CBSE EXAMINATION PAPER-2012

NEET-ZOOLOGY

(Solved)

Time allowed : 3 hours | Maximum Marks : 800

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **200 questions.** All questions are **compulsory.**

ii. This question paper is divided into **1 sections.**

iii. **Section A** – questions number **1 to 200** are multiple choice questions

iv. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

v. Use of calculator is NOT allowed.

Section A

Question 1.

A particle has initial velocity $(2\hat{i} + 3\hat{j})$ and acceleration $(0.3\hat{i} + 0.2\hat{j})$. The magnitude of velocity after 10 seconds will be:

[4 Marks]

(A) $9\sqrt{2}$ units

(B) $5\sqrt{2}$ units

(C) 5 units

(D) 9 units

Explanation:

□□ = □□ + □□t

v = (2î + 3ĵ) + (0.3î + 0.2ĵ) × 10 = 5î + 5ĵ

|□□| = √(5² + 5²)

|□□| = 5√2

Question 2.

The motion of a particle along a straight line is described by equation:

$x = 8 + 12t - t^3$

where x is in metre and t in second. The retardation of the particle when its velocity becomes zero, is:

[4 Marks]

(A) 6 ms^{-2}

(B) 12 ms^{-2}

(C) zero

(D) 24 ms^{-2}

Explanation:

$x = 8 + 12t - t^3$

The final velocity of the particle will be zero, because it retarded

$\therefore v = 0 + 12 - 3t^2 = 0$

$3t^2 = 12$

t = 2 sec

Now the retardation

$a = dv/dt = 0 - 6t$

$a[t = 2] = 12\ m/s^2$

retardation = 12 m/s^2

Question 3.

The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectiles is:

[4 Marks]

(A) $\theta = \tan^{-1}(1/4)$

(B) $\theta = \tan^{-1}(2)$

(C) $\theta = \tan^{-1}(4)$

(D) $\theta = 45°$

Explanation:

Horizontal range,
$R = u^2 \sin 2\theta / g$ ...(1)
Maximum height,
$H = u^2 \sin^2 \theta / 2g$ ...(2)
According to the condition,
$R = H$
$\Rightarrow u^2 \sin 2\theta / g = u^2 \sin^2 \theta / 2g$
$\Rightarrow 2 \sin \theta \cos \theta = \sin^2 \theta / 2$
$\Rightarrow 2 \cos \theta = \sin \theta / 2$
$\Rightarrow \cot \theta = 1/4$
$\Rightarrow \tan \theta = 4$
$\Rightarrow \theta = [\tan^{-1}(4)]$

Question 4.

A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45°, the speed of the car is:

[4 Marks]

(A) 20 ms^{-1}

(B) 30 ms^{-1}

(C) 5 ms^{-1}

(D) 10 ms^{-1}

Explanation:

For banking $\tan \theta = V^2 / Rg$

$\tan 45° = V^2 / 90 \times 10 = 1$

$V = 30$ m/s

Question 5.

A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be:

[4 Marks]

(A) 0.5 m

(B) 0.6 m

(C) 0.7 m

(D) 0.2 m

Explanation:

At maximum compression the solid cylinder will stop so loss in K.E. of cylinder = gain in P.E. of spring
$\Rightarrow 1/2\ mv^2 + 1/2\ I\omega^2 = 1/2\ kx^2$
$\Rightarrow 1/2\ mv^2 + (1/2)\ (mR^2/2)\ (v/R)^2 = 1/2\ kx^2$
$\Rightarrow 3/4\ mv^2 = 1/2\ kx^2$
$\Rightarrow 3/4 \times 3 \times (4)^2 = 1/2 \times 200\ x^2$
$\Rightarrow 36/100 = x^2$
$\Rightarrow x = 0.6$ m

Question 6.

Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity v/2 in a direction perpendicular to the original direction. The mass A moves after collision in the direction.

[4 Marks]

(A) $\theta = \tan^{-1}(1/2)$ to the x-axis

(B) $\theta = \tan^{-1}(-1/2)$ to the x-axis

(C) Opposite to that of B

(D) Same as that of B

Explanation:

According to law of conservation of linear momentum
along x-axis, we get

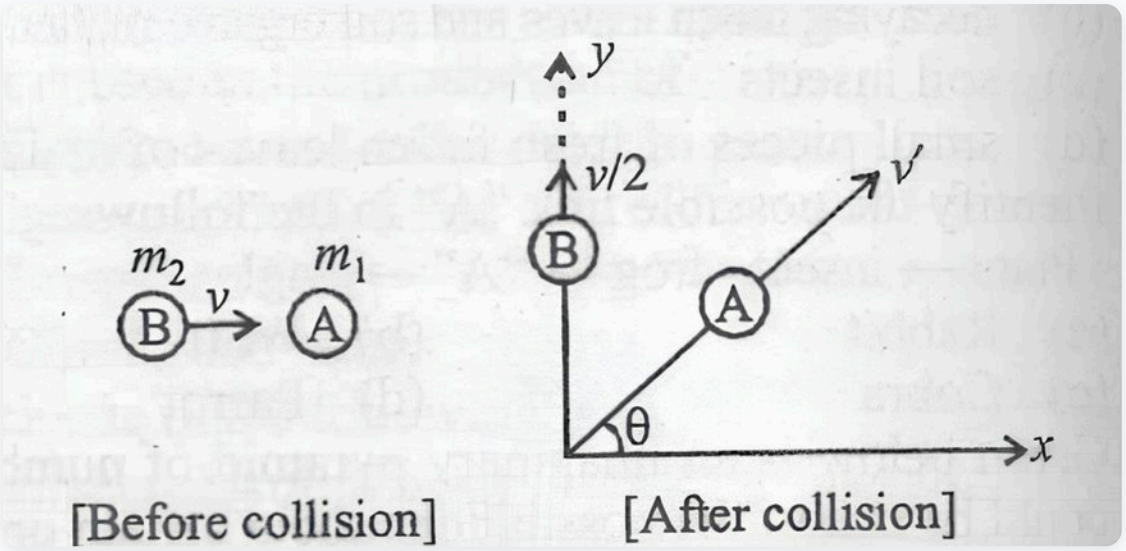
$\therefore \Rightarrow m_1(0) + m_2v = m_1v' \cos\theta$
$\Rightarrow \cos\theta = (m_2v)/(m_1v')$ ...(i)

Similarly, by law of conservation of linear momentum along y-axis, we get
$\Rightarrow m_1(0) + m_2(0) = m_1v' \sin\theta + m_2(v/2)$
$\Rightarrow \sin\theta = -(m_2v)/(2m_1v')$ ...(ii)

From equations, (i) and (ii),

$\tan\theta = -(m_2v/2mv') \times (m_1v'/m_2v) = -1/2$

$\theta = \tan^{-1}(-1/2)$ to the x-axis.



Question 7.

Two persons of masses 55 kg and 65 kg respectively, are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the centre of mass of the system shifts by

[4 Marks]

(A) 0.75m

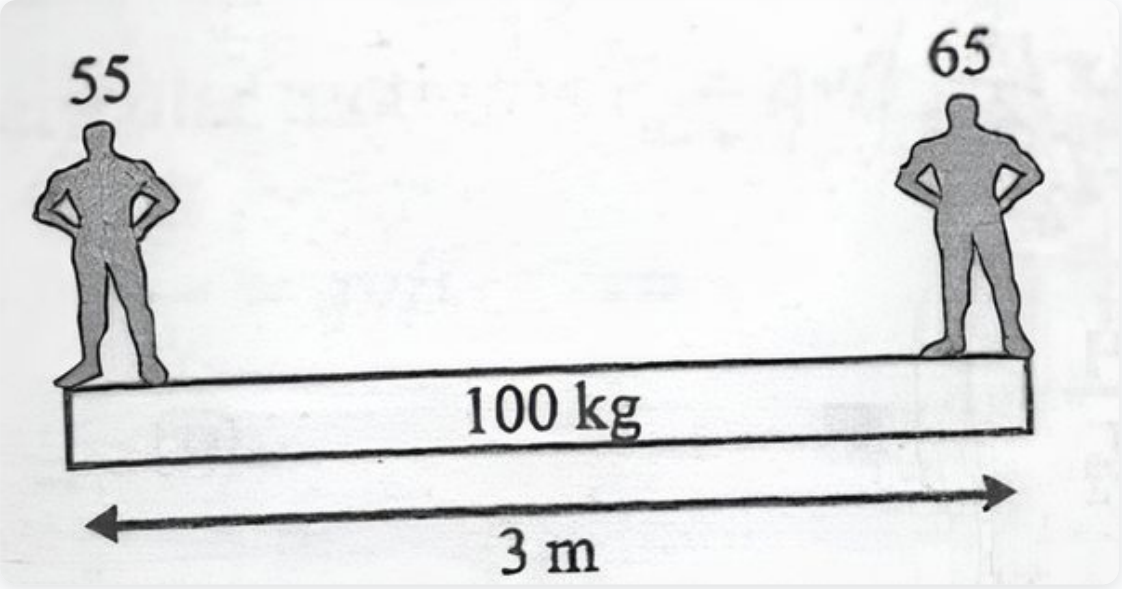
(B) zero

(C) 2.3m

(D) 3.0m

Explanation:

There is no external force so centre of mass of the system will not *shift*



Question 8.

When a mass is rotating in a plane about a fixed point, its angular momentum is directed along :

[4 Marks]

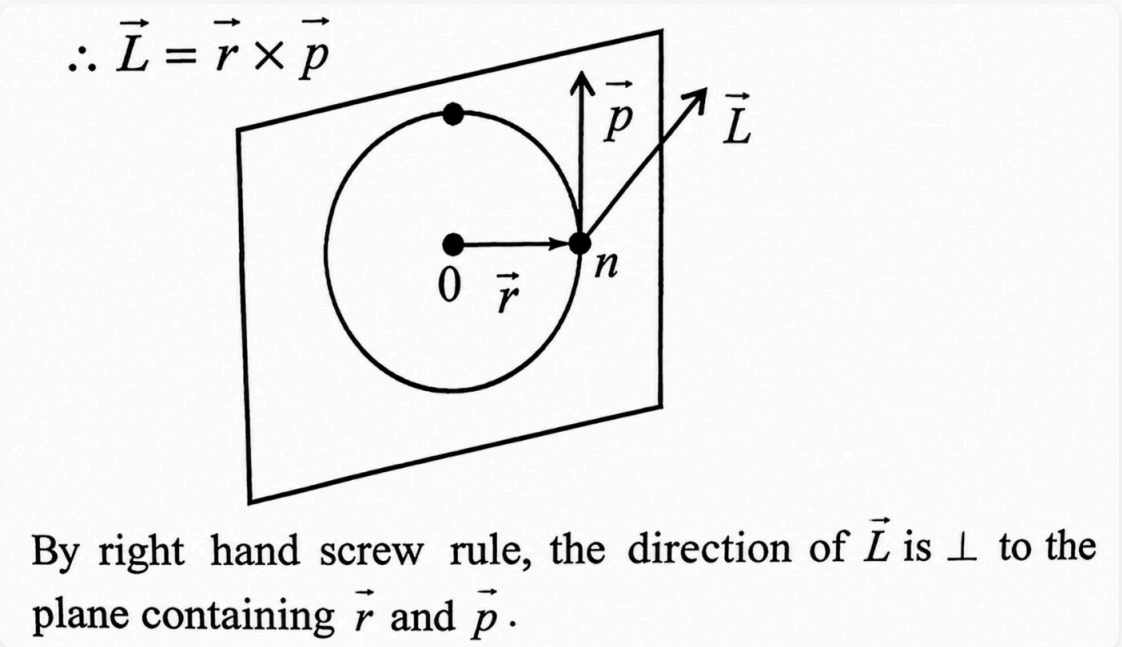
(A) a line perpendicular to the plane of rotation

(B) the line making an angle of 45° to the plane of' rotation

(C) the tangent to the orbit

(D) the radius

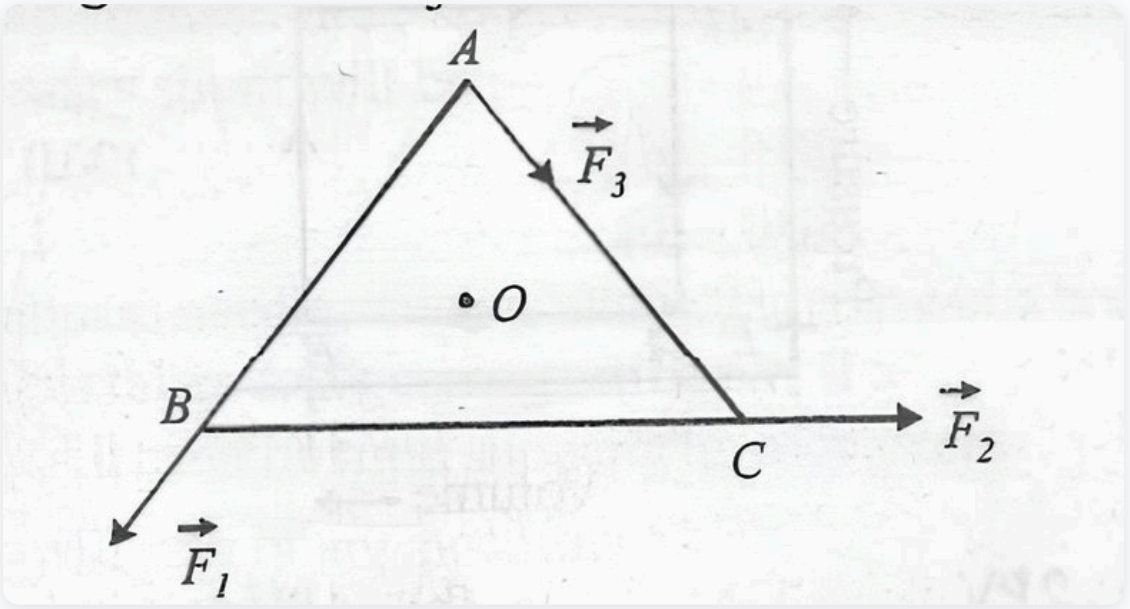
Explanation:



Question 9.

ABC is an equilateral triangle with O as its centre. □□$_1$, □□$_2$ and □□$_3$ represent three forces acting along the sides AB, BC and AC respectively. If the total torque about O is zero, the magnitude of □□$_3$ is:

[4 Marks]



(A) $F_1 + F_2$

(B) $(F_1 + F_2)/2$

(C) $2(F_1 + F_2)$

(D) $F_1 - F_2$

Explanation:

$F_1 x + F_2 x = F_3 x$

$F_3 = F_1 + F_2$

Question 10.

A spherical planet has a mass M_p and diameter D_p. A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to:

[4 Marks]

(A) GM_p/D^2_p

(B) $4GM_p/D^2_p$

(C) GM_pm/D^2_p

(D) $4GM_pm/D^2_p$

Explanation:

Gravitational attraction force on particle B,
$F_g = GM_pm / (D_p/2)^2$
Acceleration of particle due to gravity
$a = F_g / m = 4GM_p / D^2_p$

Question 11.

The height at which the weight of a body becomes 1/16th, its weight on the surface of earth (radius R), is:

[4 Marks]

(A) 5R

(B) 15R

(C) 3R

(D) 4R

Explanation:

$GM_m / (R + h)^2 = 1\ GM_m / 16\ R^2$
$\Rightarrow 1 / (R + h)^2 = 1 / 16\ R^2$
$\Rightarrow R / (R + h) = 1/4$
$\Rightarrow (R + h) / R = 4$
$\Rightarrow h = 3R$

Question 12.

A geostationary satellite s orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earthis:

[4 Marks]

(A) 6 / √2

(B) 6√2

(C) 10

(D) 5

Explanation:

According to Kepler's law of period

$T^2 \propto R^3$

$T_1^2 / T_2^2 = R_1^3 / R_2^3 = (6R)^3 / (3R)^3$

$= 8$

$\Rightarrow 24 \times 24 / T_2^2 = 8$

$\Rightarrow T_2^2 = (24 \times 24) / 8 = 72 = 36 \times 2$

$\Rightarrow T_2 = 6\sqrt{2}$

Question 13.

If the radius of a star is R and it acts as a black body, what would be the temperature of the star, in which the rate of energy production is Q?
(σ stands for Stefan's constant)

[4 Marks]

(A) $Q/4\pi R^2\sigma$

(B) $(Q/4\pi R^2\sigma)^{-1/2}$

(C) $(Q/4\pi R^2\sigma)^{1/4}$

(D) $(4\pi R^2Q/\sigma)^{1/4}$

Explanation:

Stefan's law for black body radiation

$Q = \sigma eAT^4$

$T = [Q / \sigma(4\pi R^2)]^{1/4}$

Here e = 1

$A = 4\pi R^2$

Question 14.

Liquid oxygen at 50K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?

[4 Marks]

(A) a



(B) b



(C) c



(D) d



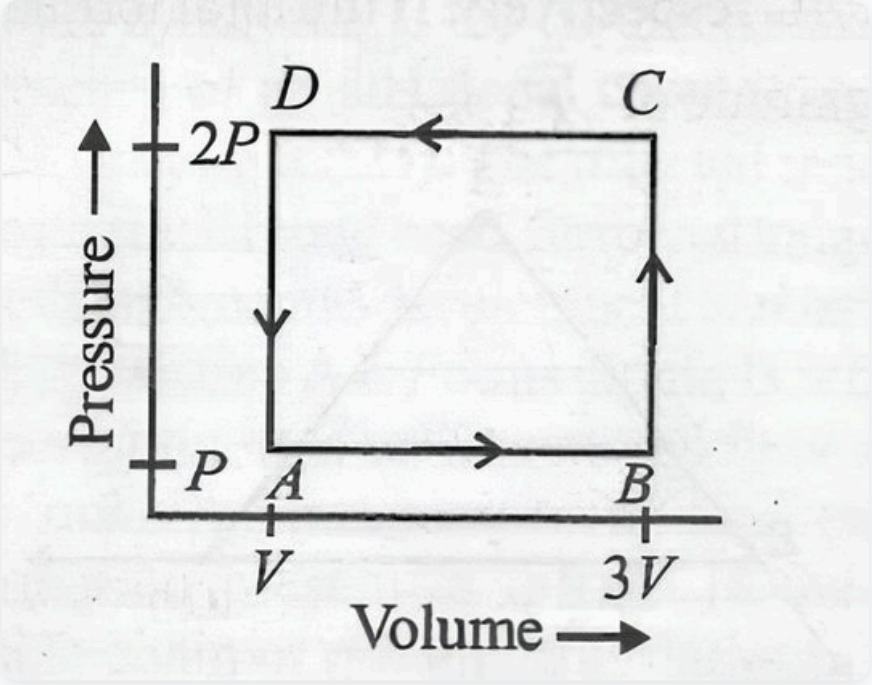
Explanation:

Initially liquid oxygen will gain the temperature up to its boiling temperature then it change its state to gas. After this again its temperature will increase, so corresponding graph will be graph(a).

Question 15.

A thermodynamic system is taken through the cycle ABCD as shown in figure. Heat rejected by the gas during the cyclic process is :

[4 Marks]



(A) PV

(B) 1 / 2 PV

(C) 2PV

(D) 4PV

Explanation:

∴ Internal energy is the state function.
∴ In cyclic process; ΔU = 0
According to 1st law of thermodynamics
ΔQ = ΔU + W
So heat absorbed
ΔQ = W = Area under the curve
= −(2V)(P) = −2PV
So heat rejected = 2PV

Question 16.

One mole of an ideal gas goes from an initial state A to final state B via two processes : It first undergoes isothermal expansion from volume V to 3V and then its volume is reduced from 3V to V at constant pressure. The correct P-V diagram representing the two processes is :

[4 Marks]

(A) a



(B) b



(C) c



(D) d



Explanation:

1st process is isothermal expansion which is only correct shown in option (d)
2nd process is isobaric compression which is correctly shown in option (d)

Question 17.

The damping force for an oscillator is directly proportional to the velocity. The unit of the constant of proportionality is:

[4 Marks]

(A) $kgms^{-1}$

(B) $kgms^{-2}$

(C) kgs^{-1}

(D) kgs

Explanation:

$F \propto v \Rightarrow F = kv$
$k = F / v \Rightarrow [k] = [kgms^{-2}] / [ms^{-1}] = kgs^{-1}$

Question 18.

If n_1, n_2 and n_3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by :

[4 Marks]

(A) $1/\sqrt{n} = 1/\sqrt{n_1} + 1/\sqrt{n_2} + 1/\sqrt{n_3}$

(B) $1/n = 1/n_1 + 1/n_2 + 1/n_3$

(C) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$

(D) $n = n_1 + n_2 + n_3$

Explanation:

$n = 1 / 2l \sqrt{(T/m)}$

or, $n \propto 1 / l$ or nl = constant, K

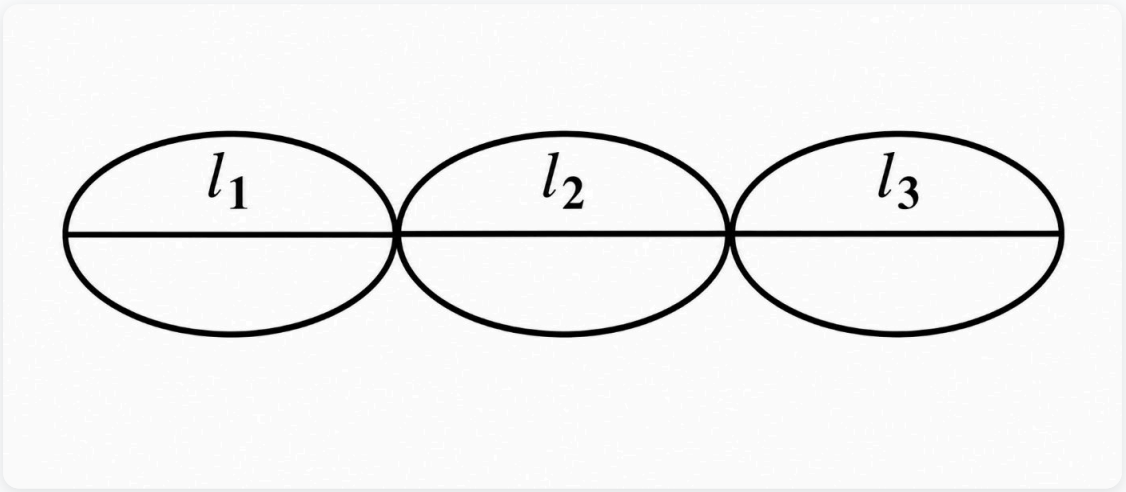
$\therefore n_1 l_1 = K,$

$n_2 l_2 = K, n_3 l_3 = K$

Also, $l = l_1 + l_2 + l_3$

or, $K / n = K / n_1 + K / n_2 + K / n_3$

or, $1 / n = 1 / n_1 + 1 / n_2 + 1 / n_3$



Question 19.

Two sources of sound placed close to each other are emitting progressive waves given by $y_1 = 4 \sin 600\pi t$ and $y_2 = 5 \sin 608\pi t$. An observer located near these two sources of sound will hear:

[4 Marks]

(A) 8 beats per second with intensity ratio 25 : 16 between waxing and waning.

(B) 8 beats per second with intensity ratio 81 : 1 between waxing and waning.

(C) 4 beats per second with intensity ratio 25 : 16 between waxing and waning.

(D) 4 beats per second with intensity ratio 81 : 1 between waxing and waning.

Explanation:

$2\pi f_1 = 600\pi$

$f_1 = 300$ ..... (1)

$2\pi f_2 = 608\pi$

$f_2 = 304$ ...(2)

$|f_1 - f_2| = 4$ beats

$I_{max} / I_{min} = (A_1 + A_2)^2 / (A_1 + A_2)^2 = (5 + 4)^2 / (5 - 4)^2 = 81 / 1$

where A_1, A_2 are amplitudes of given two sound wave.

Question 20.

An electric dipole of moment '**p'** is placed in an electric field of intensity '**E'**. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when = 90°, the torque and the potential energy of the dipole will be respectively be:

[4 Marks]

(A) pE cos θ, −pE cos θ

(B) pE sin θ, 2 pE cos θ

(C) pE sin θ, −pE cos θ

(D) pE sin θ, −2 pE cos θ

Explanation:

The torque on the dipole is given as

$\tau = pE \sin \theta$

The potential energy of the dipole in the electric field is given as

$U = - pE \cos \theta$

Question 21.

What is the flux through a cube of side 'a' if a point charge q is at one of its corner:

[4 Marks]

(A) $2q/\varepsilon_0$

(B) $q/8\varepsilon_0$

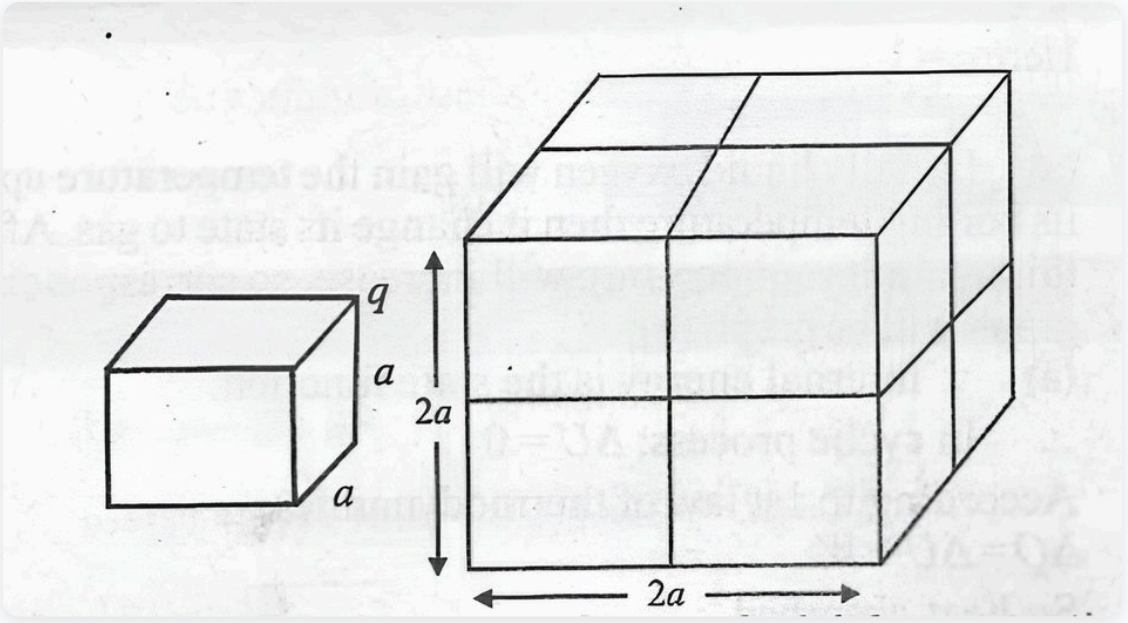
(C) q/ε_0

(D) $q/2\varepsilon_0$

Explanation:

Eight identical cubes are required to arrange so that this charge is at centre of the cube formed so flux.

$\phi = q/8\varepsilon_0$



Question 22.

Four point charges -Q, -q, 2q and 2Q are placed, one at each corner of the square. The relation between Q and q for which the potential at the centre of the square is zero is:

[4 Marks]

(A) Q = 1 / q

(B) Q = q

(C) Q = -1 / q

(D) Q = -q

Explanation:

Let the side length of square be **'a'** then potential at centre **O** is

Ac = BD = $\sqrt{(a^2 + a^2)} = a\sqrt{2}$

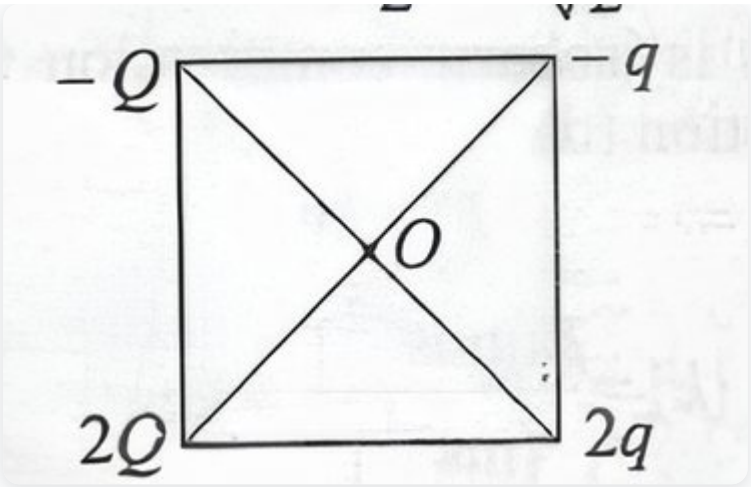
OA = OB = OC = OD = $a\sqrt{2} / 2 = a / \sqrt{2}$

$V = k(-Q) / (a\sqrt{2}) + k(-q) / a\sqrt{2} + k(2q) / a\sqrt{2} + k(2Q) / a\sqrt{2} = 0$

Given

$= -Q - q + 2q + 2Q = 0 \Rightarrow Q + q = 0$

$\Rightarrow Q = -q$



Question 23.

The potential energy of particle in a force field is $U = A / r^2 - B / r$, where **A** and **B** are positive constants and **r** is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is:

[4 Marks]

(A) B / 2A

(B) 2A / B

(C) A / B

(D) B / A

Explanation:

For equilibrium

$dU /dr = 0 \Rightarrow -2A / r^3 + B / r^2 = 0$

$r = 2A / B$

for stable equilibrium

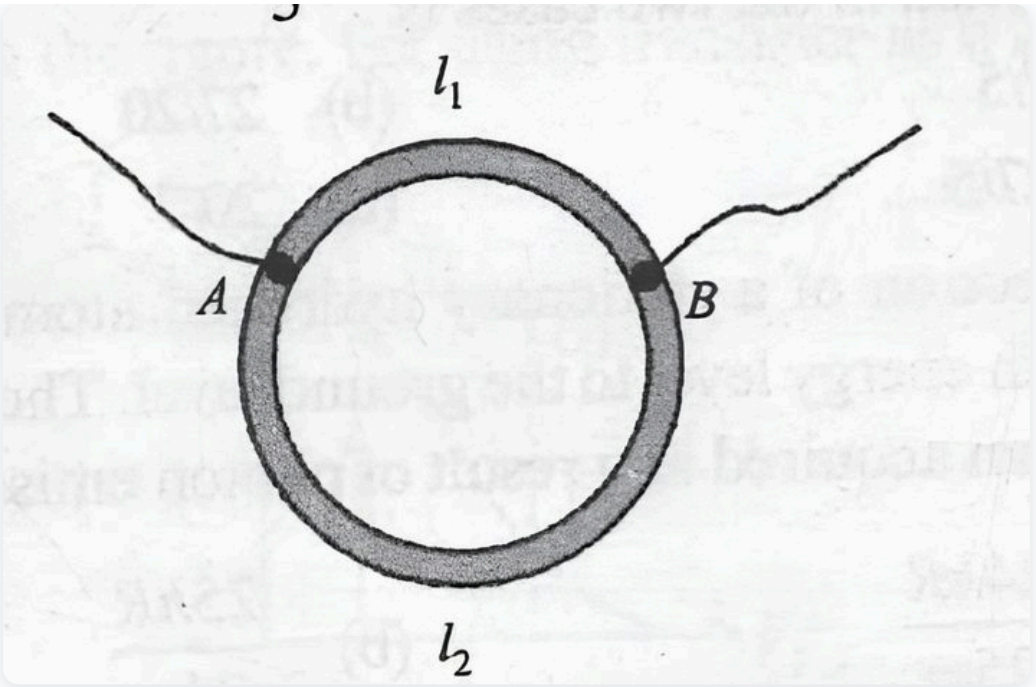
d^2U / dr^2 should be positive for the value of r

Here $.d^2U / dr^2 = 6A / r^4 - 2B / r^3$ is +ve value for $r = 2A / B$

Question 24.

A ring is made of a wire having a resistance R_0=12Ω. Find the points A and B as shown in the figure, at which a current carrying conductor should be connected so that the resistance R of the sub-circuit between these points is equal to 8/3 Ω.

[4 Marks]



(A) $l_1 / l_2 = 1 / 3$

(B) $l_1 / l_2 = 5 / 8$

(C) $l_1 / l_2 = 3 / 8$

(D) $l_1 / l_2 = 1 / 2$

Explanation:

Let x is the resistance per unit length then

equivalent resistance $R = (R_1R_2 / R_1 + R_2)[(xl_1)(xl_2) / xl_1 + xl_2]$

$\Rightarrow 8 / 3 = x(l_1l_2 / l_1 + l_2$

$\Rightarrow 8 / 3 = x(l_1 / (l_1 / l_2) + 1)$.....(i)

also $R_0 = xl_1 + xl_2$

$12 = x(l_1 + l_2)$

$12 = xl_2 (l_1/ l_2 + 1$ ...(ii)

(i) / (ii) $\Rightarrow (8/3) / (12/1)$

$= xl_1 / ((l_1/l_2) +1) / xl_2((l_1/l_2) +1)$

$= l_1 / l_2((l_1/l_2) +1)^2$

$((l_1/l_2) +1)^2 \times 8 / 36 = l_2 / l_2$

$(y^2 + 1 + 2y) \times 8/36 = y$ (where $y = l_1/l_2$)

$\Rightarrow 8y^2 + 8 + 16y = 36y$

$\Rightarrow 8y^2 - 20y + 8 = 0$

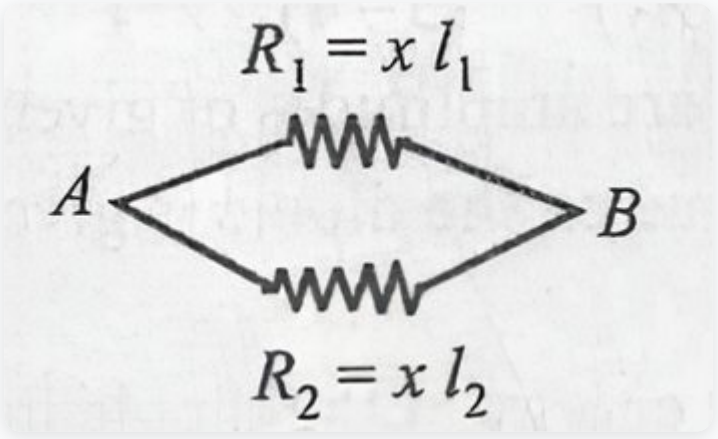
$\Rightarrow 2y^2 - 5y + 2 = 0$

$\Rightarrow 2y^2 - 4y - y + 2 = 0$

$\Rightarrow 2y(y - 2) - 1(y - 2) = 0$

$\Rightarrow (2y - 1)(y - 2) = 0$

$\Rightarrow y = l_1/l_2 = 1/2$ or 2



Question 25.

If voltage across a bulb rated 220 Volt-100 Watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is:

[4 Marks]

(A) 20%

(B) 2.5%

(C) 10%

(D) 5%

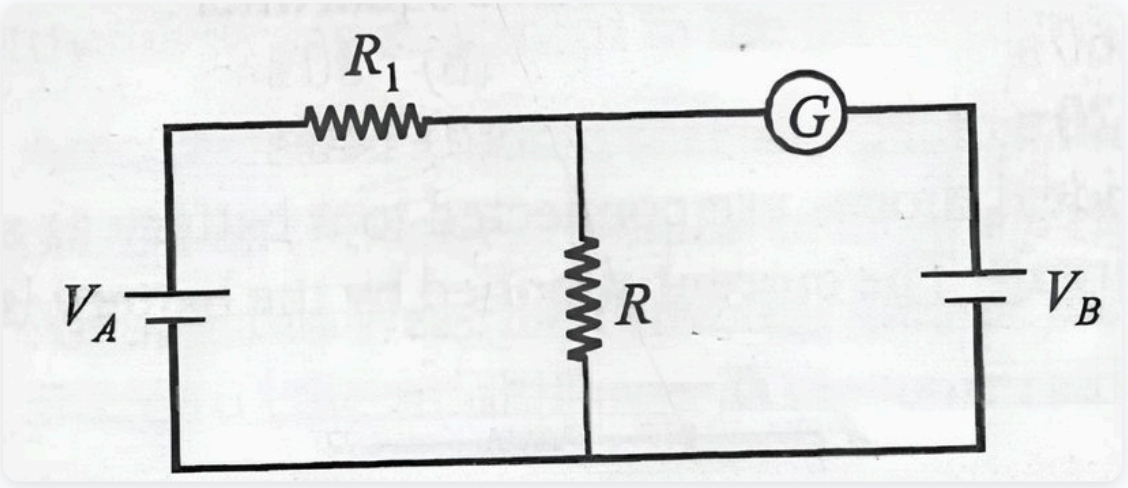
Explanation:

Resistance of bulb is constant
$P = V^2 / R \Rightarrow \Delta p / p = 2\Delta V/V + \Delta R/R$
$\Rightarrow \Delta p/ p = 2 \times 2.5 + 0 = 5\%$

Question 26.

In the circuit shown the cells A and B have negligible resistances. For V_A= 12V, R_1 = 500Ω and R = 100Ω the galvanometer (G) shows no deflection. The value of V_B is:

[4 Marks]



(A) 2 V

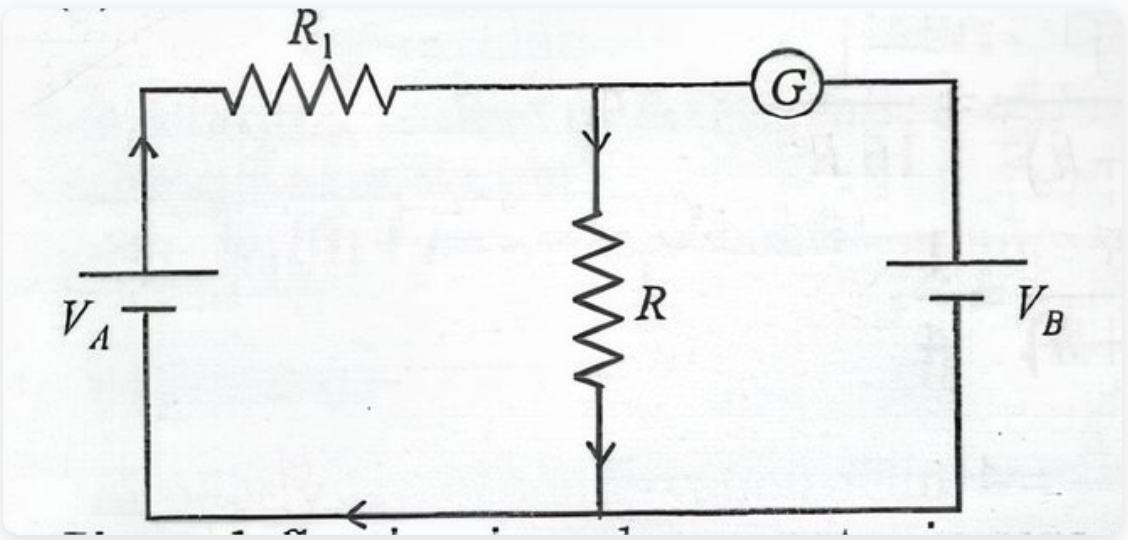
(B) 4 V

(C) 12 V

(D) 6 V

Explanation:

Since deflection in galvanometer is zero so current will flow as shown in the above diagram.
current I = V_A / R_1 + R = 12 / 500 + 100 = 12 / 600
So,
V_B = IR = 12 / 600 × 100 = 2V



Question 27.

An alternating electric field, of frequency v, is applied across the dees (radius = R) of a cyclotron that is being used to accelerate protons (mass = m). The operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of

the proton beam, produced by it, are given by :

[4 Marks]

(A) $B = 2\pi m\nu/e$ and $K = m^2\pi\nu R^2$

(B) $B = m\nu/e$ and $K = m^2\pi\nu R^2$

(C) $B = 2\pi m\nu/e$ and $K = 2m\pi^2\nu^2R^2$

(D) $B = m\nu/e$ and $K = 2m\pi^2\nu^2R^2$

Explanation:

Time period of cyclotron is
$T = 1 / v = 2\pi m / eB$; $B= (2\pi m / e) v$; $R = mv / eB = p / eB$
$\Rightarrow p = eBR = e \times (2\pi m\nu/e) R = 2\pi m\nu R$
$K.E. = p^2 / 2m = (2\pi m\nu R)^2 / 2m$
$= 2\pi^2 m\nu^2 R^2$

Question 28.

An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The wavelength associated with the particle will be :

[4 Marks]

(A) 0.01 Å

(B) 0.1 Å

(C) 1 Å

(D) 10 Å

Explanation:

Wavelength
$\lambda = h / p \Rightarrow \lambda = h/mv$,
h = Planck's constant = 6.63×10^{-34} J·S

For circular motion,

$= F_c = qvB$

$\Rightarrow mv^2 / r = qvB \Rightarrow mv / qB = r$

$r = mv / qB \Rightarrow mv = qrB$

$\Rightarrow (2e)(0.83 \times 10^{-2}) (1/4)$

$\lambda = 6.6 \times 10^{-34} \times 4 / 2 \times 1.6 \times 10^{-19} \times 0.83 \times 10^{-2}$

$\lambda = 9.93 \times 10^{-34+21} \approx 0.01$ Å

Question 29.

Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2I, respectively. The resultant magnetic field induction at the center will be :

[4 Marks]

(A) $(\sqrt{5}\ \mu_0 I) / (2R)$

(B) $(3\mu_0 I) / (2R)$

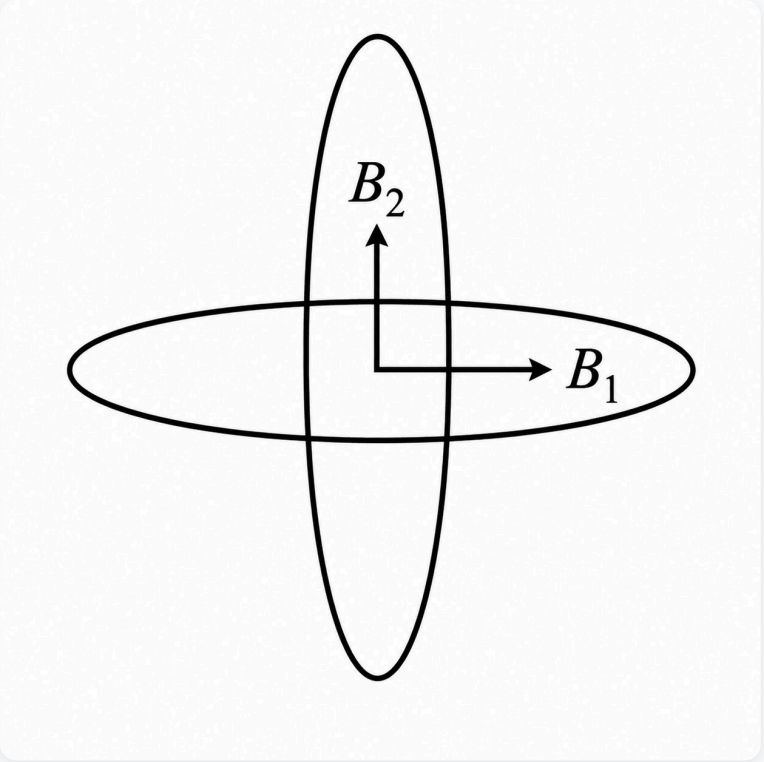
(C) $(\mu_0 I) / (2R)$

(D) $(\mu_0 I) / R$

Explanation:

The magnetic field, due the coil, carrying current I Ampere
$B_1 = \mu_0 I / 2R$
The magnetic field due to the coil, carrying current 2I Ampere
$B_2 = \mu_0(2I) / 2R$
The resultant B

$B_{net} = \sqrt{(B_1^2 + B_2^2 + 2B_1B_2 \cos\theta)}$, $\theta = 90°$
$B_{net} = \sqrt{(B_1^2 + B_2^2)} = (\mu_0(2I) / 2R)\sqrt{(1 + 4)}$
$= \sqrt{5}\ \mu_0 I / 2R$



Question 30.

A milli voltmeter of 25 milli volt range is to be converted into an ammeter of 25 ampere range. The value (in ohm) of necessary shunt will be :

[4 Marks]

(A) 0.001

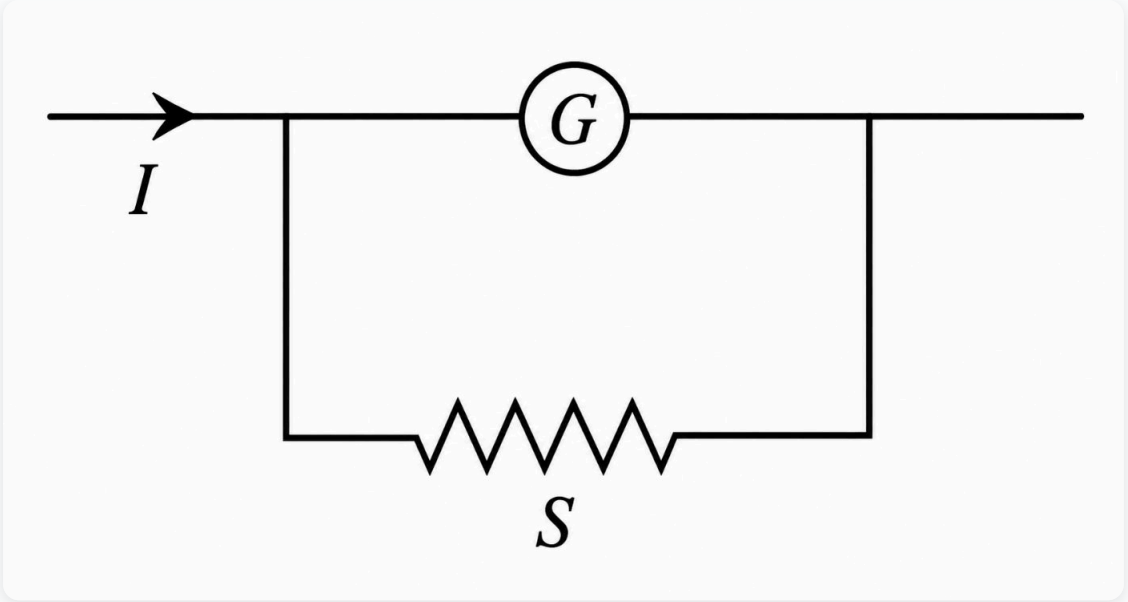
(B) 0.01

(C) 1

(D) 0.05

Explanation:

Galvanometer is converted into ammeter, by connected a shunt, in parallel with it.
$GS / G + S = V_G / I = 25 \times 10^{-3} / 25$
$GS / G + S = 0.001\ \Omega$
Here $S << G$ so
$S = 0.001\ \Omega$



Question 31.

A compass needle which is allowed to move in a horizontal plane is taken toa geomagnetic pole. It :

[4 Marks]

(A) will become rigid showing no movement

(B) will stay in any position

(C) will stay in north-south direction only

(D) will stay in east-west direction only

Explanation:

Since magnetic field is in vertical direction and needle is free to totate in horizontal plane only so magnetic force cannot rotate the needle in horizontal plane so needle can stay in any position.

Question 32.

A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux ϕ (wb) linked with the coil varies with time t (sec) as $\phi = 50t^2 + 4$. The current in the coil at t = 2 sec is :

[4 Marks]

(A) 0.5 A

(B) 0.1 A

(C) 2 A

(D) 1 A

Explanation:

According to Faraday's law of induction

Induced e.m.f. $\varepsilon = -d\phi / dt = -(100t)$

Induced current i at t = 2 sec.

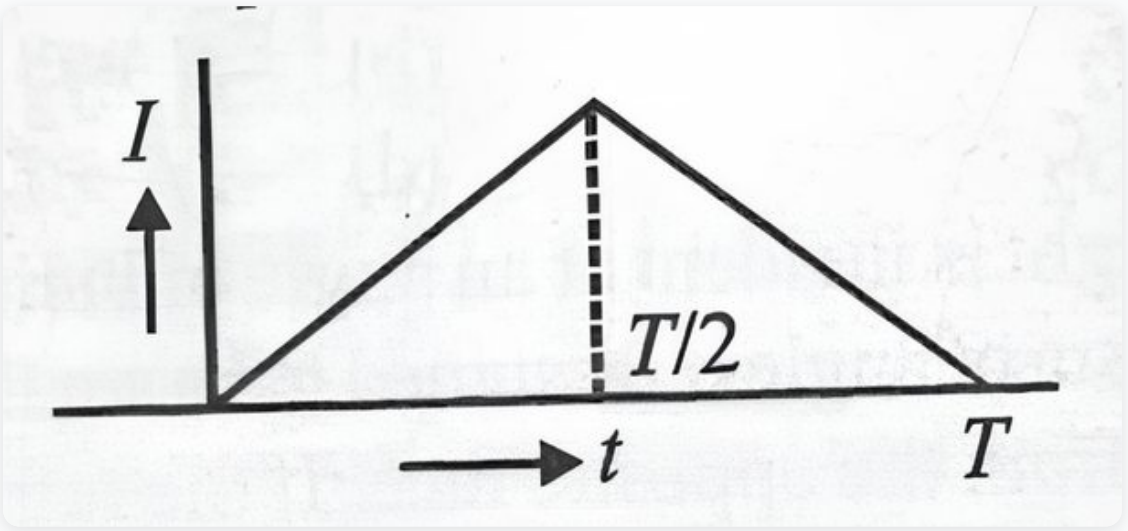
$|\varepsilon / R| = +100 \times 2 / 400 = +0.5$ A

Question 33.

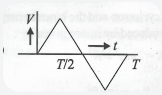
The current (I) in the inductance is varying with time according to the plot shown in figure.

Which one of the following is the correct variation of voltage with time in the coil?

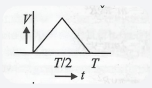
[4 Marks]



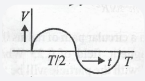
(A) a



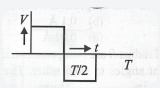
(B) b



(C) c



(D) d



Explanation:

V = -L(di / dt)

Here di / dt is +ve for T / 2 time and
di / dt is -ve for next T / 2 time so

Question 34.

In an electrical circuit R, L, C and an a.c. voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage the current in the circuit is π / 3. If instead, C is removed from the circuit, the phase difference is again π / 3. The power factor of the circuit is:

[4 Marks]

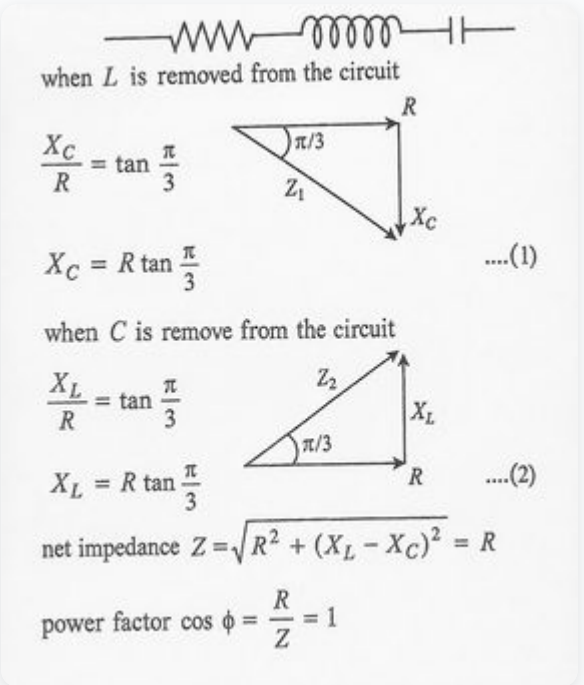
(A) 1

(B) 1 / 2

(C) 1 / √2

(D) √3 / 2

Explanation:



Question 35.

The electric field associated with an e.m. wave in vacuum is given by □□ = î 40 cos (kz − 6 × 10^8t), where E, z and t are in volt / m, meter and seconds respectively. The value of wave vector k is :

[4 Marks]

(A) 2 m^{-1}

(B) 0.5 m^{-1}

(C) 3 m^{-1}

(D) 6 m^{-1}

Explanation:

On comparing the given equation to
□□ = $a_0 \hat{i} \cos(\omega t - kz)$
$\omega = 6 \times 10^8$
Wave factor,
$k = 2\pi / r = \omega / c$
$k = \omega / c = 6 \times 10^8 / 3 \times 10^8$
$= 2\ m^{-1}$

Question 36.

When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index.

[4 Marks]

(A) equal to that of glass

(B) less than one

(C) greater than that of glass

(D) less then that of glass

Explanation:

$1 / f = (\mu_g / \mu_m - 1)(1 / R_1 - 1 / R_2)$

If $\mu_g = \mu_m$, then $1 / f = (1 - 1)(1 / R_1 - 1 / R_2)$

$\Rightarrow 1 / f = 0$

$f = 1 / 0 = \infty$

This implies that the liquid must have refractive index equal to glass.

Question 37.

A concave mirror of focal length 'f_1' is placed at a distance of 'd' from a convex lens of focal length 'f_2'. A beam of light coming from infinity and falling on this convex lens- concave mirror combination returns to infinity.
The distance 'd' must equal :

[4 Marks]

(A) $f_1 + f_2$

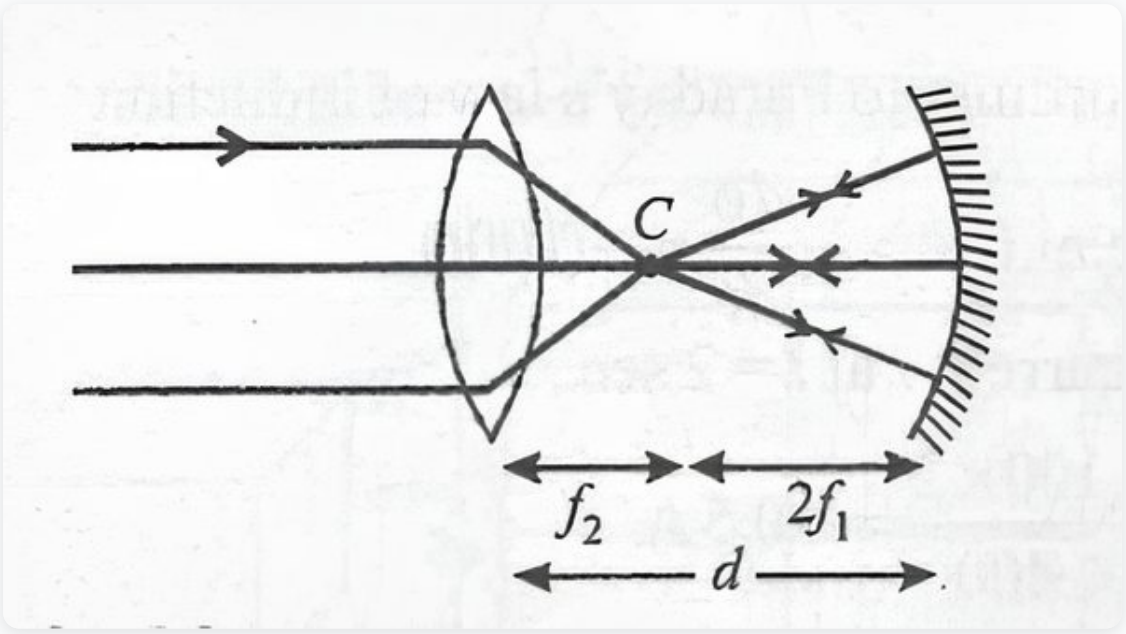
(B) $-2f_1 + f_2$

(C) $2f_1 + f_2$

(D) $-f_1 + f_2$

Explanation:

$d = f_2 + 2f_1$



Question 38.

A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence, i, is nearly equal to :

[4 Marks]

(A) μA

(B) μA / 2

(C) A / μ

(D) A / 2μ

Explanation:

For normally emerge e = 0
Therefore $r_2 = 0$ and $r_1 = A$

Snell's Law for incident ray's
1 sin i = μ sin r_1 = μ sin A
For small angle
i = μA

Question 39.

The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses are :

[4 Marks]

(A) 10 cm, 10 cm

(B) 15 cm, 5 cm

(C) 11 cm, 9 cm

(D) 18 cm, 2 cm

Explanation:

M.P. = 9 = f_0 / f_e
⇒ f_0 = 9f_e ...(1)
f_0 + f_e = 20 ...(2)
on solving
f_0 = 18 cm = focal length of the objective
f_e = 2 cm = focal length of the eyepiece

Question 40.

A 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is :

[4 Marks]

(A) 6×10^{18}

(B) 1.5×10^{20}

(C) 62×10^{20}

(D) 3×10^{19}

Explanation:

Give that, only 25% of 200W converter electrical energy into light of yellow colour
(hc / λ) × N = 200 × 25 / 100

Where N is the No. of photons emitted per second, plank's constant, c, speed of light.

$N = 200 \times 25 / 100 \times \lambda / hc$

$= 200 \times 25 \times 0.6 \times 10^{-6} / 100 \times 6.2 \times 10^{-34} \times 3 \times 10^{8}$

$= 1.5 \times 10^{20}$

Question 41.

Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the materials is :

[4 Marks]

(A) 4×10^{15} Hz

(B) 5×10^{15} Hz

(C) 1.6×10^{15} Hz

(D) 2.5×10^{15} Hz

Explanation:

$n \rightarrow 2 - 1$

$E = 10.2$ eV

$kE = E - \phi$

$Q = 10.20 - 3.57$

$h\nu_0 = 6.63$ eV

$v_0 = 6.63 \times 1.6 \times 10^{-19} / 6.67 \times 10^{-34}$

$= 1.6 \times 10^{15}$ Hz

Question 42.

Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to first excited state. The ratio of the wavelength $\lambda_1 : \lambda_2$ emitted in the two cases is

[4 Marks]

(A) 7/5

(B) 27/20

(C) 27/5

(D) 20/7

Explanation:

According to Rydberg formula

$1/\lambda = R[1/n^2_f - 1/n^2_i]$

In first case, $n_f = 3$, $n_i = 4$

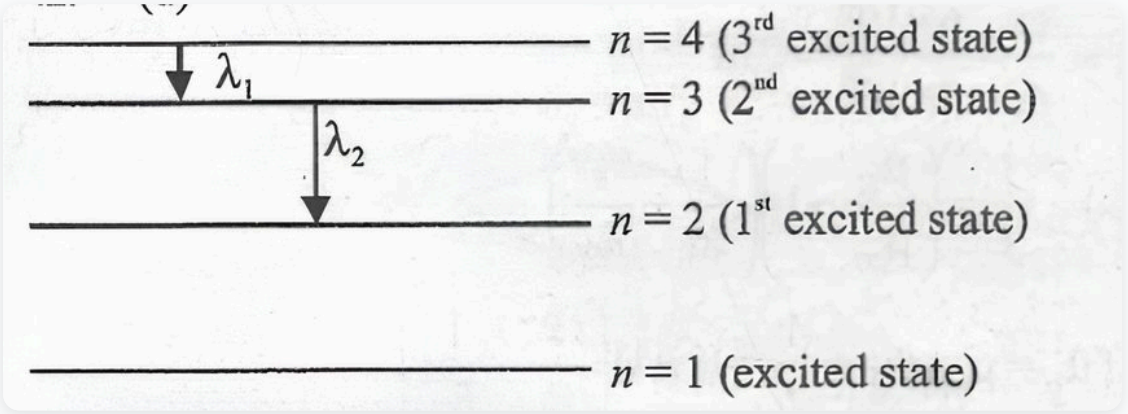
$\therefore 1/\lambda_1 = R [1/3^2 - 1/4^2] = R [1/9 - 1/16] = (7/144)R$ ...(i)

In second case, $n_f = 2$, $n_i = 3$

$\therefore 1/\lambda_2 = R [1/2^2 - 1/3^2] = R [1/4 - 1/9] = (5/36)R$ ...(ii)

Divide (ii) by (i), we get

$\lambda_1/\lambda_2 = (5/36) \times (144/7) = 20/7$



Question 43.

An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be :

(m = mass of the electron, R, Rydberg constant and h Planck's constant)

[4 Marks]

(A) 25m / 24hR

(B) 24hR / 25m

(C) 24m / 25hR

(D) 25hR / 24m

Explanation:

For emission, the wave number of the radiation is given as

$1/\lambda = RZ^2 (1/n_1^2 - 1/n_2^2)$

R = Rydberg constant, Z = atomic number

$= R (1/1^2 - 1/5^2)$

$= R (1 - 1/25)$

$\Rightarrow 1/\lambda = R (24/25)$

linear momentum

$p = h/\lambda = h \times R \times 24/25$ (de -Broglie hypothesis)

$\Rightarrow mv = 24hR/25$

$\Rightarrow v = 24hR/25m$

Question 44.

If the nuclear radius of ^{27}Al is 3.6 Fermi, the approximate nuclear radius of ^{64}Cu in Fermi is:

[4 Marks]

(A) 4.8

(B) 3.6

(C) 2.4

(D) 1.2

Explanation:

The radius of the nucleus is directly proportional to cube root of atomic number i.e. $R \propto A^{1/3}$

$R = R_0A^{1/3}$, where R_0 is a constant of proportionality

$R_2/R_1 = (A_2/A_1)^{1/3}$

$\Rightarrow (64/27)^{1/3} = 4/3$

where

R_1 = the radius of ^{27}Al, and

A_1 = Atomic mass number of Al

R_2 = the radius of ^{64}Cu and A_2 = Atomic mass number of C4

$R_2 = 3.6 \times 4/3 = 4.8$ m

Question 45.

A mixture consists of two radioactive materials A_1 and A_2 with half lives of 20 s and 10 s respectively. Initially the mixture has 40 g of A_1 and 160 g of A_2. The amount of the two in the mixture will become equal after :

[4 Marks]

(A) 20 s

(B) 80 s

(C) 60 s

(D) 40 s

Explanation:

Let, the amount of the two in the mixture will become equal after t years.

The amount of A_1, which remains after t years

$N_1 = N_{01} / (2)^{t/20}$

The amount of A_2, which remains, after t years

$N_2 = N_{02} / (2)^{t/10}$

According to the problem

$N_1 = N_2$

$40 / (2)^{t/20} = 160 / (2)^{t/10}$

$2^{t/10} = 2^{(t/10-2)}$

$t / 20 = t / 10 - 2$

$t / 20 - t / 10 = 2$

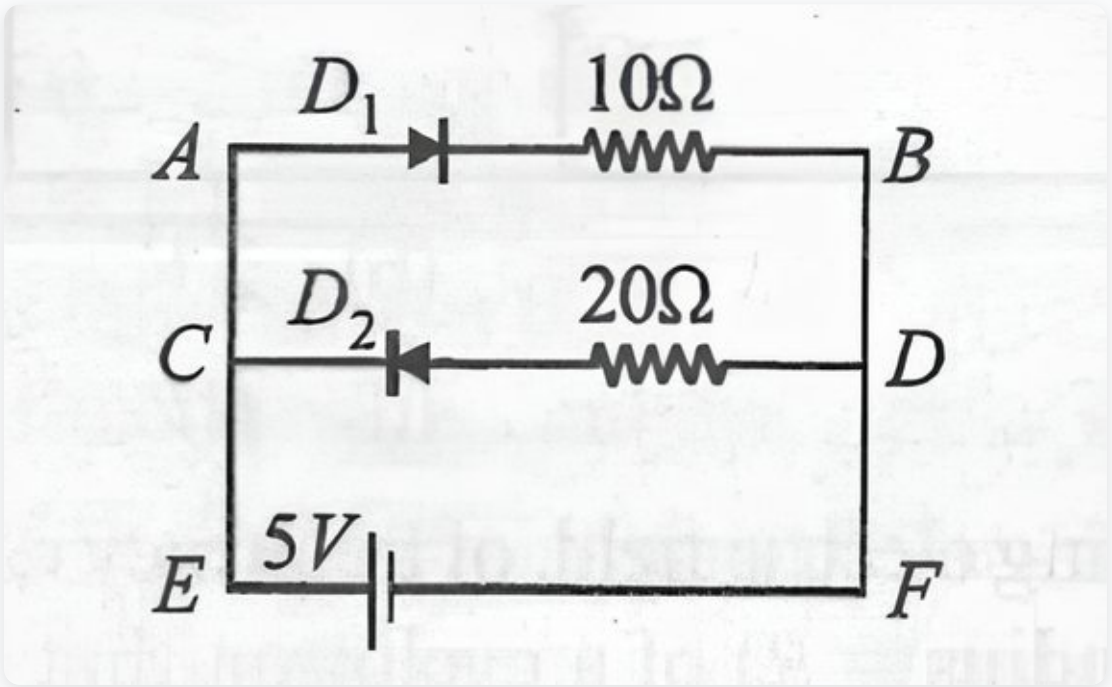
$t / 20 = 2$

$t = 40$ s

Question 46.

Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is :

[4 Marks]



(A) 0.5 A

(B) 0.75 A

(C) zero

(D) 0.25 A

Explanation:

Here D_1 is in forward bias and D_2 is in reverse bias so, D_1 will conduct and D_2 will not conduct. Thus, no current will flow through DC.

I = V / R = 5 / 10 = 1 / 2 Amp.

Question 47.

C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator whereas Si is intrinsic semiconductor. This is because :

[4 Marks]

(A) In case of C the valence band is not completely filled at absolute zero temperature.

(B) In case of C the conduction band is partly filled even at absolute zero temperature.

(C) The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

(D) The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

Explanation:

Electronic configuration of ^{6}C

$^{6}C = 1s^2, 2s^2\ 2p^2$

The electronic configuration of ^{14}Si

$^{14}Si = 1s^2, 2s^2\ 2p^6, 3s^2\ 3p^2$

As they are away from Nucleus, so effect of nucleus is low for Si even for Sn and Pb are almost metalic.

Question 48.

In a CE transistor amplifier, the audio signal voltage across the collector resistance of 2kΩ is 2V. If the base resistance is 1kΩ and the current amplification of the transistor is 100, the input signal voltage is

:

[4 Marks]

(A) 1 mV

(B) 10 mV

(C) 0.1 V

(D) 1.0 V

Explanation:

The output voltage, across the load R_C

V_0 = I_C R_C = 2

The collector current (I_C)

I_C = 2/2× 10^3 =10^{-3} Amp

Current gain (β)

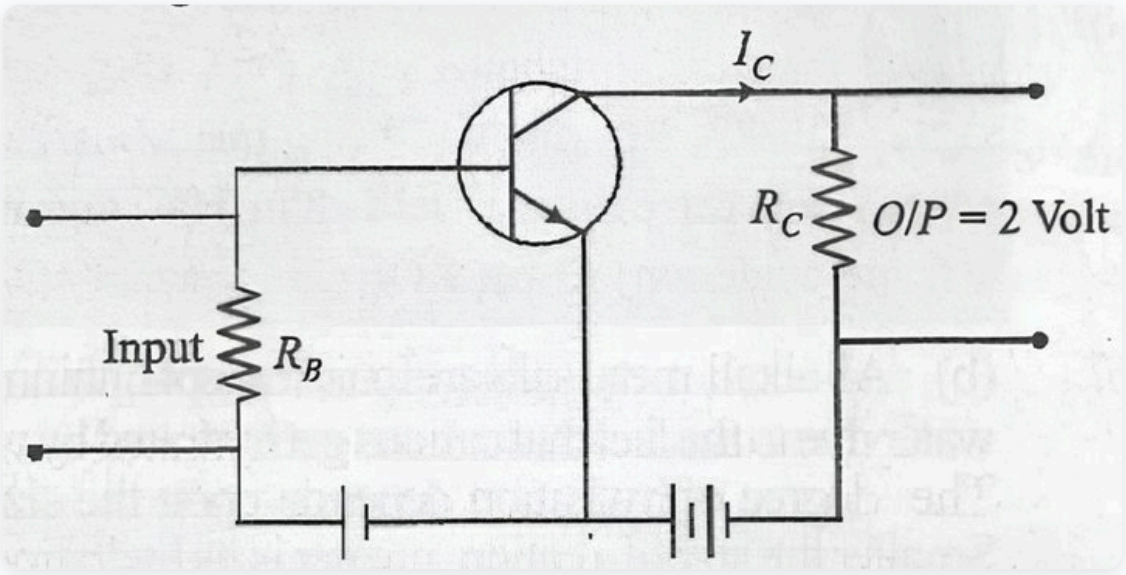
(β) current gain = I_C / I_B = 100

I_B = I_C / 100 = 10^{-3} / 100 = 10^{-5} Amp

Input voltage (V_i)

V_i = R_B I_B = 1 × 10^3 × 10^{-5} = 10^{-2}Volt

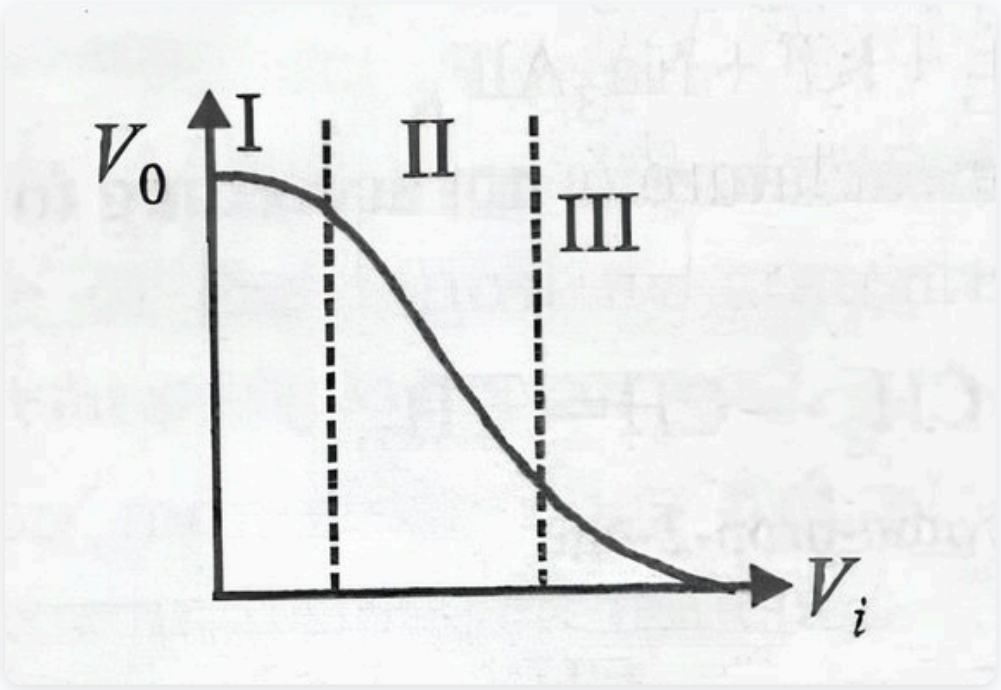
V_i = 10mV



Question 49.

Transfer characteristics [output voltage (V_0) vs input voltage (V_i)] for a base biased transistor in CE configuration is as shown in the figure. For using transistor as a switch, it is used :

[4 Marks]



(A) in region III

(B) both in region (I) and (III)

(C) in region II

(D) in region (I)

Explanation:

I → ON

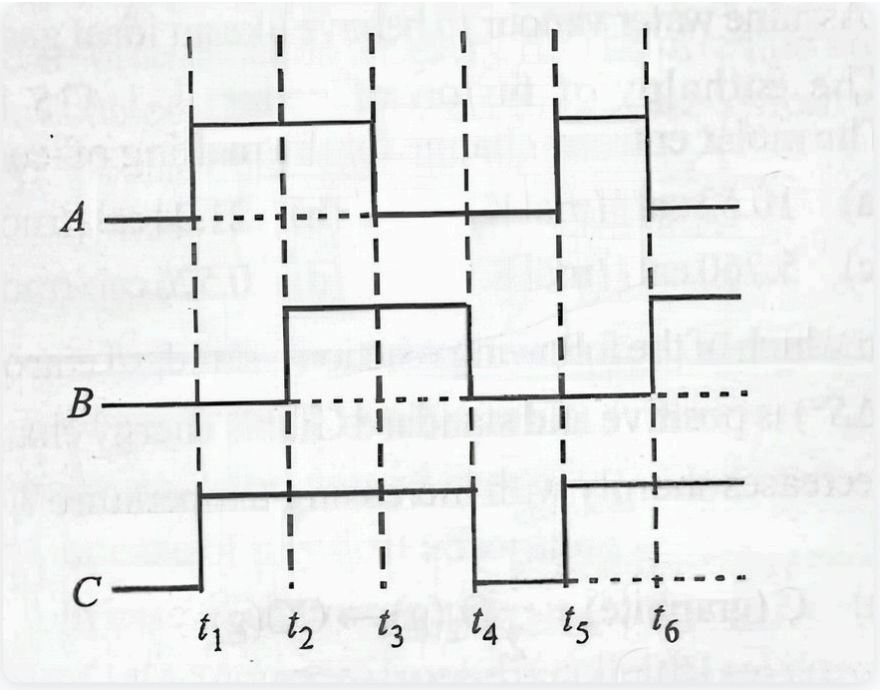
III → OFF

In IInd state it is used as a amplifier it is active region.

Question 50.

The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A ,B and C are as given. The logic circuit gate is :

[4 Marks]



(A) NOR gate

(B) OR gate

(C) AND gate

(D) NAND gate

Explanation:

OR gate

A	0	1	1	0
B	0	0	1	1
C	1	1	1	1

OR gate

Question 51.

The correct set of four quantum numbers for the valence electron of rubidium atom (Z=37) is

[4 Marks]

(A) 5,1,0, +1/2

(B) 5,0,0, +1/2

(C) 6,0,0, +1/2

(D) 5,1,1+1/2

Explanation:

Electronic configuration of Rb = **$[Kr]5s^1$**

Set of quantum numbers, **n = 5**
$\ell = 0$, ∴ s-orbital
m = 0, s = +1/2

Question 52.

Maximum number of electrons in a subshell with : /=3 and n = 4 is:

[4 Marks]

(A) 12

(B) 10

(C) 16

(D) 14

Explanation:

(n = 4, $\ell = 3$) ⇒ **4f** subshell

Since, maximum no. of electrons in a subshell
$= 2(2\ell + 1)$

So, total no. of electron in **4f** subshell
$= 2(2 \times 3 + 1) =$ **14 electrons**.

Question 53.

Identify the wrong statement in the following:

[4 Marks]

(A) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius.

(B) Atomic radius of the elements decreases as one moves across from left to right in the 2^{nd} period of the periodic table.

(C) Atomic radius of the elements increases as one moves down the first group of the periodic table.

(D) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius.

Explanation:

As the positive charge increases on metal cation, radius decreases. This is due to the fact that nuclear charge in the case of a cation is acting on lesser number of electrons and pulls them closer.

Question 54.

Which of the following species contains three bond pairs and one lone pair around the central atom ?

[4 Marks]

(A) H_2O

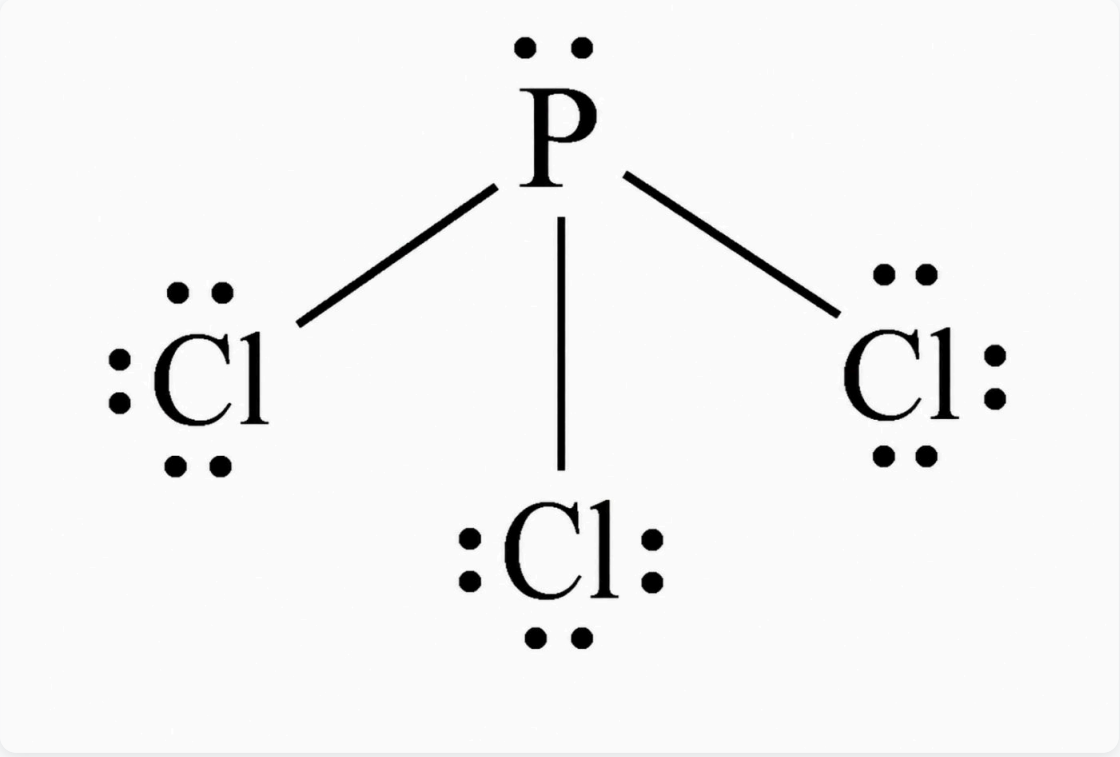
(B) BF_3

(C) NH_2^-

(D) PCl_3

Explanation:

PCl_3



Question 55.

Which one of the following pairs is isostructural (i.e., having the same shape and hybridization)?

[4 Marks]

(A) [BCl_3 and $BrCl_3^-$]

(B) [NH_3 and NO_3^-]

(C) [NF_3 and BF_3]

(D) [BF_4^- and NH_4^+]

Explanation:

BF_4^- hybridisation sp^3, tetrahedral structure.

NH_4^+ hybridisation sp^3, tetrahedral structure.

Question 56.

The pair of species with the same bond order is:

[4 Marks]

(A) N_2 , O_2

(B) NO,CO

(C) O_2^+, NO^+

(D) O_2^{2-}, B_2

Explanation:

Both O_2^{2-} and B_2 has bond order equal to 1.

B_2 (10) = [$\sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \pi 2p^1_y\ \pi 2p^1_z$]

Bond order = $N_b - N_a / 2$

= 6 - 4 / 2 = 2 / 2 = 1

B_2 is known to be in the gas phase.

O_2^{2-} = $\sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p^2_z\ \pi 2p_x^2\ \pi 2p^2_y\ \pi^* 2p_x^2\ \pi^* 2p^2_y$
Bond order = 1 / 2 (10 − 8) = 1

Question 57.

Bond order of 1.5 is shown by

[4 Marks]

(A) O_2^{2-}

(B) O_2

(C) O_2^-

(D) O_2^+

Explanation:

(O_2) = $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p^2_z\ \pi 2p_x^2$
= $\pi 2p^2_y\ \pi^*2p_x^1 = \pi^*2p^1_y$
Bond order = $N_b - N_a / 2 = 10 - 6 / 2 = 4 / 2 = 2$
$(O_2^+$ ion) = $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2$
$\sigma 2p^2_z\ \pi 2p_x^2 = \pi 2p^2_y\ \pi^*2p_x^1$
Bond order = $N_b - N_a / 2 = 10 - 5 / 2 = 5 / 2 = (2)1 / 2$
(O_2^-) = $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p^2_z$
$\pi 2p_x^2 = \pi 2p^2_y\ \pi^*2p_x^2\ \pi^*2p^1_y$
Bond order = $(N_b - N_a) / 2 = 10 - 7 / 2 = 3 / 2 = (1)1 / 2$
(O_2^{2-}) = $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p^2_z\ \pi 2p_x^2$

= $\pi 2p^2_y\ \pi^*2p_x^2 = \pi^*2p^2_y$

Bond order = $N_b - N_a / 2 = 10 - 8 / 2 = 2 / 2 = 1$

Question 58.

Standard enthalpy of vapourisation $\Delta_{vap}H°$ for water at 100°C is 40.66 kJ mol^{-1}. The internal energy of vapourisation of water at 100°C (in kJ mol^{-1}) is:

[4 Marks]

(A) −43.76

(B) +40.66

(C) +43.76

(D) +37.56

Explanation:

$\Delta_{vap}H°$ = 40.66 kJ mol^{-1}
T = 100 + 273 = 373 K, ΔE = ?
$\Delta H = \Delta E + \Delta n_gRT \Rightarrow \Delta E = \Delta H - \Delta n_gRT$
Δn_g = number of gaseous moles of products − number of gaseous moles of reactants
$H_2O(1) \rightleftharpoons H_2O(g)$
$\Delta n_g = 1 - 0 = 1$
$\Delta E = \Delta H - RT = \Delta E = (40.66 \times 10^3) - (8.314 \times 373)$
= 37559 J/mol or 37.56 kJ/mol

Question 59.

The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is:

[4 Marks]

(A) 5.260 cal / (mol K)

(B) 0.526 cal / (mol K)

(C) 21.04 cal / (mol K)

(D) 10.52 cal / (mol K)

Explanation:

$\Delta S = \Delta H / T = 1.435 \times 10^3 / 273$
$= 5.260$ cal/mol − K

Question 60.

In which of the following reactions, standard entropy change (ΔS°) is positive and standard Gibb's energy change (ΔG°) decreases sharply with increasing temperature?

[4 Marks]

(A) 1/2 C (graphite) + 1/2 $O_2(g) \rightarrow$ 1/2 $CO_2(g)$

(B) Mg(s) + 1/2 $O_2(g) \rightarrow$ MgO(s)

(C) CO(g) + 1/2 $O_2(g) \rightarrow$ $CO_2(g)$

(D) C (graphite) + 1/2 $O_2(g) \rightarrow$ CO(g)

Explanation:

Since, in the first reaction more ($\Delta n > 0$) gaseous products are forming from solid carbon hence, entropy will increase i.e. ΔS = +ve.
C(gr.) + 1/2 $O_2(g) \rightarrow$ CO(g); ΔS° = +ve
Since, $\Delta G° = \Delta H° - T\Delta S$ hence the value of ΔG decreases on increasing temperature.

Question 61.

pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product *(K_{sp})* of $Ba(OH)_2$ is :

[4 Marks]

(A) 5.0×10^{-6}

(B) 4.0×10^{-6}

(C) 3.3×10^{-7}

(D) 5.0×10^{-7}

Explanation:

Given pH = 12
or $[H^+] = 10^{-12}$

Since, $[H^+][OH^-] = 10^{-14}$

$\therefore \quad [OH^-] = 10^{-14} / 10^{-12} = 10^{-2}$

$Ba(OH)_2 \rightleftharpoons Ba^{2+} + 2OH^-$
$\quad\quad\quad\quad\quad\quad s \quad\quad 2s$

$[OH^-] = 10^{-2}$

$2s = 10^{-2}$

$s = 10^{-2} / 2 = 5 \times 10^{-3}$ m, $\quad K_{sp} = s \cdot (2s)^2$

$\Rightarrow \quad K_{sp} = 5 \times 10^{-7}$

Question 62.

Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value ?

[4 Marks]

(A) $BeCl_2$

(B) LiCl

(C) $AlCl_3$

(D) $BaCl_2$

Explanation:

($AlCl_3$, LiCl & $BeCl_2$) all these solutions are acidic due to cationic hydrolysis, whereas $BaCl_2$, is salt of strong base ($Ba(OH)_2$) and strong acid (HCl), hence it will have maximum pH.

Question 63.

Buffer solutions have constant acidity and alkalinity because

[4 Marks]

(A) they have large excess of H^+ or OH^- ions

(B) they have fixed value of pH

(C) these give unionised acid or base on reaction with added acid or alkali.

(D) acids and alkalies in these solutions are shielded from attack by other ions.

Explanation:

Constant acidity and alkalinity of buffer solution is due to the unionised acid or base.

Question 64.

A mixture of potassium chlorate, oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in the oxidation number ?

[4 Marks]

(A) S

(B) H

(C) C

(D) Cl

Explanation:

i.e. maximum change in oxidation number is observed in Cl (+5 to −1).

$$\overset{+5}{KClO_3} + H_2C_2O_4 + \overset{+6}{H_2SO_4} \rightarrow \overset{+6}{K_2SO_4} + \overset{-1}{KCl} + CO_2 + H_2O$$

Question 65.

When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from :

[4 Marks]

(A) zero to +1 and zero to −3

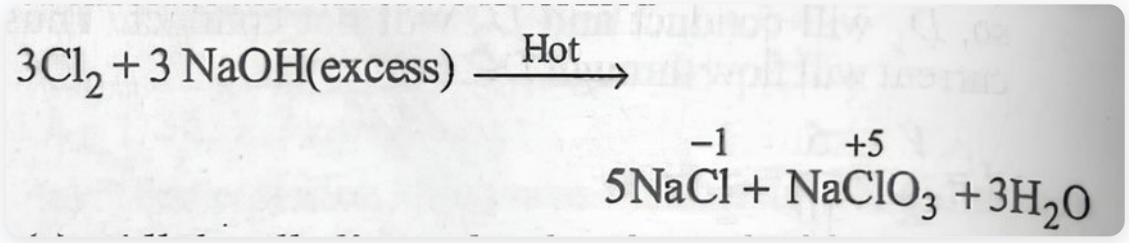
(B) zero to −1 and zero to +3

(C) zero to +1 and zero to −5

(D) zero to −1 and zero to +5

Explanation:

On reaction with hot and concentrated alkali a mixture of chloride and chlorate is formed



Question 66.

Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air ?

[4 Marks]

(A) Li

(B) Na

(C) K

(D) Rb

Explanation:

All the alkali metals when heated with oxygen form different types of oxides for example lithium forms lithium oxide (Li_2O), sodium forms sodium peroxide (Na_2O_2), while K, Rb and Cs form their respective superoxide.

Question 67.

The ease of adsorption of the hydrated alkali metal ions on an ion-exchange resins follows the order :

[4 Marks]

(A) $Li^+ < K^+ < Na^+ < Rb^+$

(B) $Rb^+ < K^+ < Na^+ < Li^+$

(C) $Na^+ < Li^+ < K^+ < Rb^+$

(D) $K^+ < Na^+ < Rb^+ < Li^+$

Explanation:

All alkali metal salts are ionic (except Lithium) and soluble in water due to the fact that cations gets hydrated by water molecules. The degree of hydration depends upon the size of the cation. Smaller the size of a cation, greater is its hydration energy.

Relative ionic radii:

$Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$

Relative ionic radii in water or relative degree of hydration:

$Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$

Question 68.

Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of :

[4 Marks]

(A) $Al_2O_3 + HF + NaAlF_4$

(B) $Al_2O_3 + CaF_2 + NaAlF_4$

(C) $Al_2O_3 + Na_3AlF_6 + CaF_2$

(D) $Al_2O_3 + KF + Na_3AlF_6$

Explanation:

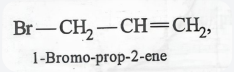
Fused alumina (Al_2O_3) is a bad conductor of electricity. Therefore, cryolite (Na_3AlF_6) and fluorspar (CaF_2) are added to purified alumina which not only make alumina a good conductor of electricity but also reduce the melting point of the mixture to around 1140 K.

Question 69.

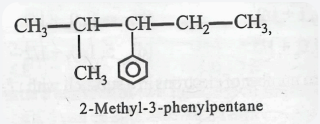
Which nomenclature is not according to IUPAC system?

[4 Marks]

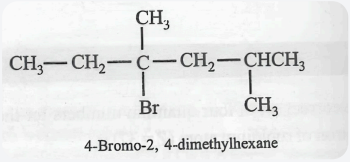
(A)



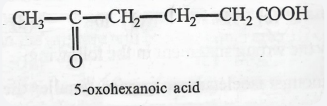
(B)



(C)

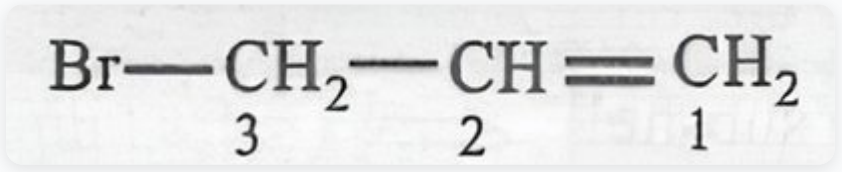


(D)



Explanation:

The correct name is **3-Bromoprop-1-ene.**



Question 70.

Among the following compounds the one that is most reactive towards electrophilic nitration is:

[4 Marks]

(A) Benzene

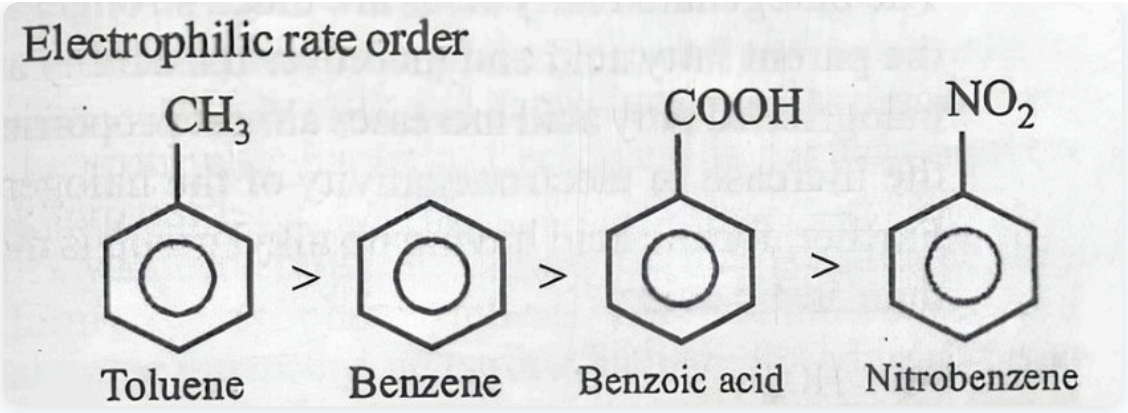
(B) Toluene

(C) Benzoic acid

(D) Nitrobenzene

Explanation:

Since nitration is an electrophilic substitution hence presence of electron releasing group like CH_3 in the nucleus facilitates nitration.



Question 71.

Which one of the following statements regarding photochemical smog is not correct?

[4 Marks]

(A) Carbon monoxide does not play any role in photochemical smog formation.

(B) Photochemical smog is an oxidising agent in character.

(C) Photochemical smog is formed through photochemical reaction involving solar energy.

(D) Photochemical smog does not cause irritation in eyes and throat.

Explanation:

The oxidised hydrocarbons and ozone in presence of humidity cause photochemical smog.

Hydrocarbons + O_2, NO_2, NO, O, O_3 → Peroxides, formaldehyde, peroxyacetyl nitrate (PAN), acrolein etc.

It is oxidising in nature and causes irritation to eyes, lungs, nose, asthamatic attack and damage plants.

Question 72.

The number of octahedral void(s) per atom present in a cubic close-packed structure is :

[4 Marks]

(A) 1

(B) 3

(C) 2

(D) 4

Explanation:

Number of octahedral voids in **ccp** is equal to effective number of atoms.

In **ccp**, effective number of atoms are 4 so, 4 octahedral voids.

So, 1 octahedral voids per atom

Question 73.

A metal crystallizes with a face-centered cubic lattice. The edge length of the unit cell is 408 pm. The diameter of the metal atom is :

[4 Marks]

(A) 288 pm

(B) 408 pm

(C) 144 pm

(D) 204 pm

Explanation:

For **fcc** structure,

$\sqrt{2}a = 4r$

$\sqrt{2} \times 408 / 2 = 2r$

(2r = Diameter)

Diameter = 288.5 ≈ 288 pm

Question 74.

P_A and **P_B** are the vapour pressure of pure liquid components, **A** and **B**, respectively of an ideal binary solution. If **X_A** represents the mole fraction of component **A**, the total pressure of the solution will be

[4 Marks]

(A) $P_b + X_a(P_a - P_b)$

(B) $P_b + X_a(P_b - P_a)$

(C) $P_a + X_a(P_a - P_b)$

(D) $P_a + X_a(P_b - P_a)$

Explanation:

P = P_A X_A + P_B X_B= P_A X_A + P_B(1 − X_A)

(for binary sol. X_A + X_B = 1)

⇒ P_A X_A + P_B − P_B X_A

⇒ P_B + X_A(P_A − P_B)

Question 75.

Limiting molar conductivity of NH_4OH

(i.e., $\Lambda^\circ_m(NH_4OH)$) is equal to :

[4 Marks]

(A) $\Lambda^\circ_m_(NH_4OH) + \Lambda^\circ_m_(NH_4Cl) - \Lambda^\circ_m_(HCl)$

(B) $\Lambda^\circ_m_(NH_4Cl) + \Lambda^\circ_m_(NaOH) - \Lambda^\circ_m_(NaCl)$

(C) $\Lambda^\circ_m_(NH_4Cl) + \Lambda^\circ_m_(NaCl) - \Lambda^\circ_m_(NaOH)$

(D) $\Lambda^\circ_m_(NaOH) + \Lambda^\circ_m_(NaCl) - \Lambda^\circ_m_(NH_4Cl)$

Explanation:

$\Lambda^\circ_m_(NH_4Cl) = \Lambda^\circ_m_NH_4^+ + \Lambda^\circ_m_Cl^-$

$\Lambda^\circ_m_(NaOH) = \Lambda^\circ_m_Na^+ + \Lambda^\circ_m_OH^-$

$\Lambda^\circ_m_(NaCl) = \Lambda^\circ_m_Na^+ + \Lambda^\circ_m_Cl^-$

$\therefore \Lambda^\circ_m_(NH_4^+) + \Lambda^\circ_m_(OH^-)$

$= \Lambda^\circ_m_(NH_4^+) + \Lambda^\circ_m_(Cl^-) + \Lambda^\circ_m_(Na^+) + \Lambda^\circ_m_(OH^-) - [\Lambda^\circ_m_(Na^+) + \Lambda^\circ_m_(Cl^-)]$

$\Lambda^\circ_m_(NH_4OH) = \Lambda^\circ_m_(NH_4Cl) + \Lambda^\circ_m_(NaOH) - \Lambda^\circ_m_(NaCl)$

Question 76.

In a reaction, A + B → Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as :

[4 Marks]

(A) Rate = $k[A]^2[B]^2$

(B) Rate = $k[A]^2[B]$

(C) Rate = $k[A][B]^2$

(D) Rate = k[A][B]

Explanation:

According to statement given in the question, it is clear that

$r \propto [A]^2$ and $r \propto [B]$

That means, order of reaction with respect to B is 1 and w.r.t A is 2.

Hence, Rate = $k[A]^2[B]^1$

Question 77.

In a zero-order reaction for every 10° rise in temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become:

[4 Marks]

(A) 256 times

(B) 512 times

(C) 128 times

(D) 64 times

Explanation:

$r_{100^\circ C} / r_{10^\circ C} = 2^{(100-10/10)} = 2^9 = 512$ times

Question 78.

In Freundlich Adsorption isotherm, the value of 1/n is

[4 Marks]

(A) 1in caseof chemisorption

(B) 1in case of physical adsorption

(C) between 2 and 4 in all cases

(D) between 0 and 1 in all cases

Explanation:

According to Freundlich Adsorption isotherm

$x / m = KP^{1/n}$

at low pressure $1 / n = 1$

$\therefore x / m \propto P^1$

at high pressure $1 / n = 0$

x/m = constant

i.e. the value of **n** varies between **0 to 1**.

Question 79.

The protecting power of lyophilic colloidal sol is expressed in terms of

[4 Marks]

(A) Coagulation value

(B) Gold number

(C) Critical miscelle concentration

(D) Oxidation number

Explanation:

The lyophobic sols are less stable than lyophilic sols. The lyophilic sols are thus used to protect the lyophobic sols. This property of lyophilic sols is known as **protective action** of lyophilic sols.

Which can be represented by **gold number**.

Question 80.

Which one of the following is a mineral of iron?

[4 Marks]

(A) Cassiterite

(B) Magnetite

(C) Pyrolusite

(D) Malachite

Explanation:

- [Fe_3O_4 ⇒ Magnetite]

- [$CuCO_3$ $Cu(OH)_2$ – Malachite]
- [Pyrolusite – MnO_2] [Cassiterite – SnO_2]

Question 81.

Identify the alloy containing a non-metal as a constituent in it.

[4 Marks]

(A) Bronze

(B) Bell metal

(C) Invar

(D) Steel

Explanation:

Invar is a nickel iron alloy, Bell metal is an alloy of about **80% copper and 20% tin**, Bronze is also an alloy of copper and tin.

Steel: It always have few % of carbon.

Question 82.

In the extraction of copper from its sulphide ore, the metal finally obtained by the reduction of cuprous oxide with :

[4 Marks]

(A) iron (II) sulphide

(B) carbon monoxide

(C) copper (I) sulphide

(D) sulphur dioxide

Explanation:

$2Cu_2S(s) + 3O_2(g) \rightarrow 2Cu_2O(s) + 2SO_2(g)$

The unchanged **Cu_2S**, mixed with **Cu_2O** and heated strongly in absence of air

$Cu_2S + 2Cu_2O \rightarrow 6Cu + SO_2$

Question 83.

In which of the following compounds, nitrogen exhibits highest oxidation state ?

[4 Marks]

(A) NH_2OH

(B) N_3H

(C) N_2H_4

(D) NH_3

Explanation:

Compound Oxidation number of nitrogen

N_2H_4 = **−2**

NH_3 = **−3**

N_3H = **−1/3**

NH_2OH = **−1**

Question 84.

Which of the following statements is not valid for oxoacids of phosphorus?

[4 Marks]

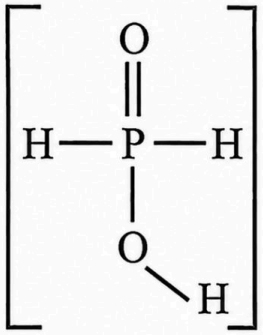
(A) Orthophosphoric acid is used in the manufacture of triple superphosphate.

(B) All oxoacids contain tetrahedral four coordinated phosphorus

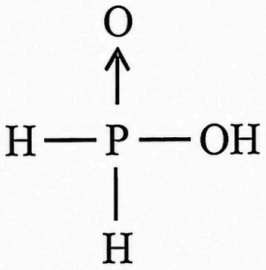
(C) Hypophosphorous acid is a diprotic acid

(D) All oxoacids contain atleast one P= 0 and one P — OH group.

Explanation:



Hypophosphorous acid (H_3PO_2) is a monobasic acid. *i.e.*, it has only one ionisable hydrogen atom or one OH is present



Question 85.

Sulphur trioxide can be obtained by which of the following reaction :

[4 Marks]

(A)

$Fe_2(SO_4)_3 \xrightarrow{\Delta}$

(B)

$S + H_2SO_4 \xrightarrow{\Delta}$

(C)

$CaSO_4 + C \xrightarrow{\Delta}$

(D)

$H_2SO_4 + PCl_5 \xrightarrow{\Delta}$

Explanation:

$$Fe_2(SO_4)_3 \xrightarrow{\Delta} Fe_2O_3 + SO_3$$

Question 86.

Which of the statements is not true?

[4 Marks]

(A) $Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ in volumetric analysis.

(B) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed.

(C) $K_2Cr_2O_7$ solution in acidic medium is orange.

(D) $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7.

Explanation:

$Na_2Cr_2O_7$ is hygroscopic in nature and therefore accurate weighing is not possible in normal atmospheric conditions. A hygroscopic substance absorbs moisture from atmosphere and this could lead to inaccuracies in weight.

Question 87.

Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour?

[4 Marks]

(A) $[Co(NH_3)_6]^{3+}$

(B) $[Ni(NH_3)_6]^{2+}$

(C) $[Cr(NH_3)_6]^{3+}$

(D) $[Zn(NH_3)_6]^{2+}$

Explanation:

$[Ni(NH_3)_6]^{2+}$

Ni^{2+} = **$3d^8$**, according to CFT = **$t^6{}_2 g\ e^2 g$**, therefore,Hybridisation is **sp^3d^2** & complex is paramagnetic and outer orbital.

Question 88.

Which of the following acids does not exhibit optical isomerism?

[4 Marks]

(A) Maleic acid

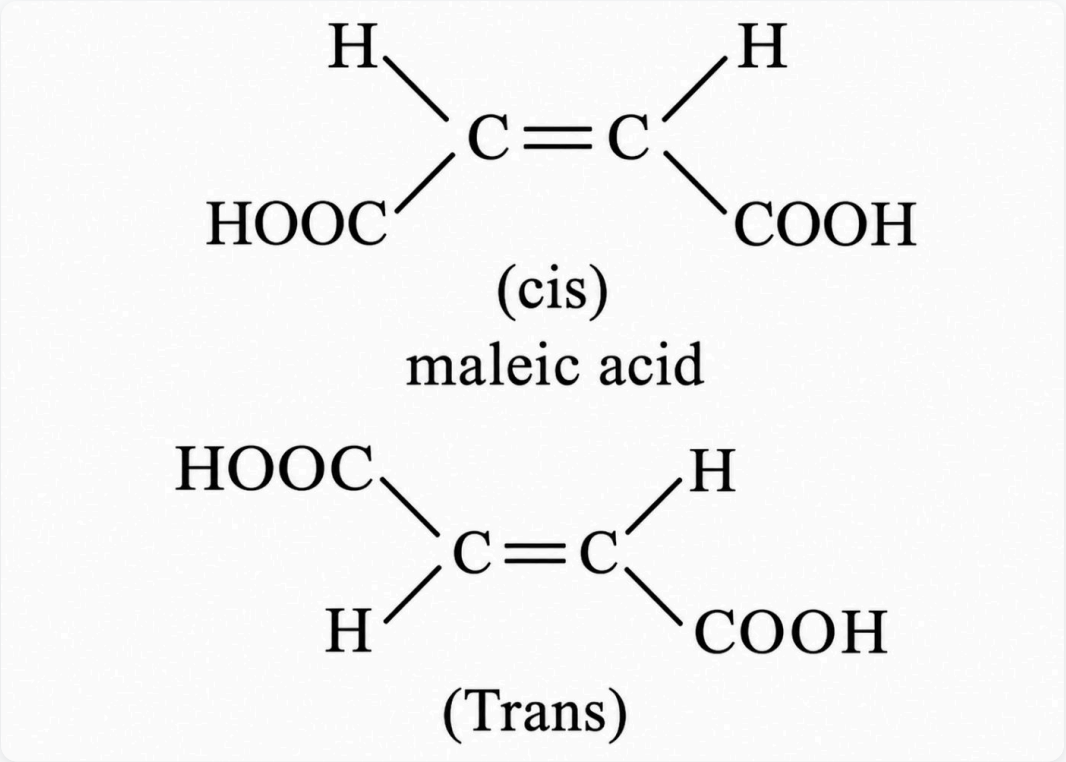
(B) Tartaric acid

(C) α-amino acids

(D) Lactic acid

Explanation:

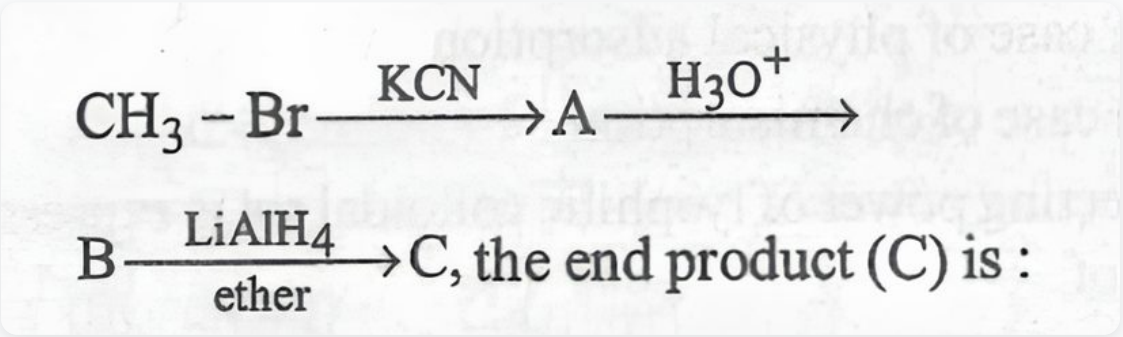
It shows geometrical isomerism but does not show optical isomerism.



Question 89.

In the following sequence of reactions

[4 Marks]



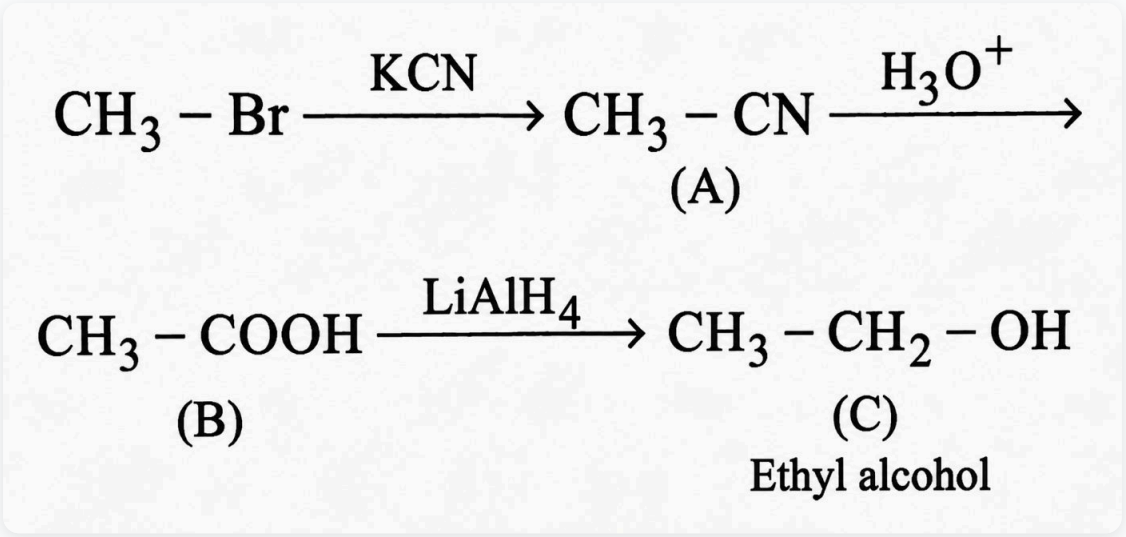
(A) Ethyl alcohol

(B) Methane

(C) Acetaldehyde

(D) Acetone

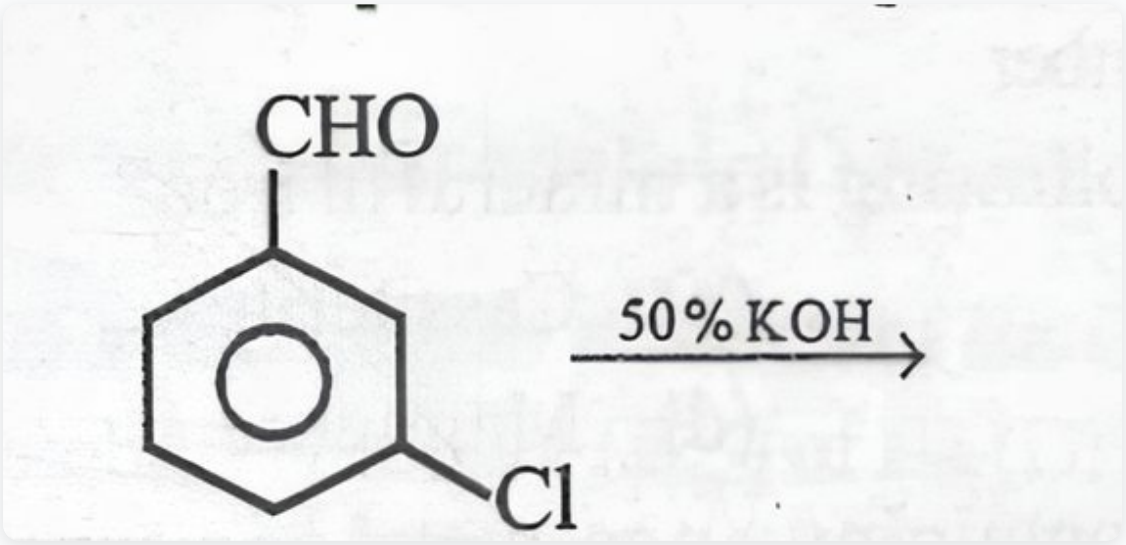
Explanation:



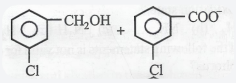
Question 90.

Predict the product in the given reaction.

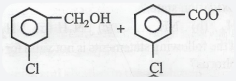
[4 Marks]



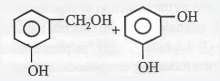
(A)



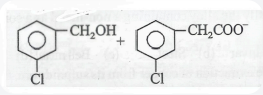
(B)



(C)

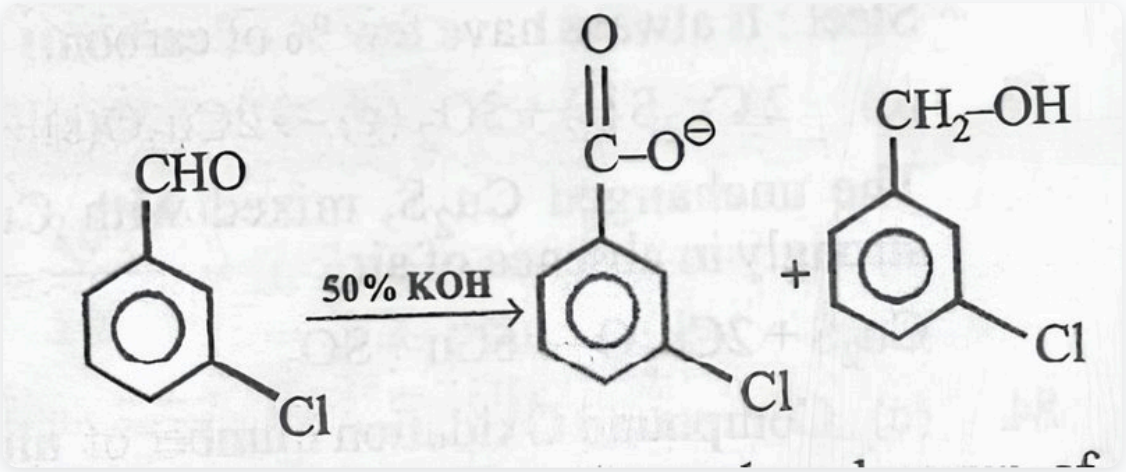


(D)



Explanation:

Cannizzaro reaction - when an aldehyde containing no α - H undergo reaction in presence of 50% KOH. It disproportionates to form a molecule of carboxylic acid and a molecule of alcohol.

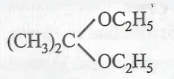


Question 91.

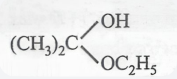
Acetone is treated with excess of ethanol in the presence of hydrochloric.acid. The product obtained is :

[4 Marks]

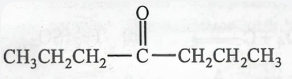
(A)



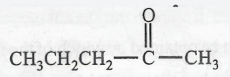
(B)



(C)

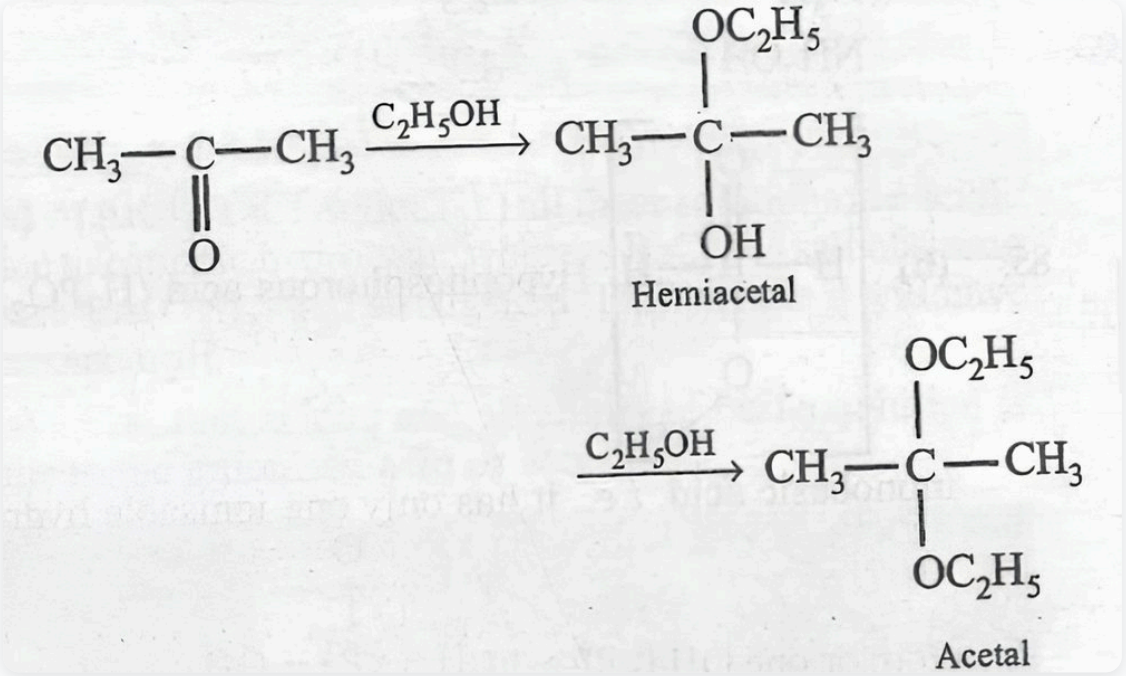


(D)



Explanation:

Anhydrous alcohols add to the carbonyl group of aldehydes in the presence of anhydrous hydrogen chloride to form acetals via hemiacetals.



Question 92.

CH_3CHO and $C_6H_5CH_2CHO$ can be distinguished chemically by :

[4 Marks]

(A) Fehling solution test

(B) Tollen's reagent test

(C) Iodoform test

(D) Benedict test

Explanation:

CH_3CHO gives Todoform test but $C_6H_5CH_2CHO$ does not give Iodoform test due to absence of methyl group.

Question 93.

The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is :

[4 Marks]

(A) A > C > B > D

(B) A > B > C > D

(C) B > D > C > A

(D) B > A > D > C

Explanation:

$CF_3COOH > CCl_3COOH > HCOOH > CH_3COOH$

(K_a order)

The halogenated fatty acids are much stronger acids than the parent fatty acid and moreover the acidity among the halogenated fatty acid increases almost proportionately with the increase in electronegativity of the halogen present.

Further, formic acid having no alkyl group is more acidic than acetic acid.

Question 94.

Which one of the following sets of monosaccharides forms sucrose?

[4 Marks]

(A) α-D-Glucopyranose and β-D-Fructofuranose

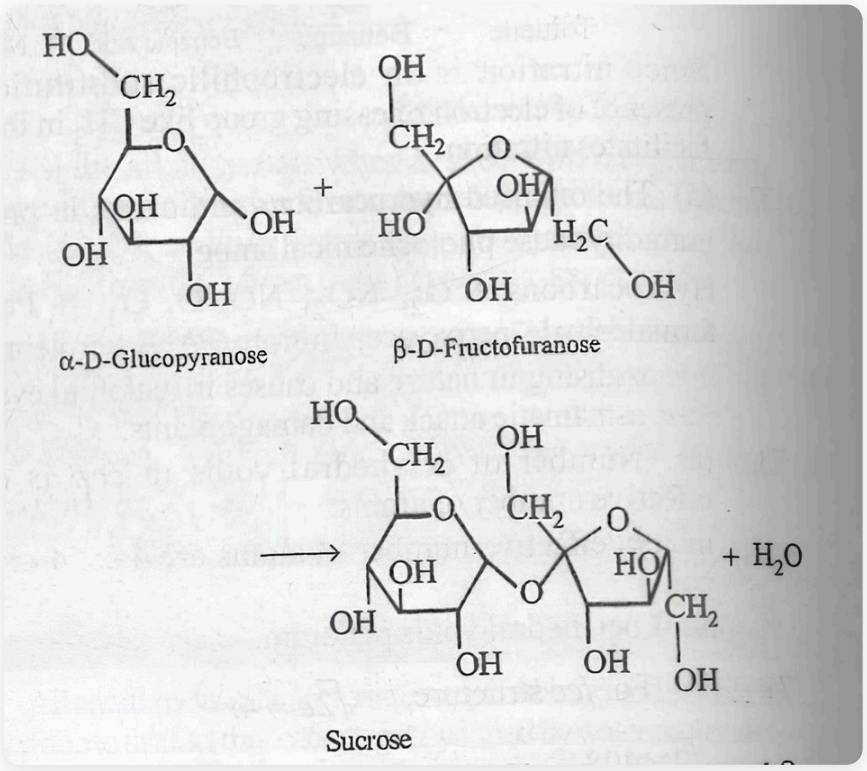
(B) α-D-Galactopyranose and α-D-Glucopyranose

(C) α-D-Glucopyranose and β-D-Fructopyranose

(D) β-D-Glucopyranose and α-D-Fructofuranose

Explanation:

Sucrose is a disaccharide of α-D Glucopyranose and β- D-Fructofuranose.



Question 95.

Which one of the following statements is incorrect about enzyme catalysis?

[4 Marks]

(A) Enzymes are mostly proteinous in nature.

(B) Enzyme action is specific.

(C) Enzymes are denatured by ultraviolet rays and at high temperature.

(D) Enzymes are least reactive at optimum temperature.

Explanation:

Enzymes are most reactive at optimum temperature.
The optimum temperature for enzymc activity is the human body temp.

Question 96.

Deficiency of vitamin B_1 causes the disease.

[4 Marks]

(A) Sterility

(B) Bari-Beri

(C) Convulsions

(D) Cheilosis

Explanation:

Bari-Beri.

Question 97.

Which one of the following is not a condensation polymer?

[4 Marks]

(A) Melamine

(B) Glyptal

(C) Dacron

(D) Neoprene

Explanation:

Neoprene is an addition polymer of isoprene.

Question 98.

Which of the following statements is false?

[4 Marks]

(A) The repeat unit in natural rubber is isoprene.

(B) Both starch and cellulose are polymers of glucose.

(C) Nylon-6,6 is an example of elastomer.

(D) Artificial silk is derived from cellulose.

Explanation:

Nylon-6,6 is an example of first synthetic fibres produced from simple molecules. It is prepared by condensation polymerisation of adipic acid and hexamethylene diamine.

Question 99.

50 mL of each gas A and gas B takes 150 and 200s respectively using through a pin hole under similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be

[4 Marks]

(A) 128

(B) 32

(C) 96

(D) none

Explanation:

$r_B / r_A = \sqrt{(M_A / M_B)} = V_B T_A / T_B.V_A$

$\Rightarrow \sqrt{(M_A / 36)} = V_A / 200 \times 150 / V_A$

or $\sqrt{(M_A / 36)} = 15 / 20 = 3 / 4$

$\sqrt{} M_A / 36 = 9 / 16$

$M_A = (9 \times 36) / 16 = (9 \times 9) / 4 = 81 / 4 = 20.2$

Therefore, none of the option is correct.

Question 100.

The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the ones as:

[4 Marks]

(A) Archaebacteria

(B) Cyanobacteria

(C) Chemosynthetic autotrophs

(D) Heterotrophic bacteria

Explanation:

The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the heterotrophic bacteria. Lactobacillis bacteria convert milk into curd.

Question 101.

The cyanobacteria are also referred to as

[4 Marks]

(A) protists

(B) golden algae

(C) slime moulds

(D) blue green algae

Explanation:

Cyanobacteria are also referred as blue green algae, they perform oxygenic photosynthesis. They are most successful autotrophic organisms on earth which are found in all types of environment - fresh water, sea water, salt marshes, moist rocks, tree trunks, moist soils, hot springs, frozen waters.

Question 102.

Which statement is wrong for viruses?

[4 Marks]

(A) They have ability to synthesize nucleic acids and proteins

(B) All are parasites

(C) Auntibiotics have no effect on them

(D) All of them have helical symmetry

Explanation:

All the viruses are obligate parasite i.e. they remain inert outside the host cell. They have ability to syntheize nucleic acids and proteins by using host cellular machinery (ribosomes, tRNAs, aminoacids, energy). Three shapes are found in viruses helical (elongate body e.g. T.M.V), cuboidal (short broad body with rhombic rounded, polyhedral shape e.g. Poliomyelitis virus) and binal (with both cuboidal and

helical parts e.g. many bacteriophages like T2). Antibiotics have no effect on them, antiviral drugs can only kill them.

Question 103.

Which one single organism or the pair of organisms is correctly assigned to its taxonomic group?

[4 Marks]

(A) Paramoecium and Plasmodium belong to the same kingdom as that of Penicillium

(B) Lichen is a composite organism formed from the symbiotic association of an algae and a protozoan

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

(D) Nostoc and Anabaena are examples of protista

Explanation:

Lichens cannot grow in places where sulphur dioxide is present in the environment.

Question 104.

Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses

[4 Marks]

(A) Multiplication by fragmentation

(B) Members of kingdom plantae

(C) Mode of Nutrition

(D) Diplontic life cycle

Explanation:

Vegetative reproduction in mosses is by fragmentation and budding in the secondary proteonema. In sexual reproduction, the sex organs antheridia and archegonia are

produced at the apex of the leafy shoots. So, Multiplication by fragmentation takes place in the multicellular fungi, fila-mentous algae and protonema of mosses.

Question 105.

Cycas and Adiantum resemble each other in having:

[4 Marks]

(A) Seeds

(B) Motile Sperms

(C) Cambium

(D) Vessels

Explanation:

Cycas (a gymnosperm) and Adiantum a pteridophyte, known as Maiden hair fern resemble each other in having motile sperm. Seeds, cambium are common in gymno-sperms and absent in pteridophytes.

Question 106.

Which one of the following is a correct statement?

[4 Marks]

(A) Pteridophyte gametophyte has a protonemal and leafy stage

(B) In gymnosperms female gametophyte is free-living

(C) Antheridiophores and archegoniophores are present in pteridophytes.

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

Explanation:

1. Gametophyte of bryophytes bears protonemal & leafy stage.
2. In gymnosperm female gametophyte is not free living.

3. Antheridiophores and archegoniophores are present in Marchantia which is a bryophyte.

4. Origin of seed habit started in pteridophyte Selaginaella.

Question 107.

In which one of the following the genus name, its two charcters and its phylum are not correctly matched, whereas the remaining three are correct

[4 Marks]

(A)

Genus name	Two characters	Phylum
Asterias	(b) Spiny Skinned Water vascular system	Echinoermata

(B)

Genus name	Two characters	Phylum
Pila	(a) Body Segmented Mouth with radula	Mollusca

(C)

Genus name	Two characters	Phylum
Periplaneta	(d) Jointed appendages Chitinous exoskeleton	Arthropoda

(D)

Genus name	Two characters	Phylum
Sycon	(c) Pore bearing Canal system	Porifera

Explanation:

Molluscans are soft bodied animals. Their body is unsegmented with a distinct head, muscular foot and visceral hump. In Pila, the buccal cavity contains a resping organ, the radula with transverse rows of teeth.

Question 108.

Phyllode is present in :

[4 Marks]

(A) Asparagus

(B) Euphorbia

(C) Australian Acacia

(D) Opuntia

Explanation:

Phyllode is present in Australian Acacia. It is modification of leaf in which lamina is absent and petiole becomes flattened and perform the function of food synthesis.

Question 109.

Placentation in tomato and lemon is

[4 Marks]

(A) Free central

(B) Parieta I

(C) Marginal

(D) Axile

Explanation:

Parietal Ex. - Mustard

Free central Ex. - Primula & Dianthus

Marginal Ex. - Pea

Axile Ex. - Tomato, lemon, Chinarose

Question 110.

Cymose inflorescence is present in :

[4 Marks]

(A) Solanum

(B) Sesbania

(C) Brassica

(D) Trifolium

Explanation:

Cymose infloresence is present in Solanum. Cymose inflorescence is the name of determinate or definite inflorescence in which the tip of the main axis terminates in a flower and further growth continues by one or more lateral

branches which also behaves like the main axis.

Question 111.

The gynoecium consists of many free pistils in flowers of

[4 Marks]

(A) Tomato

(B) Aloe

(C) Michelia

(D) Papaver

Explanation:

The female reproductive part of a flower is gynoecium, It is syncarpous or fused in tomato.

Question 112.

How many plants in the list given below have composite fruits that develop from an inflorescence: Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry

[4 Marks]

(A) Four

(B) Two

(C) Three

(D) Five

Explanation:

Fig-develops from hypanthodium inflorescence; pineapple-develops from spike inflorescence; Mulberry-develops from catkin inflorescence.

Question 113.

The coconut water and the edible part of coconut are equivalent to :

[4 Marks]

(A) Endosperm

(B) Endocarp

(C) Embryo

(D) Mesocarp

Explanation:

Liquid endosperm is the edible part of coconut.

Question 114.

Vexillary aestivation is characteristic of the family

[4 Marks]

(A) Fabaceae

(B) Asteraceae

(C) Solanaceae

(D) Brassicaceae

Explanation:

This type of aestivation is seen in fabaceae. Here, the posterior largest petal overlaps the petals that are lateral, which in turn overlap the two anterior petals.

Question 115.

Companion cells are closely associated with:

[4 Marks]

(A) Vessel elements

(B) Sieve elements

(C) Trichomes

(D) Guard cells

Explanation:

Companion cells are narrow, elongated and thin walled living cells. They lie on the sides of the sieve tubes and are closely associated with them through compound plasmodesmata.

Question 116.

Closed vascular bundles lack

[4 Marks]

(A) Pith

(B) Cambium

(C) conjunctive tissue

(D) Ground tissue

Explanation:

In closed vascular bundle cambium is absent between xylem and phloem.

Question 117.

Water containing cavities in vascular bundles are found in:

[4 Marks]

(A) Sunflower

(B) Maize

(C) Cycas

(D) Pinus

Explanation:

Stem of maize has water containing cavities in vascular bundles.

Question 118.

The common bottle cork is a product of:

[4 Marks]

(A) Phellogen

(B) Dermatogen

(C) Xylem

(D) Vascular Cambium

Explanation:

The common bottle cork is the product of phellogen. Phellogen produces cork or phellem on the outer side. It consists of dead and compactly arranged rectangular cells that possess suberised cell walls.

Question 119.

Gymnosperms are also called soft wood spermatophytes because they lack :

[4 Marks]

(A) Thick-walled tracheids

(B) Xylem fibres

(C) Cambium

(D) Phloem fibres

Explanation:

Xylem fibres provide rigidity to the plant.

Question 120.

Compared to those of humans, the erythrocytes in frog are

[4 Marks]

(A) nucleated and without haemoglobin.

(B) nucleated and with haemoglobin

(C) very much smaller and fewer

(D) Without nucleus but with haemoglobin

Explanation:

The erythrocytes or RBCs in frog are large, oval and biconvex nucleated cells with respiratory red pigment haemoglobin in its cytoplasm.

Question 121.

Select the correct statement from the ones given below with respect to Periplaneta americana.

[4 Marks]

(A) Grinding of food is carried out only by the mouth parts.

(B) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut.

(C) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives.

(D) Males bear a pair of short thread like anal styles.

Explanation:

The anal styles in males cockroaches help in copulation.

Question 122.

Which one of the following does not differ in E.coli and Chlamydomonas?

[4 Marks]

(A) Chromosomal Organization

(B) Ribosomes

(C) Cellmembrane

(D) Cell wall

Explanation:

Cell membrane of E coli. a bacteria and Chlamydomonas a unicellular green alga does not differ. As in both cell membrane is composed of lipids and proteins.

Question 123.

Nuclear mebrane is absent in

[4 Marks]

(A) Agaricus

(B) Penicillium

(C) Volvox

(D) Nostoc

Explanation:

Nostoc is a prokaryote while rest are eukaryotes. Nuclear membrane is absent in prokaryotes.

Question 124.

Ribosomal RNA is actively synthesized in

[4 Marks]

(A) Nucleolus

(B) Lysosomes

(C) Nucleoplasm

(D) Ribosomes

Explanation:

Ribosomal RNA is actively synthesized in nucleolus. Nucleolus is also known as ribosomal factory.

Question 125.

What is true about ribosomes?

[4 Marks]

(A) These-are composed of ribonucleic acid and proteins

(B) The prokaryotic ribosomes are 80S, where “S” stands for sedimentation coefficient

(C) These are found only in eukaryotic cells

(D) These are self-splicing introns of some RNAs.

Explanation:

Ribosomes are amembraneous (i.e. without membrane) cell organelle composed of rRNA and protein. These are found in both prokaryotic and eukaryotic cells.

In prokaryotes, ribosomes are 70S type while in eukaryotes, it is 80S type.

Question 126.

Select the correct statement from the following regarding cell membrane.

[4 Marks]

(A) Na^+ and K^+ ions move across cell membrane by passive transport

(B) Lipids are arranged in a bilayer with polar heads towards the inner part.

(C) Proteins make up 60 to 70% of the cell membrane.

(D) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

Explanation:

Fluid mosaic membrane model was proposed by Singer and Nicholson in 1972. It is most accepted model of structure of biomembrane.

Question 127.

Which one is the most abundant protein in the animal world

[4 Marks]

(A) Haemoglobin

(B) Trypsin

(C) Collagen

(D) Insulin

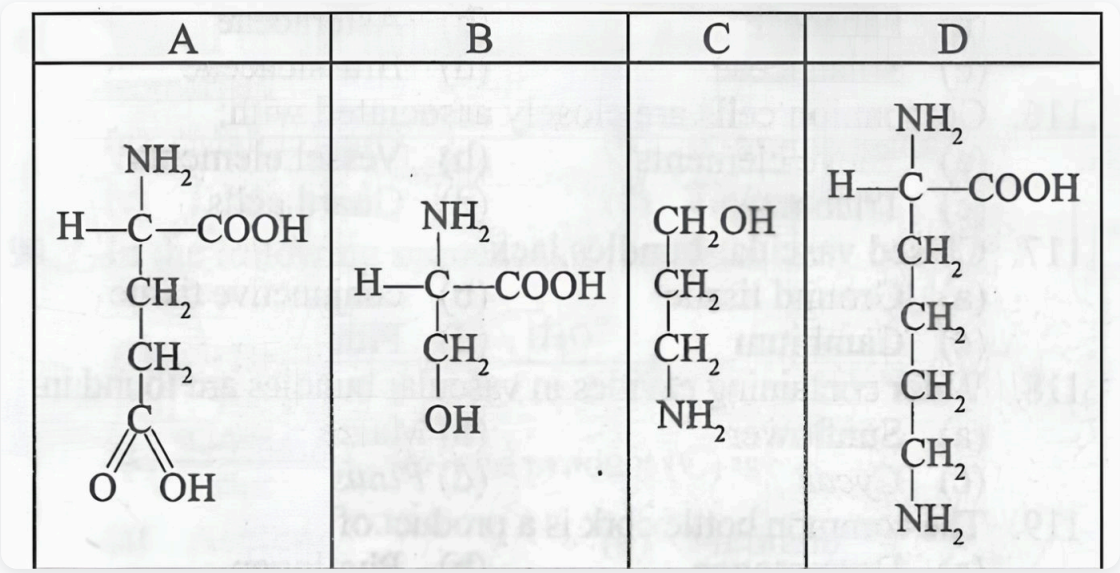
Explanation:

Collagen is the most abundant protein in the animal world. Rubisco (ribulose biphosphte carboxylase - oxy-genase) is not only the most abundant protein in plants but also in the whole biosphere.

Question 128.

Which one out of A-D given below correctly respresents the structural formula of the basic amino acid

[4 Marks]



(A) C

(B) D

(C) A

(D) B

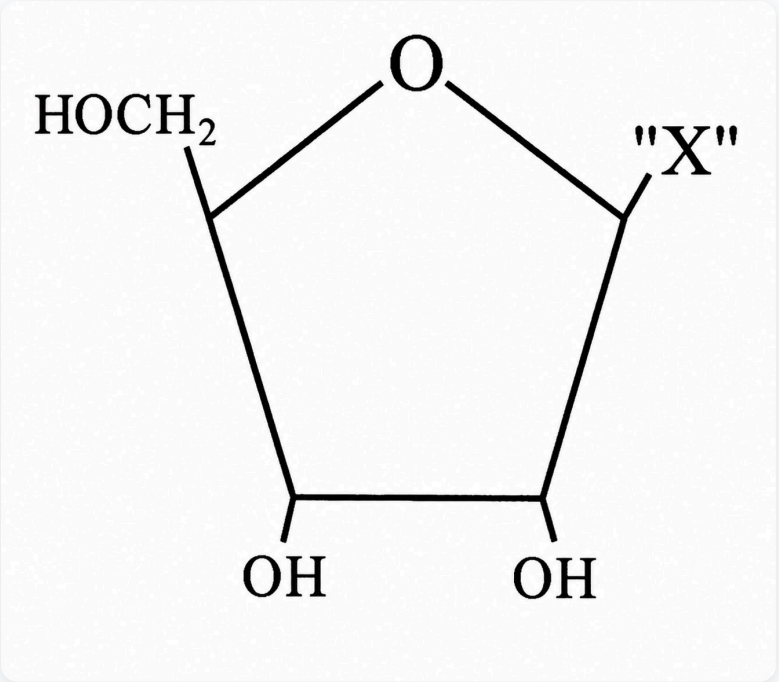
Explanation:

It is structural formula of basic amino acld lysine.

Question 129.

Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component "X" in it.

[4 Marks]



(A)

Category	Component
Amino acid	NH_2

(B)

Category	Component
Cholesterol	Guanine

(C)

Category	Component
Nucleoside	Uracil

(D)

Category	Component
Nucleotide	Adenine

Explanation:

A combination of a nitrogen base with a pentose sugar is known as nucleoside. The nitrogen base combines with the sugar molecule at its 1' carbon atom in a glycosidic bond (C — N — C) by one of

its nitrogen atoms (usually 1 in pyrimidines and 9 in purines). Depending upon the type of pentose sugar, nucleosides are differentiated into ribonucleosides and deoxyribonucleosides.

Question 130.

During gamete formation, the enzyme recombinase participates during

[4 Marks]

(A) Anaphase - II

(B) Metaphase - I

(C) Prophase - II

(D) Prophase - I

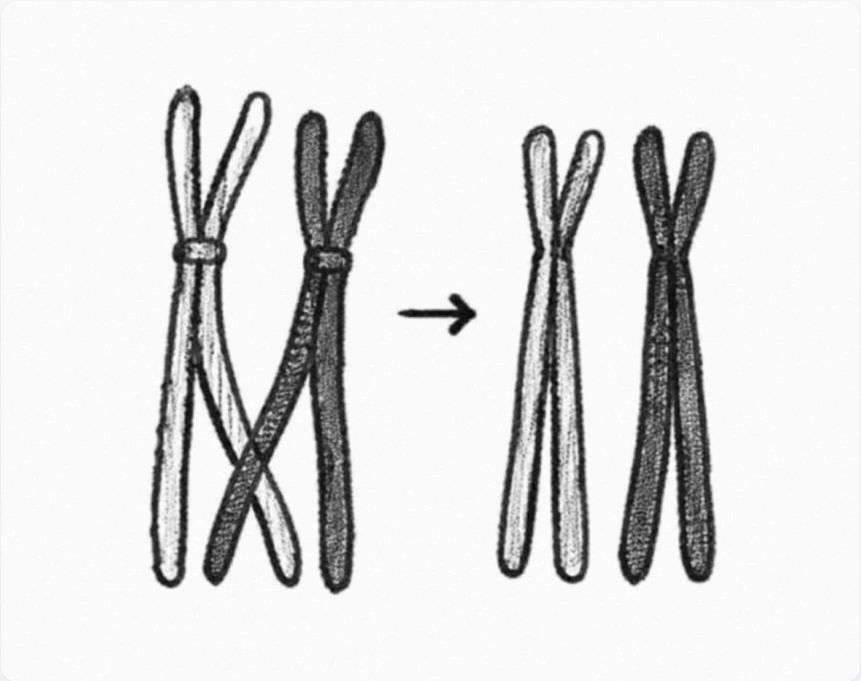
Explanation:

Recombinase enzyme catalyzes the exchange of short pieces of DNA between two long DNA strands, particularly the exchange of homologous regions between the paired maternal and paternal chromosome in prophase - I of meiosis I.

Question 131.

Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage?

[4 Marks]



(A) Prophase II during meiosis

(B) Prophase I during meiosis

(C) Prophase of Mitosis

(D) Both prophase and metaphase of mitosis

Explanation:

The given diagram represents crossing over that takes place in pachytene stage of prophase - I during meiosis.

Question 132.

Best defined function of Manganese in green plants is :

[4 Marks]

(A) Photolysis of water

(B) Calvin cycle

(C) Nitrogen fixation

(D) Water absorption

Explanation:

The best defined function of manganese is in the splitting of water to liberate oxygen during photosynthesis. It is absorbed in the form of manganese ions (Mn^{2+}). It activates many enzymes involved in photosynthesis, respiration and nitrogen metabolism.

Question 133.

Which one of the following is correctly matched ?

[4 Marks]

(A) Passive transport of nutrients - ATP

(B) Apoplast - Plasmodesmata

(C) Bakane of rice seedlings - F, Skoog

(D) Potassium - Readily immobilisation

Explanation:

Potassium immobilisation is the conversion of water soluble potassium into water insoluble form. Readily available potassium constitutes about 1% of total potassium available in soil, whereas slightly

soluble potassium accounts for about 98%.

Question 134.

Which one of the following is wrong statement?

[4 Marks]

(A) Anabaena and Nostoc are capable of fixing nitrogen in free living state also

(B) Root nodule forming nitrogen fixers live as aerobes under free-living conditions.

(C) Phosphorus is a constituent of cell membranes, certain nucleic acids and cell proteins.

(D) Nitrosomonas and Nitrobacter are chemoautotrophs.

Explanation:

Phosphorus is a constituent of nucleic acids of both DNA and RNA but absent in cell membranes and cell proteins.

Question 135.

A process that makes important difference between C_3 and C_4 plants is :

[4 Marks]

(A) Photorespiration

(B) Photosynthesis

(C) Glycolysis

(D) Transpiration

Explanation:

Photorespiration is absent is C_4 plants. Photorespiration does not produce energy or reducing power. Rather, it consumes energy. Further, it undoes the work of photosynthesis. There is 25% loss of fixed CO_2. Therefore,

photorespiration is a highly wasteful process. This happens only in case of C_3 plants.

Question 136.

The correct sequence of cell organelles during photorespiration is :

[4 Marks]

(A) Chloroplast-Golgibodies-mitochondria

(B) Chloroplast-vacuole-peroxisome

(C) Chloroplast-peroxisome-mitochondria

(D) Chloroplast-Rough Endoplasmic reticulum, Dictyosomes

Explanation:

It is chloroplast followed by peroxisomes and finally mitochondria

Question 137.

Anxiety and eating spicy food together in an otherwise normal human, may lead to

[4 Marks]

(A) Indigestion

(B) Jaundice

(C) Diarrhoea

(D) Vomiting

Explanation:

Anxiety and eating spicy food together in normal healthy man can lead to indigestion which causes difficulty in digestion.

Question 138.

Which of the following are the correct statement for respiration in human?

[4 Marks]

(A) Cigarette smoking may lead to inflammation of bronchi

(B) Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration

(C) About 90% of carbon dioxide (CO_2) is carried by haemoglobin as carbamino haemoglobin.

(D) Workers in grinding and stone - breaking industries may suffer from lung fibrosis

Explanation:

(Cigarette smoking may lead to inflammation of bronchi) and(Workers in grinding and stone - breaking industries may suffer from lung fibrosis). Neural signals from pneumotaxic center in pons region of brain can limit the duration of inspiration. About 25% of carbon dioxide (CO_2) is carried by haemoglobin as carboxyhaemglobin.

Question 139.

The maximum amount of electrolytes and water (70 - 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron ?

[4 Marks]

(A) Ascending limb of loop of Henle

(B) Distal convoluted tubule

(C) Proximal convoluted tubule

(D) Descending limb of loop of Henle

Explanation:

Nearly all the essential nutrients, and 70 -80 percent of electrolytes and H_2O are reabsorbed by proximal con- voluted tubules.

Question 140.

Select the correct statement regarding the specific disorder of muscular or skeletal system:

[4 Marks]

(A) Muscular dystrophy - age related shortening or muscles.

(B) Osteoporosis - decrease in bone mass and higher chance of fractures with advancing age.

(C) Gout - inflammation of joints due to extra deposition of calcium.

(D) Myasthenia gravis - Auto immune disorder which inhibits sliding of myosin filaments.

Explanation:

Major causative factors of osteoporosis are imbalances of hormones like calcitonin of thyroid, parathormone of parathyroids, sex hormones, and deficiencies of calcium and vitamin D.

Question 141.

The human hind brain comprises three parts, one of which Is :

[4 Marks]

(A) Cerebellum

(B) Corpus callosum

(C) Hypothalamus

(D) Spinal cord

Explanation:

The human hind brain comprises of pons, cerebellum and medulla oblongata.

Question 142.

A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system ?

[4 Marks]

(A) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal cortex.

(B) Hypothalamus activates the parasympathetic division of brain.

(C) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse

(D) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal medulla.

Explanation:

Epinephrine and norepinephrine are secreted by adrenalmedulla in response to stress of any kind and during emergency situations and are called emergency hormones or hormones of flight, or fight.

Question 143.

Which part of the human ear plays no role in hearing as such but is otherwise very much required?

[4 Marks]

(A) Eustachian tube

(B) Organ of corti

(C) Vestibular apparatus

(D) Ear ossicles

Explanation:

Rhodopsin contained in the rod type of photoreceptor cells of human eye is a derivative of vitamin A .

Question 144.

Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (Mostly in the nucleus)

[4 Marks]

(A) Insulin, glucagon

(B) Thyroxin, insulin

(C) Cortisol, testosterone

(D) Somatostain, oxytocin

Explanation:

Cortisol and testosterone are steroid hormones which are lipid soluble and easily pass through the cell membrane of a target cell and bind to specific intracellular receptor.

Question 145.

What is correct to say about the hormone action in humans?

[4 Marks]

(A) In females FSH first binds with specific receptors on ovarian cell membrane

(B) FSH. simulates the secretion of estrogen and progesterone

(C) Glucagon is secreted by β -cells of islets of Langerhans and stimulates glycogenolysis

(D) Secretion of thymosins is stimulated with ageing

Explanation:

Glucagon is secreted by α cells of islets of langerhans and stimulate glycogenolysis i.e. breakdown of glycogen into glucose Thymosin hormone secreted from thymus gland stimulates the development of certain kinds of white blood cells involved in producing immunity. It also hastens attainment of sexual maturity.

Question 146.

Which one of the following is correctly matched?

[4 Marks]

(A) Onion - Bulb

(B) Ginger -Sucker

(C) Yeast - Zoospore

(D) Chlamydomonas - Conidia

Explanation:

Onion - Bulb - Underground stem

Ginger - Rhizome

Chlamydomonas - Zoospore

Yeast - Ascospores

Question 147.

Both, autogamy and geitonogamy are prevented in -

[4 Marks]

(A) Papaya

(B) Cucumber

(C) Maize

(D) Castor

Explanation:

Papaya is dioecious i.e. male and female flowers occurs in separate plants so that it prevents both autogamy & geitonogamy (method of self pollination).

Question 148.

An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is:

[4 Marks]

(A) Cuticle

(B) Sporopollenin

(C) Lignin

(D) Cellulose

Explanation:

Sporopollenin is fatty substance present in pollen wall and provides resistance against extremes conditions like high temperature, acid, bases.

Question 149.

Even in absence of pollinating agents seed setting is as sured in

[4 Marks]

(A) Commelina

(B) Zostera

(C) Salvia

(D) Fig

Explanation:

Cleistogamous flower produce assured seed set even in the absence of pollinations. Plants such as Viola, Oxalis and Commelina.

Question 150.

The Leydig cells found in the human body are the secretory source of

[4 Marks]

(A) Progesterone

(B) intestinal mucus

(C) androgens

(D) glucagon

Explanation:

Leydig cells found in testis is the endocrine portion of the testis which are present in between seminiferous tubules secretes androgens or male sex hormone e.g. testosterone.

Question 151.

Which one of the following statements is false in respect of viability of mammalian sperm?

[4 Marks]

(A) Sperm is viable for only up to 24 hours.

(B) Survival of sperm depends on the pH of the medium and is more active in alkaline medium.

(C) Viabiliy of sperm is determined by its motility.

(D) Sperms must be concentrated in a thick suspension.

Explanation:

Sperm is viable for 2-3 days.

Question 152.

In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The result expected was

[4 Marks]

(A) High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo

(B) High level of circulating HCG to stimulate endometrial thickening

(C) High level of circulating HCG to stimulate estrogen and progesterone synthesis

(D) High level of FSH and LH in uterus to stimulate endometrical thickening

Explanation:

Pregnancy can be confirmed by detecting the presence of human chorionic gonadotropin (HCG) in blood or urine of pregnant woman. HCG is a hormone produced by the placenta after implantation. HCG plays an essential role in maintenance of corpus luteum and allows the secretion of the progesterone and estrogen hormone. Progesterone enriches the uterus with a thick lining of blood vessels and capillaries so that it can sustain the growing foetus.

Question 153.

Signals for parturition originate from :

[4 Marks]

(A) Fully developed foetus only

(B) Oxytocin released from maternal pituitary

(C) Both placenta as well as fully developed foetus

(D) Placenta only

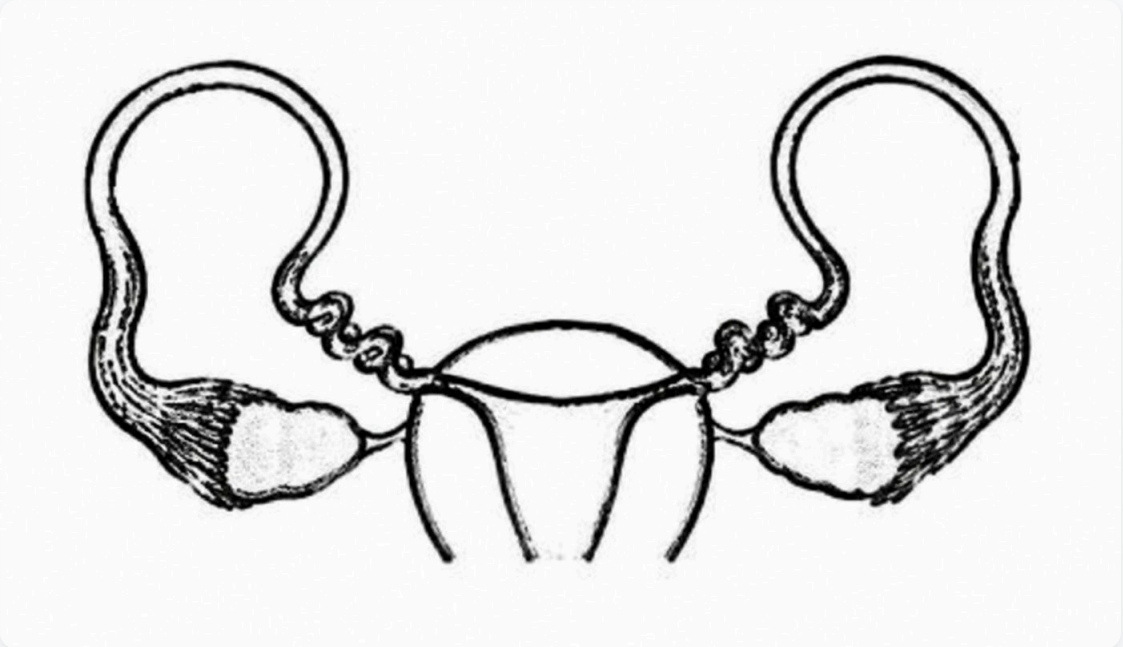
Explanation:

The signals for child blrth (parturition) originate fromn the fully matured foetus and placenta which induce mild uterine contractions called foetal ejection reflex.

Question 154.

What is the figure given below showing in particular?

[4 Marks]



(A) Ovarian cancer

(B) Uterine cancer

(C) Vasectomy

(D) Tubectomy

Explanation:

The figure shows the tubectomy. This is a surgical method to prevent pregnancy in women. In tubectomy small part of the fallopian tube is removed or tied through a small cut in the abdomen or through vagina. It is very effective method but reversibility is very poor.

Question 155.

The test-tube Baby Programme employs which one of the following techniques?

[4 Marks]

(A) Intra cytoplasmic sperm injection (ICSI)

(B) Gamete intra fallopian transfer (GIET)

(C) Zygote intra fallopian transfer (ZIFT)

(D) Intra uterine insemination (IUI)

Explanation:

Test tube baby programme employs Zygote Intrafallopian Transfer (ZIFT) Technique. In this technique, fusion of ovum and sperm is done outside the body of woman to form zygote which is allowed to divide forming 8 blastomeres, then it is transfered the fallopion tube of the woman.

Question 156.

A certain road accident patient with unknown blood group needs immediate blood transfusion. His care doctor friend at once offers his blood. What was the blood group of the donor?

[4 Marks]

(A) Blood group B

(B) Blood group O

(C) Blood group AB

(D) Blood group A

Explanation:

Blood group O acts as universal donor.

Question 157.

F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as **1 : 2 : 1**. It represents a case of:

[4 Marks]

(A) Dihybrid cross

(B) Co-dominance

(C) Monohybrid cross with incomplete dominance

(D) Monohybrid cross with complete dominance

Explanation:

Incomplete (partial or mosaic) dominance is the phenomenon where none of the two contrasting alleles or factors is dominant. The expression of the character in a hybrid or F_1 individual is intermediate or a fine mixture of the expression of the two factors (as found in homozygous state). Incomplete or mosaic inheritance is not an example of pre- Mendelian concept of blending inheritance because the parental types reappear in the F_2 generation. It is however, considered by some workers to be an example of quantitative inheritance where only a single gene pair is involved. F_2 phenotypic ratio is 1:2: 1, similar to genotypic ratio.

Question 158.

A normal-visioned man whose father was colour blind, marries a woman whose father was also colour blind. They have their first child as a daughter. What are the chance that this child would be colour blind?

[4 Marks]

(A) 50%

(B) zero percent

(C) 100%

(D) 25%

Explanation:

If a normal visioned man marries a woman whose father was also colourblind, then his wife would be carrier of this disease if her mother was normal. This trait is passed into children but daughters produced by this couple are carrier not the colourblind. 50% of sons would be colourblind.

Question 159.

If one strand of DNA has the nitrogenous base sequence ATCTG, what would be the complementary RNA strand sequence?

[4 Marks]

(A) UAGAC

(B) ATCGU

(C) AACTG

(D) TTAGU

Explanation:

Sequence of DNA is ATCTG then sequence of m-RNA will UAGAC. As adenine base pairs with uracil and guanine with cytosine.

Question 160.

Removal of RNA polymerase III from nucleoplasm will affect the synthesis of:

[4 Marks]

(A) hn RNA

(B) r RNA

(C) m RNA

(D) t RNA

Explanation:

Removal of RNA polymerase III from nucleoplasm will affect the synthesis of tRNA while RNA polymerase I forms r-RNA and RNA polymerase II form m-RNA in eukaryotes.

Question 161.

Which one of the following is not a part of a transcription unit in DNA?

[4 Marks]

(A) The inducer

(B) A promoter

(C) A terminator

(D) The structural gene

Explanation:

Transcription unit consists of promoter, structural gene & terminator.

Question 162.

Removal of introns and joining of exons in a defined order during transcription is called:

[4 Marks]

(A) Looping

(B) Slicing

(C) Inducing

(D) Splicing

Explanation:

Removal of introns by spliceosome in hnRNA and joining of exons by DNA liagse in a defined order during transcription is called splicing.

Question 163.

Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as:

[4 Marks]

(A) Adaptive radiation

(B) Divergent evolution

(C) Natural selection

(D) Migration

Explanation:

Process of evolution of different species in a given area starting from a point and radiating to other area of geographical areas is called adaptive radiations.

Example : Darwin's finches, Australian marsupials.

Question 164.

Which one of the following options gives one correct example each of convergent evolution and divergent evolution?

[4 Marks]

(A)

Convergent evolution	Divergent evolution
Eyes of octopus and mammals	Bones of forelimbs of vertebrates

(B)

Convergent evolution	Divergent evolution
Bones of forelimbs of vertebrates	Wings of butterfly and birds

(C)

Convergent evolution	Divergent evolution
"Thorns of Bougainvillia and tendrils of Cucurbita"	Wings of butterflies and birds

(D)

Convergent evolution	Divergent evolution
"Thorns of Bougainvillia and tendrils of Cucurbita"	Eyes of Octopus and mammals

Explanation:

Eyes of octopus and mammals is an example of convergent evolution because they both have different structures of eyes but evolving for the same function and hence having similarity.

The forelimb consists of: Humerus, radius and ulna, carpals, metacarpals, digits or phalanges. The top of the humerus moves against (articulates with) the scapula at the shoulder joint. By changing the number, size and shape of the various bones, fore limbs have evolved to fit different ways of life.

Question 165.

The extinct human who lived 1,00,000 to 40,000 years ago, in Europe, Asia and parts of Africa, With short stature, heavy eyebrows, retreating fore heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was

[4 Marks]

(A) Homo habilis

(B) Neanderthal human

(C) Cro-magnan humans

(D) Ramapithecus

Explanation:

Neanderthals are an extinct species or subspecies of archaic humans who lived in Eurasia until about 40,000 years ago. They probably went extinct due to competition with or extermination by immigrating European early modern humans or due to great climatic change, disease, or a combination of these factors.

Question 166.

Motile zygote of Plasmodium occurs in:

[4 Marks]

(A) Salivary glands of Anopheles

(B) Gut of female Anopheles

(C) Human RBCs

(D) Human liver

Explanation:

Motile zygote of Plasmodium occurs in gut of female Anopheles. Zygote formed in stomach of mosquito about 9 to 10 days after sucking the blood of an infected human. Anopheles receives RBCs containing different stages of erthyrocytic cycle, including gametocyte. In its gut, all stages except the gametocytes are digested. The gametocytes remain unaffected by digestive enzymes of the mosquito, hatch out from the RBCs into the lumen of mosquito's stomach and form sperm and ovum by gametogenesis. Syngamy or fusion of male and female gamete.

Question 167.

Widal Test is carried out to test :

[4 Marks]

(A) Malaria

(B) HIV/AIDS

(C) Typhoid fever

(D) Diabetes mellitus

Explanation:

Widal test is carried out to test typhoid fever caused by Salmonella typhii bacteria. Typhoid vaccine is available.

Question 168.

Common cold differs from pneumonia in that :

[4 Marks]

(A) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease.

(B) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine.

(C) Pneumonia is caused by a virus while the common cold is caused by the bacterium Haemophilus influenzae.

(D) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs.

Explanation:

Common cold is most infectious viral disease caused by Rhino viruses which is transmitted through inhalation of droplets from infected person or through contaminated objects. Pneumonia is a bacterial disease caused by Streptococcus pneumoniae and Haemophillus influenzae. This serious disease of lungs spread by sputum of the patient.

Question 169.

In which one of the following options the two examples are correctly matched with their particular type of immunity.

[4 Marks]

(A)

Examples	Types of immunity
Polymorphonuclear leukocytes and monocytes	Cellular barriers

(B)

Examples	Types of immunity
Anti-tetanus and anti-snake bite injection	Active immunity

(C)

Examples	Types of immunity
Saliva in mouth and Tear in eyes	Physical barriers

(D)

Examples	Types of immunity
Mucus coating of epithelium lining the urinogenital tract-and the HCl in stomach	Physiological barriers

Explanation:

Polymorphonuclear leukocytes named so, as they have multilobed nucleus or neutrophils and monocytes are the cellular barrier provide innate or nonspecific immunity. Cellular barriers are the

internal defence or second live of defence.

Question 170.

Which one of the following is not a property of cancerous cells whereas the remaining three are ?

[4 Marks]

(A) They divide in an uncontrolled manner

(B) They do not remain confined in the area of formation.

(C) They show contact inhibition.

(D) They compete with normal cells for vital nutrients.

Explanation:

Contact inhibition is a property of normal cell not of cancer cells. Due to this property they remain in contact with other cells inhibit their grow

Question 171.

Cirrhosis of liver is caused by the chronic intake of

[4 Marks]

(A) Opium

(B) Tobacco (Chewing)

(C) Cocaine

(D) Alcohol

Explanation:

Long term intake of alcohol causes damage to liver which is known as cirrhosis of liver with continued alcohol intake, there is destruction of hepatocytes and fibroblasts (cell which form fibres) and stimulation of collagean protein formation.

Question 172.

Which part would be most suitable for raising virus-free plants for micropropagation?

[4 Marks]

(A) Bark

(B) Vascular tissue

(C) Meristem

(D) Node

Explanation:

Meristem is most suitable for raising virus free plants for micropropagation.

Question 173.

Which one of the following is a case of wrong matching ?

[4 Marks]

(A) Micropropagation – in vitro production of plants in large numbers.

(B) Callus – Unorganised mass of cell produced in tissue culture

(C) Vector DNA – Site for t-RNA synthesis.

(D) Somatic hybridization – Fusion of two diverse cells

Explanation:

Vector DNA are the DNA molecules that can carry a foreign DNA segment and replicate inside the host cells. Vector DNA may be plasmids, a bacteriophage, cosmids, yeast artificial chromosomes.

Question 174.

Monascus purpureus is a yeast used commercially in the production of :

[4 Marks]

(A) streptokinase for removing clots from the blood vessels.

(B) ethanol

(C) citric acid

(D) blood cholesterol lowering statins

Explanation:

Monascus purpureus is a yeast used in the production of statins which are used in lowering blood cholestrol.

Question 175.

A patient brought to a hospital with myocardial infarction is normally immediately given:

[4 Marks]

(A) Streptokinase

(B) Penicillin

(C) Cyclosporin-A

(D) Statins

Explanation:

Streptokinase is immediately given to dissolve the thrombus carring myocardial infarction.

Question 176.

Yeast is used in the production of :

[4 Marks]

(A) Cheese and butter

(B) Bread and beer

(C) Lipase and pectinase

(D) Citric acid and lactic acid

Explanation:

Bread and beer

Question 177.

Which one of the following is an example of carrying out biological control of pests/diseases using microbes?

[4 Marks]

(A) Lady bird beetle against aphids in mustard

(B) Bt-cotton to increase cotton yield

(C) Trichoderma sp. against certain plant pathogens

(D) Nucleopolyhedrovirus against white rust in Brassica

Explanation:

Trichoderma sp. against certain plant pathogens

Question 178.

Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition

[4 Marks]

(A) Azotobacter

(B) Aspergillus

(C) Glomus

(D) Trichoderma

Explanation:

Glomus is endomycorrhiza that helps in absorption of nutrition specially phosphorus from soil.

Question 179.

A nitrogen-fixing microbe associated with Azolla in rice fields is:

[4 Marks]

(A) Tolypothrix

(B) Frankia

(C) Anabaena

(D) Spirulina

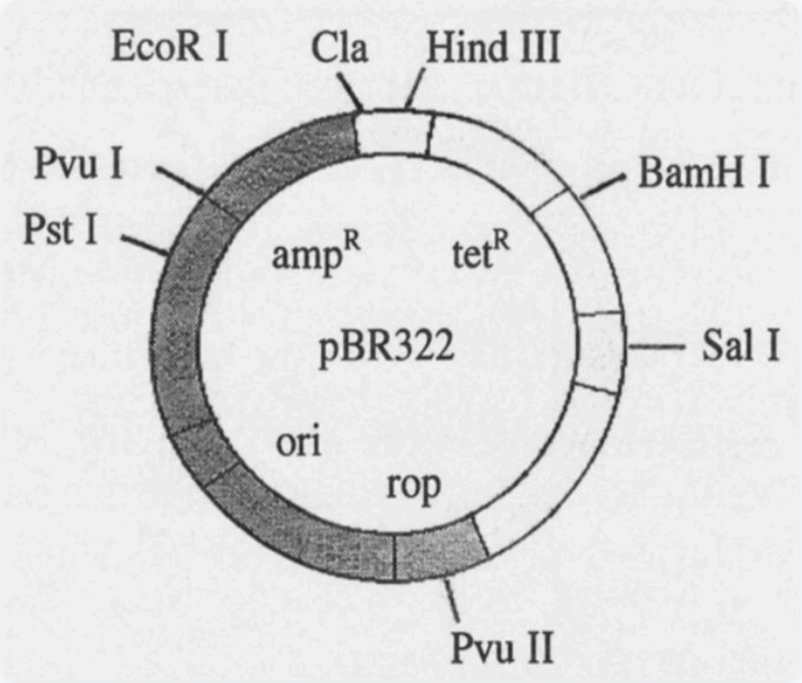
Explanation:

Anabaena

Question 180.

The figure below is the diagrammatic representation of the *E. coli* vector pBR 322. Which of the given options correctly identifies its certain component(s)?

[4 Marks]



(A) ori - original restriction enzyme

(B) amp^R, tet^R - antibiotic resistance genes

(C) rop-reduced osmotic pressure

(D) Hind III, EcoRI - selectable markers

Explanation:

In pBR 322

ori-represents site of origin or replication

rop-represents those proteins that take part in replication of plasmid.

Hind III, EcoRI- Recoginition sites of Restriction endonucleases

amp^R, tet^R - They are antibiotic resistance genes part

Question 181.

A single strand of nucleic acid tagged with a radioactive molecule is called :

[4 Marks]

(A) Vector

(B) Probe

(C) Plasmid

(D) Selectable marker

Explanation:

A single strand DNA or RNA tagged with radioactive molecule that is used in hybridization of DNA or RNA is called probe.

Question 182.

PCR and Restriction Fragment Length Polymorphism are the methods for :

[4 Marks]

(A) Genetic Fingerprinting

(B) DNA sequencing

(C) Genetic transformation

(D) Study of enzymes

Explanation:

PCR and RFLP are the methods used for genetic fingerprinting. DNA fragmentation plays an important part in forensics, especially that of DNA profiling. Restriction fragment lengths polymorphism (RFLP) analyses the variable lengths of DNA fragments which are formed from the digestion of a DNA sample with a restriction endonuclease. They are then hybridized with DNA probes that bind to a complementary DNA sequence in the sample.

Question 183.

Which one is a true statement regarding DNA polymerase used in PCR.

[4 Marks]

(A) It is used to ligate introduced DNA in recipient cell

(B) It remains active at high temperature

(C) It is isolated from a virus

(D) It serves as a selectable marker

Explanation:

It remains active at high temperature

Question 184.

For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of :

[4 Marks]

(A) Silver or Platinum

(B) Platinum or Zinc

(C) Silicon or Platinum

(D) Gold or Tungsten

Explanation:

For gene transfer into the host cell without using vector microparticles made of tungsten and gold coated with foreign DNA are bombarded into target cells at a very high velocity.

Question 185.

Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin ‘A’ deficiency?

[4 Marks]

(A) 'Flavr Savr' tomato

(B) Bt-Brinjal

(C) Canolla

(D) Golden rice

Explanation:

Golden rice is vitamin A rich variety developed by rDNA technology and used in the treatment of vitamin A deficiency.

Question 186.

Pheretima and its close relatives derive nourishment from:

[4 Marks]

(A) sugarcane roots

(B) small pieces of fresh fallen leaves of maize, etc.

(C) decaying fallen leaves and soil organic matter.

(D) soil insects

Explanation:

Earthworm derives its nutrition from decaying fallen leaves and soil organic matter. Thus the type of feeding in earthworm is detritus.

Question 187.

Identify the possible “A” in the following food chain:
Plant → insect - frog → “A” → Eagle

[4 Marks]

(A) Wolf

(B) Rabbit

(C) Cobra

(D) Parrot

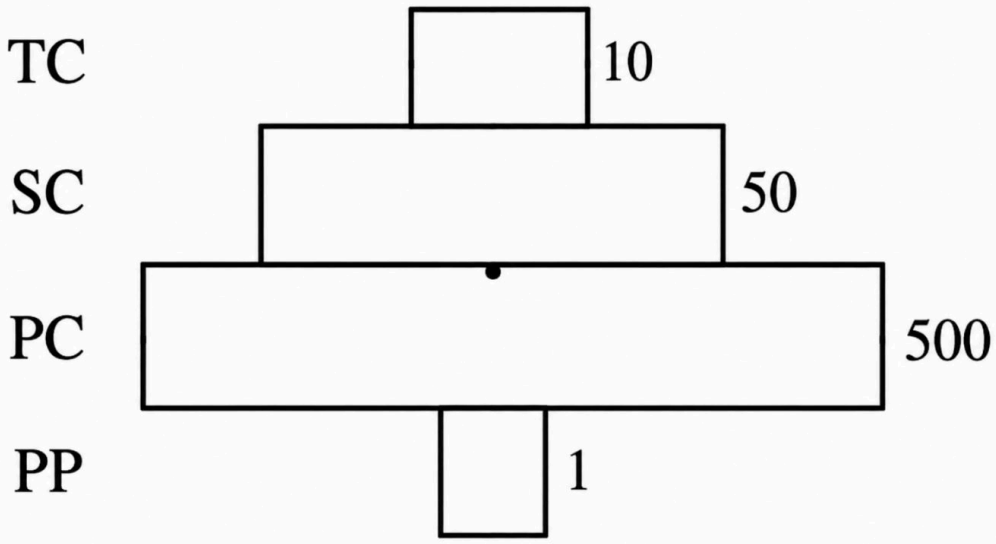
Explanation:

Cobra

Question 188.

Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels?

[4 Marks]



(A) Level one PP is “pipal trees” and the level SC is “sheep”.

(B) Level PP is “phytoplanktons” in sea and “Whale” on top level TC.

(C) Level PC is “rats” and level SC is “cats”.

(D) Level PC is “insects” and level SC is “small insectivorous birds”.

Explanation:

Level PC is “insects” and level SC is “small insectivorous birds”.

Question 189.

Which one of the following is not a function of an ecosystem?

[4 Marks]

(A) Energy flow

(B) Decomposition

(C) Productivity

(D) Stratification

Explanation:

Four important functional aspects of the ecosystem are:
(i) Productivity
(ii) Decomposition,
(iii) Energy flow and
(iv) Nutrient cycling.

Question 190.

The upright pyramid of number is absent in

[4 Marks]

(A) Pond

(B) Lake

(C) Grassland

(D) Forest

Explanation:

In forest, a single tree can support a large of number of birds, thus base showing producers in a pyramid of number will be narrower than the next slab showing primary consumers.

Question 191.

Which one of the following is not a gaseous biogeochemical cycle in ecosystem ?

[4 Marks]

(A) Sulphur cycle

(B) Phosphorus cycle

(C) Nitrogen cycle

(D) Carbon cycle

Explanation:

Phosphorus is mostly used as phosphate. Its reservoir pool is phosphate rocks while cycling pool is soil for terrestrial ecosystems and water for aquatic ecosystems.

Question 192.

Maximum nutritional diversity is found in the group.

[4 Marks]

(A) Fungi

(B) Animalia

(C) Monera

(D) Plantae

Explanation:

Monera

Question 193.

The highest number of species in the world is represented by

[4 Marks]

(A) Fungi

(B) Mosses

(C) Algae

(D) Lichens

Explanation:

Recent estimate suggests that 5.1 million fungal species exists.

Question 194.

Which one of the following areas in India, is a hotspot of biodiversity?

[4 Marks]

(A) Sunderbans

(B) Gangetic Plain

(C) Western Ghats

(D) Eastern Ghats

Explanation:

Hots are the geographical area where biodiversity is maximum. Two hotspots in India are western ghats and north eastern himalayan region.

Question 195.

In an area where DDT had been used extensively, the population of birds declined significantly because:

[4 Marks]

(A) birds stopped laying eggs

(B) many of the birds laid, did not hatch

(C) earthworms in the area got eradicated

(D) cobras-were feeding exclusively on birds

Explanation:

High concentration of DDT disturbs calcium metabolism in birds which caused thinning of eggshell and their premature breaking.

Question 196.

Measuring Biochemical Oxygen Demand (BOD) is a method used for :

[4 Marks]

(A) estimating the amount of organic matter in sewage water.

(B) working out the efficiency of oil driven automobile engines.

(C) measuring the activity of Saccharomyces cerevisae in producing curd on a commercial scale.

(D) working out the efficiency of RBCs about their capacity to carry oxygen.

Explanation:

estimating the amount of organic matter in sewage water.

Question 197.

Which one of the following is a wrong statement?

[4 Marks]

(A) Most of the forests have been lost in tropical areas.

(B) Greenhouse effect is a natural phenomenon.

(C) Ozone in upper part of atmosphere is harmful to animals.

(D) Eutrophication is a natural phenomenon in freshwater bodies.

Explanation:

Ozone present in upper part of the atmosphere i.e. stratosphere is benefical for living beings. As, it functions as a shield against harmful UV-radiation.

Question 198.

In an area where DDT had been used extensively, the population of birds declined significantly because:

[4 Marks]

(A) birds stopped laying eggs

(B) many of the birds laid, did not hatch

(C) earthworms in the area got eradicated

(D) cobras were feeding exclusively on birds

Explanation:

High concentration of DDT disturbs calcium metabolism in birds which caused thinning of eggshell and their premature breaking.

Question 199.

Which one of the following is not a gaseous biogeochemical cycle in ecosystem?

[4 Marks]

(A) Sulphur cycle

(B) Phosphorus cycle

(C) Carbon cycle

(D) Nitrogen cycle

Explanation:

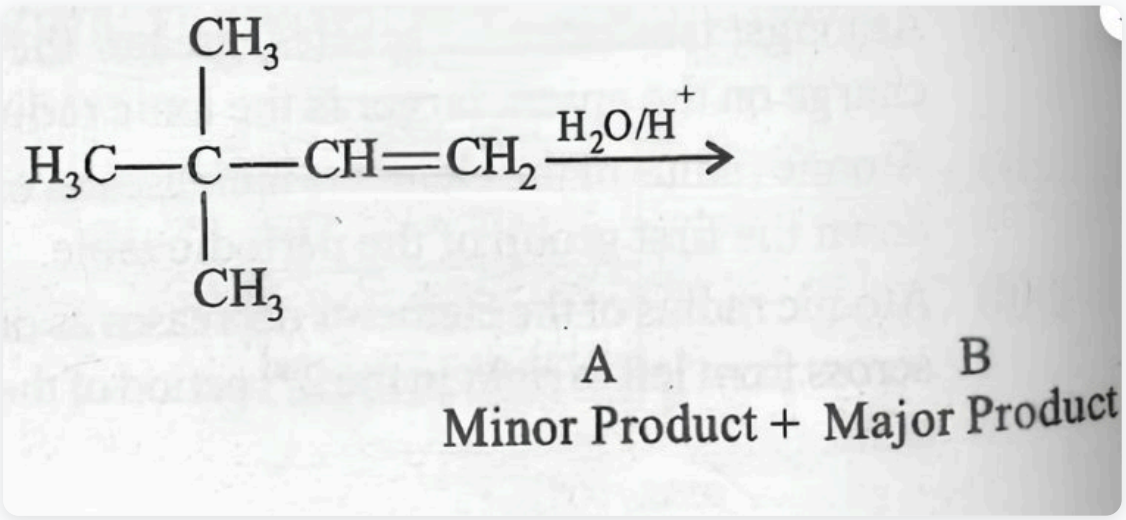
Phosphorus is mostly used as phosphate. Its reservoir pool is phosphate rocks while cycling pool is soil for terrestrial ecosystems and water for aquatic ecosystems.

Question 200.

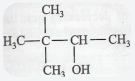
In the following reaction :

The major product is :

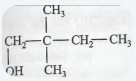
[4 Marks]



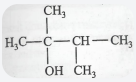
(A)



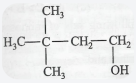
(B)



(C)



(D)



Explanation:

