FULL TEST 1 PHYSICS

NEET-UG - Physics

1. **(a)** moment of force

    Explanation: [Moment of force] = [Torque] = $[ML^2T^{-2}]$

2. **(a)** 20.0

    Explanation: Initial velocity, u = 100 m/s

    As it stops so final velocity, v = 0

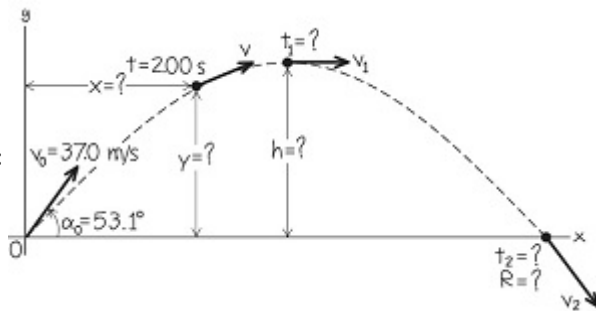   Acceleration a = - 5 m/s^2

    We know, v - u = at

    $\Rightarrow t = \frac{v-u}{a}$

    $\Rightarrow t = \frac{0-100}{-5} = \frac{-100}{-5}$

    $\Rightarrow$ t = 20.0 s

3. **(a)** 3.02 s, 44.7 m

    Explanation:

    The initial velocity of the ball has components

    $v_{ox} = v_o \cos \alpha_o = 37.0 \times \cos 53.1^o$

    = 22.2 m/s

    $v_{oy} = v_o \sin \alpha_o = 37.0 \times \sin 53.1^o$

    = 29.6 m/s

    At the highest point, the vertical velocity v_y is zero. Call the time when this happens t_1; then

    $v_y = v_{oy} - gt_1 = 0$

    $\Rightarrow t_1 = \frac{v_{oy}}{g} = \frac{29.6}{9.8} = 3.02$ s

    The height at the highest point is the value of y at time t_1:

    $h = v_{oy}t_1 - \frac{1}{2}g(t_1)^2$

    $= 29.6 \times 3.02 - \frac{1}{2} \times 9.8 \times (3.02)^2$

    = 44.7 m

4. **(a)** Both A and R are true and R is the correct explanation of A.

    Explanation: If θ be the angle between two vectors $\vec{A}$ and $\vec{B}$, then their scalar product, $\vec{A} \cdot \vec{B}$ = A B cosθ. If $\theta = 90^o$ then cos $\theta = 0$
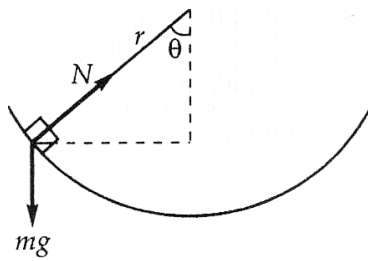
    $\therefore \vec{A} \cdot \vec{B} = 0$

    i.e., if $\vec{A}$ and $\vec{B}$ are perpendicular to each other than their scalar product will be zero.

5.

    (d) $\omega = \sqrt{\frac{g}{r}\cos\theta}$

    Explanation:

mg

Resolving the forces along horizontal and vertical directions,

$N \sin \theta = m\omega^2 r \sin \theta$

$\Rightarrow \quad N = m\omega^2 r$

and N cos θ = mg

On dividing, we get

$\frac{1}{\cos \theta} = \frac{\omega^2 r}{g}$ or $\omega = \sqrt{\frac{g}{r \cos \theta}}$.

6. **(a)** 0.25 m/s
   Explanation: By conservation of momentum,
   $100 \times v = 0.25 \times 100$
   v = 0.25 m/s

7.
   (b) 300 J
   Explanation: $U_1 = \frac{1}{2}kx_1^2$ = 100 J
   $U_2 = \frac{1}{2}kx_2^2$
   $\frac{U_2}{U_1} = \frac{x_2^2}{x_1^2} = \left(\frac{4}{2}\right)^2$ = 4
   U$_2$ = 4U$_1$ = 400 J
   $\therefore$ U$_2$ - U$_1$ = 300 J

8. **(a)** Both A and R are true and R is the correct explanation of A.
   Explanation: When the water is at the top of the fall it has potential energy mgh (when m is the mass of the water and h is the height of the fall). On falling this potential energy is converted into kinetic energy, which further converted into heat energy and so temperature of water increases.

9.
   (d) 5 : 7
   Explanation: $E_{\text{tran}} = \frac{1}{2}mv^2$
   $E_{\text{rot}} = \frac{1}{2}I\omega^2 = \frac{1}{2} \times \frac{2}{5}mr^2 \times \omega^2 = \frac{1}{5}mv^2$
   $E_{\text{tot}} = E_{\text{tran}} + E_{\text{rot}} = \left(\frac{1}{2} + \frac{1}{5}\right)mv^2 = \frac{7}{10}mv^2$
   $\frac{E_{\text{tran}}}{E_{\text{total}} = \frac{1}{2}mv^2} \frac{7}{10}mv^2 = \frac{5}{7}$ = 5 : 7

10.
   (c) A is true but R is false.
   Explanation: Torque = Force $\times$ perpendicular distance of line of force from the axis of rotation. Hence for a given applied force, torque or true tendency of rotation will be high for large value of d. If distance d is smaller, then greater force is required to cause the same torque, hence it is harder to open or shut down the door by applying a force near the hinge.

11. **(a)** Both mg and $\frac{GmM_e}{R_e^2}$
   Explanation: Force on particle at surface is
   F = mg
   where, g = acceleration due to gravity at the earth's surface
   Also, g = $\frac{GM_e}{R_e^2}$
   $\Rightarrow$ F= mg = $\frac{GmM_e}{R_e^2}$

12. **(a)** Assertion and reason both are correct statements and reason is correct explanation for assertion.
   Explanation: Assertion and reason both are correct statements and reason is correct explanation for assertion.

13.

(b) 1

Explanation: $\text{Strain} = \frac{\text{Change in length}}{\text{Original length}} = \frac{2L - L}{L} = 1$

14.

(c) 2 : 1

Explanation: $Y = \frac{Fl}{A\Delta l}$

$\Rightarrow \Delta l = \frac{Fl}{AY}$

$(\Delta l)_{\text{steel}} = (\Delta l)_{\text{Brass}}$

or $\frac{W_S l}{AY_S} = \frac{W_B l}{AY_B}$

$\therefore \frac{W_S}{W_B} = \frac{Y_S}{Y_B} = \frac{2}{1} = 2 : 1$

15.

(d) size of orifice

Explanation: Velocity of efflux, $v = \sqrt{2gh}$

Clearly, it does not depend on the size of the orifice.

16.

(d) $2\sqrt{h(H - h)}$

Explanation: From the figure, it can be considered that the water falls from a height H - h. For the fall of the water from such height, the equation is

H - h $= \frac{1}{2}gt^2$

Here, time taken by the water to reach the ground is t.

From the above equation, the time taken is

$t = \sqrt{\frac{2(H-h)}{g}}$

The horizontal distance covered by the water in time t from the foot of the tank is

x = vt

Insert $t = \sqrt{\frac{2(H-h)}{g}}$ and $v = \sqrt{2gh}$ in the above equation gives

x = vt

$= (\sqrt{2gh})\left(\sqrt{\frac{2(H-h)}{g}}\right)$

$= 2\sqrt{(H-h)h}$

Therefore, the distance of the water from the foot of the wall is $2\sqrt{(H-h)h}$.

17.

(b) 384.8 K

Explanation: It is given that:

$R = R_0 [1 + \alpha (T - T_0)]$ …(i)

where,

R_0 and T_0 are the initial resistance and temperature respectively

R and T are the final resistance and temperature respectively

α is a constant

At the triple point of water, $T_0 = 273.15$ K

Resistance of lead, $R_0 = 101.6$ Ω

At normal melting point of lead, $T = 600.5$ K

The resistance of lead, $R = 165.5$ Ω

Substituting these values in equation **(i)**, we get:

$R = R_0 [1 + \alpha (T - T_0)]$

165.5 = 101.6 [1 + α(600.5 - 273.15)]

1.629 = 1 + α(327.35)

$\therefore \alpha = \frac{0.629}{327.35} = 1.92 \times 10^{-3}$ K^{-1}

For resistance, $R_1 = 123.4$ Ω

$R_1 = R_0 [1 + \alpha (T - T_0)]$

where,

T is the temperature when the resistance of lead is 123.4 Ω

$123.4 = 101.6 [1 + 1.92 \times 10^{-3}(T - 273.15)]$

Solving for T, we get

T = 384.8 K.

18.

(c) $\frac{R^2\sigma(t+273)^4}{r^2}$

Explanation: From Stefan's law, energy radiated by the sun per second,

$E = \sigma AT^4 = \sigma \times 4\pi R^2 \times T^4$

Power received per unit area at distance r from the sun,

$I = \frac{E}{4\pi r^2} = \frac{\sigma \times 4\pi R^2 \times T^4}{4\pi r^2} = \frac{\sigma R^2 (t+273)^4}{r^2}$

19.

(d) 0.5 atm

Explanation: $PV = P_f.2V$

$P_f = \frac{V}{2V}$

$P_f = 0.5P$

20.

(c) Assertion is correct statement but reason is wrong statement.

Explanation: Assertion is correct statement but reason is wrong statement.

21.

(c) $P = \frac{2E}{3}$

Explanation: $P = \frac{2E}{3}$

22.

(d) 50 cm/sec

Explanation: Given y = 0.25 sin(200t)

compare this equation with the standard equation

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

amplitude A = 0.25cm

$\omega = 200$

$v_{max} = \omega A$

$v_{max} = 200 \times 0.25$

$v_{max} = 50$cm/s

23. (a) Second

Explanation: Frequencies that are an integral multiple of the fundamental frequency are called harmonics or overtones.

$f_n = \frac{nv}{2L}$

n = 1, is called the fundamental frequency

n = 2, 1st overtone or 2nd harmonic

n = 3, 2nd overtone or 3rd harmonic

24.

(b) 2

Explanation: F = $\frac{1}{4\pi\varepsilon_0} \frac{q(Q-q)}{x^2}$

x is constant. For maximum force,

$\frac{dF}{dq} = 0$

$\Rightarrow \frac{d}{dq} (qQ - q^2) = 0$

$\therefore Q - 2q = 0 \Rightarrow \frac{Q}{q} = 2$

25. **(a)** $\frac{1}{6}\frac{4\pi q}{4\pi\varepsilon_0}$

    Explanation: $\phi_E = \frac{q}{\varepsilon_0} = \frac{1}{6}\frac{4\pi q}{(4\pi\varepsilon_0)}$

26.

    (b) 400 V

    Explanation: $V = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2}$

    $= \frac{20\mu\text{F}\times 500\text{ V}+10\mu\text{F}\times 200\text{ V}}{20\mu\text{F}+10\mu\text{F}}$

    $= \frac{12000}{30}\text{ V} = 400\text{ V}$

27.

    (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

    Explanation: Assertion and reason both are correct statements but reason is not correct explanation for assertion.

28.

    (c) 10%

    Explanation: Let original Current In lamp = I

    Resistance of Lamp = R

    Then power P = I²R

    According to question,

    New Current $I_n = I - I \times \frac{5}{100} = \frac{19}{20}I$

    Resistance = R

    New power $P_n = I_n^2 R = (\frac{19}{20}I)^2 R = \frac{361}{400}I^2 R$

    Power decrease = $I^2 R - \frac{361}{400}I^2 R = \frac{39}{400}I^2 R$

    % Decrease = $\frac{change\ in\ power}{original\ power} \times 100$

    $= \frac{\frac{39}{400}I^2 R}{I^2 R} \times 100 = \frac{39 I^2 R}{400 I^2 R} \times 100$

    $= \frac{39}{4} = 9.75\% \approx 10\%$

29. **(a)** along with a very slow net motion in the opposite direction of the field

    Explanation: The electrons in a conductor have random velocities and when an electric field is applied, they suffer repeated collisions and in the process move with a small average velocity, opposite to the direction of the field. This is equivalent to positive charge flowing in the direction of the field.

30. **(a)** 250 Ω

    Explanation: $R_g = \frac{I_S}{V_S}$

    $= \frac{5\text{ div /mA}}{20\text{ div /V}}$

    $= \frac{5\text{ V}}{20\times 10^{-3}\text{ A}} = 250\Omega$

31.

    (d) 5 mA

    Explanation: 5 mA

32.

    (c) diamagnetism

    Explanation: Diamagnetism is a universal property among all substances.

33.

    (c) a torque but not a force

    Explanation: a torque but not a force

34.

    (c) Electromagnetic induction

    Explanation: Electromagnetic induction, the electric dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faraday's law of induction.

35. **(a)** 0

    Explanation: Power in an ac circuit,

    $P = V_{rms} I_{rms} \cos\phi$

If only inductor is present in circuit, then voltage leads the current by 90° i.e. $\phi = 90°$

Hence, P = 0 as $\cos 90° = 0$

36.

(d) zero

Explanation: Here, the phase difference between current and e.m.f.,

$\phi = \pi/2$

$\therefore$ P$_{av}$ = E$_v$I$_v$ $cos\phi$ = E$_v$I$_v$ $\cos\pi/2$ = 0

37.

(b) 2.50 $\times$ 10^{-6} N

Explanation: $F_{av} = \frac{2IA}{c} = \frac{2 \times 25 \times 10^4 \times 15 \times 10^{-4}}{3 \times 10^8}$ N

= 250 $\times$ 10^{-8} N = 2.5 $\times$ 10^{-6} N

38. **(a)** $\lambda_m > \lambda_v > \lambda_x$

Explanation: Since of the given regions, wavelength of microwave is highest and that of x-ray is minimum.

39.

(b) 10 s

Explanation: Exposure time, $t \propto d^2$

$\therefore t_2 = \frac{d_2^2}{d_1^2}t_1 = \frac{120^2}{60^2} \times 2.5 = 10s$

40. **(a)** its wavelength decreases

Explanation: The energy of the light is related to the frequency. When the light enters the medium, the apparent speed of light changes. If the frequency changed, the energy would not be conserved. The wavelength changes to balance the change in speed. When light enters from air to glass (from rarer to denser medium), its speed decreases as a consequence its wavelength also decreases.

41.

(d) Rectilinear motion

Explanation: Newton's corpuscular theory of light is based on the following points:

1. Light consists of very tiny particles known as "corpuscles".

2. These corpuscles on emission from the source of light travel in a straight line with high velocity.

3. These particles are emitted from a source of light in all directions.

42.

(b) 1.78

Explanation: Position of 8th bright fringe in the medium = Position of 5th dark fringe in air

$\frac{8\lambda'D}{d}$ = (2 $\times$ 5 - 1) $\frac{\lambda D}{2d}$

$\Rightarrow \frac{8\lambda D}{\mu d} = \frac{9\lambda D}{2d}$

$\therefore \mu = \frac{16}{9}$ = 1.78

43.

(b) momentum

Explanation: As $p = \frac{h}{\lambda}$, so electrons and photons having the same wavelength λ will have the same momentum p.

44.

(b) zero

Explanation: zero

45. **(a)** $n\lambda$

Explanation: The circumference of the orbit must be an integral multiple of de Broglie wavelength λ

i.e; $2\pi r = n\lambda$

46.

(c) The helium nucleus has more kinetic energy than the thorium nucleus.

Explanation: $^{238}_{92}\text{U} \rightarrow ^{214}_{90}\text{Th} + ^{4}_{2}\text{He}$

By conservation of linear momentum,

p$_f$ = p$_i$ = 0

$\therefore p_{\text{He}} - p_{\text{Th}} = 0 \Rightarrow p_{\text{He}} = p_{\text{Th}}$

$\Rightarrow K_{\text{He}} > K_{\text{Th}}$

47. **(a)** more than dc value

    Explanation: The output of a rectifier consists of an AC component called ripple and a DC component. The ratio of the AC and DC components will be greater than one for a half-wave rectifier, while it will be less than one for a full-wave rectifier.

48.

    (b) Forward biasing, 0 A

    Explanation: Forward biasing, 0 A

49.

    (c) added in

    Explanation: added in

50. **(a)** curve C

    Explanation: curve C

Solution

MODEL QUESTION PAPER 1

NEET-UG - Chemistry

1. **(a)** Both Normality and Molarity

   Explanation:

   Since Molarity and Normality both the modes of expression to represent the strength of a solution are volume-dependent, a variation in temperature of the solution results in a change in concentration or strength of the solution. It is due to the thermal expansion of liquids.

2.
   (c) 0.03 mL

   Explanation:

   Since, 1 microliter

   $= 1 \times 10^{-6}$ liters, & 1ml

   $= 1 \times 10^{-3}$

   $\therefore$ 1 microliter

   $= 0.001$ mL

   $\therefore$ 30 microliters

   $= (0.001 \times 30)$ mL

   1 microliter = 0.03 milliliter

3.
   (c) electrons

   Explanation:

   Cathode rays - In 1897, British physicist J. J. Thomson showed the rays were composed of a previously unknown negatively charged particle, which was later named the electron.

4.
   (d) Balmer series

   Explanation:

   Balmer series

5.
   (c) Group-1 (alkali metals) and Group-2 (alkaline earth metals)

   Explanation:

   S-block elements comprise of Group 1 (alkali metals) and Group 2 (alkaline earth metals) with the general outermost electronic configuration as ns$^{1-2}$.

6.
   (b) principal quantum number

   Explanation:

   In the modern periodic table, each period indicates the value of principal quantum number (n). It also implies the number of shells or orbits.

7. **(a)** SF_2O

   Explanation:

   SF_2O has pyramidal shape as it is sp^3 hybridised and it has 3bp and 1 lp.

8. **(a)** 3,3,3

   Explanation:

Total number of electrons in the N_2 molecule is 7+ 7= 14.

As per the formula Bonded pair of electrons N_b: $\sigma 1s^2\ \sigma 2s^2\ \pi 2p_y^2\ \pi 2p_z^2\ \sigma 2p_x^2$

Total 10 electrons.

Anti bond pairs of electrons N_a: $\sigma 1s*^2\ \ \sigma 2s*^2$ Total 4 electrons.

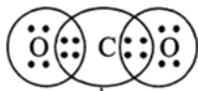Bond Order (B.O.) = $\frac{N_b - N_a}{2} = \frac{10-4}{2} = 3$

Similarly, the bond order of CO and NO^+ is 3.

9.

(c) CO_2

Explanation:

Lewis structure of CO_2 can be represented as

10. **(a)** -5.744 kJ mol^{-1}

Explanation:

Δ_rG^0 = -RTln K_c.

ΔG^0 = -2.303 $\times$ 8.314 $\times$ 300 $\times$ log10 = -5744.14 Jmol^{-1} = -5.74414 kJmol^{-1}

11.

(b) zero

Explanation:

By convention, the standard enthalpies of formation of all elements in their most stable states (reference states) are zero.

12.

(d) 1.8×10^{-3}

Explanation:

Kc = $\frac{[PCl_3][Cl_2]}{[PCl_5]}$ = 1.2 x 10^{-3} x 1.2 x 10^{-3} / 0.8 x 10^{-3} = 1.8 x 10^{-3} L mol^{-1}

13.

(b) P_{CO_2} and P_{CO} = 0.461atm and 1.739 atm

Explanation:

For the given reaction; $FeO + \underset{1.4atm}{CO(g)} = Fe(s) + \underset{0.80atm}{CO_2(g)}$

$Q_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80}{1.4} = 0.571$

It is given that K_p = 0.265

Since $Q_P > K_p$

The reaction will proceed in the backward reaction.

Therefore, we can say that the pressure of CO will increase while the pressure of CO_2 will decrease.

Now, let the increase in pressure of CO = decrease in pressure of CO_2 be P.

Then we can write

$K_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80-P}{1.4+P}$

$\Rightarrow 0.265 = \frac{0.80-P}{1.4+P}$
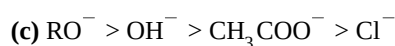
$\Rightarrow$ 0.265 (1.4 + P) = 0.80 - P

$\Rightarrow$ 0.371 + 0.265P = 0.80 - P

$\Rightarrow$ 1.265P = 0.429 $\Rightarrow$ p = 0.339atm

Therefore, equilibrium partial pressure of CO_2 = 0.80 - 0.339= 0.461 atm

Also, equilibrium partial pressure of CO = 1.4 + 0.339 = 1.739 atm

14.

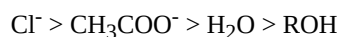**(c)** $RO^- > OH^- > CH_3COO^- > Cl^-$

Explanation:

conjugate acids of given bases are H_2O, ROH, CH_3COO^-, Cl^-

their acidic strength in the order

$Cl^- > CH_3COO^- > H_2O > ROH$

basic strength in the order $RO^- > OH^- > CH_3COO^- > Cl^-$

15.

(b) 0.04

Explanation:

The second equation can be obtained by reversing the 1st reaction.

$K_1 = [HI]/[H_2]^{1/2} \times [12]^{1/2}$

squrare the equation

$K_1 = [HI]^2/[H_2] \times [I_2]$ .... (1)

$K_2 = [H_2] \times [I_2[/[HI]$ .... (2)

From eq (1) and (2)

$(K_1)_2 = 1/K_2$

$(5.2)^2 = 1/K_2$

$K_2 = 1/27.04 = 0.0369$

16.

(c) H^+ions

Explanation:

If a reaction is carried out in acidic medium, H^+ ions are used to balance the equation. If it is carried out in basic medium, OH^- ions are used.

17.

(b) BF_3

Explanation:

BF_3 is Lewis acid and also used as a catalyst in some reaction e.g. it initiates polymerisation reactions.
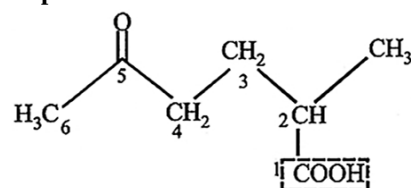
18.

(c) Covalent bond

Explanation:

A covalent bond is formed between carbon and nitrogen atom. If duplet (2) or octet (8) is completed by sharing of electrons between two electronegative elements, the bond formed is called covalent bond.

19. **(a)** 2-Methyl-5-oxohexanoic acid

Explanation:

IUPAC NAME

2-Methyl-5-oxohexanoic acid

20. **(a)** - COOR (R = alkyl group right), - COCl, - CONH$_2$, - CN, - HC = O, > C = O, - OH, - H$_2$

Explanation:

COOR (R=alkyl group) > -COCl,> -CONH$_2$ > -CN > -HC=O> >C=O> -OH, -NH$_2$ is the decreasing order of priority

ester > acyl halide > acyl amide > nitrile > aldehyde > ketones > alcohol > amine

21.
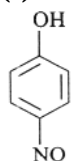
(b) P > R > Q

Explanation:

8α-H in P.

22.
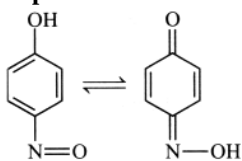
(c) A > B > C > D

Explanation:

C$_2$H$_5$SH is more acidic than C$_2$H$_5$OH as S — H bond is weaker than O — H bond.

23.

(c)

Explanation:

24.

(c) 3,6 - Diethyl - 2 - methyloctane

Explanation:

Following the rules of nomenclature, the IUPAC name of the given compound is 3, 6-Diethyl-2-methyloctane.

25.

(b) one C - C σ bond, two C - H σ bonds and two C - C π bonds.

Explanation:

Ethyne is an unsaturated compound which belongs to the alkyne family and has the formula C$_2$H$_2$. Thus it consists of one C–C σ bond, two C–H σ bonds, and two C–C π bonds.

26.

(b) a free radical mechanism.

Explanation:

The mechanism involved along with the generation of a free radical $[i.e.\ phenyl\ free\ radical(C_6H_5^{\cdot})]$ by the use of benzoyl peroxide, showing peroxide effect in given below,

$$CH_3 - CH = CH_2 \quad \xrightarrow[\text{Peroxide}]{\text{HBr}} CH_3CH_2 - CH_2Br$$
Propyl bromide

(i)
$$C_6H_5 - \overset{\overset{\displaystyle O}{\parallel}}{C} - O - O - \overset{\overset{\displaystyle O}{\parallel}}{C} - C_6H_5 \xrightarrow{\text{Homolysis}}$$

Benzoyl peroxide
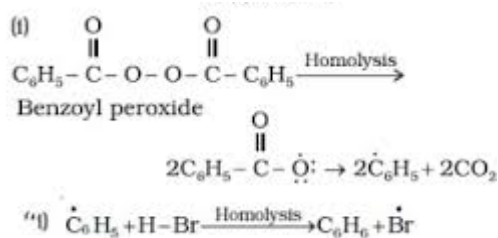$$2 C_6H_5 - \overset{\overset{\displaystyle O}{\parallel}}{C} - \dot{\underset{..}{O}}: \rightarrow 2\dot{C}_6H_5 + 2CO_2$$

(ii) $\dot{C}_6H_5 + H - Br \xrightarrow{\text{Homolysis}} C_6H_6 + \dot{Br}$
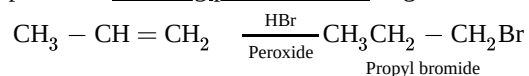
27.

(c) proportional to the pressure of the gas over the liquid

Explanation:

For the dissolution of gases in liquids, Henry's Law is applicable i.e. the mass of the gas dissolved in a given solvent at any temperature is proportional to the pressure of the gas above the solvent.

28.

(c) $HNO_3 + H_2O$

Explanation:

Negatively deviated non ideal solution.

29.

(c) cell emf

Explanation:

cell emf

30.

(d) Lead- storage battery cell

Explanation:

Lead storage battery is a secondary cell while leclanche cell and mercury cell are examples of primary batteries.

31. **(a)** infinite

Explanation:

The reaction would be 100 % complete only after infinite time which cannot be calculated.

32.

(d) four times

Explanation:

four times

33.

(c) KI

Explanation:

KI reacts with I_2 to form I_3^-. The solubility of Iodine in water in the presence of KI due to the formation of potassium triiodide.

KI_3 easily breaks down and thus the solution has all the properties of free iodine.

$KI + I_2 \Leftrightarrow KI_3$

34.

(d) 12

Explanation:

$2KClO_3 \rightarrow 2KCl + 3O_2$

2mol of $KClO_3$ gives 3 mol of O_3.

So 8 mol of potassium chlorate will yield $= \frac{8 \times 3}{2}$ = 12 mol of O_2.

35.

(b) 26

Explanation:

[Ar]3d^5: As X^{3+} is formed by the loss of 3 electrons, the configuration of element X is [Ar]3d^{6}4s^2

∴ Atomic number = 26

36. **(a)** 3d^{5}4s^2

Explanation:

3d^{5}4s^2 shows the highest oxidation state

37.

(b) 4

Explanation:

Cobalt atoms have an electronic configuration of 4s^2 3d^7 but its electronic configuration becomes 4s^0 3d^6 after losing three electrons. Thus Co^{3+} ions have 4 unpaired electrons present in 3d orbital.

38.

(d) [Cu(NH$_3$)$_4$]$^{+2}$

Explanation:

Complexes in which the central metal is bound to only one kind of donor groups are called homoleptic complexes. [Cu(NH$_3$)$_6$]$^{+2}$ is a homoleptic complex because in this only ammonia group is the donor group bound to Cu^{+2}.

39. **(a)** Ethanol

Explanation:

Ethanol

40. **(a)** SOCl$_2$ in presence of pyridine

Explanation:

The hydroxyl group of an alcohol is replaced by halogen on reaction with concentrated halogen acids, phosphorus halides, or thionyl chloride. Thionyl chloride (SOCl$_2$) is preferred because the other two products SO$_2$ and HCl are escapable gases.

Hence, the reaction gives pure alkyl halides.

ROH + SOCl$_2$ → RCl + SO$_2$ (g) + HCl (g)

41.

(c) Williamson synthesis

Explanation:

Williamson synthesis

42. **(a)** Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol

Explanation:

The boiling point increases with an increase in the molecular mass of the alcohol. Thus, the correct order is

Propan-1-ol < butan-2-ol < butan-1-ol < pentan-1-ol.

43. **(a)**
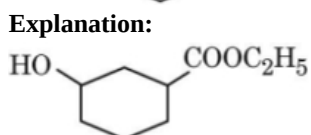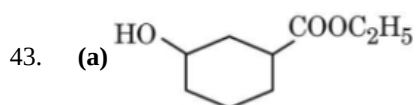
Explanation:

44.

(c) I_2 and NaOH

Explanation:

I_2 and NaOH

45.

(d) N-Ethyl-N-methylethanamine

Explanation:

By alkylation reaction of methyl amine with two moles of ethyl chloride, N-Ethyl-N-methylethanamine is formed.

$$CH_3NH_2 + C_2H_5Cl \longrightarrow CH_3 - \underset{\underset{CH_2CH_3}{|}}{NH} \xrightarrow{C_2H_5Cl} CH_3 - \underset{\underset{C_2H_5}{|}}{N} - C_2H_5$$
$$\text{(N-ethyl-N-methylethanamine)}$$

46.

(b) Aluminium chloride reacts with Aniline

Explanation:

$AlCl_3$ being a lewis acid reacts with the lone pair of -NH_2 group of aniline forming an adduct ($C_6H_5NH_2^+AlCl_3$) which deactivates the benzene system hence no friedal craft reaction occurs.

47.

(b) It gives 2, 4 DNP test.

Explanation:

Glucose doesn't react with Schiff's reagent & 2,4 DNP reagent despite having an aldehyde group because there is no free aldehyde group present in the cyclic form as it forms hemiacetal. Thus, it does not give 2,4−DNP test.

48. **(a)** preparing the uterus for implantation of fertilised egg.

Explanation:

The combination of ovum and sperm forms the fertilized egg which further gets implanted in the uterus. This is brought about by the hormone progesterone which prepares uterus for this process.

49. **(a)** Carius tube

Explanation:

Tube in which a known mass of an organic compound is heated for the quantitative analysis of S is known as Carius tube.

50.

(b) 1-chloro-2, 4-dinitrobenzene

Explanation:

From the given information, the organic compound must contain N and Cl atoms. Hence, the organic compound would be 1-chloro-2, 4-dinitrobenzene.

1. **(a)** Name of the author
Explanation:
In binomial nomenclature, the name of the author appears after the species name, i.e., at the end of the biological name and is written in an abbreviated form or in full. Mangifera indica Linn. indicates that this species was first described by Linnaeus. This method of mentioning the author's name is called a citation.

2.

(b) Triticum aestivum
Explanation:
Biological name of wheat also called bread wheat is *Triticum aestivum.*

3.

(b) All of them have helical symmetry
Explanation:
Self-assembly of virus capsids follows two basic patterns: helical symmetry, in which the protein subunits and the nucleic acid are arranged in a helix, and icosahedral symmetry, in which the protein subunits assemble into a symmetric shell that covers the nucleic acid-containing core.

4.

(d) T.O. Diener
Explanation:
In 1971, T.O. Diener discovered a new infectious agent that was smaller than viruses and caused potato spindle tuber disease. It was found to be a free RNA; it lacked the protein coat that is found in viruses, hence the name viroid. The RNA of the viroid was of low molecular weight.

5.

(b) Pericarp
Explanation:
Pericarp

6.

(b) One fuses with the egg and other fuses with central cell nuclei
Explanation:
In flowering plants,
- Out of the two male gametes, one gamete fuses with the nucleus of the egg cell and forms the zygote. The process is known as syngamy.
- The other male gamete fuses with the two polar nuclei located in the central cell to form a triploid primary endosperm nucleus (PEN). Since the process involves the fusion of three haploid nuclei, it is known as triple fusion.
- Since two kinds of fusions (syngamy and triple fusion) take place in an embryo sac it is known as double fertilisation.

7.

(c) Funaria
Explanation:
Funaria is a moss plant and the predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the protonema stage, which develops directly from a spore. It is a creeping, green, branched, and frequently filamentous stage.

8.
(c) C, F, and E

Explanation:

The parts of the grass embryo labelled as C,F, and B represent the coleoptile, shoot apex, and coleorhiza, respectively.

9.
(c) microsporophylls

Explanation:

Microsporophylls are the leaf-like structures that bear the microsporangia and stamens of the angiosperms bear the microsporangia in their anthers these represent the modified microsporophylls.

10.
(b) Phloem parenchyma

Explanation:

The described statements are associated with the phloem parenchyma. Phloem parenchyma is living and has thin cell walls. These cells form the packing tissue between all the other types of cells. These cells store compounds such as starch.

11. **(a)** Exarch

Explanation:

This condition is seen in roots.

12.
(d) Monocot stem

Explanation:

Sclerenchymatous hypodermis, a large number of scattered vascular bundles, and sclerenchymatous bundle sheath can be observed in monocot stem (Maize stem, Sunflower stem, Brinjal root, and Grasses root).

13. **(a)** 3A + XXY

Explanation:

3A + XXY

14. **(a)** homologous

Explanation:

Non-disjunction is the non-separation of a pair of homologous chromosomes during anaphase I. This results in two cells with an extra copy of one chromosome and two cells without that chromosome.

15.
(c) Base and Sugar

Explanation:

Base and Sugar

16.
(d) DNA but no histones

Explanation:

DNA but no histones

17.
(b) Fission

Explanation:

Fission

18. **(a)** 2 + 9 pattern

Explanation:

The arrangement of central and outer microtubules in a cilium is called the 2 + 9 pattern. Here 2 microtubules are in the center and 9 surrounding the center.

19.

(b) Leukaemia

Explanation:

Leukaemia

20.

(c) Health is a state of complete physical, mental, and social well-being.

Explanation:

Health could be defined as a state of complete physical, mental, and social well-being.

21.

(b) are identical in size and appearance.

Explanation:

Homologous chromosomes are chromosomes having same structural features. In diploid nuclei, pairs of homologous chromosomes can be identified at the start of meiosis. One member of each pair comes from the female parent and other from the male parent. Homologous chromosomes have the same pattern of genes along the chromosome, but the nature of the genes may differ.

22. **(a)** (i) and (iii)

Explanation:

Thermoregulation is energetically expensive for many organisms particularly true for small animals like shrews and humming birds. During the course of evolution, the costs benefits of maintaining a constant internal environment are taken into consideration.

23.

(b) More than one

Explanation:

Primary production is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis. It is expressed in terms of weight (g^{-2}) or energy (kcal m^{-2}). The rate of biomass production is called productivity. It is expressed in terms of $g^{-2} yr^{-1}$ or (kcal m^{-2}) yr^{-1} to compare the productivity of different ecosystems.

24.

(d) Fix atmospheric nitrogen

Explanation:

Fix atmospheric nitrogen

25.

(c) All of these

Explanation:

A sacred grove or sacred wood is a grove of trees of special religious importance to a particular culture.

26.

(c) Species area relationships

Explanation:

Species area relationships

27.

(b) Tea

Explanation:

Oolong tea in Taiwan and brick tea in China are commercial varieties of tea. Dust is leftover small parts of leaves widely used.

28. **(a)** Tubulin

Explanation:

Spindle fibres are the cytoskeletal structure of eukaryotic cells, that are formed during cell division. It contracts and expands to separate sister chromatids between daughter cells. It is made up of microtubules, which are composed of 97% tubulin protein, and 3% RNA. The polymeric tubulin is formed by alpha and beta loop. In cilia, the microtubules are arranged in the 9+2 arrangement.

29.

(c) ABA

Explanation:

(ABA) Cis-**abscisic acid** decreases the rates of **cell** growth and **cell division** in the meristem.

30. **(a)** H_2O

Explanation:

The excited electron from reaction centre of PS II is captured by a primary electron acceptor of the electron transport chain. The electron in the reaction centre needs to be replenished so as to repeat the cycle. This occurs by oxidation of water.

31.

(b) Mesophyll

Explanation:

Mesophyll is the site in plant leaves, where chlorophyll pigment is present. Thus carbon dioxide fixation occurs there, which produces malic acid. It is then transferred to agranal chloroplast in bundle sheath.

32. **(a)** CO_2 and light, respectively

Explanation:

There. is a linear relationship between incident light and CO_2 fixation rates at low light intensities. At higher light intensities, gradually the rate does not show further increase as CO_2 become limiting factor.

33.

(c) 3: 1

Explanation:

The molar ratio of chlorophyll to xanthophyll is 3:1. Chlorophyll is a green pigment, present in all green plants and in cyanobacteria, which is responsible for the absorption of light to provide energy for photosynthesis. Xanthophyll is a yellow or brown carotenoid plant pigment which causes the autumn colours of leaves.

34. **(a)** Glyceraldehyde - 3 - phosphate to 1,3 - diphosphoglycerate

Explanation:

In glycolytic pathway, 3PGAL is converted into 1,3 - diphosphoglyceric acid by an oxidation and phosphorylation reaction, which occurs in the presence of H_3PO_4 and coenzyme NAD. 3 - phosphoglyceraldehyde + NAD^+ + Pi $\rightarrow$ 3 - phosphoglyceraldehyde dehydrogenase 1, 3 - phosphoglyceraldehyde acid + H^+

35.

(c) ABA

Explanation:

Abscisic acid (ABA) is formed from three isoprene subunits and is a key hormone in plant adaptation to environmental stresses. Abscisic acid (ABA) is often referred to as a inhibitory rather than stimulatory hormone. It is involved in the closure of stomata, bud, and seed dormancy and is known to inhibit other hormone actions. It promotes senescence and ageing in other parts of plants.

BOTANY (Section-B)

36. **(a)** Tautonyms do not occur in plants

Explanation:

Tautonyms are the species names in which specific epithet is the exact repeat of the generic name with/without transcribed symbol. The tautonyms are never accepted by botanical nomenclature as these are prohibited. Hence, 'Tautonyms do not occur in plants' is true statement.

37.

(d) (i), (ii), (v) and (vi)

Explanation:

- The asexual spores are generally not found, but vegetative reproduction by fragmentation is common.
- The sex organs are absent, but plasmogamy is brought about by the fusion of two vegetative or somatic cells of different strains or genotypes. The resultant structure is dikaryotic which ultimately gives rise to basidium.
- Karyogamy and meiosis take place in the basidium producing four basidiospores.

38. **(a)** Wind

Explanation:

In gymnosperms, the male and the female gametophytes do not have an independent free-living existence. They remain within the sporangia retained on the sporophytes. The pollen grain is released from the microsporangium. They are carried in air currents and come in contact with the opening of the ovules borne on megasporophylls.

39.

(d) 1-Thalamus, 2-Seed, 3-Endocarp, 4-Mesocarp

Explanation:

1-Thalamus, 2-Seed, 3-Endocarp, 4-Mesocarp

40.

(b) Corymb

Explanation:

Corymb

41.

(c) The alleles of gene controlling coat colour are codominant.

Explanation:

Coat colour in short-homed cattle is an example of codominance. If a cow with black coat is crossed with a bull with white coat, the F1 hybrids possess neither black nor white coat colour, but have roan coat colour, where black and white patches appear separately. This implies that the alleles controlling white and black colours expressed themselves independently when present together. Such alleles are called codominant alleles and the inheritance pattern is called codominance.

42.

(c) Mitochondria

Explanation:

Mitochondria

43. **(a)** This structure also found in eukaryotes

Explanation:

Mesosome which is formed by the extensions of the plasma membrane into the cell. These extensions are in the **form of vesicles, tubules and lamellae.** They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content.

44.

(c) fuel wood

Explanation:

Biogas is a fuel gas, a mixture consisting of 60% methane (CH_4) and of 40% CO_2. It is a renewable energy resulting from biomass. Biogas typically refers to a mixture of different gases produced by the breakdown of organic matter in the absence of

oxygen. It can be a good substitute for fuel wood.

45.

(b) 19
Explanation:
During anaerobic respiration, only two molecules of ATP are produced by each molecule of glucose. So, 19 glucose molecules are required to produce 38 ATP molecules.

46.   **(a)** All of these
Explanation:
All of these

47.

(d) Leaching
Explanation:
Detritivores (e.g., earthworm) break down detritus into smaller particles. This process is called fragmentation. By the process of leaching, water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts. Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called as catabolism. All above process are together called humification. The humus is further degraded by some microbes and release of inorganic nutrients occur by the process known as mineralisation.

48.

(d) Point B to C
Explanation:
Point B to C

49.   **(a)** Cell elongation
Explanation:
Cell elongation

50.

(c) Violet and blue
Explanation:
Chlorophyll and carotenoid are important pigments of photosynthetic plants. These pigments can absorb light in the range of 700nm to 400 nm. Carotenoid pigment is present in the thylakoid and absorbs light violet and blue and reflects longer wavelength i.e., yellow, red and orange light.

ZOOLOGY MODEL PAPER 1

NEET-UG - Biology

ZOOLOGY (Section-A)

1.

   (d) Statement d is incorrect

   Explanation:

   Sponges, cnidarians, flatworms, and ctenophorans do not have circulatory systems.

2. **(a)** Torpedo

   Explanation:

   Torpedo is a cartilaginous fish having electric organs.

3.

   (d) Only intracellular

   Explanation:

   Digestion in Sycon and other sponges is intracellular.

4. **(a)** Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

   Explanation:

   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.

5.

   (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.

6.

   (d) Both Alveolar epithelium and Endothelium blood capillaries

   Explanation:

   Outer covering of pulmonary alveoli is alveolar epithelium while that of blood capillaries is endothelium. Thus, both alveolar epithelium and endothelium of blood capillaries separate air in pulmonary alveoli from blood capillaries.

7.

   (b) Thyroid cartilage which is unpaired

   Explanation:

   Thyroid cartilage which is unpaired

8.

   (d) Inhaling tidal volume only

   Explanation:

   Inhaling tidal volume only

9.

   (c) (i), (ii), (iv), (vi), (iii), (v)

   Explanation:

The correct sequence to initiate inspiration is
(i), (ii), (iv),(vi), (iii), and (v).

10.

(d) Spirometer

Explanation:

Spirometry is the process of recording the changes in the volume and movement of air in and out of the lungs and the instrument used for this purpose is called spirometer or respirometer, which measures the volume of air inhaled and exhaled by lungs.

11.

(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.

12. **(a)** Estrogen and progesterone

Explanation:

The cycle of events starting from one menstruation till the next one is called the menstrual cycle. The menstrual cycle is complex controlled by the sex hormones - oestrogen and progesterone produced by ovaries.

13.

(c) Immunoglobulin A

Explanation:

Colostrum, the yellowish fluid secreted by the mother during the initial days of lactation is very essential to impart immunity to the newborn infant because it contains immunoglobulin A. It will impart naturally acquired passive immunity to the new-born.

14.

(d) Both (ii) and (iv)

Explanation:

Numerous children have been produced by in vitro fertilisation without any abnormality. Infertility is the inability to conceive or produce children even after 2 years of unprotected sexual co-habitation. Often the female is blamed for the couple being childless, but more often than not, the problem lies in the male partner.

15.

(d) All STD are completely curable

Explanation:

All STD are completely curable

16.

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

Explanation:

When migration of a section of population to another place and population occurs, gene frequencies change in the original as well as in the new population. New genes/alleles are added to the new population and these are lost from the old population. This is called gene flow. If the same change occurs by chance, it is called genetic drift. Natural selection is a process in which heritable variations enabling better survival are enabled to reproduce and leave greater number of progeny. If the mutation affects a gene, it will result in a new version of that gene, a new allele.

17.

(c) Hugo de Vries, who worked on evening primrose.

Explanation:

Hugo de Vries, who worked on evening primrose.

18. **(a)** Metanephric
Explanation:
Metanephric kidney filters waste from the blood but excretes them to the outside through a pair of tubes, the ureters. In the embryo, the wastes are excreted directly into the amniotic fluid. The metanephric kidney is the final adult kidney of reptiles, birds, and mammals.

19.
(b) Cray fishes
Explanation:
Cray fishes

20.
(b) All of these
Explanation:
Renal autoregulation involves feedback mechanisms intrinsic to the kidney that causes either dilation or constriction in the afferent arteriole so as to counteract blood pressure changes and keeps a steady GFR. It can take place by renin angiotensin mechanism, juxta-glomerulus apparatus and vasopressin.

21. **(a)** Contraction of muscles after death
Explanation:
Contraction of muscles after death

22.
(d) Large blood vessels
Explanation:
All hollow organs like the intestine, stomach, and urinary bladder contains single-unit smooth muscles. Muscles of body parts that carry flow like air or blood are carrying multi-unit smooth muscles.; body parts like lung and large arteries show multi-unit muscles.

23.
(c) Hinge joint
Explanation:
In hinge joint movement is possible in one direction only. Joint of malleus and incus, knee joint, elbow joint, articulation joint of the lower jaw.

24.
(c) Medulla oblongata + cerebellum + pons
Explanation:
The brain is divided into three regions (i) Forebrain (ii) Midbrain and (iii) Hindbrain.
The forebrain is the largest part of the brain. It is the main thinking region. It is made up of cerebrum, hypothalamus and thalamus. The midbrain does not have any further divisions. The hindbrain consists of cerebellum, pons and medulla.

25. **(a)** Medulla oblongata
Explanation:
Hypothalamus is the region of the forebrain in the floor of the third ventricle, linked with the thalamus above and the pituitary gland below. It contains important control temperature (at 37^oC), It functions as a centre for the integration of hormonal and autonomic nervous activity through its control o fthe pituitary secretions.

26. **(a)** scotopic vision and is the function of rods.
Explanation:
The rods contain the rhodopsin pigment that is highly sensitive to dim light. It is responsible for scotopic (twilight) vision.

27.

(d) Aldosterone

Explanation:

Conn's syndrome occurs by the over-secretion of aldosterone by adrenal glands.

28. **(a)** Adrenaline

Explanation:

Adrenaline

29.

(c) Vasoconstriction

Explanation:

The circulatory system promotes heat retention! .conservation through vasoconstriction of vessels in the skin. To retain heat, the body wants to divert blood flow away from exposed surfaces, such as the skin. Vasodilation results from a decrease in smooth muscle contraction. Smooth muscle is found within the tunica media of arterial vessels. Vasodilation produces an increase in surface area of the affected vessels.

30.

(c) All of these

Explanation:

The QRS complex represents the depolarisation of the ventricles. The contraction starts shortly after Q and marks the beginning of the systole.

31.

(c) Ca

Explanation:

Ca

32. **(a)** Selectable marker

Explanation:

Selectable marker

33.

(c) Prevention of the multiplication of bacteriophage in bacteria

Explanation:

Restriction enzymes are found in bacteria and archaea and provide a defense mechanism against invading viruses. They cut both strands of DNA when certain foreign nucleotides are introduced in the cell and prevent the multiplication of viruses.

34.

(c) Bacillus thuringiensis

Explanation:

Bacillus thuringiensis

35. **(a)** Root

Explanation:

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

ZOOLOGY (Section-B)

36.

(c) Echinoderm

Explanation:

Asterias (Star fish) is an example of Echinoderm.

37.

(d) Cockroach

Explanation:

Cockroach

38.

(b) semilunar and tricuspid valve

Explanation:

Three semilunar valves are located at the base of the pulmonary trunk and aorta. Tricuspid valve guards the opening between the right atrium and right ventricle.

39. **(a)** more surface area for diffusion of gases.

Explanation:

Air flows through the lung's complicated network of air-carrying tubes called bronchioles, which branch off the windpipe like the many branches on a tree trunk. Each branch ends in tiny sacs (or pockets) called alveoli, which allow oxygen and carbon dioxide to move between the lungs and bloodstream. These increase the surface area for respiratory exchange of gases tremendously.

40.

(c) Signal for parturition comes from fully developed foetus and placenta

Explanation:

The signals for parturition originate from the fully developed foetus and the placenta, which induces mild uterine contractions called foetal ejection reflex.

41.

(c) (i) and (iv)

Explanation:

(i) and (iv)

42. **(a)** Random mating

Explanation:

Random mating

43.

(b) Ammonia

Explanation:

Ammonia

44.

(d) Tibia and fibula

Explanation:

Tibia and tarsals

45.

(c) Acetylcholine

Explanation:

Acetylcholine

46.

(d) All of these

Explanation:

All of these

47.

(d) Adrenal gland

Explanation:

Adrenal gland

48.

(c) 'Lubb' sound at the beginning of systole

Explanation:

The first heart sound is called lub. It is associated with the closure of the tricuspid and bicuspid valves.

49.

(c) Insertional inactivation of alpha-galactosidase in recombinant bacteria

Explanation:

Insertional inactivation of alpha-galactosidase in recombinant bacteria

50. **(a)** Retrovirus

Explanation:

Retrovirus is commonly used as a vector for introducing a DNA fragment in human lymphocytes as in gene therapy of ADA deficiency.