FULL TEST 5 PHYSICS

NEET-UG - Physics

1.

(d) $\frac{\sigma}{\rho\lambda}$

Explanation:

Let v $\propto$ $x^a \rho^b \lambda^c$

Equating dimensions on both sides,

$[M^0 L^1 T^{-1}] \propto [MT^{-2}]^a [ML^{-3}]^b [L]^c \propto [M]^{a+b} [L]^{-3b+c} [T]^{-2a}$

Equating the powers of M, L, T on both sides, we get;

a + b = 0

-3b + c = 1

-2a = - 1

Solving, we get;

a = $\frac{1}{2}$, b = -$\frac{1}{2}$, c = -$\frac{1}{2}$

$\therefore \quad v \propto \sigma^{1/2} \rho^{-1/2} \lambda^{-1/2}$

$\therefore \quad v^2 \propto \frac{\sigma}{\rho\lambda}$

2. **(a)** $m = \frac{m_0}{\sqrt{1 - \frac{V^2}{c^2}}}$

Explanation:

According to theory of dimensions, dimensions on two sides of an equation must always be equal. Hence, denominator of the expression must be dimensionless, which holds good only in the given option.

3. **(a)** 3

Explanation:

In 310 the number of significant figures is 3.

4.

(b) 4 m/s, 2 m/s^2

Explanation:

v^2 - u^2 = 2as or 6^2 - u^2 = 2a $\times$ 5

and 8^2 - u^2 = 2a (5 + 7) = 2a $\times$ 12

solving, a = 2 m/s^2 and u = 4 m/s

5. **(a)** 122.5 m

Explanation:

suppose h be the height at time t then h = 1/2 g t^2 .....(1)

then according to the given question $\frac{9h}{25}$ = $\frac{1}{2} g(2t - 1)$.......(2)

by solving 1 and 2, we get

t= 5sec and h = 122.5 m

6.

(d) A is false but R is true.

Explanation:

The projection of vector $\vec{A}$ along y-axis is given by

$\vec{A} \cdot \hat{j} = (3\hat{i} - 4\hat{k}) \cdot \hat{j}$ = 0

7.

(b) 2 N

Explanation:

P + Q = 7 N and P - Q = 3 N

$\therefore$ P = 5 N, Q = 2 N

Thus smaller force is equal to 2 N.

8.

(c) 8.1 kW

Explanation:

P = $\frac{W}{t} = \frac{mgh}{t} = \frac{15 \times 10 \times 60}{1}$ = 9000 W = 9 kW

Loss = 10%

Useful power = 90% of 9 kW = $\frac{90 \times 9}{100}$ = 8.1 kW

9.   **(a)** $m_1 = m_2$

Explanation:

During elastic collision between two equal masses, the velocities get exchanged. Hence energy transfer is maximum when $m_1 = m_2$.

10.

(c) 6×10^{-2}

Explanation:

As the particles moving in circular orbits, So

$\frac{mv^2}{r} = \frac{16}{r} + r^2$

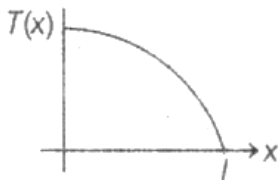Kinetic energy, $KE_0 = \frac{1}{2}mv^2 = \frac{1}{2}\left[16 + r^4\right]$

For first particle, r = 1, $K_1 = \frac{1}{2}m(16 + 1)$

Similarly, for second particle, r = 4, $K_2 = \frac{1}{2}m(16 + 256)$

$\therefore \frac{K_1}{K_2} = \frac{\frac{16+1}{2}}{\frac{16+256}{2}} = \frac{17}{272} = 6 \times 10^{-2}$

11.

(d)

Explanation:

To find tension at x distance from fixed end, let us assume an element of dx length and dm mass. Tension on this part due to rotation is

dT = Kx ...(i)

As, K = mω^2

For this element, K = (dm)ω^2 ...(ii)

$\therefore$ dT = (dm)ω^2x ...(iii)

To find complete tension in the rod, we need to integrate Eq. (iii),

$\int\limits_0^T dT = \int\limits_0^m (dm)\omega^2 x$ ...(iv)

Using linear mass density, $\lambda = \frac{m}{l} = \frac{dm}{dx}$

$\Rightarrow \quad dm = \frac{m}{l} \cdot dx$ ...(v)

Putting the value of Eq. (v) in Eq. (iv), we get

$T = \int\limits_x^l \frac{m}{l} \cdot \omega^2 x \cdot dx = \frac{m}{l} \cdot \omega^2 \left[\frac{x^2}{2}\right]_x^l$

$\Rightarrow \quad T = \frac{m\omega^2}{2l}\left[l^2 - x^2\right]$ or $T \propto -x^2$

12. **(a)** 200 rad/s

Explanation:

From work-energy theorem, Work done produces change in kinetic energy,
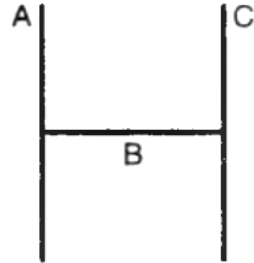
$\therefore W = \frac{1}{2}I\omega^2$ ....($\because$ K.E. $= \frac{1}{2}I\omega^2$)

$\therefore \omega = \sqrt{\frac{2\,W}{I}} = \sqrt{\frac{2 \times 10^5}{5}}$ = 200 rad/s

13.

(d) $\frac{2Ml^2}{6}$

Explanation:

$I = I_A + I_B + I_C$

$= \frac{Ml^2}{12} + 0 + \frac{Ml^2}{12} = \frac{Ml^2}{6}$

14. **(a)** 1.5 hrs

Explanation:

1.5 hrs

15.

(b) $K_A > K_B > K_C$

Explanation:

$L = I\omega$ = constant

$KE = \frac{L^2}{2I}$

$\because I_A < I_B < I_C$

$\therefore K_A > K_B > K_C$

16.

(c) elongated to 50.1414 cm

Explanation:

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

$F = \frac{YA\Delta l}{l}$

Work done on the wire,

$W = \frac{1}{2}F\Delta l = \frac{1}{2}\frac{YA\Delta l}{l} \times \Delta l$

or $(\Delta l)^2 = \frac{2Wl}{YA} = \frac{2 \times 2 \times 10^{-2} \times 50 \times 10^{-2}}{2 \times 10^{10} \times 0.5 \times 10^{-6}}$

$= 2 \times 10^{-6} \text{m}^2$

$\therefore \Delta l = \sqrt{2} \times 10^{-3}\text{m} = \sqrt{2} \times 10^{-1}\text{cm} = $ 0.1414 cm

the wire must be elongated to

$= l + \Delta l = 50 + 0.1414$

= 50.1414 cm

17.

(d) $24\,\pi R^2 S$

Explanation:

$W = 8\pi S\left(R_2^2 - R_1^2\right) = 8\pi S\left[(2R)^2 - \left(R^2\right)\right] = 24\,\pi R^2 S$

18.

(c) 9 cm

Explanation:

Let h be the length of mercury column at 100° C. Then

Expansion in mercury = Volume of stem

$\gamma V \Delta T = Ah$

$h = \frac{\gamma V \Delta T}{A} = \frac{18 \times 10^{-5} \times 10^{-6} \times 100}{0.002 \times 10^{-4}}$ m

$= 9 \times 10^{-2}$ m = 9 cm

19.

(b) 30 Js^{-1}

Explanation:

According to the first law of thermodynamic,

ΔQ = ΔU + ΔW

$\frac{\Delta Q}{\Delta t} = \frac{\Delta U}{\Delta t} + \frac{\Delta W}{\Delta t}$

$\because \frac{\Delta Q}{\Delta t}$ = 120 W,

$\frac{\Delta W}{\Delta t}$ = 90 Js^{-1}

$\therefore \frac{\Delta U}{\Delta t}$ = 120 - 90

= 30 Js^{-1}

20.   **(a)** adiabatic expansion

Explanation:

In adiabatic expansion we know that dQ = 0

$\therefore$ dQ = dU + PdV or 0 = dU + PdV

PdV = -dU

Thus, work done decreases internal energy which is a function of temperature. Hence, temperature also decreases.

21.

(d) 70 R

Explanation:

$Q = nC_P \Delta T = \frac{m}{M} \times \frac{7}{2} R \times \Delta T$

$= \frac{14}{28} \times \frac{7}{2} R \times 40$ = 70 R

22.

(b) uniform circular motion

Explanation:

SHM could be related to uniform circular motion. The projection of uniform circular motion on a diameter of the circle follows simple harmonic motion.

23.   **(a)** Frequency

Explanation:

Any medium has its characteristic such as refractive index which affects the characteristics of a wave such as wavelength, velocity etc. The velocity and wavelength of a wave decrease by a factor p, (refractive index) on passing through a medium but frequency remains unchanged.

24.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

If σ be the surface charge density of the two spheres of radius r and R, then electric fields for the two spheres are respectively:

$E_1 = \frac{K4\pi r^2 \sigma}{r^2} = K4\pi\sigma$

$E_2 = \frac{K4\pi R^2 \sigma}{R^2} = K4\pi\sigma$

So, electricfield intensities are equal. The assertion is true.

Surface charge density is charge per unit area = $\frac{\text{Total charge}}{\text{area}}$

So, reason is also true.

But the reason does not explain the assertion.

25.

(b) zero

Explanation:

zero

26.

(c) A is true but R is false.

Explanation:

A is true but R is false.

27.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

During take off and landing, the friction between tyres and the run way may cause electrification of tyres. Due to conducting nature of tyre, the charge so collected is conducted to a ground and electrical sparking is avoided.

28.

(b) low resistance and low melting point

Explanation:

We know that fuse wire is a device to prevent a high current from passing through the circuit. It consists of piece of wire made from a metal of low resistance and low melting point.

29.

(b) 6.25×10^{18}

Explanation:

As we know that,

q = It

ne = It

$\therefore n = \frac{It}{e}$

$= \frac{1 \times 1}{1.6 \times 10^{-19}}$

$= 6.25 \times 10^{18}$

30.

(d) 8

Explanation:

To carry a current of 4 ampere, we need four paths, each carrying a current of one ampere. Let r be the resistance of each path. These are connected in parallel. Hence, their equivalent resistance will be $\frac{r}{4}$. According to the given condition,

$\frac{r}{4} = 5$

r = 20Ω

For this propose two resistances should be connected. There are four such combinations. Hence,

Total number of resistance = 4 $\times$ 2 = 8

31.

(d) Assertion (A) is false and Reason (R) is also false.

Explanation:

Assertion (A) is false and Reason (R) is also false.

32. **(a)** $1.985 \times 10^3 \ \Omega$

    Explanation:

    Given: Current through the galvanometer,

    $i_g = 5 \times 10^{-3}$ A

    Galvanometer resistance, G = 15Ω

    Let resistance R to be put in series with the galvanometer to convert it into a voltmeter.

    $V = i_g (R + G)$

    $10 = 5 \times 10^{-3}(R + 15)$

    $\therefore$ R = 2000 - 15 = 1985 = $1.985 \times 10^3 \Omega$

33.

    (c) 1.28 Am^2

    Explanation:

    m = NIA

    $= 2000 \times 1.6 \times 10^{-4} \times 4$

    = 1.28 Am^2

34.

    (c) $\frac{r^2}{R}$

    Explanation:

    Magnetic field at the centre of a large coil, $B = \frac{\mu_0 I}{2R}$ as, r << R

    Magnetic flux linkage, $\phi = \frac{\mu_0 I}{2R} \times \pi r^2$

    Thus, $M = \frac{\phi}{I} = \frac{\mu_0 \pi r^2}{2R}$

    $\therefore M \propto \frac{r^2}{R}$

35. **(a)** 1

    Explanation:

    In steady-state current passing through the solenoid

    i = $\frac{E}{R} = \frac{10}{10}$ = 1A

36. **(a)** 26.5 Wm^{-2}

    Explanation:

    $|\vec{S}| = \frac{EB}{\mu_0} = \frac{E^2}{C\mu_0}$

    $= \frac{10^4}{3 \times 10^8 \times 4\pi \times 10^{-7}} = 26.5 \text{Wm}^{-2}$.

37.

    (c) becomes less than two times

    Explanation:

    $\Delta \lambda = \lambda_{K_\alpha} - \lambda_{\min}$

    When V is halved, $\lambda_{\min}$ becomes two times but λ_{K_α} remains the same.

    $\therefore \Delta \lambda' = \lambda_{K_\alpha} - 2\lambda_{\min.} = 2(\Delta \lambda) - \lambda_{K_\alpha}$

    $\therefore \Delta \lambda' < 2(\Delta \lambda)$

38.

    (c) 1.35

    Explanation:

    $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$

    Putting v = 3 cm

$\mu_1 = 1$

$u = \infty$

R = 0.78 cm

$\frac{\mu_2}{3} - \frac{1}{\infty} = \frac{\mu_2 - 1}{0.78}$

$\therefore \mu_2 = 1.35$

39.

(c) 2D

Explanation:

If new value of distance of screen from double slit be D', then

$\beta' = \frac{\lambda D'}{d'} = \frac{\lambda D'}{(2d)} = \frac{\lambda D}{d} = \beta$

or $D' = $ 2D

40.

(b) Tourmaline

Explanation:

Some crystals such as tourmaline and sheets of iodosulphate of quinine have the property of strongly absorbing the light with vibrations perpendicular to a specific direction (called transmission axis) transmitting the light with vibrations parallel to it. This selective absorption of light is called dichroism.

41.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

Both A and R are true but R is not the correct explanation of A.

42.

(d) 1.1eV

Explanation:

$\phi_0 = 2eV$

$\lambda = 4000 \overset{o}{A}$

$E_k = \left[\frac{6.6 \times 10^{-34} \times 3 \times 10^8}{4000 \times 10^{-10} \times 1.6 \times 10^{-19}} \right] eV = 3.1 eV$

$K_{\max} = E - \phi_0 = 3.1 - 2 = 1.1 eV$

43.

(d) 9I

Explanation:

9I

44.

(c) 5.3×10^{-11} m

Explanation:

Energy of electron, $E = -\frac{e^2}{8\pi\varepsilon_0 r}$

E = -13.6 eV = -2.2 x 10^{-18} J

Radius, $r = \frac{-e^2}{2(4\pi\varepsilon_0)E} = \frac{(9 \times 10^9)(1.6 \times 10^{-19})^2}{2(2.2 \times 10^{-18})} = 5.3 \times 10^{-11} m$

45. **(a)** converted into energy which binds the nucleons together

Explanation:

The mass defect converted into energy which binds the nucleons together.

46.

(d) electric field is zero

Explanation:

Due to reverse biasing, the width of the depletion region increases and current flowing through the diode is almost zero. In this case, electric field is almost zero at the middle of the depletion region.

47. **(a)** 100

Explanation:

Current gain,

$\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{(10-5)mA}{(150-100)\mu A} = \frac{5 \times 10^{-3}}{50 \times 10^{-6}} = 100$

48.

(d)

Explanation:

The circuit is forward biased, as the p-side is at a higher potential than the n-side.

49.

(d) Both A and R are false.

Explanation:

In a p-n junction with open ends, a depletion layer is created at the junction due to diffusion of majority carriers from one side to another and a constant electric field is set up across the junction and therefore, there is motion of charge carriers in p-n junction due to which depletion layer is created.

50.

(d) Positive, 0.027 mm

Explanation:

Positive, 0.027 mm

1. **(a)** 4
    Explanation:
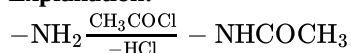   16 moles of NaOH neutralizes 16 moles of H^+ source of $H^+ \rightarrow$ 2 moles HCl + 1 mol H2SO4.

    $\therefore$ 1 mol SO_2Cl_1 is producing 4 mol H^+ ions
    $\therefore$ No. of moles of $SO_2C_{l2} = \frac{16}{4}$ = 4 moles

2.
    (d) 5
    Explanation:
    $-NH_2 \xrightarrow[-HCl]{CH_3COCl} - NHCOCH_3$
    Presence of one -NH_2 shows an increase of molar mass by 42 units (one CH_3CO - 1H)

    Total increase 210 unit
    No. of -NH_2 gps. in molecules = $\frac{210}{42}$ = 5

3. **(a)** $\frac{h}{\sqrt{2}\pi}$
    Explanation:
    Angular momentum in an orbital
    $= \frac{h}{2\pi}\sqrt{l(l+1)} = \frac{h}{2\pi} \times \sqrt{2} = \frac{h}{\sqrt{2}\pi}$ ($\because$ l = 1)

4.
    (d) 5.16×10^{13}
    Explanation:
    Frequency v = 155×10^{17} Hz (i.e., s^{-1})
    Wave number is the number of waves present in 1 cm length of a wave
    Wavenumber $\bar{v} = \frac{1}{\lambda} = \frac{v}{c} = \frac{155 \times 10^{17}}{3 \times 10^8 \times 10^2 \text{ cm}}$
    = 51.66×10^7 cm^{-1}
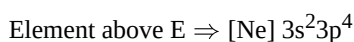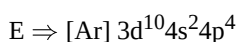   Wave number $\bar{v} = 51.66 \times 10^7$ cm^{-1}
    No. of waves present in 1 km is
    = $51.66 \times 10^7 \times 10^5 = 5.16 \times 10^{13}$

5. **(a)** $3s^2.3p^4$
    Explanation:
    Period of the element just above E is 3 i.e., n = 3 group number = 16, so orbital is p and it contain $4e^-$ in last orbital.
    E $\Rightarrow$ [Ar] $3d^{10}4s^24p^4$
    Element above E $\Rightarrow$ [Ne] $3s^23p^4$

6.
    (d) A, C
    Explanation:
    A, C

7.
    (c) D
    Explanation:

Net vector sum is zero for XeF_2, XeF_4 and PCl_3F_2;
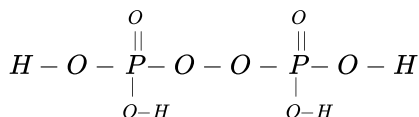
So, molecules are non-polar.

8.

(c) 6, 6

Explanation:

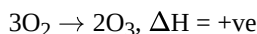$(HPO_3)_6$ has 6-P-O-P linkages.

P_4H_{10} also has 6 P-O-P linkages.

$$H - O - \overset{\overset{O}{\|}}{\underset{|}{P}} - O - O - \overset{\overset{O}{\|}}{\underset{|}{P}} - O - H$$
$$\underset{O-H}{}\underset{O-H}{}$$

9.

(d) x > y = z

Explanation:

x > y = 2

10. **(a)** ozone is less stable than oxygen and ozone decomposes forming oxygen readily

Explanation:

$3O_2 \rightarrow 2O_3$, ΔH = +ve

In endothermic reaction reactant is more stable than product.

11.

(d) -74.8 kJ mol^{-1}

Explanation:

Based on given $\triangle_r H^o$

$\triangle_f H^o = H^{\circ}_{CO_2}$ = -93.5 kJ mol^{-1} ......(i)

$\triangle_f H^o = H^{\circ}_{H_2O}$ = -285.8kJ mol^{-1} ......(ii)

$\triangle_f H^o = H^{\circ}_{o_2}$ = 0.00 (elements) ......(iii)

Required thermal reaction is for $\triangle_f H°$ of CH_4

Thus, from III

$890.3 = [\Delta_f H^\circ (CH_4) + 2\Delta_f H^\circ (O_2)] - [\Delta_f H^\circ (CO_2) + 2\Delta_f H^\circ (H_2O)]$
$= \Delta_f H^\circ (CH_4) + 0] - [-393.5 - 2 \times 285.5]$
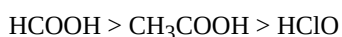$\therefore \Delta_f H^\circ (CH_4) = $ - 74.8 kJ/mol

12.

(c) Hypochlorous acid > Acetic acid > Formic acid

Explanation:

K_a is a measure of the strength of the acid i.e., larger the value of K_a, the stronger is the acid.

Thus, the correct order of acidic strength is

$HCOOH > CH_3COOH > HClO$

K_a: $1.8 \times 10^{-4} > 1.74 \times 10^{-5} > 3.0 \times 10^{-8}$

Stonger the acid, lesser will be the value of pH. Hence, the correct order of pH is $HClO > CH_3COOH > HCOOH$

13.

(b) 0.61 atm^{-1}

Explanation:

0.61 atm^{-1}

14.

(d) $K_{sp} (M_2X) = K_{sp} (QY_2) > K_{sp} (PZ_3)$

Explanation:

K_{sp} of $M_2X = 4s^3$

K_{sp} of $QY_2 = 4s^3$

K_{sp} of $PZ_3 = 27s^4$

(Note s < 0.1)

So K_{sp} values are related as

$K_{sp} (M_2X) = K_{sp} (QY_2) > K_{sp} (PZ_3)$

15.

(c) A and B

Explanation:

$\triangle G^o = -RT \ln K$

Now, $\triangle G^o = \triangle H^o - T\triangle S^o$

$\therefore \triangle H^o - T\triangle S^o = -RT \ln K$

$\therefore \ln K = \frac{\Delta H^\circ}{RT} + \frac{\Delta S^\circ}{R}$

When the temperature range is small, $\triangle H^o$ and $\triangle S^o$ can be considered constant, hence the equation gives $\ln K$ as a linear function of $\frac{1}{T}$.

$\ln K = \underbrace{\left(\frac{-\Delta H^\circ}{R} \right)}_{\text{Slope}} \times \frac{1}{T} + \underbrace{\frac{\Delta S^\circ}{R}}_{\text{Intercept}}$
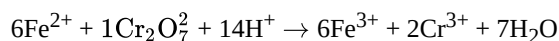
For an exothermic reaction, the enthalpy change is negative. Therefore, the plot of $\ln K$ versus 1/T will have a positive slope. Hence, lines A and B correctly show the temperature dependence of equilibrium constant (K) for an exothermic reaction.

16.

(d) 2

Explanation:

The balanced chemical equation is:

$6Fe^{2+} + 1Cr_2O_7^2 + 14H^+ \rightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$

The species having prime number coefficients are Cr^{3+} and H_2O.

17.

(c) all of these

Explanation:

all of these
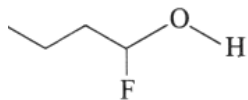
18. **(a)** passing steam over hot coke

Explanation:

$\underset{Coke}{C_{(s)}} + \underset{Steam}{H_2O_{(g)}} \xrightarrow{473-1273K} \underset{Water\ gas}{\underbrace{CO + H_2}}$
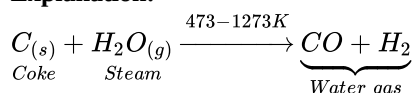
19.

(b) Hybridisation of boron is sp^3

Explanation:

Hybridization of Boron is sp^3.

20.

(b)

Explanation:

-I power of -F is maximum in

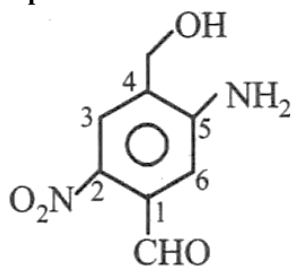21. **(a)** S > Q > R > P
Explanation:
S is most stabilise as it is aromatic.
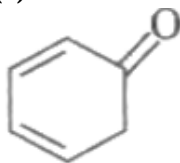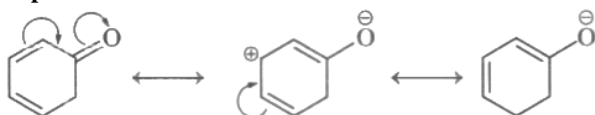
22.

(d) 5-amino-4-hydroxymethyl-2-nitrobenzaldehyde
Explanation:

5-Amino-4-hydroxymethyl-2-nitrobenzaldehyde
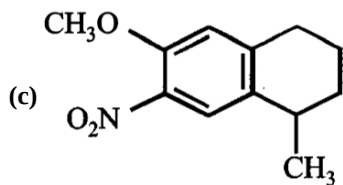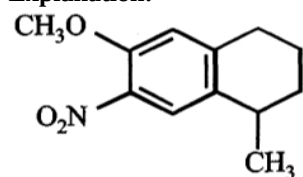
23.

(d)

Explanation:

Double bond get converted in single bond.

24.

(c)

Explanation:

$AlCl_3$ gives rise to a carbcation here. Carbocations in the side chains of a ring undergo cyclization or ring formation.

25.

(c) 6

Explanation:

Each double bond shows 2 isomers.

26.

(b) $\Delta H_{soln.} = \Delta H_1 + \Delta H_2 + \Delta H_3$

Explanation:

Solution so formed will be ideal if $\Delta H_{soln.} = \Delta H_1 + \Delta H_2 + \Delta H_3$

Adding (i) to (iii)

pure solute + pure solvent → solution;

$\Delta H = \Delta H_1 + \Delta H_2 + \Delta H_3$

27. **(a)** 0.22, 0.39, 0.39

Explanation:

% of water = 100 - (35 + 46) = 19

Number of moles of acetic acid (n_A)

$= \frac{W_A}{M_A} = \frac{35}{60}$ = 0.58

Number of moles of ethanol (n_B) = $\frac{W_B}{M_B} = \frac{46}{46}$ = 1

Number of moles of ethanol (n_C) = $\frac{W_C}{M_C} = \frac{19}{18}$ = 1.055 ≈ 1

Mole fraction of acetic acid ($x_{acetic\ acid}$)

$= \frac{n_A}{n_A + n_B + n_C} = \frac{0.58}{0.58 + 1 + 1} = \frac{0.58}{2.58} \approx$ 0.22

Mole fraction of ethanol ($x_{ethanol}$)

$= \frac{n_B}{n_A + n_B + n_C} = \frac{1}{2.58} \approx$ 0.39

Mole fraction of water (x_{water})

$= \frac{n_C}{n_A + n_B + n_C} = \frac{1}{2.58} \approx$ 0.39

28.

(c) manganese dioxide

Explanation:

The term "depolarizer" has been used to denote a substance used in a primary cell to prevent a buildup of hydrogen gas bubbles. A battery depolarizer takes up electrons during the discharge of the cell; therefore, it is always an oxidizing agent. Manganese dioxide, used in the Dry cell as a depolarizer.

29.

(c) $Cr(NH_3)_6]Cl_3$

Explanation:

Coordination number of Cr is six and thus $[Cr(NH_3)_6]Cl_3$ furnishes four ions to give maximum conductance.

$[Cr(NH_3)_6]Cl_3 \rightleftharpoons [Cr(NH_3)_6]^{3+} + 3Cl^-$
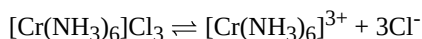
30. **(a)** K is independent of [A] and [B]

Explanation:

K is independent of [A] and [B]

31.

(b) Order cannot be fractional

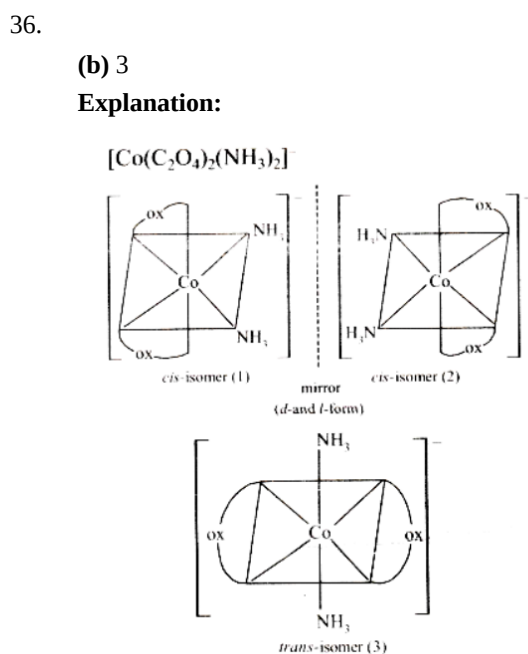**Explanation:**

Order cannot be fractional

32.

(d) Ba < Ca < Se < S < Ar

Explanation:

Ba < Ca < Se < S < Ar is the correct order of increasing first ionization enthalpy. Ionization enthalpy increases along the period but decreases down the group.

The IE of an element increases as one moves across a period in the periodic table because the electrons are held tighter by the higher effective nuclear charge.

The ionization energy of the elements decreases as one moves down the group because the electrons are held in lower-energy orbitals, away from the nucleus and therefore, are less tightly bound.

Ar has higher IE because it is a noble gas and Ba has the lowest IE as it is in 6 periods and more metallic.

33.

(d) X = $ClONO_2$, Y = HOCl, Z = HNO_3

Explanation:

$$\overset{\bullet}{ClO} + NO_2 \longrightarrow \underset{(X)}{ClONO_2} \xrightarrow{+H_2O} \underset{(Y)}{HOCl} + \underset{(Z)}{HNO_3}$$

34.

(c) $FeSO_4$

Explanation:

$FeSO_4$ will require the least amount of acidified $KMnO_4$ for complete oxidation.

35.

(b) Cr^{+2} and Fe^{+2}

Explanation:

$Cr^{+2} - 3d^4$ 4 unpaired electrons

$Fe^{+2} - 3d^6$ 4 unpaired electrons.

36.

(b) 3

Explanation:

37.

(c) Only (C)

Explanation:

$K_3[Fe(CN)_6]$

38. **(a)**

Explanation:

39.

(d)
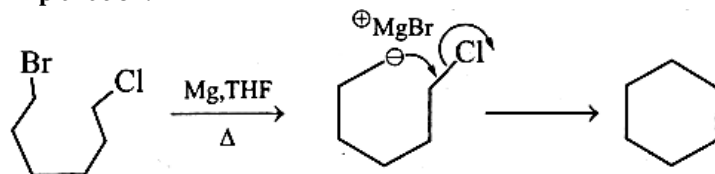
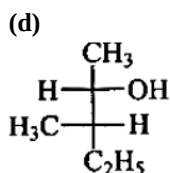**Explanation:**

S_N2 reaction proceed with inversion of configuration.

40.

(c)
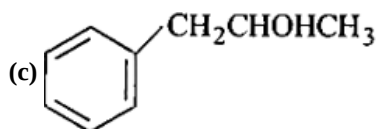
Explanation:

Markovnikov addition of H_2O on alkene without rearrangement.

41.

(c) weak acids

Explanation:

Sodium alkoxides formed by the action of Na on alcohols behave as strong bases while its conjugate acid (i.e. alcohols) behave as weak acids.

42.

(b) Option (iv)

Explanation:

Schiff base has general structure $R_2C = NR$ and acetaldehyde on reaction with benzylamine give $(CH_3)_2C = NCH_2C_6H_5$.

Nitration of hexamethylenetetramine (urotropine) yields RDX or cyclonite.

Acetone reacts with ethylene glycol to form a cyclic ketal. Benzophenone, being bulky does not react with sodium bisulphite.

43.

(c)
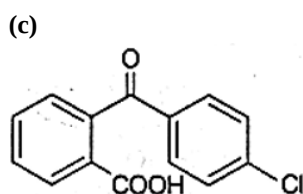
Explanation:

This reaction proceeds via Friedel-Craft acylation. Here, -Cl group present on chlorobenzene is ortho and para directing. It can be easily understood by resonating structures of chlorobenzene.
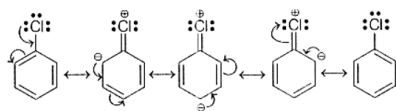
The given reaction proceeds as follows:
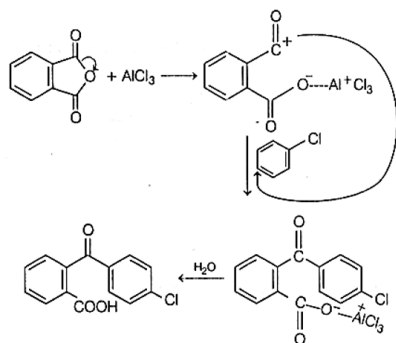
44.

(b)
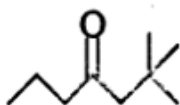
Explanation:
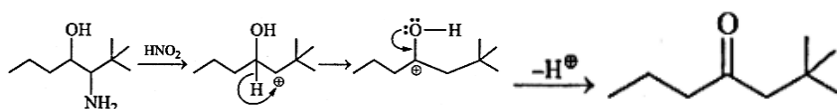
45.

(c) (II) < (I) < (IV) < (III)

Explanation:

Among the given compounds in , Nitrogen is sp^2-hybridised. This marginally increases the electronegativity of nitrogen which in turn decreases the electron donation tendency of nitrogen. Thus making compound least basic.

Among the rest is totally different from others as in this compound lone pair of one nitrogen are in conjugation with π bond i.e. As a result of this conjugation the cation formed after protonation becomes resonance stabilised
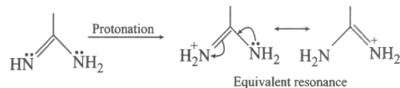

This equivalent resonance in cation makes most basic among all.

 Categorisation is very simple between rest two as (primary amine) is less basic than
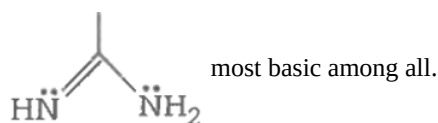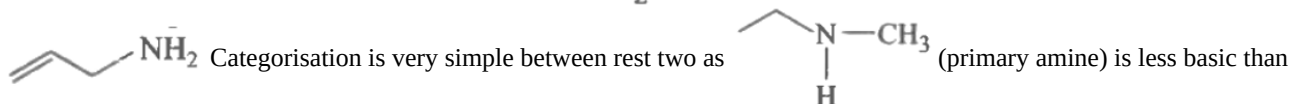
(secondary amine)

Hence, the correct order is

(II) < (I) < (IV) < (III).

46.

(b) Lactic acid

Explanation:

$$\text{Glucose} \xrightarrow{\text{(does not need oxygen; need only enzymes)}} \text{Pyruvic acid} \xrightarrow{O_2} CO_2 + H_2O$$

Glucose stored in the form of Glycogen

Pyruvic acid → Lactic acid
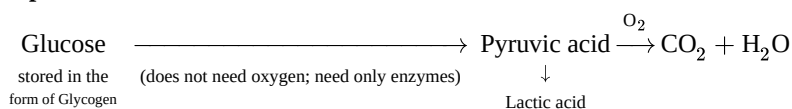
During vigorous exercise sufficient oxygen is not available to meet the energy demand, so energy is derived through the

conversion of pyruvic acid to lactic acid.

47.   **(a)** A = $C_7H_{14}O_8$, B = C_6H_{14}

Explanation:
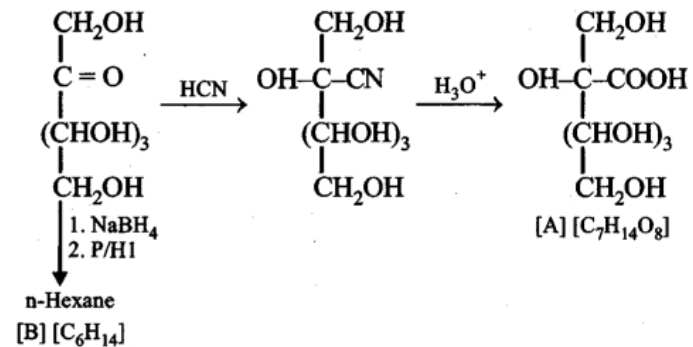
48.
(c) Reduced pressure distillation
Explanation:
Vacuum distillation or reduced pressure distillation method is used to purify compounds that can decompose before reaching their boiling point at atmospheric pressure. Those liquids can be encouraged to boil at lower temperature.

49.
(b) Steam distillation
Explanation:
Steam distillation

50.
(d) calorimeter constant
Explanation:
calorimeter constant

BOTANY MODEL PAPER-5

NEET-UG - Biology

BOTANY (Section-A)

1.

(b) Species, genus, family, order, class

Explanation:

Species - Genus - Family - Order - Class is the correct sequence of taxa in the taxonomic arrangement of hierarchy.

2.

(c) Ernst Mayr

Explanation:

Ernst Mayr was known as Darwin of 20th century. who was a leading evolutionary biologist in his time and promoted and dispersed Darwin's hypotheses.

3.

(c) Viral disease

Explanation:

Mumps is a viral disease caused by the mumps virus.

4.

(d) mechanical pressure and enzymes

Explanation:

The adhesive pad of fungi penetrates the host with the help of mechanical pressure and enzymes. It pushes against the cell wall of the host and then releases cellulase to digest cellulose of the host cell wall so that the hypha can penetrate the host cell wall.

5. **(a)** Papaya

Explanation:

Papaya

6. **(a)** Naked seeds

Explanation:

Plants which bear seeds and have two cotyledons are called dicots. Cycas is a Gymnosperm. Although it possessed two cotyledons it is not included under Angiosperms because the seeds are naked and not enclosed within the fruit.

7.

(d) Only a few characters are considered

Explanation:

The typological species concept is the concept of a species as a group whose members share certain characteristics that distinguish them from other species. This Aristotelian concept was applied to the natural world by the early taxonomists. In this system, the characteristics which were found useful in classifying organisms in different types were used only.

8.

(d) Only D

Explanation:

One fertilizes an egg cell and the other fertilizes the polar nuclei that for food reserve tissue.

9.

(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

10. **(a)** A - Endosperm, B - Embryo, C - Scutellum, D - Coleoptile, E - Coleorhiza
Explanation:
The structures marked as A, B, C, D and E in the given figure of monocotyledonous seeds, are respectively endosperm, embryo, scutellum, coleoptile and coleorhiza. Endosperm is the part of a seed which acts as a food store for the developing plant embryo, usually containing starch with protein and other nutrients. Embryo is the part of a seed which develops into a plant, consisting (in the mature embryo of a higher plant) of a plumule, a radicle, and one or two cotyledons. Scutellum is the large shield like cotyledon of the embryo of certain monocots. It is specialized for the absorption of food from the endosperm. Coleoptile is the first leaf above the ground, forming a protective sheath around the stem tip. It surrounds the plumule. Coleorhiza is the sheath that envelops the radicle in certain plants and that is penetrated by the root in germination.

11. **(a)** Umbel
Explanation:
An umbel is an inflorescence that consists of a number of short flower stalks (called pedicels) which spread from a common point, somewhat like umbrella ribs.

12. **(a)** Endodermis
Explanation:
The innermost layer of the cortex is the endodermis. It is structurally and physiologically different from the cells on either side of it. The radial and transverse walls of the endodermal cells contain a band of lignin and suberin known as Casparian strip.

13.
(c) 7 years
Explanation:
Gregor Mendel conducted hybridisation experiments on garden peas for 7 years (1856-1863).

14.
(c) Antirrhinum majus
Explanation:
Antirrhinum majus

15.
(b) 2000 base pairs/second
Explanation:
The average rate of polymerisation of DNA in E.coli is 2000 bp per second. It has only 4.6×10^6 bp and completes the process of replication within 18 minutes.

16. **(a)** Translation control
Explanation:
Translation control involves regulating the rate at which mRNA is translated into protein.

17.
(b) Ribosomes
Explanation:
Ribosomes is made up of RNA and protein.

18. **(a)** They are found inside the plasma membrane of a cell.
Explanation:
Cell walls are found outside the plasma membrane of a cell.

19. **(a)** Allergens
Explanation:
Allergens

20.

(d) They show contact inhibition

Explanation:

They show contact inhibition

21.

(c) Metaphase - II

Explanation:

Metaphase - II: chromosomes are lined up and each sister chromatid is attached to a spindle fiber. In anaphase, sister chromatids (now called chromosomes) are pulled toward opposite poles.

22.

(d) Grassland biomes

Explanation:

Grassland biomes

23.

(d) Desert ecosystem

Explanation:

Desert ecosystem

24.

(c) Anaerobic digesters

Explanation:

Anaerobic digester is used to treat sludge which is a thick, soft and deposits. Anaerobic digester is large tanks which are heated on the certain temperature, in which biodegradable materials are degraded in the absence of oxygen. There is no use of chemicals in such processes.

25.

(b) Panda

Explanation:

Panda

26.

(c) Birds: Amazon Rain forest > India

Explanation:

Birds: Amazon Rain forest > India

27. **(a)** Periyar-Tiger

Explanation:

Periyar-Tiger

28.

(c) S - phase

Explanation:

The first step of chromatin structure duplication is the synthesis of histone proteins: H1, H2A, H2B, H3, H4. These proteins are synthesized during the S phase of the cell cycle.

29. **(a)** All of these

Explanation:

Meiosis is a type of cell division that reduces the number of chromosomes in the parent cell by half and produces four gamete cells. The process **results** in four daughter cells that are haploid, which means they contain half the number of chromosomes of

the diploid parent cell.

30.

(c) C_3 plants

Explanation:

In C_3 plants some O_2 does bind to RuBisCO, and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecules of PGA binds with O_2 to form one molecule of phosphoglycerate and phosphoglycolate in a pathway called photorespiration.

31.

(c) D

Explanation:

More than one

32.

(d) PGAL

Explanation:

PGAL

33. **(a)** 3 carbon atoms

Explanation:

3 carbon atoms

34. **(a)** ATP in respiration

Explanation:

ATP in respiration

35.

(d) Plants retain the capacity for unlimited growth throughout their life

Explanation:

Plants retain the capacity for unlimited growth throughout their life

BOTANY (Section-B)

36.

(b) Lamarck

Explanation:

Philosophic zoologique was written by Jean-Baptiste Lamarck, in which he outlines his pre-Darwinian theory of evolution.

37.

(b) Phycomycetes

Explanation:

In Albugo, the mycelium is aseptate and coenocytic. Asexual reproduction takes place by zoospores (motile) or by aplanospores (non-motile). These spores are endogenously produced in the sporangium. That is why it is included in phycomycetes.

38.

(c) Origin of seed habit can be traced in pteridophytes

Explanation:

In Pteridophytes the female gametophytes in these plants are retained on the parent sporophytes for variable periods. The development of the zygotes into young embryos takes place within the female gametophytes. This event is a precursor to the seed habit considered an important step in evolution.

39. **(a)** Fertilization of a flower by the pollen from another flower of the same plant.
Explanation:
Fertilization of a flower by the pollen from another flower of the same plant.

40.
(b) Epiphytic roots
Explanation:
Velamen tissue is found in the roots of some epiphytes or semi epiphytes plants. It helps in the absorption of atmospheric moisture.

41. **(a)** 3 : 1
Explanation:
It is clear from the question that AA Bb CC contains only one heterozygous allelic pair 'Bb', Hence the cross behave as a monohybrid cross leading to phenotypic ratio 3 : 1.

42. **(a)** 8
Explanation:
8

43.
(d) Microtubules
Explanation:
The filaments present in cilia and flagella are composed of Microtubules.The microtubules are hollow, unbranched cylinders generally 25nm wide with a core of 15nmand wall of 5nm thickness. The microtubules may occur singly or in bundles and radiate from the centrioles to the periphery of the cell.

44.
(c) All of these
Explanation:
Gobar gas (or biogas) is a mixture of methane and carbon dioxide produced by bacterial degradation of organic matter and used as a fuel. Gobar gas is an efficient source of energy and used as good fertilizers. It also reduces the chances of spreading of pathogens.

45.
(b) Mitochondria, peroxisomes and chloroplast
Explanation:
Mitochondria, peroxisomes and chloroplast

46.
(b) Marsh gas
Explanation:
Marsh gas.or methane gas is mainly produced by the activities of anaerobic bacteria on sewage. During digestion, bacteria produce a mixture of gases such as methane, hydrogen sulphide and carbon dioxide. These gases are called biogas and can be easily used as a source of energy as it is inflammable.

47.
(c) All of these
Explanation:
All of these

48.
(b) Gibberellic acid
Explanation:

Gibberellins help in the reversal of dwarfism in many genetically dwarf plants. External supply of Gibberellic acid causes rapid elongation of growth, e.g., Rosette plant of sugar beet when treated with GA, undergoes marked longitudinal growth of axis.

49. **(a)** Cycocel
    Explanation:
    Cycocel

50. **(a)** Primary carbon dioxide acceptor.
    Explanation:
    RuBP is the primary carbon dioxide acceptor in C3 plants and PEP is the primary acceptor in C4 plants.

1.

(d) It is absent throughout life in humans from the very beginning

Explanation:

Humans are vertebrates belonging to Class Mammals in which the notochord is replaced by a cartilaginous or bony vertebral column in the adult.

2.

(d) Pinctada

Explanation:

An example of phylum Mollusca - Pinctada is commonly called as Pearl oyster.

3.

(d) Adamsia - sea anemone

Explanation:

Adamsia is correctly matched with its common name sea anemone, belonging to phylum Coelenterata.

4.

(c) Bronchioles and Fallopian tubes

Explanation:

Bronchioles and Fallopian tubes are lined with ciliated epithelium to move particles or mucus in a specific direction.

5.

(d) (i) Tight junctions (ii) Adhering junctions (iii) Gap junctions

Explanation:

   i. Tight junctions help to stop substances from leaking across a tissue.
   ii. Adhering junctions perform cementing to keep neighbouring cells together.
   iii. 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.

6. **(a)** (A)-(iv), (B)-(i), (C)-(ii), (D)-(iii)

   Explanation:

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

7.

(d) Oxygen

Explanation:

Oxygen

8.

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

Explanation:

The correct option is A - (iii), B - (i), C - (iv), D - (ii)

The small hair presents in the nasal cavity (nose) help to filter particles of dust and other foreign matter.

Epiglottis, a leaf shaped cartilage, acts as a switch between the larynx and the oesophagus to permit air to enter the airway to the lungs and food to pass into the gastrointestinal tract. It also protects the body from choking on food that would normally obstruct the airway.

Pharynx is a cone-shaped passageway leading from the oral and nasal cavities in the head to the oesophagus and larynx. The pharynx chamber serves both respiratory and digestive functions.

Larynx (voice box) holds the vocal cords. It is responsible for producing voice, helping us swallow and breathe. Air passes in and out of the larynx each time the body inhales or exhales.

9.
(d) Elastic fibers

Explanation:

Elastic fibers

10.
(c) Epiglottis

Explanation:

The epiglottis protects the respiratory system by prevention of entry of food particles.

11.
(d) 1-Myometrium, 2-Ampulla, 3-Fimbriae, 4-Cervical canal

Explanation:

1-Myometrium, 2-Ampulla, 3-Fimbriae, 4-Cervical canal

12.
(b) seventh

Explanation:

After about a week of fertilisation, blastocyst embeds in the uterine wall.

13.
(b) Penetration of ovum by sperm

Explanation:

Acrosome forms a cap in front of the nucleus. It is filled with enzymes that help to penetrates the egg membrane during fertilization.

14.
(c) Increased health facilities along with better living conditions

Explanation:

Increased health facilities along with better living conditions

15.
(d) Pills, injections and implants

Explanation:

Progestogens alone or in combination with estrogens can be used as a contraceptive in the form of pills, injection and implants.

16.
(b) Carboniferous

Explanation:

Carboniferous

17.
(c) Saltation

Explanation:

Saltation

18.

(c) Renal vein, takes the blood they have been purified by the kidneys back to the heart and then further into the circulation.

Explanation:

The marked structure (A) is renal vein. Renal veins are veins that drain the kidney. They connect the kidney to the inferior vena cava. They carry the blood filtered by the kidney.

19. **(a)** Glucose

Explanation:

The proximal convoluted tubule is the major site for tubular reabsorption of water (obligatory water resorption), nutrients, electrolytes, small proteins e.g. albumin etc. Glucose, amino acids, inorganic phosphate, and some other solutes are resorbed via secondary active transport through co-transporters driven by the sodium gradient out of the nephron.

20.

(d) Phosphate and uric acid

Explanation:

Phosphate and uric acid

21.

(b) Pectoral girdle

Explanation:

Pectoral girdle

22.

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

Explanation:

Column I	Column II
(A) Fast muscle fibres	(ii) Lactic acid
(B) Slow muscle fibres	(i) Myoglobin
(C) Actin filament	(iv) I-band
(D) Sarcomere	(iii) Contractile unit

23.

(d) Humerus with scapula

Explanation:

Upper rounded end of the humerus (bone of arm) is called head that articulates into the glenoid cavity of the pectoral girdle (shoulder girdle) of scapula or shoulder blade bone.

24.

(d) ciliary body

Explanation:

Choroid becomes thick in the anterior part of eye to form the ciliary body. Ciliary body is a part of the eye that includes the ciliary muscle, which controls the shape of the lens, and the ciliary epithelium, which produces the aqueous humour. The vitreous humour is produced in the non-pigmented portion of the ciliary body.

25.

(c) Creative thinking and consciousness

Explanation:

Creative thinking and consciousness

26. **(a)** Neutrophil
    Explanation:
    Neutrophil

27.
    (c) Testosterone
    Explanation:
    Testosterone

28. **(a)** Cyclic AMP
    Explanation:
    Cyclic AMP

29.
    (c) Only (iii) is correct
    Explanation:
    Only (iii) is correct

30.
    (d) 190/110 mm Hg may harm vital organs like brain and kidney
    Explanation:
    190/110 mm Hg may harm vital organs like brain and kidney

31.
    (d) Sphygmomanometer
    Explanation:
    Blood pressure is measured with an instrument called a sphygmomanometer.

32.
    (b) Availability of 'Thermostable' DNA polymerase
    Explanation:
    In PCR, amplification of specific DNA sequences is carried out in vitro. Such repeated amplification is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, Thermus aquaticus), which remains active and stable during the high temperature induced for denaturation of double-stranded DNA.

33.
    (c) Option (b)
    Explanation:
    RNA polymerase III activity is in nucleus for tRNA synthesis.

34.
    (b) gives high yield and is rich in vitamin A.
    Explanation:
    An improved variety of transgenic basmati rice gives high yield and is rich in vitamin A.

35.
    (d) live microbial food supplement.
    Explanation:
    Probiotics are live microorganisms that may be able to help prevent and treat some illnesses. Promoting a healthy digestive tract and a healthy immune system are their most widely studied benefits at this time. These are also commonly known as friendly, good, or healthy bacteria.

ZOOLOGY (Section-B)

36.

(c) Body covered with dry and cornified skin, scales over the body are epidermal; they do not have external ears.
Explanation:
All the characteristics given in option (Fresh water animals with bony endoskeleton and airbladder regulates buoyancy) belong to class reptilia. Characters given in options (Marine animals with cartilaginous endoskeleton and body are covered with placoid scales), (Body covered with dry and cornified skin, scales over the body are epidermal; they do not have external ears), and (Body is covered with moist skin and is devoid of scales, the ear is represented by a tympanum, alimentary canal, urinary, and reproductive tracts open into a common cloaca.) belong to the classes amphibia, osteichthyes and chondrichthyes, respectively.

37.

(c) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
Explanation:
The correct sequence of organs in the alimentary canal of cockroach starting from mount is:
Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
So, the correct answer is 'Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum

38.

(d) Fibrinogen
Explanation:
Fibrinogen

39. **(a)** Larynx
Explanation:
The larynx, or voice box, is located in the neck and performs several important functions in the body. The larynx is involved in swallowing, breathing, and voice production. Sound is produced when the air which passes through the vocal cords causes them to vibrate and create sound waves in the pharynx, nose, and mouth.

40.

(d) Immature eggs
Explanation:
Immature eggs

41. **(a)** A-Male condom, B-Female condom, C-CuT, D-Implants
Explanation:
A-Male condom, B-Female condom, C-CuT, D-Implants

42.

(b) Absence of water
Explanation:
Absence of water

43.

(c) Presence of liver in right side therefore kidney does not ascends properly in I.U.L.
Explanation:
Presence of liver in right side therefore kidney does not ascends properly in I.U.L.

44.

(d) Bacterial disease
Explanation:
Bacterial disease

45.

(c) Lateral part of frontal lobe

Explanation:

Broca's area is located in a region called the inferior frontal gyrus, found in the frontal lobe.

46.

(c) Hypothalamus

Explanation:

Hypothalamus

47.

(c) Steroid

Explanation:

Steroid

48.   **(a)** It has degenerated during development

Explanation:

It has degenerated during development

49.

(d) (ii), (iii), and (vi)

Explanation:

Antibiotic resistance genes are selectable markers. Desirable genes are the ones which are introduced in the vector for getting desired protein product. In agarose gel electrophoresis, DNA fragments are separated according to their size. After the formation of the product in a bioreactor, it undergoes some processes before a finished product is ready for marketing. The processes include separation and purification of products which are collectively called downstream processing.

50.

(c) insulin

Explanation:

Insulin is the first hormone prepared by genetic engineering.