Solution

NEET

Entrance Exam - NEET-UG

PHYSICS

1.

(b) 2.5%

Explanation:

2.5%

2.

(b) $[ML^2T^{-2}Q^{-1}]$

Explanation:

$\varepsilon = \frac{E}{Q}$

$[\varepsilon] = \frac{[\varepsilon]}{[Q]} = \frac{[M^1L^2T^{-2}]}{[Q]}$

$= [ML^2T^{-2}Q^{-1}]$

3. **(a)** $\left[\mathrm{M}^2\right]\left[\mathrm{L}^{-1}\right]\left[\mathrm{T}^0\right]$

Explanation:

Given,

E = Energy

G = Gravitational constant

$\frac{E}{G}$ = ?

Dimensional formula of energy

$(\mathrm{E}) = \left[\mathrm{ML}^2\ \mathrm{T}^{-2}\right]$

Dimensional formula of gravitational constant

$= \frac{\left[\mathrm{MLT}^{-2}\ \mathrm{L}^2\right]}{\left[\mathrm{M}^2\right]}$

$= \left[\mathrm{M}^{-1}\ \mathrm{L}^3\ \mathrm{T}^{-2}\right]$

Hence,

$\frac{E}{G} = \frac{[ML^2T^{-2}]}{[M^{-1}L^3T^{-2}]}$

$= \left[M^2L^{-1}T^0\right]$

4.

(c) More than 19.6 m/s

Explanation:

Time interval of each throw (t) = 2 sec and acceleration due to gravity (g) = 9.8 m/s^2.

We know that time of flight of first ball $(T) = \frac{2u}{g}$

since, more than two balls remain in the sky, therefore time of flight of the first ball (T) must be greater than 2t = 2×2 = 4 sec.

$\frac{2u}{g} > 4$ or u > 2g = 2×9.8 = 19.6 m/s

5.

(b) $\frac{7}{5}$

Explanation:

It is noted that s $\propto$ (2n - 1),

So, $\frac{s_4}{s_3} = \frac{7}{5}$

6.

(c) $\tan^{-1}(\frac{4}{9})$

Explanation:

H = $\frac{u^2 \sin^2 \theta}{2g}$

or 80 = $\frac{u^2 \sin^2 \theta}{2 \times 10}$

or $u^2 \sin^2 \theta$ = 1600

or u sin θ = 40 ms^{-1}

Horizontal velocity = u cos θ = at

= 3 $\times$ 30 = 90 ms^{-1}

$\frac{u \sin \theta}{u \cos \theta} = \frac{40}{90}$

or tan $\theta = \frac{4}{9}$ or θ = $\tan^{-1}(\frac{4}{9})$

7.

(d) 90°

Explanation:

dot products of two vectors is zero so the angle between them will be 90°.

8.

(b) The reading of spring balance will increase and the physical balance will remain in equilibrium.

Explanation:

The reading of spring balance will increase and the physical balance will remain in equilibrium.

9.

(b) $\frac{1}{2}$ mg(h + 4d)

Explanation:

$\frac{1}{2}$ mg(h + 4d)

10. **(a)** 0, 1

Explanation:

Here, m_1 = m, m_2 = 2m

u_1 = 2 m/s, u_2 = 0

Coefficient of restitution, e = 0.5

Let v_1 and v_2 be their respective velocities after collision.

Applying the law of conservation of linear momentum, we get,

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

$\therefore m \times 2 + 2m \times 0 = m \times v_1 + 2m \times v_2$

or 2m = mv_1 + 2 mv_2

or 2 = (v_1 + 2v_2) ...(i)

By definition of coefficient of restitution,

e = $\frac{v_2 - v_1}{u_1 - u_2}$

or $e(u_1 - u_2) = (v_2 - v_1)$

$0.5(2 - 0) = (v_2 - v_1)$

$1 = v_2 - v_1$ ...(ii)

Solving equations (i) and (ii), we get,

$v_1 = 0$ m/s, $v_2 = 1$ m/s

11.

(c) 3 J

Explanation:

Apply the law of conservation of energy, Work required = change in kinetic energy

Since, final KE = 0

And, initial KE = $\frac{1}{2}mv^2 + \frac{1}{2}\mathrm{I}\omega^2 = \frac{3}{4}mv^2$

$= \frac{3}{4} \times 100 \times \left(20 \times 10^{-2}\right)^2 = 3\ \mathrm{J}$

Hence, change in KE, $|\Delta KE| = 3J$

12. **(a)** $L_B > L_A$

Explanation:

Given that $(KE)_A = (KE)_B$

$\therefore \frac{1}{2}I_A\omega_A^2 = \frac{1}{2}I_B\omega_B^2$ ...(i)

or $\frac{1}{2}L_A\omega_A = \frac{1}{2}L_B\omega_B$ ...(ii)

Since $I_B > I_A$, hence, $\omega_B < \omega_A$ [from eq. (i)]

From eq. (ii), as $\omega_B < \omega_A$, hence $L_B > L_A$

13. **(a)** 2I

Explanation:

Here, angular momentum is conserved.

Initial angular momentum = Final angular momentum

$I \times 20 = I' \times 10$

Where I' is new moment of inertia

$I' = 2I$

14.

(b) a line perpendicular to the plane of rotation

Explanation:

The angular momentum is given as

$\vec{L} = \vec{r} \times \vec{v}$

so it is perpendicular to the plane containing r and velocity vector, hence along the axis perpendicular to the plane.

15.

(c) 32 km

Explanation:

We know that gravity at any height is given as;

$g' = g\left(\frac{1-2h}{R}\right)$ ...(1)

Decrease by 1% implies that $g' = \left(\frac{99}{100}\right)g$

Substitute in (1), we get

$\left(\frac{99}{100}\right)g = g\left[1-\left(\frac{2h}{R}\right)\right]$

$\frac{99}{100} = 1-\left(\frac{2h}{R}\right)$

$\frac{2h}{R} = 1-\left(\frac{99}{100}\right)$

$\frac{2h}{R} = \frac{1}{100}$

$h = \frac{R}{200}$

h = $\frac{6400}{200}$ (R = 6400 km)

h = 32 km from surface of earth

16.

(d) Increases by more than 19%

Explanation:

g = $\frac{GM}{R^2}$ ...(i)

$g' = \frac{GM}{\left(\frac{90}{100}R\right)^2} = \frac{100}{81}\frac{GM}{R^2}$ ...(ii)

From eqn i and ii

$g' = \frac{100}{81}g \Rightarrow \frac{g'}{g} = \frac{100}{81}$

$\triangle g = \frac{19}{81}g$ = 23% of g

So increase is more than 19 % of g.

17.

(c) $\sqrt{400}$ m/s

Explanation:

Pressure at the bottom of tank P = hρg

= 3×10^5 Nm^{-2}

Pressure due to liquid column:

$P_l = 3 \times 10^5 - 1 \times 10^5 = 2 \times 10^5$

As the velocity of water $v = \sqrt{2gh}$

$v = \sqrt{2gh}$

$= \sqrt{2\frac{P_l}{\rho}}$ (as $P_l = \rho gh$)

$= \sqrt{\frac{2\times2\times10^5}{10^3}}$

$= \sqrt{400} m/s$

18.

(c) > 50°C

Explanation:

Body at 100°C temperature will posses greater heat capacity than the body at 0°C, so the final temperature will be closer to 100°C. So T_C > 50° C.

19.

(c) $(500)^4$

Explanation:

temperature = 500K

emissive power is proportional to $(T)^4$

hence emissive power is proportional to $(500)^4$

20. **(a)** 375°C

Explanation:

375°C

21.

(b) $\frac{1}{d^2}$

Explanation:

The mean free path X is the average distance covered by a molecule between two successive collisions and is given by

$\lambda = \frac{1}{\sqrt{2}n\pi d^2}$

where n is the number density and d is the diameter of the molecule.

$\therefore \lambda \propto \frac{1}{d^2}$

22.

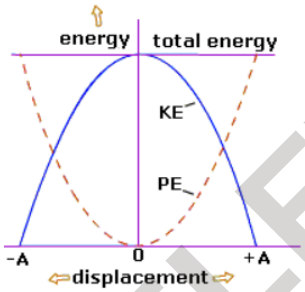
(d) ± 1

Explanation:

For an SHM the PE of the particle is zero at equilibrium position where KE is maximum. Again at the extreme positions for displacement =+a or -a, the KE of the particle is zero it has

got maximum PE.

Hence displacement between these two points is +a or -a, where a is the amplitude of the SHM.



23.

(c) a periodic, but not simple harmonic motion with a period $\frac{\pi}{\omega}$

Explanation:

y = $\frac{1-\cos 2\omega t}{2}$

$\therefore$ Period, T = $\frac{2\pi}{2\omega} = \frac{\pi}{\omega}$

24.

(d) 6

Explanation:

The fundamental frequency of an organ pipe closed at one end is 1500 Hz

The audible frequency of human ear is in between 20 Hz to 20000 Hz

If the maximum number of audible harmonics generated be n then the maximum frequency will be nearly 20000 . Here one end close organ pipe generates only odd

harmonics as follows

1500 $\times$ 1,1500 $\times$ 3,1500 $\times$ 5 .....etc which are in AP having 1 \mathrm{st} term 1500 and common difference 3000

So n^{th} term =

1500+(n-1) $\times$ 3000 = 20000

$\Rightarrow$ n $\times$ 3000 = 20000 + 1500

$\Rightarrow$ n = $\frac{21500}{3000}$

$\Rightarrow$ n = 7

So, the number of audible overtones generated will be (n - 1) = 7 - 1 = 6

25.

(c) 20 Hz

Explanation:

Difference between any two successive frequencies of COP

$= \frac{2v}{4l} = 260 - 220 = 40\text{Hz}$

or, $\frac{v}{4l} = 20\text{Hz}$

Hence, fundamental frequency = 20 Hz

26.

(b) $-K\frac{e^2}{r^3}\vec{r}$

Explanation:

$-K\frac{e^2}{r^3}\vec{r}$

27.

(b) $\frac{9F}{16}$

Explanation:

$\frac{9F}{16}$

28.

(b) $\frac{4K}{K+3}$

Explanation:

The capacitance of a parallel plate capacitor in the absence of the dielectric is,

$C_0 = \frac{\varepsilon_0 A}{d}$ ...(i)

where A is the area of each plate and d is the distance between them.

The capacitance of a parallel plate capacitor in the presence of a dielectric slab of thickness t and dielectric constant K, is

$C = \frac{\varepsilon_0 A}{(d-t)+\frac{t}{K}} = \frac{\varepsilon_0 A}{\left(d-\frac{3}{4}d\right)+\frac{3d}{4K}}$

$= \frac{\varepsilon_0 A}{\frac{d}{4}+\frac{3d}{4K}} = \frac{4K\varepsilon_0 A}{d(k+3)}$ ...(ii)

Dividing eqn. (ii) by eqn. (i), we get

$\frac{C}{C_0} = \frac{4K\varepsilon_0 A}{d(K+3)} \times \frac{d}{\varepsilon_0 A} = \frac{4K}{K+3}$

29.

(d) maximum at B

Explanation:

We know that electric potential goes on decreasing as we move forward in the direction of the electric field.

$\therefore V_B > V_C > V_A$

30. **(a)** more with 39 bulbs then with 40 bulbs

Explanation:

The voltage terminals same for both the cases So, illuminance, H $\propto(\frac{1}{R})$.

Hence the combination of 39 bulbs have low resistance as compared to 40 bulb, so 39 bulb combination will glow more.

31.

(c) 30°

Explanation:

F = IlB sinθ

B = 2T, F = 7.5 N , I = 1.5 A , l = 5m

sin θ = $\frac{7.5}{11B} = \frac{7.5}{1.5 \times 5 \times 2} = \frac{1}{2}$

$\therefore\ \theta = 30^\circ$

32.

(c) d^4

Explanation:

Magnetic field due to first magnet having dipole moment M_1 at a distance d as its axis.

$B_1 = \frac{\mu_0}{4\pi}\frac{2M_1 d}{\left(d^2-l^2\right)^2}$

If 2nd magnet is placed at distance d, having poles length l. Let m_2 be its pole strength, then the force acting at their poles will be

$F_1 = \frac{\mu_0}{4\pi}\frac{2M_1 m_2}{(d-l)^3}$ and $F_2 = \frac{\mu_0}{4\pi}\frac{2M_1 m_2}{(d+l)^3}$

So, the net force F = F_1 - F_2

$= \frac{\mu_0}{4\pi}2M_1 m_2\left[\frac{1}{(d-l)^3} - \frac{1}{(d+l)^3}\right]$

$= \frac{2\mu_0 M_1 m_2}{4\pi}\left[\frac{6d^2 l}{\left(d^2-l^2\right)^3}\right]$

Here, l < < d, so,

$F = \frac{\mu_0 M_1 (2m_2 l)}{4\pi}\left[\frac{6d^2}{d^6}\right]$

$F = \frac{\mu_0}{4\pi}M_1 M_2\left[\frac{6}{d^4}\right]$

$\propto -$

33.

(d) $\frac{M}{2}, m$

Explanation:

Magnetic moment M = m $\times$ 2L

or, mL = $\frac{M}{2}$

If m' is pole strength of each magnet part and M' is magnetic moment of each magnet part, then

M' = m'L' = m $\times$ L = $\frac{M}{2}$

34. **(a)** 1.0 henry

Explanation:

For a long solenoid, B = $\mu_0 \quad ni = \mu_0 \frac{N}{l} \cdot i$

Flux = $\mu_0 \frac{N}{l} \cdot i \cdot A$

given flux per turn = 4 $\times$ 10^{-3} ; i = 2A

$\therefore$ Total flux = 4 $\times$ 10^{-3}

L = $\left(\mu_0 \frac{N}{l} \cdot NA\right) = \frac{4 \times 10^{-3} \times 500}{2}$ = 1 henry

35.

(b) $-\frac{BR^2\omega}{2}$

Explanation:

Radius of the disc = R metre

Area A of the disc = πR^2 metre^2

Angular velocity = ω radian/sec

Frequency of revolution = $\frac{\omega}{2\pi}$ per second

Area swept out per second = $(\pi R^2)(\omega/2\pi)$ metre^2/sec

= $(\omega R^2/2)$ meter^2/sec

Magnetic induction = B tesla

Rate of change in flux = $\left(\frac{\omega R^2}{2}\right) B$

Induced emf, e = $-\frac{\Delta\phi}{\Delta t} = -\frac{R^2\omega B}{2}$ volt.

36.

(c) Induction furnace

Explanation:

Induction furnace

37. **(a)** zero

Explanation:

E = 20 sin 300 t

Average value of any AC voltage over a cycle = 0 and it will have equal values for both positive and negative cycle, which will cancel out each other and resultant is zero.

38.

(d) $\omega L = \frac{1}{\omega C}$

Explanation:

The current will be maximum when Impedance is minimum, i.e., when, $X_L = X_C$ or $\omega L = \frac{1}{\omega C}$

39.

(c) its wavelength is comparable to interatomic distance

Explanation:

Crystal structure is explored through the diffraction of waves having a wavelength comparable with the interatomic spacing (10^{-10} m) in crystals. Radiation of longer wavelengths cannot resolve the details of the structure, while radiation of much shorter wavelength Is diffracted through inconveniently small angles. Usually, the diffraction of

X-ray is employed in the study of crystal structure as X-ray has a wavelength comparable to interatomic spacing.

40.

(c) μ = 1.50

Explanation:

In case of total internal reflection, sin i > sin c

sin 45^{o} > $\frac{1}{\mu}$

$\mu > \sqrt{2}$

41.

(b) -8 cm

Explanation:

According to lens maker's formula,

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

For given concave lens,

R_1 = -3 cm and R_2 = -4 cm

$\therefore \frac{1}{v} - \frac{1}{u} = (\mu - 1)\left(\frac{1}{-3} + \frac{1}{4}\right)$

or $\frac{1}{v} - \frac{1}{(-12)} = (1.5 - 1)\left(\frac{-4+3}{12}\right)$

or $\frac{1}{v} + \frac{1}{12} = 0.5 \times \frac{-1}{12} = \frac{-1}{24}$

or $\frac{1}{v} = -\frac{1}{24} - \frac{1}{12} = \frac{-1-2}{24} = -\frac{1}{8}$

or v = -8 cm

42.

(d) there will be no change in fringe width but fringe pattern shifts

Explanation:

When we put a glass plate in the path of one of the beams interfering with each other then there is a change of place of fringes on the screen. All the fringes including central fringe are shifted. It does not result in a change of fringe width.

43.

(b) 2×10^{20}

Explanation:

Given that; the wavelength of photons,

E = nhv

But E = P × t

$\therefore$ P × t = nhv

or P × t = $\frac{nhc}{\lambda}$

$\therefore$ 60 × 1 = $\frac{n \times 6.6 \times 10^{-34} \times 3 \times 10^{8}}{660 \times 10^{-9}}$

or 60 = $\frac{n \times 6.6 \times 3 \times 10^{-19}}{6.6}$

or n = $\frac{60}{3 \times 10^{-19}}$ = 2×10^{20} photons

44.

(d) Energy

Explanation:

E = $\frac{12375}{\lambda}$eV

Wavelength of spectral line emitted is inversely proportional to energy $\lambda \propto \frac{1}{E}$.

45.

(b) 7

Explanation:

$\frac{\text{Binding energy}}{\text{Nucleon}} = 0.0303 \times \frac{931}{4} \approx 7$

CHEMISTRY

46. **(a)** 5 mL O_2

Explanation:

$$\underset{30}{\underset{0}{H_2}} + \frac{1}{2}\underset{20}{\underset{5}{O_2}} \longrightarrow \underset{0}{\underset{15}{H_2O}}$$

47.

(d) Cu^+

Explanation:

Cu^+ has $3d^{10}$ configuration.

48. **(a)** 5f > 6p > 5p > 4d

Explanation:

(n + 1) values for, 4d = 4 + 2 = 6

5p = 5 + 1 = 6

5f = 5 + 3 = 8

6p = 6 + 1 = 7

∴ Correct order of energy would be

5f > 6p > 5p > 4d

49. **(a)** -5.1 eV

Explanation:

$Na \rightarrow Na^+ + e^-$, I.P. = +5.1 eV

$Na^+ + e \rightarrow Na \rightarrow \Delta H_{eg}$ = -5.1 eV

50.

(b) D

Explanation:

Smaller the atom, stronger is the bond and greater the bond dissociation energy.

51.

(c) HF

Explanation:

Among the given molecules, in HE fluorine is most electronegative element which is bonded to hydrogen thus, it shows maximum hydrogen bonding.

52.

(d) Option (a) is correct.

Explanation:

PCl_5 is trigonal bipyramidal.

53.

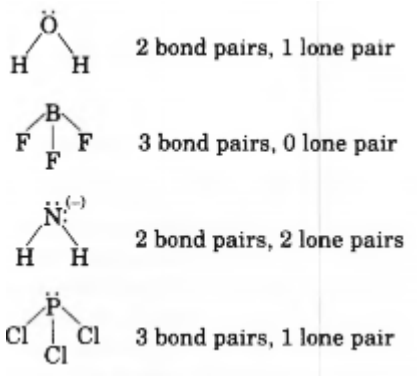
(c) CO_2

Explanation:

CO_2 molecule is sp-hybridised and thus it is linear, while CO_3^{2-} is planar (sp^2-hybridised), SO_2 is an angular molecule with sp^2 hybridisation SO_4^{2-} is tetrahedral (sp^3 -hybridised).

54. **(a)** PCl_3

Explanation:



55.

(c) 100 J mol^{-1} K^{-1}

Explanation:

$\Delta S = \frac{\Delta H}{T} = \frac{30 \times 10^3}{300}$ = 100 J mol^{-1} K^{-1}

56.

(b) Pb^{2+}, Sn^{4+}

Explanation:

ΔG = -ve for $Pb^{4+} \rightarrow Pb^{2+}$ spontaneous and Pb^{2+} is more stable

ΔG = +ve for $Sn^{4+} \rightarrow Sn^{2+}$ non-spontaneous and Sn^{4+} is more stable

57.

(b) The molar solubility of MY in water is less than that of NY_3

Explanation:

$$\underset{s}{MY} \rightleftharpoons \underset{s}{M^+} + \underset{s}{Y^-}$$

K_{sp} = s . s

$\Rightarrow 6.0 \times 10^{-13} = s^2 \Rightarrow s = \sqrt{6.2 \times 10^{-13}}$

= 7.87×10^{-7} mol L^{-1}

$$\underset{s}{NY_3} \rightleftharpoons \underset{s}{N^+} + \underset{3s}{3Y^-}$$

K_{sp} = $s.(3s)^3 = 27s^4$

$\Rightarrow 6.2 \times 10^{-13} = 27s^4$

$\Rightarrow$ s = 3.89×10^{-4} mol L^{-1}

Hence, molar solubility of MY in water is less than that of NY_3.

58. **(a)** CO_2

Explanation:

HCl removes OH^- ions but also oxidised by $KMnO_4$. Similarly, SO_2 is also oxidised.

$CO_2 + 4OH^- \rightarrow H_2CO_3 + H_2O$

59.

(b) $K_p = p_{CO_2}$

Explanation:

Among the given species involved in the reaction only gaseous species is CO_2 thus, $K_p = p_{CO_2}$ [p = partial pressure]

60.

(c) 0.4 moles

Explanation:

$[5e^- + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O$ ...(i)$] \times 2$

$[C_2O_4^{2-} \rightarrow 2e^- + 2CO_2$ ...(ii)$] \times 5$

$2MnO_4^- + 16H^+ + 5C_2O_4^{2-} \rightarrow 2Mn^{2+} + 10CO_2$

2 moles of MnO_4^- required to oxidize 5 moles of oxalate

$\therefore$ Number of moles of MnO_4^- required to oxidize 1 mole of oxalate = $\frac{2}{5}$ = 0.4

61.

(d) phosphorus acid

Explanation:

H_3PO_3 is phosphorus acid

62.

(c) Bi_2O_3

Explanation:

$SeO_2 \rightarrow$ acidic oxide

$Al_2O_3 \rightarrow$ amphoteric

$Sb_2O_3 \rightarrow$ amphoteric

$Bi_2O_3 \rightarrow$ basic oxide

63.

(c) BN

Explanation:

BN is known as inorganic graphite and has a structure similar to graphite.

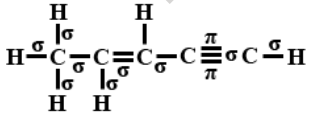
64.

(c) 10 σ bonds and 3 π bonds

Explanation:

The structure of pent-2-en-4-yne is as below: Here,

No. of σ bonds are 10 and No of π bond are 3.

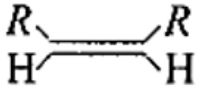


65. **(a)** butane

Explanation:

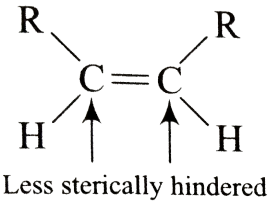
The C-C bond length is maximum for single bond, so butane has largest C-C bond length because it contains C-C single bond.

66.

(c) 

Explanation:

During catalytic hydrogenation, alkene molecule gets absorbed on the surface of the catalyst. Its rate of adsorption will be faster if the side of alkene being adsorbed is less sterically hindered.



67.

(b) X = 1-butyne, Y = 3-hexyne

Explanation:

$$HC \equiv CH \xrightarrow{NaNH_2/Liq.NH_3}$$

$$HC \equiv CNa \xrightarrow{CH_3CH_2Br} \underset{1-\text{butyne (X)}}{CH_3CH_2C \equiv CH}$$

$$\xrightarrow{NaNH_2/liq.NH_3} CH_3CH_2C{\equiv}CNa$$

$$\xrightarrow{CH_3CH_2Br} \underset{3-\text{hextyne (Y)}}{CH_3CH_2C \equiv CCH_2CH_3}$$

68.

(d) 0.01 m NaCl

Explanation:

We know that $\Delta T_f \propto m$

So, 0.01 molal NaCl solution will have the minimum freezing point because its molality is more and it gives two ions after dissociation.

69.

(b) -0.372^{O}C

Explanation:

ΔT_f = molality $\times$ K_f

$= \frac{68.5\times1000}{342\times1000} \times 1.86$

= 0.372

$\therefore T_f$ = 0 - 0.372 = -0.372°C

70.

(d) HBrO

Explanation:

$\overset{+1}{H}\overset{}{Br}\overset{}{O} \rightarrow \overset{0}{Br_2}, E^o_{HBrO/Br_2}$ = 1.595 V

$\overset{+1}{H}\overset{}{Br}\overset{}{O} \rightarrow \overset{+5}{Br}O_3^-,\ E^o_{HBrO/BrO_3^-}$ = -1.5 V

2HBrO $\rightarrow$ Br_2 + BrO_3^-

E°_{Cell} for disproportionation of HBrO is

$E^o_{Cell} = E^o_{OP_{HBRO/BrO_3^-}} + E^o_{RP_{HBrO/Br2}}$

= -1.5 + 1.595

= 0.095 V = +ve

(Thus spontaneous reaction)

71.

(b) 390.71 Ω^{-1} cm^2

Explanation:

From Kohlrausch's Law,

λ_∞ for NaCl = $\lambda_{Na^+} + \lambda_{Cl^-}$ ...(1)

λ_∞ for HCl = $\lambda_{H^+} + \lambda Cl^-$ ...(2)

λ_∞ for C_2H_5COONa = $\lambda_{Na^+} + \lambda_{C_2H_5COO^-}$ ...(3)

Thus λ_∞ for C_2H_5COOH,

Adding on (2) + (3) + (1), we get

λ_∞ for CH_3CH_2COOH

$\lambda_{\infty(C_2H_5COONa)}$ + $\lambda_{\infty(HCl)}$ - $\lambda_{\infty(NaCl)}$

= (91 + 426.16 - 126.45) S cm^2 = 390.71 S cm^2

72.

(c) $-\frac{2}{3}\frac{d[A]}{dt}$

Explanation:

$-\frac{1}{3}\frac{d[A]}{dt} = \frac{1}{2}\frac{d[B]}{dt}$

73. **(a)** 34.7 kJ mol^{-1}

Explanation:

2.303 $\log_{10}\frac{k_2}{k_1} = \frac{E_a}{R}\frac{[T_2-T_1]}{T_1T_2}$

$\therefore \frac{r_2}{r_1} = \frac{k_2}{k_1}$ = 2 ($\because r_2 = 2r_1$)

$\therefore$ 2.303 $\log_{10}$ 2 = $\frac{E_a}{8.314}\left[\frac{15}{293\times308}\right]$

$\therefore E_a$ = 34676 ?J = 34.7 kJ mol^{-1}

74.

(c) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$

Explanation:

On going from La^{3+} to Lu^{3+}, the ionic radius shrinks from 1.15 $\mathring{A}$ at 0.93 $\mathring{A}$ (lanthanide contraction). The radius of La^{3+} is also larger than that of Y^{3+} ion which lies immediately above it in periodic table.

75.

(d) As_4O_6

Explanation:

The acidic character of the oxides decreases with the decrease in the oxidation state and also decreases down the group.

76.

(c) tetrathionate ion

Explanation:

$2Na_2S_2O_3 + 12 \rightarrow$ $Na_2\ S_4O_6 + 2NaI$ (Sodium tetrathionate)

77. **(a)** Cr^{3+}

Explanation:

Cr^{3+} $(21e^-) \longrightarrow 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^3$.

As Cr^{3+} ion has three unpaired electrons in its valence shell, so it imparts green colour to an aqueous solution.

78.

(b) it is a pseudohalide

Explanation:

Cyanide ion is a strong field ligand because it is a pseudohalide ion. Pseudohalide ions are stronger coordinating ligands and they have the ability to form σ-bond (from the pseudohalide to the metal) and π bond (from the metal to pseudohalide).

79.

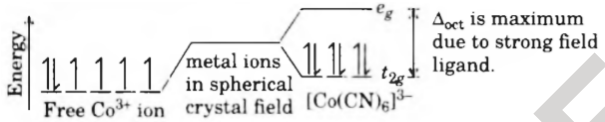
(c) $[Co(CN)_6]^{3-}$

Explanation:

When the ligands are arranged in order of the magnitude of crystal field splitting, the arrangement, thus, obtained is called spectrochemical series.

Arranged in increasing field strength as I^- < Br^- < Cl^- < NO_3^- < F^- < OH^- < $C_2O_4^{2-}$- < H_2O < NH_3 < en < NO_2^- < CN^- < CO

It has been observed that ligands before H_2O are weak field ligands while ligands after H_2O are strong field ligands.



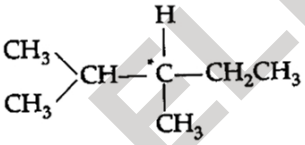
C.F.S.E. in octahedral field depends upon the nature of ligands. Stronger the ligands larger will be the value of Δ_{oct}.

80.

(d) 2, 3-dimethylpentane

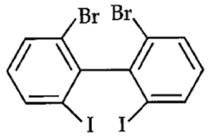
Explanation:

For a compound to show optical isomerism it should have chiral centes. Among the given options only 2, 3-dimethylpentane contains one chiral centre.



(optically active)

81.

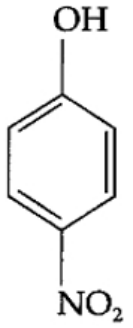
(d) 

Explanation:

Ortho substituted biphenyls are optically active as both the rings are not in one plane and their mirror images are non-superimposable.

82.

(d)



Explanation:

p-nitrophenol has -NO_2 group attached directly to ring. Due to -I and -M effect it will stabilise the phenoxide ion formed by release of H^+ ion.

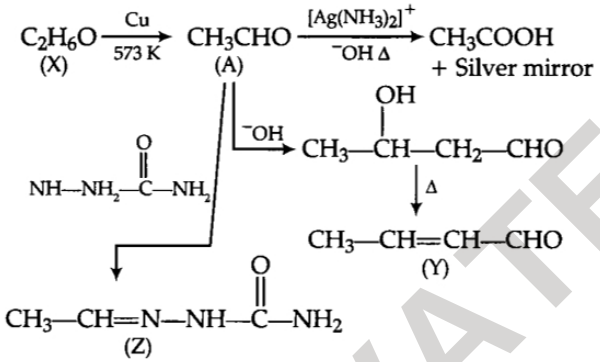
83.

(b) A-ethanal, X-ethanol, Y-but-2-enal, Z-semicarbazone

Explanation:

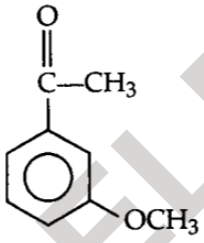
'A' gives silver mirror test thus, it must be an aldehyde or a-hydroxyketone. 'X' must be an alcohol which reduces it to give an aldehyde 'A'.

'A' on treatment with base followed by heating will give alcohol condensation product. This indicates that 'A' must be an aldehyde and not a ketone. 'Z' must be a semicarbazone.

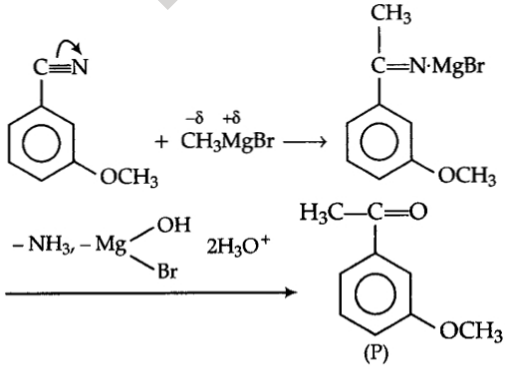


84.

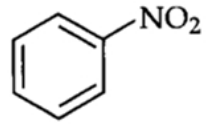
(d)



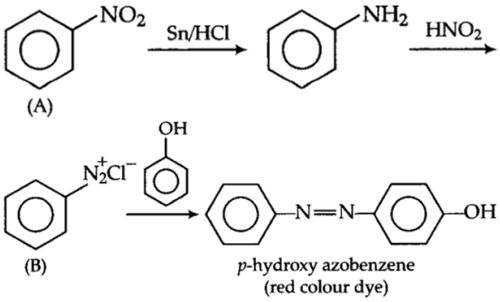
Explanation:



85.

(b) 

Explanation:



86. **(a)** (+) Sucrose

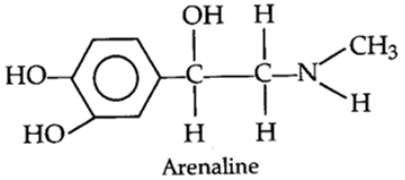
Explanation:

Sucrose does not show mutarotation. Only those sugars which have a free aldehyde (-CHO) or ketone $\left(\rangle C=O\right)$ group are capable of showing mutarotation.

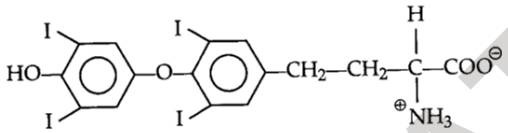
87. **(a)** Thyroxine

Explanation:

Thyroxine and adrenaline are amine hormone. They are water soluble hormones.



Arenaline



Thyroxine

88.

(b) DNA $\rightarrow$ RNA $\rightarrow$ Proteins

Explanation:

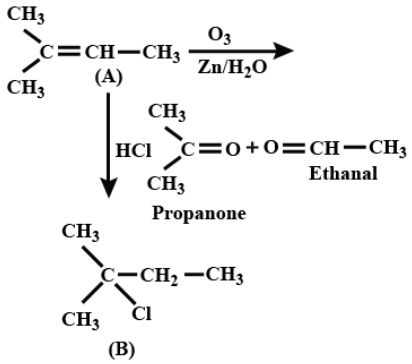
The central dogma of molecular genetics is

$$\text{DNA} \xrightarrow{\text{Transcription}} \text{RNA} \xrightarrow{\text{Transcription}} \text{Proteins.}$$

89.

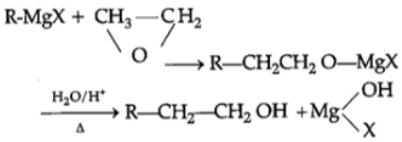
(b) $H_3C-CH_2-\underset{Cl}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3$

Explanation:



90. **(a)** RCH_2CH_2OH

Explanation:



BOTANY

91.

(d) Tiger - Tigris, species

Explanation:

The scientific name of the tiger is *Panthera tigris* where Panthera is the genus name and tigris is the species name. Hence, the correct animal name matched with its particular taxonomic category is Tiger - Tigris, the species.

92. **(a)** All fungi possess a purely cellulosic cell wall

Explanation:

Cell wall in fungi is composed of chitin, a polysaccharide comprising N-acetyl-D-glucosamine (a derivative of glucose).

93.

(b) Statement (c) is correct.

Explanation:

Different spores are produced by a different structure called fruiting bodies. The sexual cycle involves the three following steps. They are plasmogamy karyogamy, and meiosis in a zygote. The fusion of protoplasm between motile and non-motile gametes is called plasmogamy.

94.

(d) Yeast used in making bread and beer is a fungus.

Explanation:

Nostoc and Anabaena are examples of cyanobacteria.

Paramecium and Plasmodium belong to the kingdom protista, whereas Penicillium belong to the kingdom fungi. Lichen is a symbiotic association of algae and fungus.

95.

(b) Embryo sac

Explanation:

In a majority of flowering plants, one of the megaspores is functional while the other three degenerate. Only the functional megaspore develops into the female gametophyte (embryo sac).

96. **(c)** Entomophily
Explanation:
Insect pollinated plants provide rewards such as nectar and pollen grains to sustain insect visits. In some species, floral rewards are in providing safe places to lay egg
97. **(a)** Sequoia is one of the tallest trees
Explanation:
One of the gymnosperms, the giant redwood tree Sequoia is one of the tallest tree species.
98. **(c)** Agaricus
Explanation:
- Agaricus belongs to Basidiomycetes. In Basidiomycetes karyogamy and meiosis take place in the basidium producing four basidiospores. The basidiospores are exogenously produced on the basidium.
- Saccharomyces and Neurospora belongs to Ascomycetes. In Ascomycetes sexual spores are called ascospores which are produced endogenously in sac-like asci.
- Alternaria belongs to Deuteromycetes. In Deuteromycetes sexual reproduction is not observed at all.

99. **(d)** Thick cuticle
Explanation:
Conifers are Gymnosperms. They are cone-bearing seed plants with vascular tissue. The leaves in gymnosperms are well-adapted to withstand extremes of temperature, humidity, and wind. In conifers, the needle-like leaves reduce the surface area. Their thick cuticle and sunken stomata also help to reduce water loss.
100. **(a)** Pteris
Explanation:
Pteris
101. **(a)** Hilum
Explanation:
Ovule, an integument megasporangium consists of a nucellus invested by one or two integuments and funiculus (stalk). The funicle attaches the ovule to the placenta, while the body of the ovule fused with the funicle is called the hilum.
102. **(b)** Honey is made by bees by digesting pollen collected from flowers.
Explanation:
Honey is made by nectar and pollens. Bees collect pollen and nectar in the spring when most flowers bloom. They collect them in their stomach where after sometime it mixes with proteins and enzymes produced by bees, which convert nectar into honey
103. **(d)** Adventitious root

Explanation:

Sweet potato is a modified adventitious root for storage of food.

104.

(d) Axile

Explanation:

Axile

105.

(b) Inferior ovary

Explanation:

Hypogynous flowers have dome-shaped thalamus and superior ovary as seen in brinjal. Perigynous flowers have the half-inferior ovary with the flattened thalamus as seen in peaches. Epigynous flowers have an inferior ovary with the flattened thalamus as seen in the ray florets of sunflowers.

106.

(c) Solid style

Explanation:

In solid style, there is a central region of transmitting tissue, which consists of densely cytoplasmic cells with intercellular mucilage through which pollen tube grows.

107.

(b) Epidermis and stele

Explanation:

Generally, the cortex is few to many-layered thick and in most cases, it is thin-walled and parenchymatous with intracellular spaces. The cells of the cortex contain starch grains, oil, tannins, and crystals of various types. Cortex is present in between the epidermis and stele.

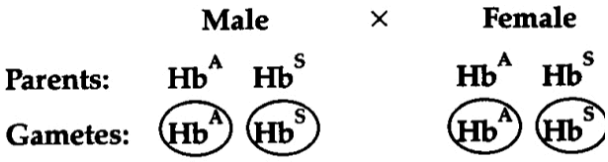
108.

(d) 25%

Explanation:

Sickle cell anemia is an example of auto-somal recessive disorder. It is caused due to frameshift mutation, which leads to the replacement of valine in the place of glutamic acid. It is transmitted from parent to offspring when both the partners are heterozygous carriers. It is expressed only in the homozygous (Hb^SHb^S) individuals that are about only

25%.



♀ \ ♂	Hb^A	Hb^S
Hb^A	Hb^A Hb^A Normal	Hb^A Hb^S Carrier
Hb^S	Hb^A Hb^S Carrier	Hb^S Hb^S Sickle cell

Normal: 25%
Carriers: 50%
Sickle cell: 25%

109. **(b)** Recombination
Explanation:
During meiosis in eukaryotes, genetic recombination involves the pairing of homologous chromosomes. This is followed by exchange between the chromosomes which leads of the formation of new traits in offspring.

110. **(a)** A unit of distance between genes on chromosomes, representing 1% cross over.
Explanation:
1 map unit represents a 1% cross-over. The map unit is used to measure genetic distance. This genetic distance is based on an average number of cross-over frequencies.

111. **(c)** AGGUAUCGCAU
Explanation:
Coding strand and mRNA has same nucleotide sequence except, 'T' -Thymine is replaced by 'U'-Uracil in mRNA.

112. **(b)** 23 S rRNA
Explanation:
23 S rRNA

113. **(b)** Probe
Explanation:
Probe

114. **(c)** Prior to fission
Explanation:
Prior to fission

115. **(d)** Spindle fibers, centrioles and cilia
Explanation:
Microtubules are found in the cytoplasmic matrix of all eukaryotic cells. They occur in Spindle fibers, centrioles and cilia.
116. **(a)** Ribosomes
Explanation:
Ribosomes are membrane-less organelle made up of RNA and protein.
117. **(d)** Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
Explanation:
Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
118. **(c)** HIV/AIDS
Explanation:
HIV/AIDS
119. **(d)** Gut of female Anophele
Explanation:
Gut of female Anophele
120. **(a)** Magnesium
Explanation:
Magnesium is required for maintaining the structure of ribosomes.
121. **(d)** Metaphase
Explanation:
During metaphase spindle fibres attach to kinetochores of chromosomes.
122. **(c)** Species A (-); Species B (0)
Explanation:
The interaction between the population of two different species is called interspecific interaction. It can be beneficial, detrimental, or neutral. It can be represented by the sign of '+', '-' and '0' respectively. In amensalism, one species is harmed, whereas the other is unaffected. This type of interaction will prevent the growth of other species by releasing certain chemicals.
123. **(b)** Less than 50%
Explanation:
Photosynthetically active radiation (PAR) is the proportion is sun's radiation that reaches. Plants capture 2-10% of PAR
124. **(c)** Trichoderma sp. against certain plant pathogens

Explanation:

A biological control being developed for use in the treatment of plant disease is the fungus Trichoderma. Trichoderma species are free living fungi that are very common in the root ecosystems. They are effective biocontrol agents of several plant pathogens.

125. **(a)** South Africa

Explanation:

Conservation of biodiversity is a collective responsibility of all nations. The historic Convention on biological diversity ('The Earth Summit') held in RiodeJaneiro in 1992 , called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilisation of its benefits. In a follow-up, the World Summit on Sustainable Development held in 2002 in Johannesburg, South Africa, 190 countries pledged their commitment to achieve by 2010 , a significant reduction in the current rate of biodiversity loss at global, regional and local levels.

126.

(c) Sacred groves

Explanation:

Sacred groves

127.

(d) IUCN

Explanation:

IUCN is International Union of Conservation of Nature and Natural Resources which is now called World Conservation Union (WCU).

128.

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

Explanation:

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

- **Pachytene -** The third stage of prophase I of meiosis, followed by zygotene bivalent chromosomes clearly appear as tetrads, crossing over between homologous chromosomes occurs.
- **Metaphase I -** The bivalents chromosomes align on the equatorial plate of the spindle. The microtubes from the opposite poles of the spindle attach to the pair of homologous chromosomes.
- **Diakinesis -** The fifth and final Stage of prophase -I marked by terminalisation of chiasmata followed by diplotene. Chromosomes are fully condensed and -the meiotic spindle is assembled to prepare the homologous chromosome for separation.
- **Zygotene -** The second stage of Prophase I of meiosis. Chromosomes start pairing together in a process called synapsis. Each paired chromosome is homologous. Synapsis is accompanied by the formation of the complex structures-synaptonemal complex.

129.

(b) Diplotene

Explanation:

The dissolution of the synaptonemal complex takes place in the diplotene stage of meiosis. The beginning of diplotene is recognized by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures are called chiasmata.

130.

(c) They have more chloroplasts

Explanation:

They have more chloroplasts

131. **(a)** Mn

Explanation:

Mn

132.

(c) C_4

Explanation:

This plant is a C_4 plant. C4 plants are special as they have a special type of leaf anatomy called Kranz Anatomy. They can tolerate higher temperatures, they show a response to high intensities of light, they lack a wasteful process called photorespiration and they have improved efficiency of nitrogen utilization. Most of the plants that are adapted to dry tropical regions have the C_4 pathway and are known as C_4 plants. In these plants, double fixation of carbon dioxide occurs.

133.

(d) Formation of ATP by energy released from electrons removed during substrate oxidation

Explanation:

Oxidative phosphorylation is the synthesis of energy rich ATP molecules with the help of energy liberated during oxidation of reduced coenzymes (NADH, $FADH_2$) produced in respiration. The enzyme required for this synthesis is called ATP synthase. It is located in F_1 or head piece of F_0-F_1 or elementary particles present in the inner mitochondrial membrane. F_1 particle is capable of ATP synthesis. ATP synthase becomes active in ATP formation only when there is a proton gradient having higher concentration of H^+ or protons on the F_0 side as compared to F_1 side. This higher concentration creates an electric potential across the mitochondrial membrane. The proton gradient and membrane electric potential together forms proton motive force (PMF). The flow of protons through the FO channel which induces F_1 particle to function as ATP synthase. The energy of the proton gradient is used in attaching a phosphate radicle to ADP by high energy bond. This produces ATP.

134.

(d) Sigmoid

Explanation:

Geometric growth cannot be sustained for long in natural condition. Limited nutrient availability slows down the growth. It leads to a stationary phase or even a decline.

Plotting the growth against time, gives a typical sigmoid, or S-curve. Sigmoid curve of growth is typical of most organisms in their natural environment including plants. The exponential growth can be expressed as:

$W_1 = W_0 e^{rt}$

where

W_1 = final size (weight, height, number, etc.)

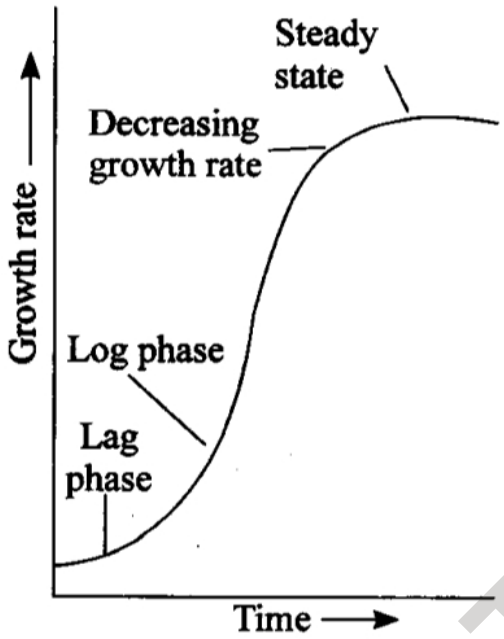
W_0 = initial size at the beginning of the period

r = growth rate

t = time of growth

e = base of natural

logarithms An idealised sigmoid growth curve is given below:



135.

(d) Flowering

Explanation:

Light and temperature may affect flowering in plants in various ways. The effect of photoperiods or daily duration of light hours (and dark periods) on flowering is called photoperiodism. Photoperiodic response is mediated by phytochrome, a pigment which perceives the photoperiod stimulus in leaves. It shows reversible change in red and far red wavelength. Besides correct photoperiod, some plants require low temperature for flowering. These plants remain vegetative during the warm season flower in winters on receiving low temperature. This was found by Lysenko, that the cold requiring annual and biennial plants can be made to flower in one growing season by providing low temperature treatment (vernalisation). Stimulus of vernalisation is perceived by meristematic cells, e.g., shoot tips, root apex, etc., and is named as vernalin.

ZOOLOGY

136.

(d) Sea horse and Flying fish-Cold-blooded (poikilothermal)

Explanation:

Hippocampus (Sea horse) and Exocoetus (Flying fish) are both Osteichthyes that are cold-blooded or poikilothermous animals.

137.

(c) Coloumn I - Petromyzon, **Coloumn II -** Ectoparasite, **Coloumn III -** Cyclostomata

Explanation:

Petromyzon is an ectoparasite on some fishes. It belongs to Class Cyclostomata.

138.

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

Explanation:

- **Trygon**- A fish possessing a poison sting is Trygon (e.g. sting-ray).
- **Cyclostomes**- They have 6-15 pairs of gill slits.
- **Chondrichthyes**- They are cartilaginous fish with heterocercal caudal fins (e.g. sharks).
- **Osteichthyes**- They are the bony fish having air or gas bladder that helps in controlling the buoyancy, this, in turn, helps to stay at their current water depth without having to waste energy in swimming.

139.

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

Explanation:

Physalia is known as the Portuguese man of war. Limulus is called a living fossil. Ancylostoma is a kind of roundworm called hookworm. Pinctada is called pearl oyster, belongs to phylum Mollusca.

140.

(c) Option (a) is incorrectly matched pair

Explanation:

Chondrocytes are cartilage cells.

141. **(a)** A ring of gastric caeca is present at the junction of midgut and hind gut.

Explanation:

In a cockroach, the entire foregut is lined with a cuticle. Gastric caecae is present at the junction of the foregut and midgut. Malpighian tubules are located at the junction of the midgut and hindgut.

142.

(b) Potassium urate

Explanation:

Cockroach excretes nitrogenous waste in the form of soluble potassium urate, which is liberated into the haemolymph. It is taken up by the cells lining the Malpighian tubules which facilitate the absorption of urate where the potassium urate reacts with water and carbon dioxide to form potassium hydrogen carbonate and uric acid. The potassium hydrogen carbonate is absorbed back and the uric acid is excreted.

143. **(a)** Emphysema

Explanation:

Emphysema is a chronic obstructive pulmonary disease (COPD) caused due to cigarette smoking. It is an inflation or abnormal distention of the bronchioles or alveolar sacs of the lungs which causes irreversible distension and loss of elasticity of alveoli of the lungs.

144.

(d) There is a negative intra pleural pressure pulling at the lung walls

Explanation:

Intrapleural pressure is the pressure of air within the pleural cavity. Intrapleural pressure is always negative, which acts like a suction to keep the lungs inflated and prevent them from collapsing. The negative intrapleural pressure is due to three main factors: Surface tension of the alveolar fluid; elasticity of lungs; elasticity of thoracic wall.

145.

(c) As bicarbonate ions

Explanation:

As bicarbonate ions

146.

(d) C - Vena Cava - takes blood from body parts to right auricle, P_{CO_2} = 45 mm Hg

Explanation:

C - Vena Cava - takes blood from body parts to right auricle, P_{CO_2} = 45 mm Hg

147.

(d) Option (i) and (ii)

Explanation:

During Inspiration: Contraction of diaphragm takes place. This downward movement of the diaphragm causes less intra-pulmonary pressure than the atmosphere. Simultaneously, the external intercostal muscles also contract and cause the rib cage to be able to move outward. This further increases the pulmonary space and decreases the pulmonary pressure. Both of these movements cause inspiration.

148. **(a)** Rete testis $\rightarrow$ Efferent ductules $\rightarrow$ Epididymis $\rightarrow$ Vas deferens

Explanation:

The seminiferous tubules open into the vasa efferentia (efferent ductules) through rete testis. The vasa efferentia leave the testis and open into epididymis which leads to vas deferens.

149. **(a)** Sperm is viable for only up to 24 hours

Explanation:

Sperms can remain alive upto 72 hours and retain their ability to fertilise an ovum upto 48 hours after getting released into the female genital tract.

150.

(b) Causes strong uterine contractions during parturition

Explanation:

During parturition, signals originate from both the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex. This triggers release of oxytocin from the maternal pituitary. Oxytocin acts on the uterine muscle and causes stronger uterine contractions.

151.

(c) Zygote Intra Fallopian Transfer (ZIFT)

Explanation:

Zygote Intra Fallopian Transfer (ZIFT)

152.

(b) Who cannot produce an ovum

Explanation:

In GIFT method, the ovum collected from a donor is transferred into the fallopian tube of another female who cannot produce one, but can provide suitable environment for fertilisation and for its further development.

153.

(b) Small part of the fallopian tube is removed or tied up

Explanation:

In tubectomy, a small part of the fallopian tube is removed and tied up through a small incision in the abdomen or through vagina.

154.

(c) Wings of Bat and Wings of Pigeon

Explanation:

Wings of Bat and Wings of Pigeon

155.

(c) Interspecific competition

Explanation:

According to Darwin, any population has built in variation in characteristics. Those characteristics which enable some to survive better in natural conditions (climate, food, physical factors, etc.) would outbreed others that are less-endowed to survive under such natural conditions. Another word used is fitness of the individual or population. The fitness, according to Darwin, refers ultimately and only to reproductive fitness.Hence, those who are better fit in an environment, leave more progeny than others. These, therefore, will survive more and hence are selected by nature.

156. **(a)** Natural selection

Explanation:

Natural selection

157. **(a)** (iii) and (iv) are correct

Explanation:

The statements i and ii are incorrect because dialysis eliminates urea and potassium from the body whereas, iii and iv are correct.

As phosphate ions are eliminated during dialysis, along with that calcium ions are also eliminated. So, there will be reduced absorption of calcium ions from the gastrointestinal tract. RBCs production will be reduced, due to reduced erythropoietin hormone.

158.

(d) Statement a is correct

Explanation:

The descending limb of loop of Henle is permeable to water but impermeable to electrolytes but while the ascending limb is impermeable to water but permeable to electrolytes.

159.

(b) A-Adrenal gland-located at the anterior part of kidney. Secrete Catecholamines

which stimulate glycogen breakdown

Explanation:

In the given figure, A is adrenal gland which secretes two catecholamines; adrenaline (epinephrine) and noradrenaline (norepinephrine), Adrenaline increases the conversion of glycogen to glucose providing quick energy for "fight or flight" response. B is renal pelvis which is a sac like cavity of the kidney leading to ureters, is not directly connected to loop of Henle. C is medulla, the inner region of kidney containing loop of Henle, collecting ducts and ducts of Bellini. D is cortex which has proximal and distal convoluted tubules and contains Malpighian corpuscles.

160.

(c) Only A

Explanation:

Osteoporosis is an age-related disorder of skeletal system caused due to weakening of bones by decreased Ca^{++} and oestrogen levels. Oestrogen helps in decreasing the resorption of bone by decreasing osteoclastic activity. As the oestrogen levels decrease the osteoclastic activity increases and more Ca^{++} is withdrawn into the blood from bone resulting in osteoporosis. So the correct option is A.

161. **(a)** Calcium

Explanation:

Calcium is the ion released into the sarcoplasma from sarcoplasmic reticulum during the polarisation. Ca^{++} attaches to the Troponin-C. This brings a conformational change in the tropomyosin. As a result unmasking of active sites on actin for myosin takes place. Cross bridges are formed between actin and myosin. This results in muscle contraction. Magnesium is used in phosphorylation reactions involving ATP. Sodium and potassium help in maintaining the membrane potential.

162.

(d) Only C

Explanation:

The H-zone in the skeletal muscle fibre is due to the central gap between actin filaments extending through myosin filaments in the A-band.

163.

(b) Cerebellum

Explanation:

Cerebellum

164.

(b) Free ribosomes and RER

Explanation:

Free ribosomes and RER

165.

(c) Limbic system: Consists of fibre tracts that interconnect different regions of brain: Controls movement.

Explanation:
In a brain, every part has a specific function. All the involuntary movements in the body are controlled by medulla oblongata.

166.
(b) Melatonin
Explanation:
Melatonin

167.
(b) Insulin
Explanation:
Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis. Insulin acts mainly on hepatocytes and adipocytes (cells of adipose tissue), and enhances cellular glucose uptake and utilization. As a result, there is a rapid movement of glucose from blood to hepatocytes and adipocytes resulting in decreased blood glucose levels (hypoglycemia).

168.
(c) It only stores and releases hormone
Explanation:
The posterior pituitary or neurohypophysis does not synthesise hormones, it does store and releases two hormones, oxytocin and vasopressin, which are actually synthesised by the hypothalamus.

169.
(b) (A) - (iii), (B) - (iv), (C) - (ii), (D) - (i)
Explanation:
Epinephrine/adrenaline is a catecholamine and a biogenic amine. Cortisol is a steroid. Endorphins are natural painkiller.

170.
(d) Systole of the left ventricle
Explanation:
Systole of the left ventricle

171. **(a)** Parasympathetic neural signals
Explanation:
Parasympathetic nerves decrease cardiac output.

172.
(b) Clotting factors
Explanation:
Plasma without the clotting factors is called serum.

173.
(c) Statement c is correct.
Explanation:
Gel Electrophoresis - separation of DNA fragments. Ligase- join DNA fragments. PCR - amplification of DNA.

174.

(c) as selectable markers.

Explanation:

Selectable markers help identify and select genetically transformed cells by allowing only those with the recombinant DNA to survive in the presence of a specific antibiotic.

175.

(d) It remains active at high temperature

Explanation:

DNA polymerase had to be replenished after every cycle due to unstability at the high temperatures which are needed for denaturation. This problem was solved in 1987 with the discovery of a heat-stable DNA polymerase called Taq, an enzyme isolated from the thermophilic bacterium, Thermus aquaticus, which inhabits hot springs.

176. **(a)** Recombinant DNA techniques

Explanation:

Recombinant DNA techniques

177.

(d) Insulin

Explanation:

Insulin is now being commercially produced by genetic engineering. Insulin consists of two short polypeptide chains; chain A and chain B, that are linked together by disulphide bonds. Insulin, in mammal is synthesised as a prohormone which contains an extra stretch called the C-peptide. During maturation this C-peptide is removed. The production of insulin could only have been commercially possible if some how the maturation process of C-peptide been skipped.

This problem was solved in 1988 by Eli Lilly, an American company which prepared functionable insulin from two DNA sequences corresponding to A and B chains of human insulin and introduced them in plasmids of E. coli to produce insulin chains. In this way, chains A and B were produced separately which was extracted, combined by creating disulphide bonds to get human insulin.

178.

(c) Nematodes

Explanation:

Silencing of mRNA has been used in producing transgenic plants resistant to nematodes. Several nematodes parasitise a wide variety of plants and animals including human beings. A nematode Meloidogyne incognita infects the roots of tobacco plants and causes a great reduction in yield.

179.

(b) Insulin

Explanation:

The recombinant DNA technological processes have made great impact in the area of health care by mass production of safe and more effective therapeutic drugs. In 1983, Eli Lilly an American company, first prepared two DNA sequences corresponding to A and B chains of human insulin and introduced them in plasmids of Escherichia coli to produce

insulin chains. Chains A and B were produced separately, extracted and combined by creating disulphide bonds to form human insulin (Humulin).

180. **(a)** Root

Explanation:

Meloidogyne incognita is a nematode which infects the roots of the tobacco plants and causes a great reduction in the yield.