 30,000 genes.
- c. E. coli that has only 4.6×10^6 bp (compare it with humans whose diploid content is 6.6×10^9 bp), completes the process of replication within 18 minutes; that means the average rate of polymerization has to be approximately 2000 bp per second.
- d. Chromosome Y has the fewest (231).

161. Answer: 4**Sol:**

A cup-shaped array of flattened membranous vesicles found in plant cells. Dictyosomes modify proteins from the endoplasmic reticulum, and may also polymerize sugars to polysaccharides.

Dictyosomes are golgi bodies that are absent in prokaryotic microorganisms like cyanobacteria, mycoplasma and bacteria, but present in plants.

162. Answer: 4**Sol:**

a, c & d are correct

12th NCERT PAGE NO.- 153

163. Answer: 1**Sol:**

A - ii, B - i, C - iii

12th NCERT, PAGE NO.- 20, 21

164. Answer: 4**Sol:**

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

12th NCERT PAGE NO.- 75

165. Answer: 3**166. Answer: 2**

Sol:

The tonoplast is the cytoplasmic membrane surrounding a vacuole, separating the vacuolar contents from the cell's cytoplasm.

Plasmalemma is a plasma or cell membrane that is mainly found in plants. It serves as an attachment surface for the cell wall, the glycocalyx, and the cytoskeleton.

A cell wall is a structural layer surrounding some types of cells, just outside the cell membrane. It can be tough, flexible, and sometimes rigid.

Plasmodesmata are microscopic channels which traverse the cell walls of plant cells and some algal cells, enabling transport and communication between them. Hence, vacuole is surrounded by tonoplast.

167. Answer: 4**Sol:**

Nitrogenous bases follow complementary base pairing. Adenine is complementary to thymine and guanine is complementary to cytosine. Thymine is replaced with uracil in RNA. Accordingly, the complementary base pairing for the given sequence of ATG GTG AGC TAC GCG on the coding strand will be TAC CAC TCG ATG CGC on the template strand. From this template strand, the codon sequence on mRNA will be AUG GUG AGC UAC GCG.

169. Answer: 2**Sol:**

Phylum Coelenterata (Cnidaria) are aquatic, mostly marine, sessile or free-swimming, radially symmetrical animals. The characteristic feature is cnidoblast (stinging capsule).

Cnidarians exhibit two basic body forms called **polyp** and **medusa**. The former is a sessile and cylindrical form like Hydra, Adamsia, etc. whereas, the latter is umbrella-shaped and free-swimming like **Aurelia or jelly fish**

These include- **Physalia** (Portuguese man-of-war), **Adamsia** (Sea anemone), **Pennatula** (Sea-pen), **Gorgia** (Sea-fan) and **Meandrina** (Brain coral).

171. Answer: 3**Sol:**

12th NCERT Page No. 142-143

168. Answer: 4**Sol:**

ER, Golgi apparatus, and lysosome and vacuoles are single membranous cell organelles which work in a well-coordinated manner.

peroxisomes chloroplast and mitochondria are not considered as the endomembrane system because they are not coordinated with the above cell organelles

ncert (page 133 1st para 3rd line)

170. Answer: 4**Sol:**

E. coli is a prokaryotic organism, which does not contain a nucleus and nuclear wall. The genetic material of E. coli is a double-stranded circular DNA molecule present in cytoplasm.

172. Answer: 3

Sol:

During S phase (before division), which follows G₁ phase, all of the chromosomes are replicated. Following replication, each chromosome now consists of two sister chromatids (see figure below). Thus, the amount of DNA in the cell has effectively doubled, even though the ploidy, or chromosome count, of the cell remains at 2n.

Sol:

Green glands are excretory organs found in many higher crustaceans, such as **prawns**, crabs, lobsters, crayfish, shrimp, krill, woodlice, and barnacles.

Flame cells are present in the phylum Platyhelminthes (flatworms). e.g. **fasciola**.

Malpighian tubules are excretory organs in many **insects**, including **cockroaches**.

Nephridia are excretory organs found in annelids, a phylum of segmented invertebrates. In **earthworms**, for example, a pair of nephridia are present in almost every segment, and they excrete waste through a pair of pores in each segment.

173. Answer: 4**Sol:**

Many non-human model organisms, such as bacteria, yeast, *Caenorhabditis elegans* (a free living non-pathogenic nematode), *Drosophila* (the fruit fly), plants (rice and *Arabidopsis*), etc., have also been sequenced for their complete study and to be used in research field.

Hence correct answer is option "4" - All of the above.

175. Answer: 4**Sol:**

11th NCERT Page No. 43,44, 45, 48

Pleurobrachia – Ctenophora

Radula – Mollusca

Stomochord – Hemichordata

Air bladder – Osteichthyes

174. Answer: 2**Sol:**

Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus. Can you think of how tapetal cells could become bi-nucleate? This happens due to endomitosis.

176. Answer: 3**Sol:**

11th NCERT PAGE NO.- 126

177. Answer: 1**Sol:**

When any plane passing through the central axis of the body divides the organism into two identical halves, it is called radial symmetry. Coelenterates, ctenophores and echinoderms.

179. Answer: 1**178. Answer: 1****Sol:**

interphase and M-phase/divisional phase

11th NCERT PAGE NO.- 121

180. Answer: 4**Sol:**

11th NCERT, Page No.- 114

Sol:

Exocrine glands secrete mucus, saliva, earwax, oil, milk, digestive enzymes and other cell products which are released through ducts or tubes.

Gap junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules.