CBSE EXAMINATION PAPER-2007

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.

Dimensions of resistance in an electrical circuit, in terms of dimension of mass [M], of length [L], of time [T] and of current [I], would be

[4 Marks]

(A) $[ML^2T^{-3}I^{-1}]$

(B) $[ML^2T^{-3}I^{-2}]$

(C) $[ML^2T^{-2}]$

(D) $[ML^2T^{-1}I^{-1}]$

Explanation:

As we know that

R = [V]/[I] = w/ q.i

= *w / (i* . t . i) Dimension of Resistance = $[ML^2T^{-3}I^{-1}] / [T][I] = [ML^2T^{-3}I^{-2}]$

Question 2.

A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform speed v_d. The average speed for this round trip is

[4 Marks]

(A) √(v_u v_d)

(B) (v_d v_u) / (v_d + v_u)

(C) 2v_d v_u / (v_d + v_u)

(D) (v_u + v_d) / 2

Explanation:

Average speed = total distance travelled / total time taken Let s be the distance from X to Y. Therefore, Average speed = (s + s) / (t_1 + t_2) = 2s / (s/v_u + s/v_d) = 2v_u v_d / (v_d + v_u)

Question 3.

The position x of a particle with respect to time t along x-axis is given by $x = 9t^2 - t^3$ where x is in metres and t in second. What will be the position of this particle when it achieves maximum speed along the +ve x direction?

[4 Marks]

(A) 81m

(B) 54m

(C) 32m

(D) 24m

Explanation:

Speed $v = dx/dt = d/dt(9t^2 - t^3) = 18t - 3t^2$ For maximum speed its acceleration should be zero, Acceleration = dv/dt = 0 => 18 - 6t = 0 => t = 3 At t = 3 its speed is max => x_max = 81 - 27 = 54 m

Question 4.

A particle moving along x-axis has acceleration f, at time t, given by f = f_0 (1 - t/T), where f_0 and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity (v_x) is

[4 Marks]

(A) $f_0 T^2$

(B) $(1/2) f_0 T^2$

(C) $(1/2) f_0 T$

(D) $f_0 T$

Explanation:

Here, f = f_0(1 - t/T)

or, dv/dt = f_0(1 - t/T)

If f = 0, then

0 = f_0(1 - t/T) => t = T

Hence, particle's velocity in the time interval t = 0 and t = T is given by

v_x = integral from v=0 to v=v_z of dv = integral from t=0 to t=T of [f_0(1 - t/T)]dt

= f_0 [t - t^2/(2T)] evaluated from 0 to T

= f_0 (T - T^2/(2T)) = f_0 × (T - T/2) = (1/2)f_0 T.

Question 5.

□□ and □□ are two vectors and θ is the angle between them, if | □□ x □□| = √3(□□ . □□), the value of θ is

[4 Marks]

(A) 60°

(B) 90°

(C) 30°

(D) 45°

Explanation:

|□□ x □□| = √3(□□ . □□)

=> AB sin θ = √3 AB cos θ

=> tan θ = √3 => θ = 60°

Question 6.

A particle starting from the origin (0, 0) moves in the (x, y) plane. Its coordinates at a later time are (√3, 3). The path of the particle makes with the x-axis an angle of

[4 Marks]

(A) 60°

(B) 45°

(C) 0°

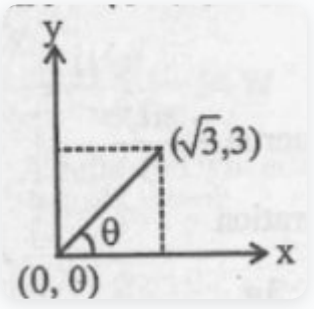
(D) 30°

Explanation:

Let θ be the angle which the particle makes with x-axis.

From figure, tan θ = 3 / √3 = √3

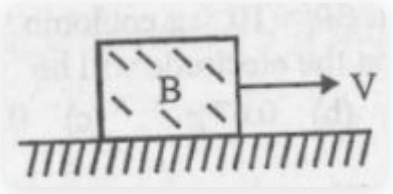
=> θ = $\tan^{-1}(\sqrt{3})$ = 60°



Question 7.

A block B is pushed momentarily along a horizontal surface with an initial velocity V. If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time

[4 Marks]



(A) gμ/V

(B) g/V

(C) V/g

(D) V/(gμ)

Explanation:

Friction is the retarding force for the block

F = ma = μR = μmg

Therefore, from the first equation of motion

v = u - at

0 = V - μg * t => V/μg = t

Question 8.

A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in the process is

[4 Marks]

(A) mg(h + d) - (1/2)kd²

(B) mg(h - d) - (1/2)kd²

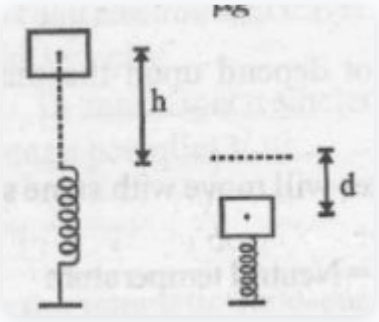
(C) mg(h - d) + (1/2)kd²

(D) mg(h + d) + (1/2)kd²

Explanation:

W = Potential energy stored in the spring + Loss of potential energy of mass

W = mg(h + d) - (1/2)kd²



Question 9.

A wheel has angular acceleration of 3.0 rad/sec² and an initial angular speed of 2.00 rad/sec. In a time of 2 sec it has rotated through an angle (in radian) of

[4 Marks]

(A) 10

(B) 12

(C) 6

(D) 4

Explanation:

Since, $\theta = \omega_0 t + (1/2)\alpha t^2$

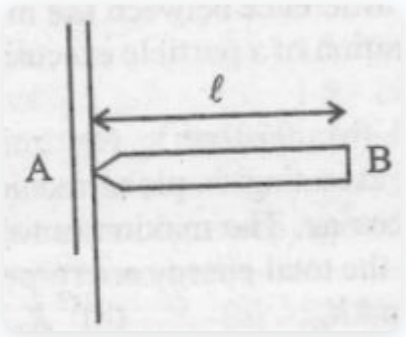
Where α is angular acceleration, ω_0 is the initial angular speed. t = 2s

$\theta = 2\ 2 + (1/2)\ 3 * (2)^2 = 4 + 6 = 10$ rad

Question 10.

A uniform rod AB of length l, and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $ml^2/3$, the initial angular acceleration of the rod will be

[4 Marks]



(A) mgl/2

(B) 2g/(3l)

(C) 3g/(2l)

(D) (3/2)gl

Explanation:

Weight of the rod will produce torque,

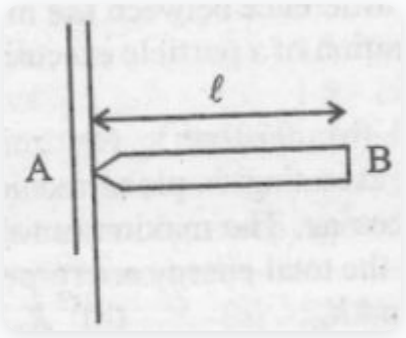
$\tau = mg * l/2$

Also, $\tau = I\alpha$

where, I is the moment of inertia = $ml^2/3$

and α is the angular acceleration

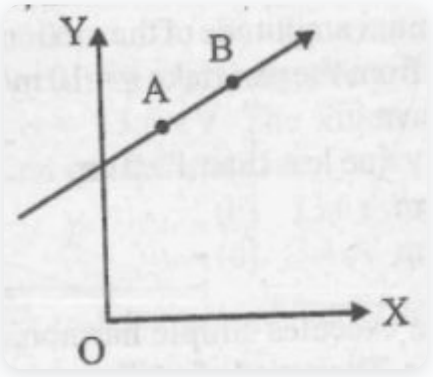
Therefore, $(ml^2/3)\alpha = mg * l/2 \Rightarrow \alpha = 3g / (2l)$



Question 11.

A particle of mass m moves in the XY plane with a velocity v along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B, then

[4 Marks]



(A) the relationship between L_A and L_B depends upon the slope of the line AB

(B) L_A > L_B

(C) L_A = L_B

(D) L_A < L_B

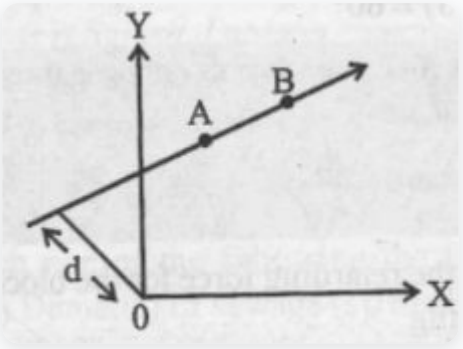
Explanation:

Angular momentum = Linear momentum * distance of line of action of linear momentum about the origin.

L_A = p_A *d, L_B = p_B * d

As linear momenta are p_A and p_B equal,

therefore, L_A = L_B.



Question 12.

Two satellites of earth, S_1 and S_2 are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true?

[4 Marks]

(A) The potential energies of earth satellites in the two cases are equal.

(B) S_1 and S_2 are moving with the same speed.

(C) The kinetic energies of the two satellites are equal.

(D) The time period of S_1 is four times that of S_2.

Explanation:

Since orbital velocity of satellite is v = √(GM / r), it does not depend upon the mass of the satellite. Therefore, both satellites will move with same speed.

Question 13.

If the cold junction of a thermo-couple is kept at 0°C and the hot junction is kept at T°C then the relation between neutral temperature (T_n) and temperature of inversion (T_i) is

[4 Marks]

(A) T_n = 2T_i

(B) T_n = T_i - T

(C) T_n = T_i + T

(D) T_n = T_i / 2

Explanation:

Since $T_n = (T_i + T_c) / 2$ = Neutral temperature

$T_n = (T_i + 0) / 2 = T_i / 2$

[$T_c = 0°C$ = temperature of cold junction]

Question 14.

A black body is at 727°C. It emits energy at a rate which is proportional to

[4 Marks]

(A) $(727)^2$

(B) $(727)^4$

(C) $(1000)^2$

(D) $(1000)^4$

Explanation:

According to Stefan's law,

$E \propto T^4$

$E \propto (t + 273)^4$ K [$727°C = (727 + 273)K$]

$E \propto (727 + 273)^4$ K

$E \propto (1000)^4$ K

Question 15.

Assuming the sun to have a spherical outer surface of radius r, radiating like a black body at temperature t°C, the power received by a unit surface, (normal to the incident rays) at a distance R from the centre of the sun is

[4 Marks]

(A) $r^2 \sigma (t + 273)^4 / (4\pi R^2)$

(B) $16\pi^2 r^2 \sigma t^4 / R^2$

(C) $r^2 \sigma (t + 273)^4 / R^2$

(D) $4\pi r^2 \sigma t^4 / R^2$

Explanation:

Power radiated by the sun at t°C

$= \sigma(t + 273)^4 \, 4\pi r^2$

Power received by a unit surface

$= \sigma(t + 273)^4 \, 4\pi r^2 / (4\pi R^2) = r^2\sigma(t + 273)^4 / R^2$

Question 16.

An engine has an efficiency of 1/6. When the temperature of sink is reduced by 62°C, its efficiency is doubled. Temperature of the source is

[4 Marks]

(A) 37°C

(B) 62°C

(C) 99°C

(D) 124°C

Explanation:

Since efficiency of engine is $\eta = 1 - T_2/T_1$

According to problem,

$1/6 = 1 - T_2/T_1$ .....(i)

When the temperature of the sink is reduced by 62°C, its efficiency is doubled

$2(1/6) = 1 - (T_2 - 62) / T_1$ .....(ii)

Solving (i) and (ii) $T_2 = 372$ K

$T_1 = 99°C$ = Temperature of source.

Question 17.

The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is

[4 Marks]

(A) 0.707π

(B) π

(C) zero

(D) 0.5π

Explanation:

Let $y = A \sin \omega t$

$v_{inst} = dy/dt = A\omega \cos \omega t = A\omega \sin(\omega t + \pi/2)$

Acceleration $= -A\omega^2 \sin \omega t = A\omega^2 \sin(\pi + \omega t)$

Therefore, $\varphi = \pi/2 = 0.5\pi$

Question 18.

The particle executing simple harmonic motion has a kinetic energy $K_0 \cos^2 \omega t$. The maximum values of the potential energy and the total energy are respectively

[4 Marks]

(A) $K_0 / 2$ and K_0

(B) K_0 and $2K_0$

(C) K_0 and K_0

(D) 0 and $2K_0$

Explanation:

We have, U + K = E

where, U = potential energy, K = Kinetic energy, E = Total energy.

Also, we know that, in S.H.M., when potential energy is maximum,

K.E. is zero and vice-versa.

Therefore, $U_{max} + 0 = E \Rightarrow U_{max} = E$

Further,

K.E. $= (1/2)m\omega^2a^2 \cos^2 \omega t$

But by question, K.E. $= K_0 \cos^2 \omega t$

Therefore, $K_0 = (1/2)m\omega^2a^2$

Hence, total energy, $E = (1/2)m\omega^2a^2 = K_0$

Therefore, $U_{max} = K_0$ & $E = K_0$.

Question 19.

A mass of 2.0 kg is put on a flat pan attached to a vertical spring fixed on the ground as shown in the figure. The mass of the spring and the pan is negligible. When pressed slightly and released the mass executes a simple harmonic motion. The spring constant is 200 N/m. What should be the minimum amplitude of the motion so that the mass gets detached from the pan (take g = 10 m/s^2)?

[4 Marks]



(A) any value less than 12.0 cm

(B) 8.0 cm

(C) 4.0 cm

(D) 10.0 cm

Explanation:

Mass gets detached at the upper extreme position when pan returns to its mean position.

At that point, $R = mg - m\omega^2a = 0$

i.e. $g = \omega^2a$

$\Rightarrow a = g / \omega^2 = mg / k$

$\Rightarrow a = 2 * 10 / 200$ [As $\omega^2 = k / m$]

$\Rightarrow a = 1/10$ m = 10cm

Question 20.

A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is

[4 Marks]

(A) T/8

(B) T/12

(C) T/2

(D) T/4

Explanation:

Displacement from the mean position

$y = a \sin((2\pi / T)t)$

According to problem $y = a/2$

$a/2 = a \sin((2\pi / T)t)$

$\Rightarrow \pi/6 = (2\pi / T)t \Rightarrow t = T/12$

This is the minimum time taken by the particle to travel half of the amplitude from the equilibrium position.

Question 21.

Three point charges +q, -q and +q are placed at points (x = 0, y = a, z = 0), (x = 0, y = 0, z = 0) and (x = a, y = 0, z = 0) respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are

[4 Marks]

(A) $\sqrt{2}$ qa along +ve x direction

(B) $\sqrt{2}$ qa along +ve y direction

(C) qa along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)

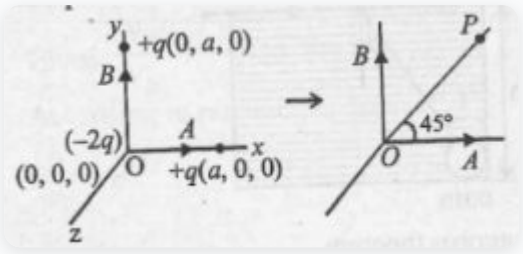
(D) $\sqrt{2}$ qa along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)

Explanation:

Three point charges +q, -2q and +q are placed at points B(x = 0, y = a, z = 0), O(x = 0, y = 0, z = 0) and A(x = a, y = 0, z = 0)

The system consists of two dipole moment vectors due to (+q and -q) and again due to (+q and -q) charges having equal magnitudes qa units — one along □□ □□ and other along □□ □□. Hence, net dipole moment,

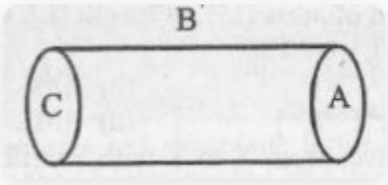
P_net = √((qa)² + (qa)²) = √2 qa along □□ □□ at an angle 45° with positive X-axis.



Question 22.

A hollow cylinder has a charge q coulomb within it. If φ is the electric flux in units of voltmeter associated with the curved surface B, the flux linked with the plane surface A in units of voltmeter will be

[4 Marks]



(A) q / (2ε_0)

(B) φ / 3

(C) q/ε_0 - φ

(D) (1/2) * (q/ε_0 - φ)

Explanation:

Since φ_total = φ_A +φ_B + φ_C = q / ε_0,

where q is the total charge.

As shown in the figure, flux associated with the curved surface B is φ = φ_B

Let us assume flux linked with the plane surfaces A and C be Φ_A = φ_C = φ'

Therefore,

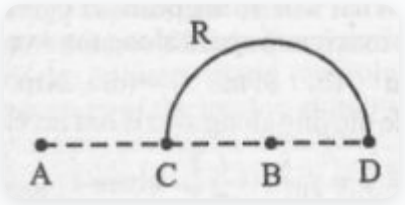
q / ε_0 = 2φ' +φ_B = 2φ' +φ

=> φ' = (1/2) * (q / ε_0 - φ)

Question 23.

Charges +q and -q are placed at points A and B respectively which are a distance 2L apart, C is the midpoint between A and B. The work done in moving a charge +Q along the semicircle CRD is

[4 Marks]



(A) - qQ / (6π ε_0 L)

(B) qQ / (6π ε_0 L)

(C) qQ / (2π ε_0 L)

(D) qQ / (4π ε_0 L)

Explanation:

Potential at C = V_C = 0

Potential at D = V_D

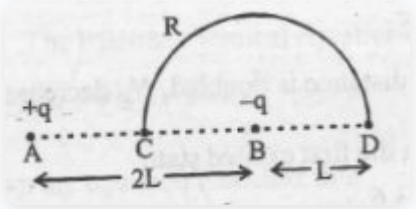
= k(-q/ L) + kq /3 L = -2 /3 kq / L

Potential difference

V_D - V_C = - 2/ 3 kq / L = 1 / (4π ε_0) *(- 2 / 3 .q / L)*

=> *Work done = Q(V_D - V_C)*

= *2/3* * 1 / (4π ε_0) (qQ / L) = -qQ / (6π ε_0 L)

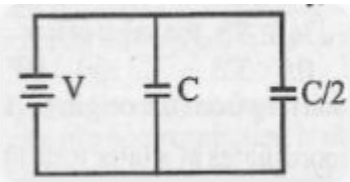


Question 24.

Two condensers, one of capacity C and other of capacity C/2 are connected to a V-volt battery, as shown.

The work done in charging fully both the condensers is

[4 Marks]



(A) (1/4) CV^2

(B) (3/4) CV^2

(C) (1/2) CV^2

(D) $2CV^2$

Explanation:

Work done = Change in energy

= $(1/2)(C + C/2)V^2 = (1/2)(3C / 2)V^2 = 3CV^2 / 4$

Question 25.

A steady current of 1.5 amp flows through a copper voltameter for 10 minutes. If the electrochemical equivalent of copper is 30×10^{-5} g coulomb^{-1}, the mass of copper deposited on the electrode will be

[4 Marks]

(A) 0.67 g

(B) 0.50 g

(C) 0.40 g

(D) 0.27 g

Explanation:

We have, m = ZIt

where, Z is the electrochemical equivalent of copper.

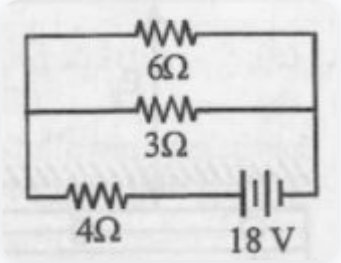
=> $m = 30 \times 10^{-5} \times 1.5 *10 \times 60$

= 0.27 gm

Question 26.

The total power dissipated in watts in the circuit shown here is

[4 Marks]



(A) 40

(B) 54

(C) 4

(D) 16

Explanation:

Power dissipated = P

= $V^2 / R = (18)^2 / 6 = 54$ W

Question 27.

Three resistances P, Q, R each of 2Ω and an unknown resistance S form the four arms of a Wheatstone bridge circuit. When a resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S?

[4 Marks]

(A) 3Ω

(B) 6Ω

(C) 2Ω

(D) 1Ω

Explanation:

A balanced wheatstone bridge simply requires

P / Q = R / S => 2 / 2 = 2 / S

Therefore, S should be 2Ω.

A resistance of 6Ω is connected in parallel.

In parallel combination,

1 / R = 1 / R_1 + 1 / R_2

1 / 2 = 1 / 6 + 1 / S => S = 3Ω

Question 28.

A beam of electron passes undeflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move

[4 Marks]

(A) along a parabolic path

(B) in a circular orbit

(C) in an elliptical orbit

(D) along a straight line

Explanation:

If the electric field is switched off, and the same magnetic field is maintained, the electrons move in a circular orbit and electron will travel a magnetic field perpendicular to its velocity.

Question 29.

In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semicircular path of radius R using a magnetic field B. If V and B are kept constant, the ratio (charge on the ion / mass of the ion) will be proportional to

[4 Marks]

(A) 1/R

(B) R

(C) $1/R^2$

(D) R^2

Explanation:

In mass spectrometer, when ions are accelerated through potential V

$(1/2)mv^2 = qV$ .....(i)

As the magnetic field curves the path of the ions in a semicircular orbit

$Bqv = mv^2 / R \Rightarrow v = BqR / m$ .....(ii)

Substituting (ii) in (i)

$(1/2)m \times (BqR / m)^2 = qV$

or $q / m = 2V / (B^2R^2)$

Since V and B are constants, therefore, $q / m \propto 1/R^2$

Question 30.

A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by

[4 Marks]

(A) qvR^2

(B) $qvR^2/2$

(C) qvR

(D) qvR/2

Explanation:

Magnetic moment, m = IA

$= (qv / (2\pi R)) \times (\pi R^2) = qvR / 2$

[I = q/T and $T = 2\pi R/v$]

Question 31.

Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius R with constant speed v. The time period of the motion

[4 Marks]

(A) depends on R and not on v

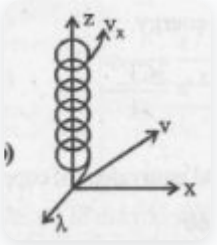
(B) depends on v and not on R

(C) depends on both R and v

(D) is independent of both R and v

Explanation:

When a test charge q_0 enters a magnetic field □□ directed along z-axis, with a velocity □□ making angles d with the z-axis. The time period of the motion is independent of R and v.



Question 32.

The resistance of an ammeter is 13 Ω and its scale is graduated for a current upto 100 amps. After an additional shunt has been connected to this ammeter it becomes possible to measure currents upto 750 amperes by this meter. The value of shunt-resistance is

[4 Marks]

(A) 20 Ω

(B) 0.2 Ω

(C) 2 kΩ

(D) 2 Ω

Explanation:

We know

$I / I_s = 1 + G / S$

$750 / 100 = 1 + 13 / S$

$S \Rightarrow 2\Omega$

Question 33.

Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show

[4 Marks]

(A) anti ferromagnetism

(B) no magnetic property

(C) diamagnetism

(D) paramagnetism

Explanation:

Beyond Curie temperature, ferromagnetic substances behaves like a paramagnetic substance.

Question 34.

What is the value of inductance L for which the current is maximum in a series LCR circuit with C = 10 μF and ω = 1000 s^{-1}?

[4 Marks]

(A) cannot be calculated unless R is known

(B) 1 mH

(C) 10 mH

(D) 100 mH

Explanation:

Condition for which the current is maximum in a series LCR circuit is,

$\omega = 1 / \sqrt{(LC)} \Rightarrow 1000 = 1 / \sqrt{(L(10 \times 10^{-6}))}$

$\Rightarrow L = 100$ mH

Question 35.

The primary and secondary coil of a transformer have 50 and 1500 turns respectively. If the magnetic flux φ linked with the primary coil is given by $\varphi = \varphi_0 + 4t$, where φ is in webers, t is time in seconds and φ_0 is a constant, the output voltage across the secondary coil is

[4 Marks]

(A) 30 volts

(B) 90 volts

(C) 120 volts

(D) 220 volts

Explanation:

Since $V_s / V_p = N_s / N_p$

Where

N_s = No. of turns across primary coil = 50

N_p = No. of turns across secondary coil = 1500

and $V_p = d\varphi/dt = d/dt(\varphi_0 + 4t) = 4$

=> $V_s = (1500 / 50) \times 4 = 120$ V

Question 36.

A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximately

[4 Marks]

(A) 90%

(B) 50%

(C) 10%

(D) 30%

Explanation:

Efficiency of the transformer

$\eta = P_{output} / P_{input} \times 100 = 100 / (220 \times 0.5) \times 100 = 90.9\%$

Question 37.

The electric and magnetic field of an electro-magnetic wave are

[4 Marks]

(A) in opposite phase and perpendicular to each other

(B) in opposite phase and parallel to each other

(C) in phase and perpendicular to each other

(D) in phase and parallel to each other

Explanation:

Variation in magnetic field causes electric field and vice-versa. In electromagnetic waves, □□ is perpendicular to □□. Both □□ and □□ are in the same phase.

In electromagnetic waves

$E = E_0 \sin(\omega t - kx)$

$B = B_0 \sin(\omega t - kx)$

The electromagnetic waves travel in the direction of (□□ x □□).

Question 38.

The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be

[4 Marks]

(A) 1.50

(B) 3.00

(C) 1.4

(D) 1.33

Explanation:

By using $v = n\lambda$

Here, $n = 2 \times 10^{14}$ Hz

$\lambda = 5000$ Å $= 5000 \times 10^{-10}$ m

$v = 2 \times 10^{14} \times 5000 \times 10^{-10} = 10^{8}$ m/s

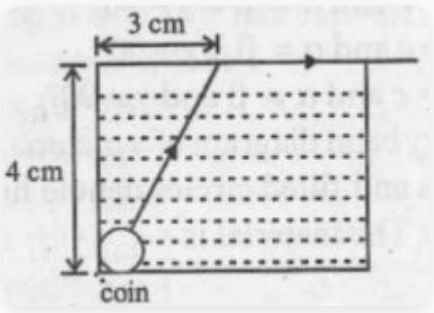
Refractive index of the material,

$\mu = c / v = (3 \times 10^{8}) / 10^{8} = 3$

Question 39.

A small coin is resting on the bottom of a beaker filled with liquid. A ray of light from the coin travels upto the surface of the liquid and moves along its surface. How fast is the light travelling in the liquid?

[4 Marks]



(A) 1.8 * 10^{8} m/s

(B) 2.4 * 10^{8} m/s

(C) $3.0 * 10^8$ m/s

(D) $1.2 * 10^8$ m/s

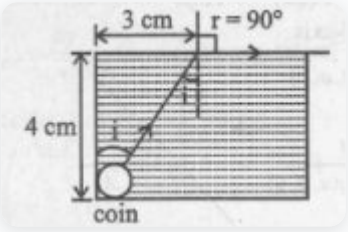
Explanation:

From pythagorus theorem, Hypotenuse comes out to be 5 cm.

Since, $1 / \mu = \sin i / \sin 90°$

$\mu = 1 / \sin i = 5 / 3$

Speed, $v = c / \mu = (3 * 10^8) / (5/3) = 1.8 * 10^8$ m/s



Question 40.

Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted, on the average, by the sources per second is

[4 Marks]

(A) 5×10^{14}

(B) 5×10^{15}

(C) 5×10^{17}

(D) 5×10^{16}

Explanation:

Since $p = nh\nu$

$\Rightarrow n = p / h\nu = (2 \times 10^{-3}) / (6.6 \times 10^{-34} \times 6 \times 10^{14}) = 5 \times 10^{15}$

Question 41.

Biological organisation starts with

[4 Marks]

(A) submicroscopic molecular level

(B) atomic level

(C) organismic level

(D) cellular level

Explanation:

Biological organisms starts with submicroscopic molecular level like viruses, bacteria etc.

Question 42.

The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for

[4 Marks]

(A) growth and movement

(B) interaction with the environment and progressive evolution

(C) responsiveness to touch

(D) reproduction

Explanation:

There are several factors and processes which differentiate living beings from non-living things like reproduction, respiration, growth etc. But among them, reproduction is the only difference, which differentiates living beings from non-living things without any exception.

Question 43.

ICBN stands for

[4 Marks]

(A) International Code of Botanical Nomenclature

(B) Indian Congress of Biological Names

(C) Indian Code of Botanical Nomenclature

(D) International congress of Biological Names

Explanation:

ICBN (International code of Botanical Nomenclature) - It is one of the code of nomenclature which is independent of zoological and bacteriological nomenclature.

Question 44.

Which one of the following statements about mycoplasma is wrong?

[4 Marks]

(A) They are sensitive to penicillin

(B) They are also called PPLO

(C) They cause diseases in plants

(D) They are pleomorphic

Explanation:

While working at the Rockefeller Institute, Brown reported isolation of a PPLO from human arthritic joint tissue in 1938. In 1949, Dienes reported to the 7th International Rheumatology Congress, the isolation of PPLO from the genitourinary tracts of men afflicted with arthritis. In discussing the significance of this observation, Brown reported successful treatment of arthritic patients in 1949 with a new antibiotic called aureomycin (Clark, 1997).

Question 45.

Which one of the following is a slime mould?

[4 Marks]

(A) Anabaena

(B) Rhizopus

(C) Thiobacillus

(D) Physarum

Explanation:

Physarum polycephalum belongs to phylum Amoebozoa, infraphylum Mycetozoa, and class Myxogastrea. *P. polycephalum*, often referred to as the “many-headed slime,” is a slime mold that inhabits shady, cool, moist areas, such as decaying leaves and logs.

Question 46.

Which pair of the following belongs to Basidiomycetes?

[4 Marks]

(A) birds nest fungi and puffballs

(B) Morchella and mushrooms

(C) puffballs and Claviceps

(D) peziza and stink horn

Explanation:

The class Basidiomycetes includes those members that produce their basidia and basidiospores on or in a basidiocarp.

Question 47.

Ergot of rye is caused by species of of

[4 Marks]

(A) Claviceps

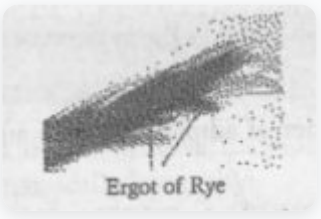
(B) Ustilago

(C) Phytophthora.

(D) Uncimula

Explanation:

Ergot of Rye is a plant disease that is caused by the fungus *Claviceps purpurea*. The so-called ergot that replaces the grain of the rye is a dark, purplish sclerotium, from which the sexual stage, of the life cycle will form after over wintering.



Question 48.

If you are asked to classify the algae into distinct groups, which of the following characters you should choose?

[4 Marks]

(A) chemical composition of the cell wall

(B) types of pigments present in the cell

(C) structural organisation of thallus

(D) nature of stored food materials in the cell

Explanation:

Algae are classified on the basis of types of pigment present in the cell, like Rhodophyceae shows presence of phycoerythrin, chlorophyceae shows presence of phycocyanin etc. Phaeophyceae contains the amount of the xanthophyll pigment such as fucoxanthin.

Question 49.

Spore dissemination in some liverworts is aided by

[4 Marks]

(A) calyptra

(B) peristome teeth

(C) elaters

(D) indisium

Explanation:

Elater is an elongated, spirally thickened, water-attracting cell in the capsule of a liverwort, derived from sporogenous tissue and assist in spore dispersal. In mosses calyptra is a structure initially present around sporophyte then break later. It is developed from venter wall after fertilization. It provides protective covering to the developing

Peristome teeth are found in the capsule of moss. These are present below operculum and are hygroscopic in nature.

Question 50.

In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times. As a result

[4 Marks]

(A) there is no change in success rate of fertilization

(B) one can conclude that the plant is apomictic

(C) there is high degree of sterility

(D) self-fertilization is prevented

Explanation:

In the prothallus of a vascular cryptogams the antherozoids and eggs mature at different times which result in failure of self-fertilisation.

Question 51.

Flagellated male gametes are present in all the three of which one of the following sets?

[4 Marks]

(A) Riccia, Dryopteris and Cycas

(B) Zygema, Saprolegnia and Hydrilla

(C) Fucus, Marsilea and Calotropis

(D) Anthoceros, Funaria and Spirogyra

Explanation:

The male gametes of bryophytes are biflagellate and those of pteridophytes are multiflagellate, except *Selaginella* having biflagellates gametes. The male gametes of gymnosperms are non-motile except those of *Cycas* having multiflagellate gametes.

Question 52.

In gymnosperms, the pollen chamber represents

[4 Marks]

(A) a cell in the pollen grain in which the sperms are formed

(B) the microsporangium in which pollen grains develop

(C) an opening in the megagametophyte through which the pollen tube approaches the egg

(D) a cavity in the ovule in which pollen grains are stored after pollination

Explanation:

In gymnosperms, the pollen chamber represents a cavity in the ovule in which pollen grains are stored after pollination within the pollen chamber, the generative cell nucleus divides to form two genetic nuclei and the tube cell elongates results in the formation of pollen tube, the pollen tube penetrates the female gametophyte and the sperm nuclei and then it pass through the tube. So, one of the sperm nuclei get fused with the egg results in the formation of zygote (diploid).

Question 53.

What is true about *Nereis*, scorpion, cockroach and silver fish?

[4 Marks]

(A) None of them is aquatic

(B) They all have jointed paired appendages

(C) They all possess dorsal heart

(D) They all belong to the same phylum

Explanation:

Nereis (belongs to class polychaeta of phylum Annelida), scorpion and cockroach (belonging to phylum arthropoda) and silver fish all have dorsal heart.

Question 54.

Which one of the following is a matching pair of a body feature and the animal possessing it?

[4 Marks]

(A) Pharyngeal gill slits absent in embryo — Chameleon

(B) ventral central nervous system — Leech

(C) Post-end tail — Octopus

(D) Ventral heart — Scorpion

Explanation:

Leech has ventral central nervous system which consists of nerve ring, a solid, double, mid ventral nerve cord with ganglia.

Question 55.

Which of the following pairs are correctly matched?
Animals – Morphological features
(i) Crocodile – 4-chambered heart
(ii) Sea urchin – Parapodia
(iii) Obelia – Thecodont
(iv) Lemur – Thecodont

[4 Marks]

(A) only (i) and (iv)

(B) (i), (iii) and (iv)

(C) only (i) and (ii)

(D) (ii), (iii) and (iv)

Explanation:

Crocodile belongs to class reptilia which has four chambered heart. Lemur teeth are embedded in the sockets of jaw, two of which is known as thecodont.

Question 56.

Which of the following is a flowering plant with nodules containing filamentous nitrogen-fixing micro-organism

[4 Marks]

(A) Cicer arietinum

(B) Casuarina equisetifolia

(C) Cycas revoluta

(D) Crotalaria juncea

Explanation:

It also know as Australian pine, which is a deciduous tree with a soft, wispy, pine-like appearance that can grow to 100 feet or more in height.

Question 57.

Passage cells are thin walled cells found in

[4 Marks]

(A) endodermis of roots facilitating rapid transport of water from cortex to pericycle

(B) central region of style through which the pollen tube grows towards the ovary

(C) testa of seeds to enable emergence of growing embryonic axis during seed germination

(D) phloem elements that are present as entry points for substance for transport to other plant parts

Explanation:

The innermost layer of the cortex is called endodermis. It comprises a single layer of barrel shaped cells without any intercellular spaces. In roots thick walled endodermal cells are interrupted by thin walled passage cells or transfer tissue.

Question 58.

For a critical study of secondary growth in plants, which one of the following pairs is suitable?

[4 Marks]

(A) sugarcane and sunflower

(B) wheat and maize and herb sunflower

(C) deodar and fern

(D) teak and pine

Explanation:

Teak and pine are most suitable for the study of critical secondary growth because in secondary growth, secondary tissues are formed from lateral meristem which is well developed in these two cases and secondary growth occurs in gymnosperms and dicots.

Question 59.

In which one of the following preparations are you likely to come across cell junctions most frequently?

[4 Marks]

(A) Tendon

(B) Ciliated epithelium

(C) Thironocytes

(D) Hyaline cartilage

Explanation:

It is ciliated epithelium which bears numerous delicate hair like outgrowths, the cilia, arising from basal granules. The cilia remains in rhythmic motion and creates current to transport the materials which comes in contact with them.

Question 60.

Select the wrong statement from the following

[4 Marks]

(A) Both chloroplasts and mitochondria contain an inner and an outer membrane

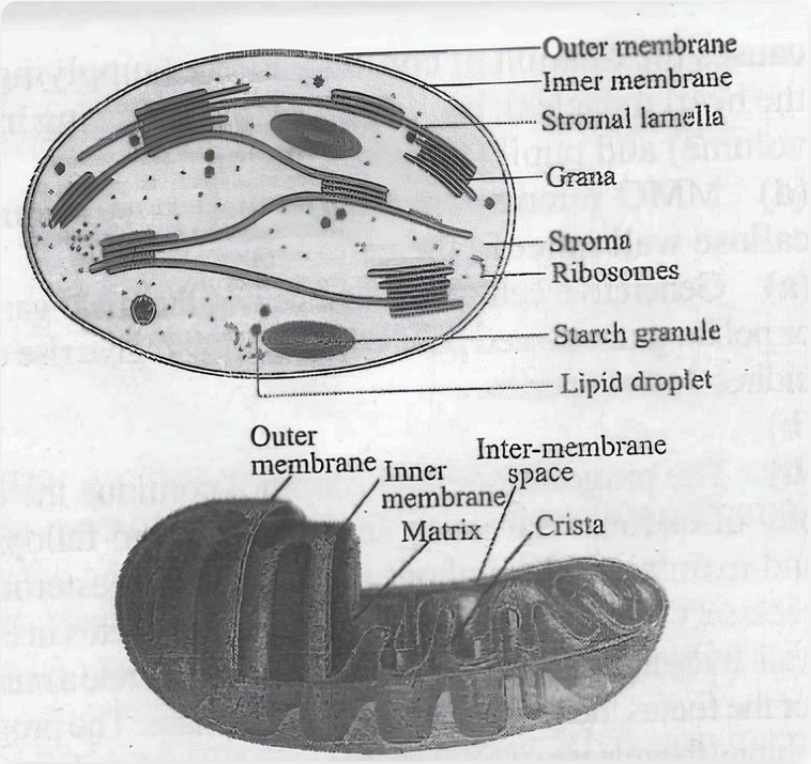
(B) Both chloroplasts and mitochondria contain DNA

(C) The chloroplasts are generally much larger than mitochondria

(D) Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane

Explanation:

Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by double membrane



Question 61.

Which one of the following is not a constituent of cell membrane?

[4 Marks]

(A) proline

(B) glycolipids

(C) cholesterol.

(D) phospholipids

Explanation:

Proline (symbol Pro or P) is a proteinogenic amino acid that is used in the biosynthesis of proteins.

Question 62.

A 5 watt source emits monochromatic light of wavelength 5000 Å. When placed 0.5 m away, it liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 1.0 m, the number of photoelectrons liberated will be reduced by a factor of

[4 Marks]

(A) 16

(B) 8

(C) 2

(D) 4

Explanation:

Number of emitted electrons $N_E \propto$ Intensity $\propto 1 / (\text{Distance})^2$ Therefore, as distance is doubled, N_E decreases by (1/4) times.

Question 63.

About 98 percent of the mass of every living organism is composed of just six elements including carbon, hydrogen, nitrogen, oxygen and

[4 Marks]

(A) magnesium and sodium

(B) sulphur and magnesium

(C) phosphorus and sulphur

(D) calcium and phosphorus

Explanation:

Calcium and phosphorus are the remaining elements.

Question 64.

The total energy of electron in the ground state of hydrogen atom is -13.6 eV. The kinetic energy of an electron in the first excited state is

[4 Marks]

(A) 6.8 eV

(B) 13.6 eV

(C) 1.7 eV

(D) 3.4 eV

Explanation:

Energy in the first excited state

= -13.6 / n^2 = -13.6 / 2^2 = -3.4 eV

But K.E. = -(Total energy) = +3.4 eV.

Question 65.

If the nucleus $^{27}_{13}$ Al has nuclear radius of about 3.6 fm, then $^{125}_{32}$Te would have its radius approximately as

[4 Marks]

(A) 9.6 fm

(B) 4.8 fm

(C) 12.0 fm

(D) 6.0 fm

Explanation:

It has been known that a nucleus of mass number A has radius

R = R_0 A^(1/3), where R_0 = 1.2 10^{-15} m

and A = mass number

In case of $^{27}_{13}$Al, let nuclear radius be R_1

and for $^{125}_{32}$Te, nuclear radius be R_2

For $^{27}_{13}$Al, R_1 = R_0 (27)^(1/3) = 3R_0

For $^{125}_{32}$Te, R_2 = R_0 (125)^(1/3) = 5R_0

R_2 / R_1 = 5R_0 / 3R_0

= 5 / 3R_1

= 5/3 × 3.6=6fm

Question 66.

Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure 7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will

[4 Marks]

(A) movement of water from Cell A to B.

(B) movement of water from cell B to A.

(C) no movement of water

(D) equilibrium between the two

Explanation:

Movement of water will be from low DPD to high DPD i.e from A to B.

The term diffusion pressure deficit (DPD) was coined by B. S. Meyer in 1938. Originally DPD was described as suction pressure by Renner (1915). It is a reduction in the diffusion pressure of water in solution or cell over its pure state due to the presence of solutes in it and forces opposing diffusion. Diffusion pressure deficit (DPD) is the amount by which two solutions differ in their diffusion pressure. It is defined as the amount by which the diffusion pressure of water of solvent in a solution is lower than that of pure water or solvent. It allows easy absorption of water due to diffusion pressure gradient.

Question 67.

A plant requires magnesium for

[4 Marks]

(A) chlorophyll synthesis

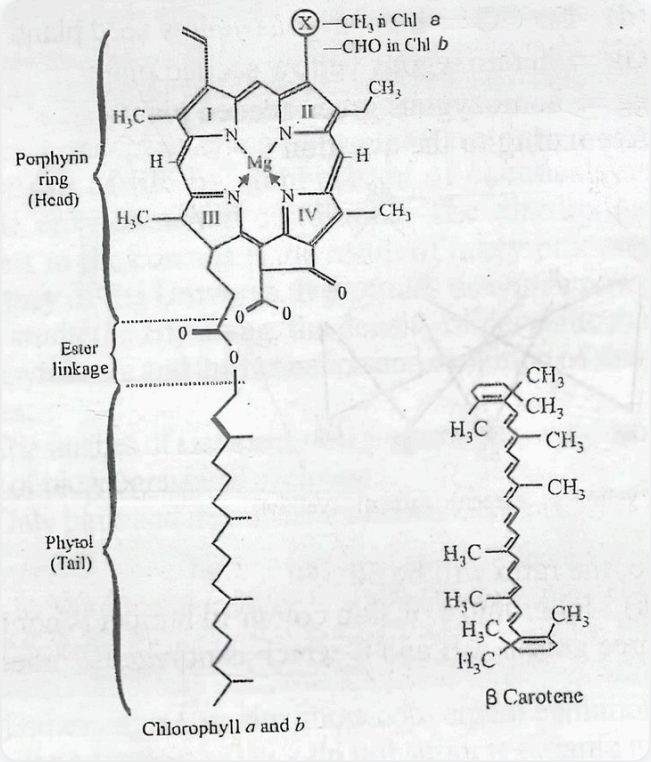
(B) protein synthesis

(C) cell wall development

(D) holding cells together.

Explanation:

A plant requires magnesium for chlorophyll synthesis. All four rings bind with metal atom magnesium (Mg^{++}), which remain present at the center of chlorophyll molecule.



Question 68.

A nucleus $^{A}_{Z}X$ has mass represented by M(A, Z). If M_p and M_n denote the mass of proton and neutron respectively and B.E. the binding energy in MeV, then

[4 Marks]

(A) B.E. = $M(A, Z) - ZM_p - (A - Z)M_n$

(B) B.E. = $[M(A, Z) - ZM_p - (A - Z)M_n]c^2$

(C) B.E. = $[ZM_p + ZM_n - M(A, Z)]c^2$

(D) B.E. = $[ZM_p + (A - Z)M_n - M(A, Z)]c^2$

Explanation:

The difference in mass of a nucleus and its constituents, ΔM, is called the mass defect and is given by

$\Delta M = [ZM_p + (A - Z)M_n] - M$

and binding energy = ΔMc^2

$= \{[ZM_p + (A - Z)M_n] - M\}c^2$

Question 69.

Which one of the following elements is not an essential micronutrient for plant growth?

[4 Marks]

(A) Zn

(B) Cu

(C) Ca

(D) Mn

Explanation:

Essential micro elements are Fe, Mn, Zn, B, Cu, Mo and essential macronutrients are C, H, N, P, S, Ca, K, Mg.

Question 70.

Two radioactive substances A and B have decay constants 5λ and λ respectively. At t = 0 they have the same number of nuclei. The ratio of number of nuclei of A to those of B will be $(1/e)^2$ after a time interval

[4 Marks]

(A) 2λ

(B) 1/(2λ)

(C) 1/(4λ)

(D) 4λ

Explanation:

$\lambda_A = 5\lambda$ and $\lambda_B = \lambda$

At t = 0, $(N_0)_A = (N_0)_B$

Given, $N_A / N_B = (1/e)^2$

According to radioactive decay,

$N / N_0 = e^{(-\lambda t)}$

Therefore, $N_A / (N_0)_A = e^{(-\lambda_A t)}$ .....(i)

$N_B / (N_0)_B = e^{(-\lambda_B t)}$ .....(ii)

From (1) and (2),

$N_A / N_B = e^{(-(5\lambda - \lambda)t)}$

$\Rightarrow (1/e)^2 = e^{(-4\lambda t)} = (1/e)^{(4\lambda t)}$

=> 4λt = 2

Therefore, t = 1 / (2λ).

Question 71.

In a radioactive decay process, the negatively charged emitted β-particles are

[4 Marks]

(A) the electrons produced as a result of the decay of neutrons inside the nucleus

(B) the electrons produced as a result of collisions between atoms

(C) the electrons orbiting around the nucleus

(D) the electrons present inside the nucleus

Explanation:

In beta minus decay (β^-), a neutron is transformed into a proton, and an electron is emitted from the nucleus along with antineutrino. n = p + e^- + ν_bar

Question 72.

The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is

[4 Marks]

(A) quinone

(B) cytochrome

(C) iron-sulphur protein

(D) ferredoxin

Explanation:

The first acceptor of electrons from an excited chlorophyll of PSII is quinone.

NOTES- Quinones represent a class of toxicological intermediates which can create a variety of hazardous effects in vivo, including acute cytotoxicity, immunotoxicity, and carcinogenesis. Quinones are Michael acceptors, and cellular damage can occur through alkylation of crucial cellular proteins and/or DNA.

Question 73.

For a cubic crystal structure which one of the following relations indicating the cell characteristics is correct?

[4 Marks]

(A) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90°$

(B) $a = b = c$ and $\alpha \neq b \neq \gamma = 90°$

(C) $a \neq b \neq c$ and $\alpha \neq \beta$ and $\gamma \neq 90°$

(D) $a = b = c$ and $\alpha = \beta = \gamma = 90°$

Explanation:

For a cubic crystal,

$a = b = c$ and $\alpha = \beta = \gamma = 90°$

Question 74.

The wavelength of light absorbed by Pr form of phytochrome is

[4 Marks]

(A) 680 nm

(B) 720 nm

(C) 620 nm

(D) 640 nm

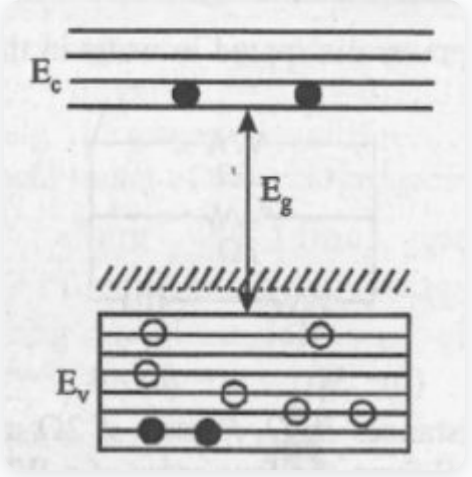
Explanation:

The Pr form absorbs light between 660 to 680 nm and absorbs at a peak of 666 nm. It is the form synthesized in dark-grown seedlings. When Pr absorbs red light, it is converted to the Pfr form.

Question 75.

In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is

[4 Marks]



(A) an insulator

(B) a metal

(C) an n-type semiconductor

(D) a p-type semiconductor

Explanation:

For a p-type semiconductor, the acceptor energy level, as shown in the diagram, is slightly above the top E_v of the valence band. With very small supply of energy an electron from the valence band can jump to the level E_A and ionise acceptor negatively.

Question 76.

A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance of 200 Ω. The power gain of the amplifier is

[4 Marks]

(A) 50

(B) 1250

(C) 500

(D) 1000

Explanation:

Power gain = voltage gain current gain

= $V_G \times I_G = (V_o / V_i) \times (I_o / I_i)$

= $(V_o)^2 \times (V_i)^2 \times (R_i / R_o) = 50 \times 50 \times 100 / 200$

= 2500 / 2 = 1250

Question 77.

In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of

[4 Marks]

(A) mesophyll

(B) epidermis

(C) bundle sheath

(D) phloem

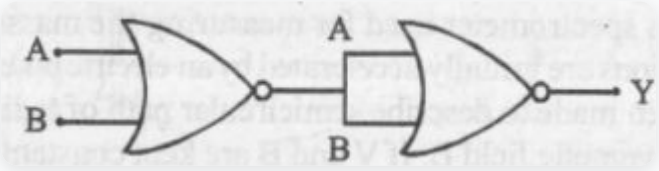
Explanation:

In C_4 plants, C_4 cycle occurs in mesophyll cells and C_3 -cycle occurs in bundle sheath cells.

Question 78.

In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table

[4 Marks]



(A)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(B)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

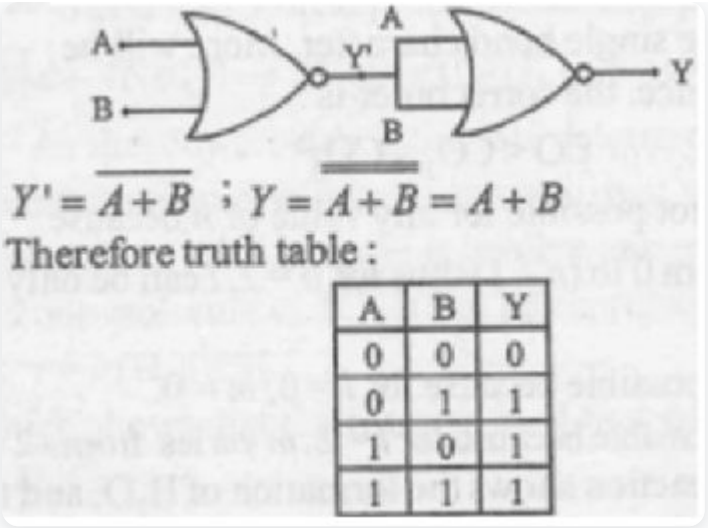
(C)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(D)

A	B	Y
0	1	1
0	1	1
1	0	1
1	1	0

Explanation:



$Y' = \overline{A+B}$; $Y = \overline{\overline{A+B}} = A+B$

Therefore truth table :

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

Question 79.

The C_4 plants have photosynthetic efficiency more than C_3 plants because

[4 Marks]

(A) they have more chloroplasts

(B) the CO_2 efflux is not prevented

(C) the CO_2 compensation point is more

(D) CO_2 generated during photorespiration is trapped and recycled through PCP carboxylase

Explanation:

The C_4 pathway allows photosynthesis to occur at very low concentrations of carbon dioxide as PEP carboxylase has an extremely high affinity for carbon dioxide. This pathway also works well at high temperatures and light intensity, enabling efficient photosynthesis in tropical plants.

Question 80.

All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membrane in eukaryotes and in cytosol in prokaryotes. This enzyme is

[4 Marks]

(A) isocitrate dehydrogenase

(B) malate dehydrogenase

(C) succinate dehydrogenase

(D) lactate dehydrogenase

Explanation:

Succinate dehydrogenase (SDH) or succinate-coenzyme Q reductase (SQR) or respiratory Complex II is an enzyme complex, found in many bacterial cells and in the inner mitochondrial membrane of eukaryotes.

It is the only enzyme that participates in both the citric acid cycle and the electron transport chain. Succinate dehydrogenase catalyses the oxidation of succinate to fumarate in the citric acid cycle by simultaneously reducing ubiquinone to ubiquinol in the electron transport chain.

Question 81.

The overall goal of glycolysis, krebs cycle and the electron transport system is the formation of

[4 Marks]

(A) ATP in one large oxidation reaction

(B) sugars

(C) nucleic acids

(D) ATP in small stepwise units.

Explanation:

Glycolysis, Krebs cycle and electron transport system, they all give ATP which is the main energy currency of our body. Glycolysis takes place in cytoplasm, Krebs cycle also occurs in cytoplasm while ETS takes place in the mitochondria.

Question 82.

Opening of floral buds into flowers, is a type of

[4 Marks]

(A) autonomic movement of variation

(B) paratonic movement of growth

(C) autonomic movement of growth

(D) autonomic movement of locomotion.

Explanation:

Opening of floral buds into flowers, is a type of autonomic movement of growth which is dependent.

NOTES

Epinasty is caused by ethylene that is released by the leaves and roots are flooded. Flooded roots

make ACC, the precursor to ethylene, and this is transported up the xylem stream where to leaf where it is converted to the gas hormone.

Question 83.

Which one of the following pairs, is not correctly matched?

[4 Marks]

(A) Gibberellic acid - Leaf fall

(B) Cytokinin - Cell wall elongation

(C) Abscisic acid - Stomatal closure.

(D) IAA - Cell wall elongation

Explanation:

Gibberellic acid stimulates cell growth of leaves and stem causing their expansion, elongation respectively and leaf fall is controlled by ABA.

Question 84.

The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is

[4 Marks]

(A) 1

(B) 3/5

(C) 4/5

(D) 2/5

Explanation:

The balance chemical equation is:

$2MnO_4^- + 6H^+ + 5SO_3^{2-} \rightarrow 2Mn^{2+} + 5SO_4^{2-} + 3H_2O$ From the equation it is clear that

Moles of MnO_4^- require to oxidise 5 moles of SO_3^{2-} are 2

Moles of MnO_4^- require to oxidise 1 mole of SO_3^{2-} are 2/5.

Question 85.

Identify the correct order of the size of the following:

[4 Marks]

(A) $Ca^{2+} < Ar < K^{+} < Cl^{-} < S^{2-}$

(B) $Ca^{2+} < K^{+} < Ar < S^{2-} < Cl^{-}$

(C) $Ar < Ca^{2+} < K^{+} < Cl^{-} < S^{2-}$

(D) $Ca^{2+} < K^{+} < Ar < Cl^{-} < S^{2-}$

Explanation:

For isoelectronic species, size of anion increases as negative charge increases whereas size of cation decreases with increase in positive charge. Further ionic radii of anions is more than that of cations. Thus the correct order is

$Ca^{2+} < K^{+} < Ar < Cl^{-} < S^{2-}$

Question 86.

An element, X has the following isotopic composition:

^{200}X : 90%

^{199}X : 8.0%

^{202}X : 2.0%

The weighted average atomic mass of the naturally occuring element X is closest to

[4 Marks]

(A) 200 amu

(B) 202 amu

(C) 199 amu

(D) 201 amu

Explanation:

Average isotopic mass of X = (200 × 90 + 199 × 8 + 202 × 2) / (90 + 8 + 2)

= (18000 + 1592 + 404) / 100

= 19996 / 100 = 199.96 ≈ 200 amu

Question 87.

In which of the following pairs, the two species are isostructural?

[4 Marks]

(A) SO_3^{2-} and NO_3^-

(B) BrO_3^- and XeO_3

(C) SF_4 and XeF_4

(D) BF_3 an NF_3

Explanation:

Hybridization of Br in BrO_3^-

H = (1/2) × (7 + 0 - 0 + 1) = 4

hybridization = sp^3

Hybridization of Xe in XeO_3

H = (1/2) × (8 + 0 - 0 + 0) = 4

Hybridization = sp^3

In both cases, the structure is trigonal pyramidal.

Question 88.

Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g mL^{-1}. Volume of acid required to make one litre of 0.1M H_2SO_4 solution is

[4 Marks]

(A) 11.10 mL

(B) 5.55 mL

(C) 22.20 mL

(D) 16.65 mL

Explanation:

Molarity of H_2SO_4 solution

= (98 × 1000) / (98 × 100) × 1.80 = 18.0

Suppose V mL of this H_2SO_4 is used to prepare 1 lit. of 0.1M H_2SO_4

Therefore, V × 18.0 = 1000 × 0.1

or V = (1000 × 0.1) / 18.0 = 5.55 mL.

Question 89.

The correct order of C-O bond length among CO, CO_3^{2-}, CO_2 is

[4 Marks]

(A) $CO_3^{2-} < CO_2 < CO$

(B) $CO < CO_2 < CO_3^{2-}$

(C) $CO < CO_3^{2-} < CO_2$

(D) $CO_2 < CO_3^{2-} < CO$

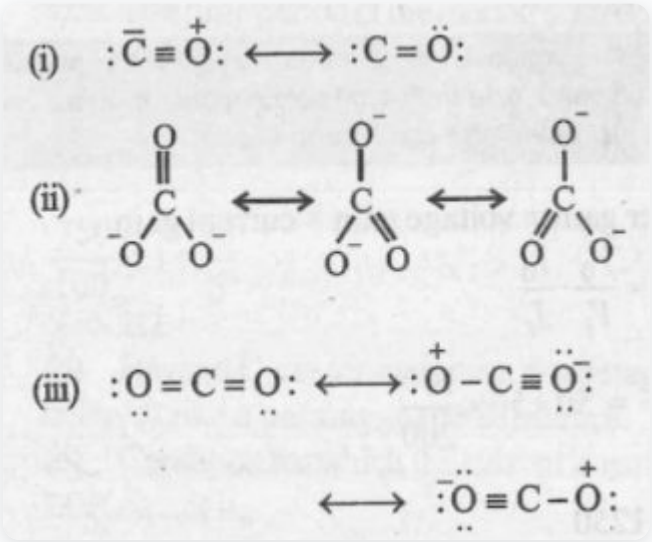
Explanation:

All these structures exhibits resonance and can be represented by the following resonating structures.

More is the single bond character. More will be the bond length.

Hence, the correct order is:

$CO < CO_2 < CO_3^{2-}$



Question 90.

Consider the following sets of quantum numbers:

Which of the following sets of quantum number is not possible?

[4 Marks]

	n	l	m	s
(i)	3	0	0	+1/2
(ii)	2	2	1	+1/2
(iii)	4	3	−2	−1/2
(iv)	1	0	−1	−1/2
(v)	3	2	3	+1/2

(A) (i), (ii), (iii) and (iv)

(B) (ii), (iv) and (v)

(C) (i) and (iii)

(D) (ii), (iii) and (iv)

Explanation:

(ii) is not possible for any value of n because

l varies from 0 to (n - 1) thus for n = 2, l can be only 0 and 1.

(iv) is not possible because for l = 0, m = 0.

(v) is not possible because for l = 2, m varies from -2 to +2.

Question 91.

Consider the following reactions:

Enthalpy of formation of H_2O (l) is

[4 Marks]

(i) $H^+(aq) + OH^-(aq) = H_2O(l)$, $\Delta H = -X_1$ kJ mol^{-1}

(ii) $H_2(g) + \frac{1}{2}O_2(g) = H_2O(l)$, $\Delta H = -X_2$ kJ mol^{-1}

(iii) $CO_2(g) + H_2(g) = CO(g) + H_2O$, $\Delta H = -X_3$ kJ mol^{-1}

(iv) $C_2H_2(g) + \frac{5}{2}O_2(g) = 2CO_2(g) + H_2O(l)$, $\Delta H = +4X_4$ kJ mol^{-1}

(A) $+X_1$ kJ mol^{-1}

(B) $+X_3$ kJ mol^{-1}

(C) $-X_2$ kJ mol^{-1}

(D) $-X_4$ kJ mol^{-1}

Explanation:

This reaction shows the formation of H_2O, and the X_2 represents the enthalpy of formation of H_2O.

Question 92.

Which one of the following ionic species has the greatest proton affinity to form stable compound?

[4 Marks]

(A) NH_2^-

(B) F^-

(C) I^-

(D) HS^-

Explanation:

Proton affinity decreases in moving across the period from left to right due to increase in charge, within a group the proton affinities decreases from top to bottom.

Nitrogen family > Oxygen family > Halogens

Question 93.

Which of the following electronic configuration of an atom has the lowest ionisation enthalpy?

[4 Marks]

(A) $1s^2\ 2s^2\ 2p^3$

(B) $1s^2\ 2s^2\ 2p^6$

(C) $1s^2\ 2s^2\ 2p^5$

(D) $1s^2\ 2s^2\ 2p^5\ 3s^1$

Explanation:

$1s^2$, $2s^2$, $2p^5$, $3s^1$ is an unstable configuration with the outermost electron in 3rd orbit. Hence, it has lowest ionisation enthalpy.

Question 94.

Given that bond energies of H - H and Cl - Cl are 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol^{-1}, bond enthalpy of HCl is

[4 Marks]

(A) 380 kJ mol^{-1}

(B) 425 kJ mol^{-1}

(C) 290 kJ mol^{-1}

(D) 245 kJ mol^{-1}

Explanation:

$(1/2)H_2 + (1/2)Cl_2 \rightarrow HCl$

$\Delta H_{HCl} = \sum$ B.E. of reactant

$- \sum$ B.E. of products

-90 = (1/2) 430 + (1/2) 240 - B.E. of HCl

Therefore, B.E. of HCl = 215 + 120 + 90

= 425 kJ mol^{-1}

Question 95.

The order of decreasing reactivity towards an electrophilic reagent, for the following would be

(i) benzene

(ii) toluene

(iii) chlorobenzene

(iv) phenol

[4 Marks]

(A) (ii) > (iv) > (i) > (iii)

(B) (iv) > (iii) > (ii) > (i)

(C) (iv) > (ii) > (i) > (iii)

(D) (i) > (ii) > (iii) > (iv)

Explanation:

Electrophiles have high affinity for electrons. They attack at the site where electron-density is highest. Electron donating groups increases the electron density. The electron donating tendency decreases in the order:

-OH > $-CH_3$ > -H > -Cl

Therefore, the correct order of reactivity towards electrophile is

phenol > toluene > benzene > chlorobenzene

Question 96.

The following equilibrium constants are given:

$N_2 + 3H_2 \rightleftharpoons 2NH_3$; K_1

$N_2 + O_2 \rightleftharpoons 2NO$; K_2

$H_2 + (1/2)O_2 \rightleftharpoons H_2O$; K_3

The equilibrium constant for the oxidation of 2 moles NH_3 by oxygen to give NO is

[4 Marks]

(A) $K_2 K_3^3 / K_1$

(B) $K_1 K_2 / K_3$

(C) $K_2^2 K_3 / K_1$

(D) $K_2 K_3^2 / K_1$

Explanation:

Given,

$N_2 + 3H_2 \rightleftharpoons 2NH_3$; K_1.....(i)

$N_2 + O_2 \rightleftharpoons 2NO$; K_2 .....(ii)

$H_2 + (1/2)O_2 \rightleftharpoons H_2O$; K_3 .....(iii)

We have to calculate

$4NH_3 + 5O_2$ -> $4NO + 6H_2O$; K = ?

or $2NH_3 + (5/2)O_2$ -> $2NO + 3H_2O$

For this equation, K = $[NO]^2 [H_2O]^3 / ([NH_3]^2 [O_2]^{(5/2)})$

but $K_1 = [NH_3]^2 / ([N_2][H_2]^3)$, $K_2 = [NO]^2 / ([N_2][O_2])$

&$K_3 = [H_2O] / ([H_2][O_2]^{(1/2)})$ or $K_3^3 = [H_2O]^3 / ([H_2]^3 [O_2]^{(3/2)})$

Now operate, $(K_2 . K_3^3) / K_1$

$= ([NO]^2 / ([N_2][O_2]))*([H_2O]^3 / ([H_2]^3 [O_2]^{(3/2)})). ([N_2][H_2]^3 / [NH_3]^2)$

$= ([NO]^2 [H_2O]^3) / ([NH_3]^2 [O_2]^{(5/2)}) = K$

Therefore, $K = K_2 . K_3^3 / K_1$

Question 97.

Calculate the pOH of a solution at 25°C that contains $1 * 10^{-10}$ M of hydronium ions, i.e. H_3O^+.

[4 Marks]

(A) 9.0000

(B) 1.000

(C) 4.000

(D) 7.000

Explanation:

Given $[H_3O^+] = 1 * 10^{-10}$ M

at 25°C $[H_3O^+][OH^-] = 10^{-14}$

Therefore, $[OH^-] = 10^{-14} / 10^{-10} = 10^{-4}$

Now, $[OH^-] = 10^{(-pOH)} = 10^{-4}$

Therefore, pOH = 4

Question 98.

A weak acid, HA, has a K_a of 1.00×10^{-5}. If 0.100 mol of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to

[4 Marks]

(A) 0.100%

(B) 99.0%

(C) 99.9%

(D) 1.00%

Explanation:

Given $K_a = 1.00 \times 10^{-5}$, C = 0.100 mol

for a weak electrolyte,

degree of dissociation

$\alpha = \sqrt{(K_a / C)} = \sqrt{(1 \times 10^{-5} / 0.100)} = 10^{-2} = 1\%$

Question 99.

The fraction of total volume occupied by the atoms present in a simple cube is

[4 Marks]

(A) π / (3√2)

(B) π / (4√2)

(C) π / 4

(D) π / 6

Explanation:

Number of atoms per unit cell = 1

Atoms touch each other along edges. Hence

r = a / 2

(r = radius of atom and a = edge length)

Therefore % fraction = $((4/3)\pi r^3) / (2r)^3 = \pi / 6 = 0.52$

Question 100.

The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is

[4 Marks]

(A) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

(B) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

(C) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$

(D) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$

Explanation:

As the cation size increases down the group, the metal carbonates become more ionic in nature. Hence, the thermal stability increases as: $BeCO_3 < MgCO_3 < CaCO_3$.

The ionic character of group 1 carbonates is more than that of group 2, thus they possess more thermal stability. Hence, the correct order of thermal stability: $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$.

Question 101.

If NaCl is doped with 10^{-4} mol % of $SrCl_2$, the concentration of cation vacancies will be ($N_A = 6.02 \times 10^{23}$ mol^{-1})

[4 Marks]

(A) $6.02 * 10^{15}$ mol^{-1}

(B) $6.02 * 10^{14}$ mol^{-1}

(C) $6.02 * 10^{17}$ mol^{-1}

(D) $6.02 * 10^{16}$ mol^{-1}

Explanation:

For each Sr^{2+} ion added, one Na^+ ion is removed to maintain the electrical neutrality.

Hence concentration of cation vacancies = mole % of $SrCl_2$ added = 10^{-4} mole %

$= (10^{-4} / 100) \times 6.023 \times 10^{23} = 6.023 \times 10^{17}$

Question 102.

In which of the following the hydration energy is higher than the lattice energy?

[4 Marks]

(A) $MgSO_4$

(B) $RaSO_4$

(C) $BaSO_4$

(D) $SrSO_4$

Explanation:

The solubility and the hydration energy of sulphates of alkaline earth metals decreases as we move down the group from Be to Ba due to the reason that ionic size increases down the group. The lattice energy remains constant because sulphate ion is so large, so that small change in cationic sizes do not make any difference. Thus the order will be:

$BeSO_4 > MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4$

Question 103.

0.5 molal aqueous solution of a weak acid (HX) is 20% ionised. If K_f for water is 1.86 K kg mol^{-1}, the lowering in freezing point of the solution is

[4 Marks]

(A) 0.56 K

(B) 1.12 K

(C) -1.12 K

(D) -0.56 K

Explanation:

As $\Delta T_f = i \times K_f m$

For

	HX	$\rightleftharpoons$	H^+	+	X^-
t = 0	1		0		0
t_{eq}	(1 − 0.20)		0.20		0.20

Total no. of moles $= 1 - 0.20 + 0.20 + 0.20$

$= 1 + 0.20 = 1.2$

$\therefore \Delta T_f = 1.2 \times 1.86 \times 0.5 = 1.1160 \approx 1.12\,K$

Question 104.

Which of the compounds with molecular formula C_5H_{10} yields acetone on ozonolysis?

[4 Marks]

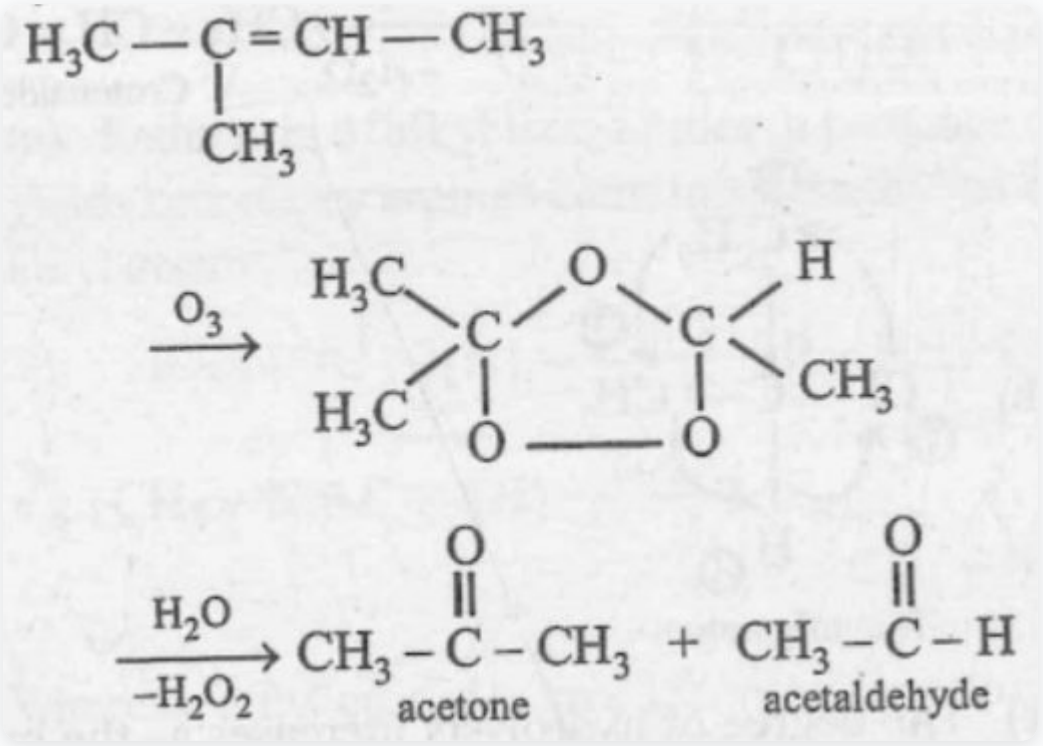
(A) 2-methyl-2-butene

(B) cyclopentane

(C) 2-methyl-1-butene

(D) 3-methyl-1-butene

Explanation:



Question 105.

The equilibrium constant of the reaction:

$Cu(s) + 2Ag^+(aq) \longrightarrow Cu^{2+}(aq) + 2Ag(s)$; $E° = 0.46$ V at 298 K is

[4 Marks]

(A) 2.4×10^{10}

(B) 4.0×10^{10}

(C) 4.0×10^{15}

(D) 2.0×10^{10}

Explanation:

As $E°_{cell} = (0.0591 / n) \times \log K_c$

Therefore, $0.46 = (0.0591 / 2) \times \log K_c$

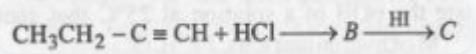
Therefore, log K_c = (2 × 0.46) / 0.0591 = 15.57

or K_c = Antilog 15.57 = $3.7 \times 10^{15} \approx 4 \times 10^{15}$

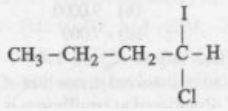
Question 106.

Predict the product C obtained in the following reaction of butyne-1.

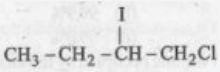
[4 Marks]



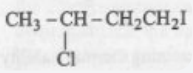
(A)



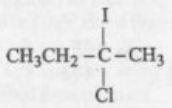
(B)



(C)

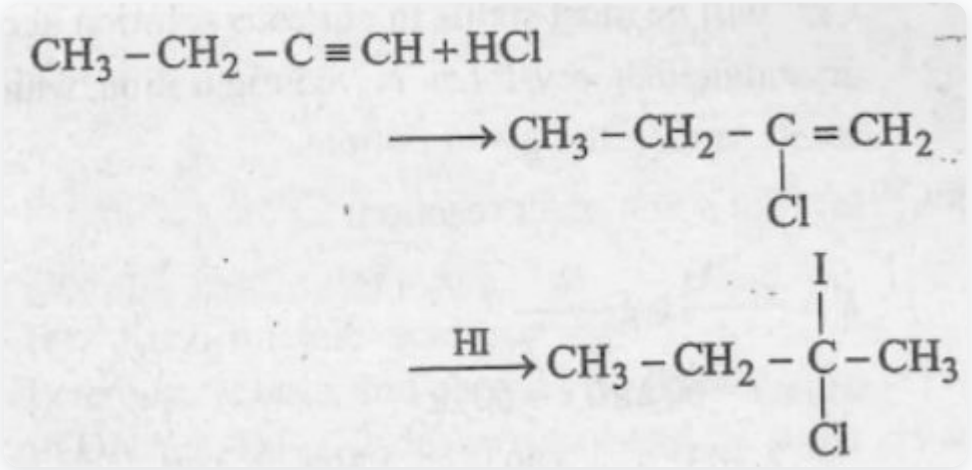


(D)



Explanation:

According to Markownikoff's rule which states that when an unsymmetrical alkene undergo hydrohalogenation, the negative part goes to the C-atom which contain lesser no. of H-atom.



Question 107.

The efficiency of a fuel cell is given by

[4 Marks]

(A) ΔS / ΔG

(B) ΔH / ΔG

(C) ΔG / ΔH

(D) ΔG / ΔS

Explanation:

Efficiency of a fuel cell (η) = ΔG / ΔH

Question 108.

Sulphide ores of metals are usually concentrated by froth flotation process. Which one of the following sulphide ores offer an exception and concentrated by chemical leaching?

[4 Marks]

(A) Argentite

(B) Copper pyrite

(C) Galena

(D) Sphalerite

Explanation:

Leaching is the selective dissolution of the desired mineral leaving behind the impurities in a suitable dissolving agent, e.g. Argentite or Silver glance, Ag_2S is an ore of silver. Silver is extracted from argentite by the mac-Arthur and Forest process (leaching process).

$Ag_2S + 4NaCN \longrightarrow 2Na[Ag(CN)_2] + Na_2S$

Question 109.

The reaction of hydrogen and iodine monochloride is given as:

$H_2(g) + 2ICl(g) \longrightarrow 2HCl(g) + I_2(g)$

The reaction is of first order with respect to $H_2(g)$ and ICl(g), following mechanisms were proposed.

Mechanism A:

$H_2(g) + 2ICl(g) \longrightarrow 2HCl(g) + I_2(g)$

Mechanism B:

$H_2(g) + ICl(g) \longrightarrow HI(g)$; slow

$HI(g) + ICl(g) \longrightarrow HCl(g) + I_2(g)$; fast

Which of the above mechanism(s) can be consistent with the given information about the reaction?

[4 Marks]

(A) B only

(B) A and B both

(C) neither A nor B

(D) A only

Explanation:

As the slowest step is the rate determining step thus the mechanism B will be more consistent with the given information. Also because it involve one molecule of H_2 and one molecule of ICl, it can be expressed as:

$r = k[H_2][ICl]$

Which shows that the reaction is of first order w.r.t. both H_2 & ICl.

Question 110.

Which one of the following orders correctly represents the increasing acid strengths of the given acids?

[4 Marks]

(A) $HOCl < HOClO < HOClO_2 < HOClO_3$

(B) $HOClO < HOCl < HOClO_3 < HOClO_2$

(C) $HOClO_3 < HOClO_2 < HOClO < HOCl$

(D) $HOClO_2 < HOClO_3 < HOClO < HOCl$

Explanation:

HOCl (+1) < HOClO (+3) < $HOClO_2$ (+5) < $HOClO_3$ (+7)

Question 111.

In a first-order reaction A ⟶ B, if k is rate constant and initial concentration of the reactant A is 0.5 M, then the half-life is

[4 Marks]

(A) log 2 / k √0.5)

(B) 0.693 / 0.5k

(C) ln 2 / k

(D) log 2 / k

Explanation:

For a first order reaction

$k = (2.303 / t) \times \log_{10}(a / (a - x))$

when t = t_(1/2)

$k = (2.303 / t_{(1/2)}) \times \log_{10}(a / (a - a/2))$

or $t_{(1/2)} = (2.303 / k) \times \log_{10} 2 = \ln 2 / k$

Question 112.

Which one of the following ions is the most stable in aqueous solution?

[4 Marks]

(A) Mn^{3+}

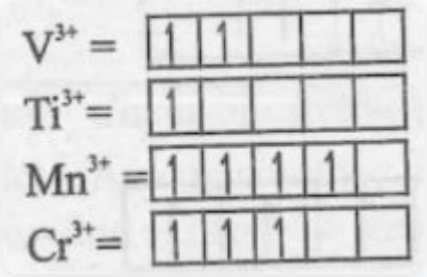
(B) Cr^{3+}

(C) V^{3+}

(D) Ti^{3+}

Explanation:

Cr^{3+} will be most stable in aqueous solution according to crystal field theory. It has t_2_g^3 configuration, which is most stable among the given options.



Question 113.

If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately (log 4 = 0.60, log 5 = 0.69)

[4 Marks]

(A) 45 minutes

(B) 50 minutes

(C) 60 minutes

(D) 40 minutes

Explanation:

For a first order reaction

$k = (2.303 / t) \times \log(a / (a - x))$

when t = 60 and x = 60%

$k = (2.303 / 60) \times \log(100 / (100 - 60))$

$= (2.303 / 60) \times \log(100 / 40)$

$= 0.0153$

Now,

$t_{(1/2)} = (2.303 / 0.0153) \times \log(100 / (100 - 50))$

$= (2.303 / 0.0153) \times \log 2$

$= (2.303 / 0.0153) \times 0.3010$

$= 45.31$ min.

Question 114.

Identify the incorrect statement among the following:

[4 Marks]

(A) Lanthanoid contraction is the accumulation of successive shrinkages.

(B) Shielding power of 4f electrons is quite weak.

(C) As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements.

(D) There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.

Explanation:

Due to lanthanoid contraction the properties of 4d series of the transition element have similarities with the 5d series of elements.

Question 115.

The Langmuir adsorption isotherm is deduced using the assumption:

[4 Marks]

(A) the adsorption sites are equivalent in their ability to adsorb the particles

(B) the heat of adsorption varies with coverage

(C) the adsorbed molecules interact with each other

(D) the adsorption takes place in multilayers.

Explanation:

Langmuir adsorption isotherm is based on the assumption that every adsorption site is equivalent and the ability of a particle to bind there is independent of whether or not nearby sites are occupied.

Question 116.

Which of the following will give a pair of enantiomorphs?

[4 Marks]

(A) $[Cr(NH_3)_6][Co(CN)_6]$

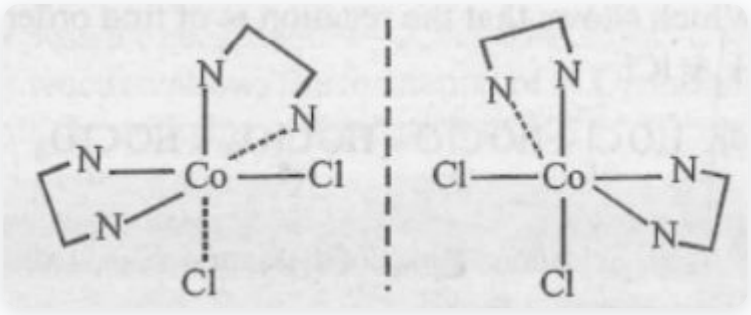
(B) $[Co(en)_2Cl_2]Cl$

(C) $[Pt(NH_3)_4][PtCl_6]$

(D) $[Co(NH_3)_4Cl_2]NO_2$. (en = $NH_2CH_2CH_2NH_2$)

Explanation:

Non-superimposable mirror images are called optical isomers and may be described as 'chiral'. They are also called enantiomers and rotate plane polarised light in opposite directions.



Question 117.

Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

[4 Marks]

(A) The ΔG°_f of the sulphide is greater than those for CS_2 and H_2S.

(B) The ΔG°_f is negative for roasting of sulphide ore to oxide.

(C) Carbon and hydrogen are suitable reducing agents for metal sulphides.

(D) Roasting of the sulphide to the oxide is thermodynamically feasible.

Explanation:

The sulphide ore is roasted to oxide before reduction because the ΔG°_f of most of the sulphides are greater than those of CS_2 and H_2S, therefore, neither C nor H can reduce metal sulphide to metal. Further, the standard free energies of formation of oxide are much less than those of SO_2. Hence, oxidation of metal sulphides to metal oxide is thermodynamically favourable.

Question 118.

The d electron configurations of Cr^{2+}, Mn^{2+}, Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?

(At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28)

[4 Marks]

(A) $[Mn(H_2O)_6]^{2+}$

(B) $[Cr(H_2O)_6]^{2+}$

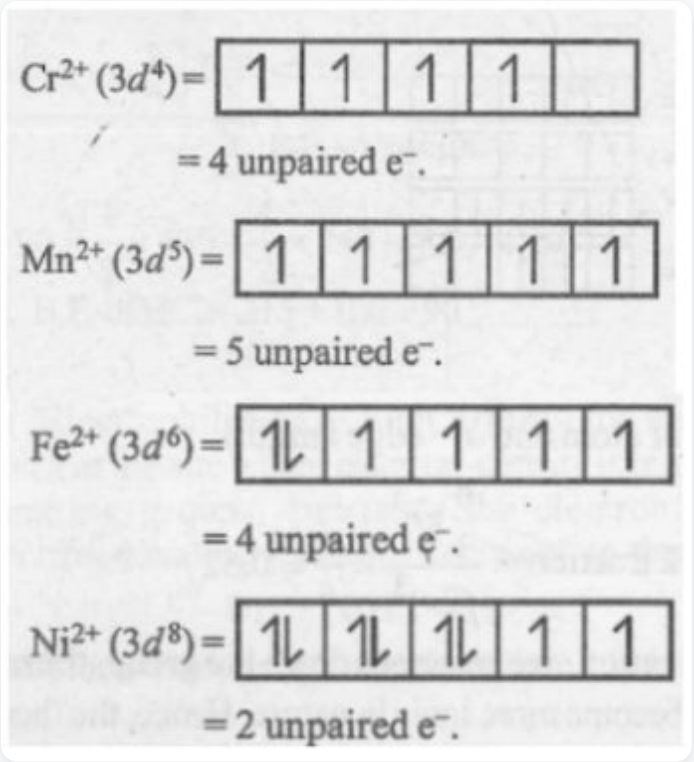
(C) $[Fe(H_2O)_6]^{2+}$

(D) $[Ni(H_2O)_6]^{2+}$

Explanation:

Lesser is the number of unpaired electrons smaller will be the paramagnetic behaviour. As Cr^{2+}, Mn^{2+}, Fe^{2+} & Ni^{2+} contains.

As Ni^{2+} has minimum no. of unpaired e^- thus this is least paramagnetic.



Question 119.

If there is no rotation of plane polarised light by a compound in a specific solvent, though to be chiral, it may mean that

[4 Marks]

(A) the compound is certainly meso

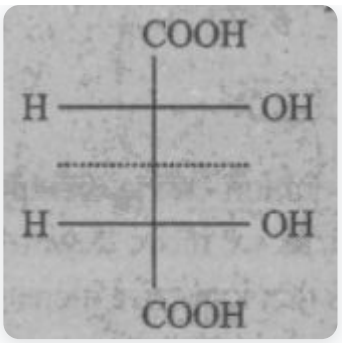
(B) the compound is certainly achiral.

(C) there is no compound in the solvent

(D) the compound may be a racemic mixture

Explanation:

Compounds which do not show optical activity in spite of the presence of chiral carbon atoms are called meso-compounds.



Question 120.

The product formed in Aldol condensation is

[4 Marks]

(A) A beta-hydroxy acid

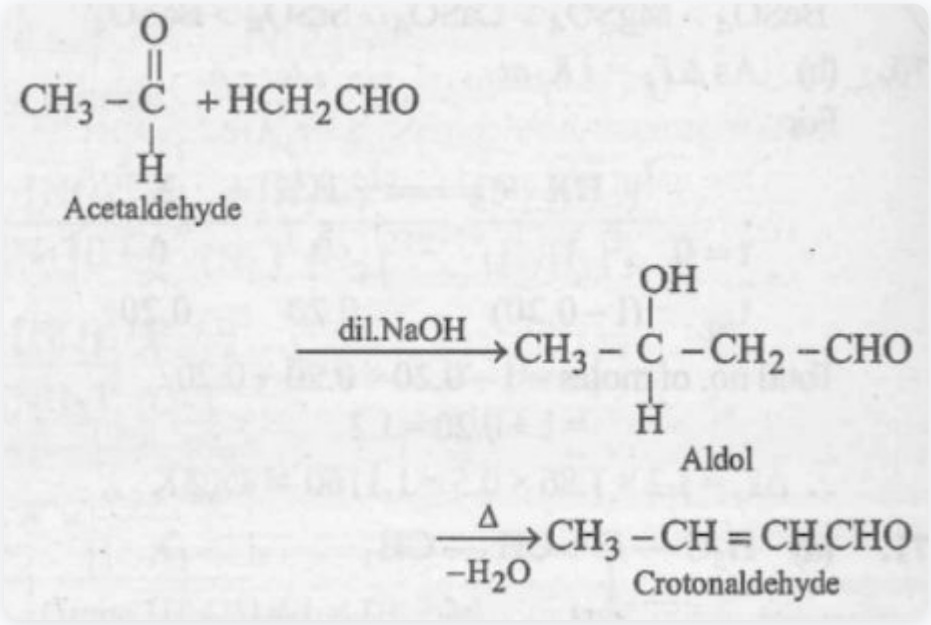
(B) An alpha, beta unsaturated ester

(C) An alpha-hydroxy aldehyde or ketone

(D) A beta-hydroxy aldehyde or a beta-hydroxy ketone

Explanation:

Aldehydes and ketones having at least one α-hydrogen atom in presence of dilute alkali give β-hydroxy aldehyde or β-hydroxy ketone.



Question 121.

CH_3 - CHCl - CH_2 - CH_3 has a chiral centre. Which one of the following represents its R-configuration?

[4 Marks]

(A)



(B)



(C)

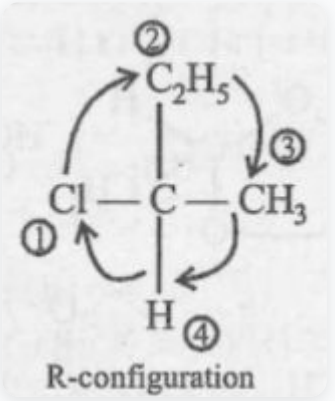


(D)



Explanation:

Aldehydes and ketones having at least one α-hydrogen atom in presence of dilute alkali give β-hydroxy aldehyde or β-hydroxy ketone.

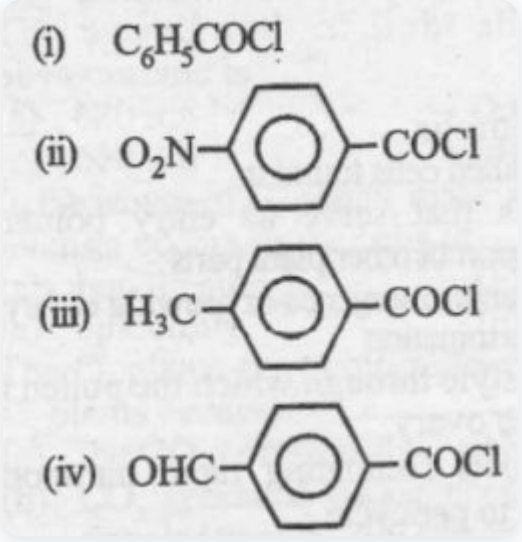


Question 122.

Consider the following compounds.

The correct decreasing order of their reactivity towards hydrolysis is

[4 Marks]



(A) (ii) > (iv) > (iii) > (i)

(B) (ii) > (iv) > (i) > (iii)

(C) (iv) > (ii) > (i) > (iii)

(D) (i) > (ii) > (iii) > (iv)

Explanation:

The degree of hydrolysis increases as the magnitude of positive charge on carbonyl group increases. Electron withdrawing group increases the positive charge and electron releasing group decreases the positive charge. Among these NO_2 & -CHO are electron withdrawing group from which $-NO_2$ exhibit more -I effect than -CHO. On the other hand $-CH_3$ is a electron releasing group therefore the order of reactivity towards hydrolysis is

(ii) > (iv) > (i) > (iii)

Question 123.

For (i) I^-, (ii) Cl^-, (iii) Br^-, the increasing order of nucleophilicity would be

[4 Marks]

(A) $Cl^- < Br^- < I^-$

(B) $I^- < Cl^- < Br^-$

(C) $Br^- < Cl^- < I^-$

(D) $I^- < Br^- < Cl^-$

Explanation:

Nucleophilicity increases down the periodic table : $I^- > Br^- > Cl^- > F^-$

Question 124.

Which of the following represents the correct order of the acidity in the given compounds?

[4 Marks]

(A) $FCH_2COOH > CH_3COOH > BrCH_2COOH > ClCH_2COOH$

(B) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH > CH_3COOH$

(C) $CH_3COOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$

(D) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_3COOH$

Explanation:

Electron withdrawing substituents (like halogen, $-NO_2$, $-C_6H_5$ etc.) would disperse the negative charge and hence stabilise the carboxylate ion and thus increase acidity of the parent acid. On the other hand, electron-releasing substituents would intensify the negative charge, destabilise the carboxylate ion and thus decrease acidity of the parent acid.

Electronegativity decreases in order

F > Cl > Br

and hence -I effect also decreases in the same order, therefore the correct option is

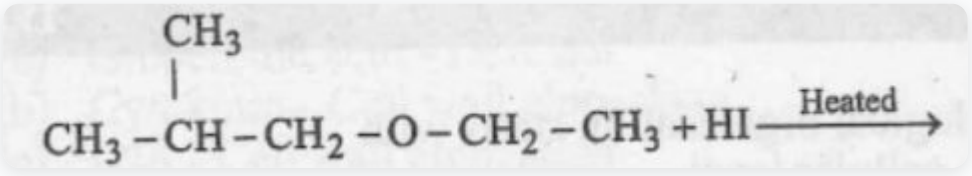
$[FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_3COOH]$

Question 125.

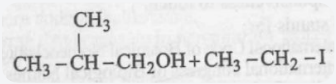
In the reaction:

Which of the following compounds will be formed?

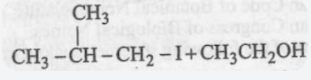
[4 Marks]



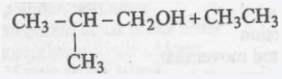
(A)



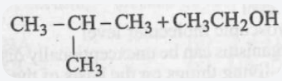
(B)



(C)

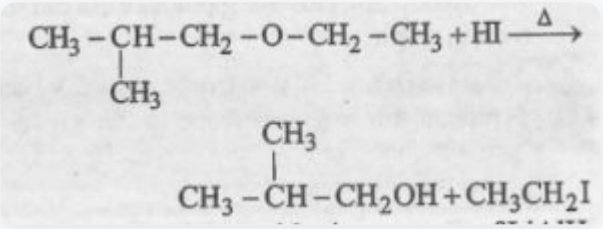


(D)



Explanation:

In the cleavage of mixed ethers with two different alkyl groups, the alcohol and alkyl iodide that form depend on the nature of alkyl group. When primary or secondary alkyl groups are present, it is the lower alkyl group that forms alkyl iodide therefore



Question 126.

Which one of the following on reduction with lithium aluminium hydride yields a secondary amine?

[4 Marks]

(A) Nitroethane

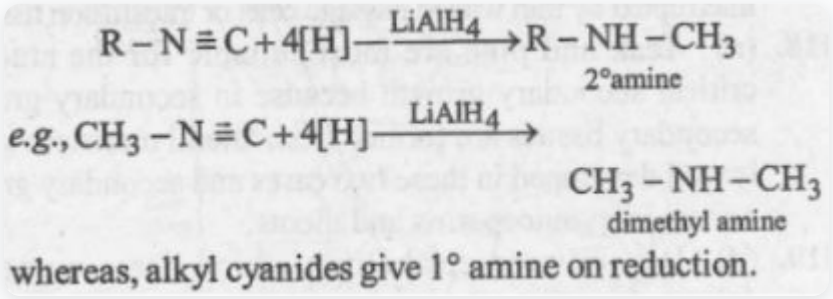
(B) Methyl cyanide

(C) Acetamide

(D) Methyl isocyanide

Explanation:

Reduction of alkyl isocyanides in presence of $LiAlH_4$ yields secondary amines containing methyl as one of the alkyl group.



Question 127.

Reduction of aldehydes and ketones into hydrocarbons using zinc amalgam and conc. HCl is called

[4 Marks]

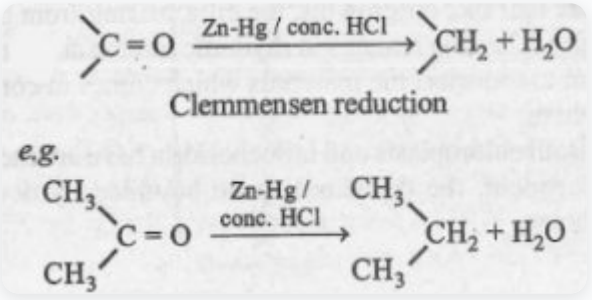
(A) Clemmensen reduction

(B) Dow reduction

(C) Wolff-Kishner reduction

(D) Cope reduction

Explanation:



Question 128.

RNA and DNA are chiral molecules, their chirality is due to

[4 Marks]

(A) L-sugar component

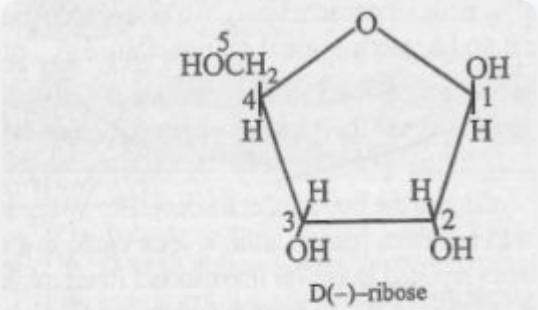
(B) chiral phosphate ester units

(C) D-sugar component

(D) chiral bases

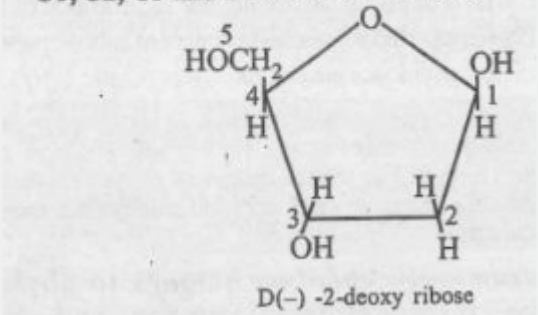
Explanation:

Each nucleic acid consists of a pentose sugar a heterocyclic base, and phosphoric acid. The sugar present in DNA is -D(-)-2-deoxy ribose and the sugar present in RNA is D (-)-ribose. The chirality of DNA and RNA molecules are due to the presence of sugar components.



D(–)–ribose

C1, C2, C3 and C4 are chiral carbons.



D(–) -2-deoxy ribose

C1, C3 and C4 are chiral carbons.

Question 129.

Which one of the following on treatment with 50% aqueous sodium hydroxide yields the corresponding alcohol and acid?

[4 Marks]

(A)

$C_6H_5CH_2CHO$

(B)

$CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

(C)

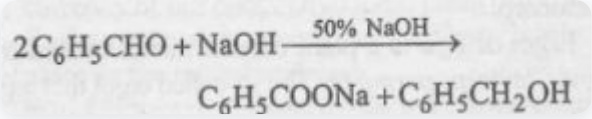
C_6H_5CHO

(D)

$CH_3CH_2CH_2CHO$

Explanation:

Aldehydes containing no α-hydrogen atom on warming with 50% NaOH or KOH undergo disproportionation i.e. self oxidation-reduction known as Cannizzaro's reaction.



Question 130.

Which of the following is water-soluble?

[4 Marks]

(A) Vitamin E

(B) Vitamin K

(C) Vitamin B

(D) Vitamin A

Explanation:

Vitamin B is water soluble whereas all other are fat soluble.

Question 131.

Which one of the following polymers is prepared by condensation polymerisation?

[4 Marks]

(A) Teflon

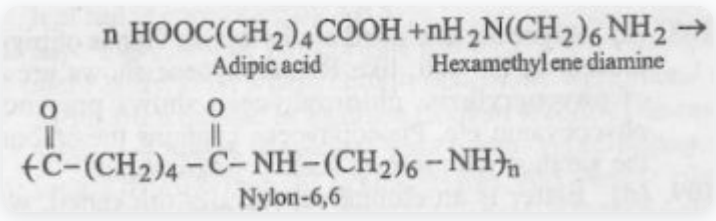
(B) Natural rubber

(C) Styrene

(D) Nylon-6,6

Explanation:

Copolymer of adipic acid (6C) and hexamethylene diamine (6C).



Question 132.

Which one of the following anions is present in the chain structure of silicates?

[4 Marks]

(A) SiO_4^{4-}

(B) $Si_2O_7^{6-}$

(C) $(SiO_3^{2-})_n$

(D) $(Si_2O_5^{2-})_n$

Explanation:

Chain silicates have the general formula $(SiO_3^{2-})_n$

Question 133.

Which of the following oxidation states are the most characteristic for lead and tin respectively?

[4 Marks]

(A) +2, +4

(B) +4, +4

(C) +2, +2

(D) +4, +2

Explanation:

Among common characteristic states for Pb and Sn, we find +2 and +4 respectively.

Question 134.

“Foolish seedling” disease of rice led to the discovery of

[4 Marks]

(A) ABA

(B) GA

(C) IAA

(D) 2,4-D

Explanation:

The effect of gibberellins had been known in Japan since early 1800 where certain rice plants were found to suffer from bakane or bakanae (foolish seedling) disease. Such rice plants were thin, pale green, spindle-shaped, longer by 50% than the healthy plants, and were sterile.

Question 135.

A person who is one day hunger strike and is surviving only on water, will have

[4 Marks]

(A) less amino acids in his urine

(B) more glucose in his blood

(C) more sodium in his urine.

(D) less urea in his urine

Explanation:

Due to long hunger strike and survival on water, a person will have less urea in his urine because urea is delivered to kidneys as a waste product from liver which is formed after the breakdown of proteins, fats, carbohydrates during hunger.

Question 136.

Lysozyme that is present in perspiration, saliva and tears, destroys

[4 Marks]

(A) certain types of bacteria

(B) all viruses

(C) most virus-infected cells

(D) certain fungi

Explanation:

Lysozyme is an antibacterial agent which is secreted by the major salivary glands.

Question 137.

Which one of the following is a fat-soluble vitamin and its related deficiency disease?

[4 Marks]

(A) Retinol - Xerophthalmia

(B) Cobalamine - Beri-beri

(C) Calciferol - Pellagra

(D) Ascorbic acid - Scurvy.

Explanation:

Fat soluble vitamins are - A, D, E and K and lack of vitamin A causes xerophthalmia.

Question 138.

A drop of each of the following, is placed separately on four slides. Which of them will not coagulate?

[4 Marks]

(A) Blood serum

(B) Blood plasma

(C) Sample from the thoracic duct of lymphatic system

(D) Whole blood from pulmonary vein

Explanation:

Blood serum is of pale yellow colour and is liquid minus clotting elements. It does not have fibrinogen and other clotting materials therefore it does not takes part in blood clotting.

Question 139.

Which one of the following mammalian cells is not capable of metabolising glucose to carbon-dioxide aerobically?

[4 Marks]

(A) Unstriated muscle cells

(B) Liver cells

(C) White blood

(D) Red blood cells

Explanation:

Since RBCs do not have mitochondria so they can respire only anaerobically.

Question 140.

In human body, which one of the following is anatomically correct?

[4 Marks]

(A) Floating ribs - 2 pairs

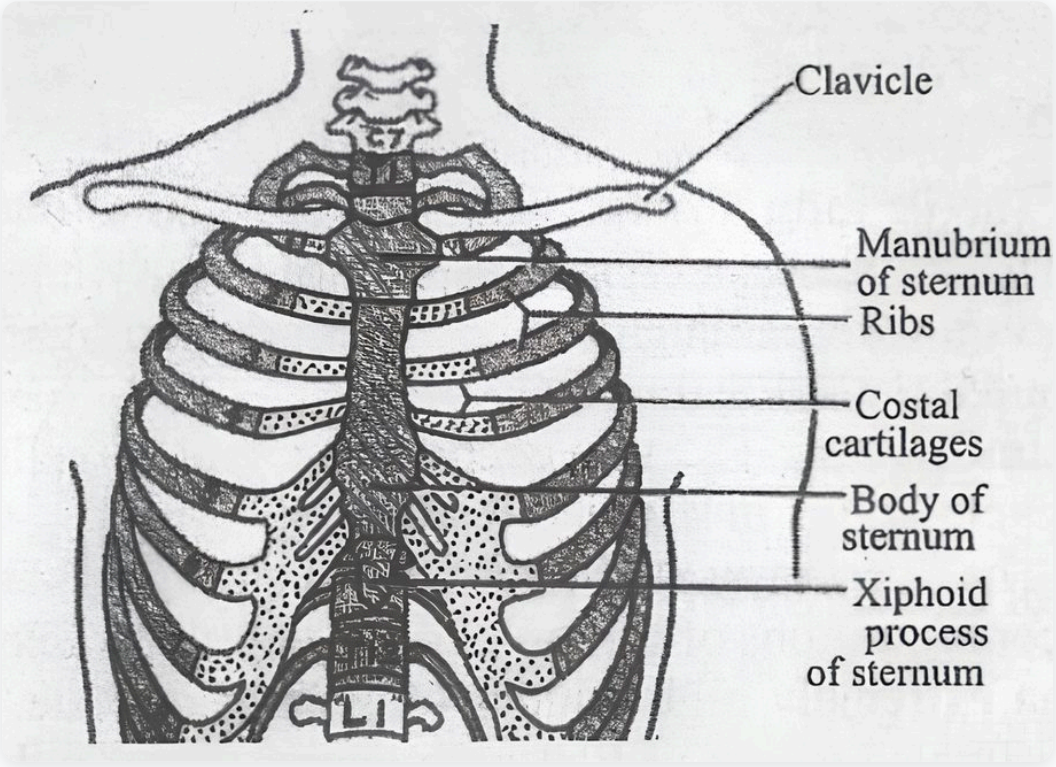
(B) Cranial nerves - 10 pairs

(C) Salivary glands - 1 pairs

(D) Collar bones - 3 pairs

Explanation:

Floating ribs are 2-pairs (11th and 12th pair) which are not attached to sternum.



Question 141.

During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge?

[4 Marks]

(A) First positive, then negative and continue to be positive

(B) First negative, then positive and continue to be positive

(C) First positive, then negative and again back to positive

(D) First negative, then positive and again back to negative.

Explanation:

Once the events of depolarization have occurred, a nerve impulse or spike is initiated. Action potential is another name of nerve impulse. It lasts for about 1 msec (millisecond). The stimulated, negatively

charged point on the outside of the membrane sends out an electrical current to the positive point (still polarized adjacent to it).

NOTES

This local current causes the adjacent inner part of the membrane to reverse its potential from –70 mV to +30 mV. The reversal repeats itself over and over until the nerve impulse is conducted through the length of the neuron.

Question 142.

Which one of the following pairs of structures distinguishes a nerve axon from other types of cells?

[4 Marks]

(A) Flagellum and medullary sheath

(B) Vacuoles and fibres

(C) Nucleus and mitochondria

(D) Perikaryon and dendrites.

Explanation:

The cytoplasm immediately surrounding the nucleus is loaded with protein synthetic machinery and is called perikaryon, dendrites are usually shorter, tapering and much branched processes which may be one to several. These two are only present in nerve cells.

Question 143.

Which of the following is an example of negative feedback loop in humans?

[4 Marks]

(A) Secretion of tears after falling of sand particles into the eye.

(B) Salivation of mouth at the sight of delicious food

(C) Constriction of skin blood vessels and contraction of skeletal muscles when it is too cold

(D) Secretion of sweat glands and constriction of skin blood vessels when it is too hot

Explanation:

When the set point of hypothalamus is disturbed by high temperature, it stimulates vasodilation and sweating while in low temperatures there is vasoconstriction and shivering.

Question 144.

Which part of ovary in mammals acts as an endocrine gland after ovulation?

[4 Marks]

(A) Stroma

(B) Germinal epithelium

(C) Vitelline membrane

(D) Graafian follicle.

Explanation:

Graafian follicle – the ovarian medulla contains many rounded or oval bodies, called ovarian, or graafian follicles, at various stages of development. Each follicle contains a large ovum surrounded by many layers of follicle cells.

Question 145.

A person is having problems with calcium and phosphorus metabolism in his body. Which one of following glands may not be functioning properly?

[4 Marks]

(A) Parotid

(B) Pancreas

(C) Thyroid

(D) Parathyroid

Explanation:

Parathyroid disorders : It causes the lowering of blood calcium level. This increases the excitability of nerves and muscles causing cramps and convulsions.

Question 146.

Feeling the tremors of an earthquake, a scared resident of seventh floor of a multistored building starts climbing down the stairs rapidly. Which hormone initiated this action ?

[4 Marks]

(A) adrenaline

(B) glucagone

(C) gastrin

(D) thyroxine

Explanation:

It is commonly called as “emergency hormone” or 3F-hormone (For fear, fight & flight). Its secretion is regulated by SNS, and not by pituitary, as in case of adrenal cortex. It stimulates sweating, heart beat and breathing rate. It causes the dilation of coronary artery (supplying blood to the heart muscles), bronchioles (for increasing inspiratory volume) and pupil (for better vision).

Question 147.

Which one of the following is surrounded by a callose wall?

[4 Marks]

(A) male gamete

(B) egg

(C) microspore mother cell

(D) pollen grain

Explanation:

MMC riscopore mother cell is surrounded by a callose wall inter to the cell wall.

Question 148.

Male gametes in angiosperms are formed by the division of

[4 Marks]

(A) generative cell

(B) microspore mother cell

(C) microspore.

(D) vegetative cell

Explanation:

Generative cell which is a cell of the male gametophyte or pollen grain in seed plants that divides to give rise directly or indirectly two sperms.

Question 149.

Which one of the following pairs of plant structures has haploid number of chromosomes?

[4 Marks]

(A) Megaspore mother cell and antipodal cells

(B) Egg cell and antipodal cells

(C) Nucleus and antipodal cells

(D) Egg nucleus and secondary nucleus

Explanation:

Egg cell and antipodal cells is right answer.

Question 150.

In human female, menstruation can be deferred by the administration of

[4 Marks]

(A) combination of FSH and LH

(B) combination of estrogen and progesterone

(C) FSH only

(D) LH only

Explanation:

The progesterone and estradiol continue the hypertrophy of endometrial lining in the uterus and fallopian tubes and maintain the throughout pregnancy. Progesterone is also necessary for the proper implantation of the foetus in the uterine wall. It stimulates the endometrial glands to secrete nutrient fluid for the foetus, hence the term secretory phase. The progesterone inhibits the release of FSH so that it may not develop additional follicles and eggs.

Question 151.

A common test to find the genotype of a hybrid is by

[4 Marks]

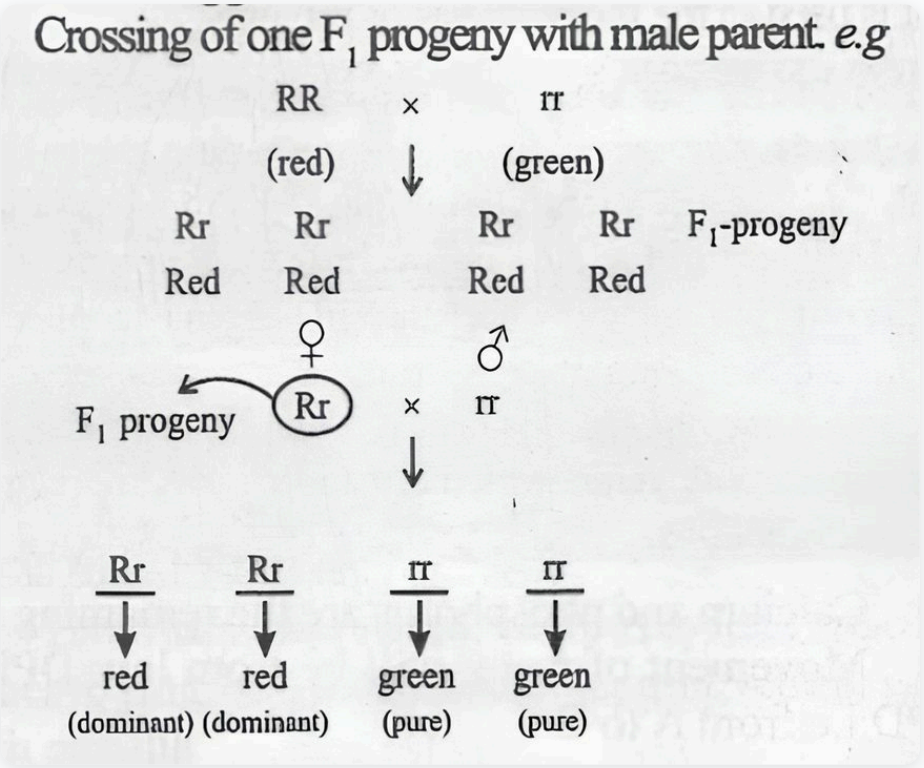
(A) crossing of one F_2 progeny with male parent

(B) crossing of one F_1 progeny with male parent.

(C) studying the sexual behaviour of F_1 progenies

(D) crossing of one F_2 progeny with female parent

Explanation:



Question 152.

Two genes R and Y are located very close on the chromosomal linkage map of maize plant. When RRYY and rryy genotypes are hybridized, the F_2 segregation will show

[4 Marks]

(A) higher number of the recombinant types.

(B) higher number of the parental types

(C) segregation in the expected 9 : 3 : 3 : 1 ratio

(D) segregation in 3 : 1 ratio

Explanation:

When the linked genes are situated quite close, the chances of crossing over are highly reduced. Due to this, large number of parental gametes are formed and only few recombinant gametes are formed. This results in higher number of parental types in F_2 generation as compared to recombinant.

Question 153.

In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F_1 generation?

[4 Marks]

(A) 3 : 1

(B) 50 : 50

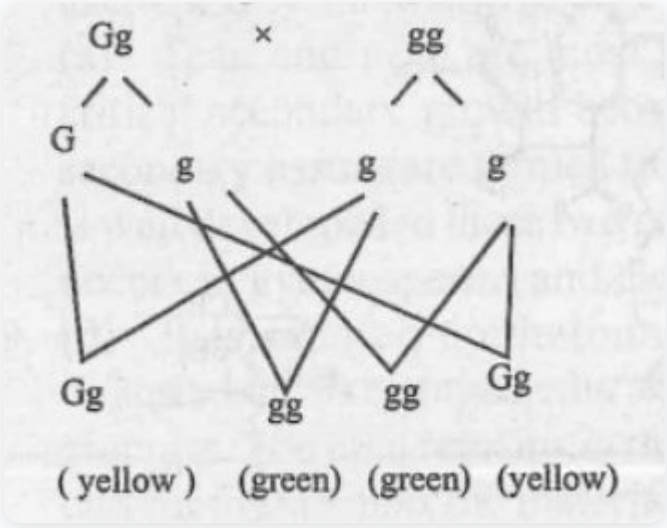
(C) 9 : 1

(D) 1 : 3

Explanation:

Let GG = homozygous yellow seed plant.
Gg ⇒ heterozygous yellow seeded plant
gg ⇒ homozygous green seeded plant

According to the question :



Question 154.

Inheritance of skin colour in humans is an example of

[4 Marks]

(A) point mutation

(B) polygenic inheritance

(C) codominance

(D) chromosomal aberration.

Explanation:

Inheritance of skin colour in human is controlled by three genes, A B and C which is polygenic inheritance.

Question 155.

A human male produces sperms with the genotypes AB, Ab, aB, and ab pertaining to two diallelic characters in equal proportions. What is the corresponding genotype of this person?

[4 Marks]

(A) AaBB

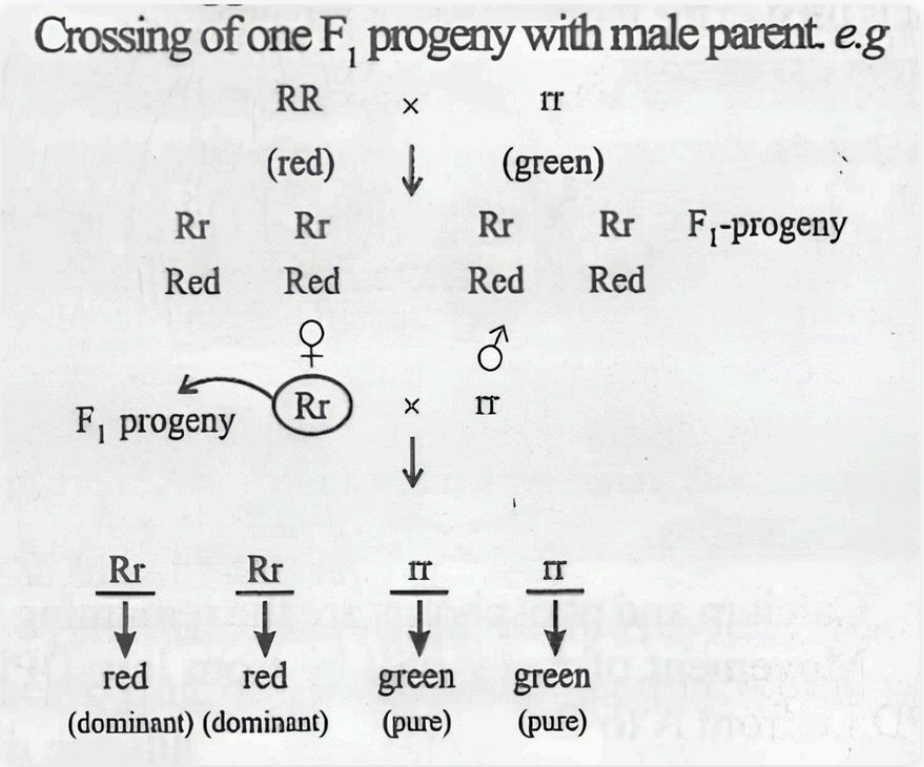
(B) AABb

(C) AABB

(D) AaBb

Explanation:

Ans.



Question 156.

The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?

[4 Marks]

(A) DNase digestion

(B) super-coiling in nucleosomes

(C) through elimination of repetitive DNA

(D) deletion of non-essential genes.

Explanation:

The nucleosome model explains the packaging of histone proteins and DNA in the chromatin material which forms the chromosome.

Question 157.

A sequential expression of a set of human genes

[4 Marks]

(A) messenger RNA

(B) DNA sequence

(C) ribosome

(D) transfer RNA.

Explanation:

A sequential expression of a set of human genes is the DNA sequence. Because gene is the functional part of DNA sequence.

Question 158.

During transcription, RNA polymerase holoenzyme binds to a gene promoter and assumes a saddle-like structure, what is it's DNA-binding sequence?

[4 Marks]

(A) CACC

(B) AATT

(C) TATA

(D) TTAA

Explanation:

The DNA binding sequence for RNA polymerase is called TATA box.

Question 159.

The two polynucleotide chains in DNA are

[4 Marks]

(A) discontinuous

(B) semi-conservative

(C) antiparallel

(D) parallel.

Explanation:

The two chains are antiparallel, one aligned in 5'→3' direction the other in 3'→5' direction.

Question 160.

Molecules basis of organ differentiation depends on the modulation in transcription by

[4 Marks]

(A) RNA polymerase.

(B) anticodon

(C) transcription factor

(D) ribosome

Explanation:

Transcription factor is right answer.

Question 161.

The okazaki fragments in DNA chain growth

[4 Marks]

(A) polymerize in the 3' - to - 5' direction and forms replication fork

(B) prove semi-conservative nature of DNA replication

(C) polymerize in the 5' - to - 3' direction and explain 3' - to - 5' DNA replication

(D) result in transcription.

Explanation:

Okazaki fragments in DNA are linked up by the enzyme DNA ligase. Replication always occurs in 5'→3' direction. Okazaki fragments synthesised on 3'→5' DNA template, join to form lagging strand.

Question 162.

one gene-one enzyme relationship was established for the first time in

[4 Marks]

(A) Neurospora crassa.

(B) Diplococcus pneumoniae

(C) Escherichia coli

(D) Salmonella typhimurium

Explanation:

It was given by Geneticist George W. Beadle and E. L. Tatum which states that each gene in an organism controls the production of a specific enzyme. It is the enzyme that catalyses the reactions that leads to the phenotype of the organism.

Question 163.

When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed

[4 Marks]

(A) microevolution

(B) co-evolution

(C) divergent evolution

(D) convergent evolution

Explanation:

The analogous organs show convergent evolution due to similar adaptations which do not support organic evolution.

Question 164.

Which one of the following statement is correct?

[4 Marks]

(A) Stem cells are specialized cells.

(B) Ontogeny repeats phylogeny

(C) All plant and animal cells are totipotent

(D) There is no evidence of the existence of gills during embryogenesis of mammals

Explanation:

Ontogeny recapitulates phylogeny.

NOTE
The theory of recapitulation, also called the biogenetic law or embryological parallelism—often expressed using Ernst Haeckel's phrase "ontogeny recapitulates phylogeny"—is a historical hypothesis that the development of the embryo (of an animal, from fertilization to gestation or hatching/fancying) goes through stages resembling or representing successive adult stages in the evolution of the animal's remote ancestors (phylogeny). It was formulated in the 1820s by Étienne Serres based on the work of Johann Friedrich Meckel, after whom it is also known as Meckel–Serres law.

Question 165.

The concept of chemical evolution is based on

[4 Marks]

(A) effect of solar radiation on chemicals

(B) interaction of water, air and clay under intense heat

(C) crystallization of chemicals.

(D) possible origin of life by combination of chemicals under suitable environmental conditions

Explanation:

The concept of chemical evolution is based on possible origin of life by combination of chemicals under suitable environmental conditions. The distribution of elements in the cosmos is the result of many processes in the history of the Universe. It provides us with a powerful tool to study the Big

Bang, the density of baryonic matter, galaxiesynthesis and the formation and evolution of stars and galaxies.

Question 166.

The finches of Galapagos islands provide an evidence in favour of

[4 Marks]

(A) biogeographical evolution

(B) special creation.

(C) retrogressive evolution

(D) evolution due to mutation

Explanation:

The finches of Galapagos islands provides an evidence in favour of biogeographical evolution.

Question 167.

What is common between parrot, platypus and kangaroo?

[4 Marks]

(A) Functional post-anal tail

(B) Toothless jaws

(C) Homeothermy

(D) Oviparity

Explanation:

Only birds and mammals are homeothermous.

Question 168.

What is common to whale, seal and shark?

[4 Marks]

(A) Thick subcutaneous fat

(B) Convergent evolution

(C) Homeothermy

(D) Seasonal migration.

Explanation:

The analogous organs show convergent evolution due to similar adaptation. They do not support organic evolution. Whale, seal and shark shows convergent evolution due to similar habitats.

Question 169.

Industrial melanism as observed in peppered moth proves that

[4 Marks]

(A) the lighter-form moth has no selective advantage either in polluted industrial area or non-polluted area

(B) the melanic form of the moth has no selective advantage over lighter form in industrial area

(C) melanism is a pollution-generated feature

(D) the true black melanic forms arise by a recurring random mutation.

Explanation:

During the period when the number of coal-burning factories in England, was increasing (during the so-called Industrial Revolution) it was noticed that the mutant melanic individuals of the species of Peppered Moth (*Biston betularia*) was becoming more common. Originally rare in the population of normally light-colored moths, the frequency of the melanic form increased in polluted areas until it was over 90%. This change in coloration has become known as “industrial melanism.”

Question 170.

Adaptive radiation refers to

[4 Marks]

(A) evolution of different species from a common ancestor

(B) migration of members of a species to different geographical areas

(C) power of adaptation in an individual to a variety of environments

(D) adaptations due to geographical isolation.

Explanation:

Adaptive radiation refers to evolution of different species from a common ancestor. The mammals are adapted for different mode of life, they show adaptive radiation. They can be aerial (bat), aquatic

(whale and dolphins), burrowing or fossorial (rat), cursorial (horse), scansorial (squirrel) or arboreal (monkey). The adaptive radiation, the term is obso, is also known as Divergent evolution.

NOTES

An adaptation or adaptive trait is a trait/characteristic that has evolved in a population of organisms which provides a functional advantage andaptation increases the biological fitness of a population. Fredity describe how the trait evolved e.g. mutation.

Question 171.

One of the important consequences of geographical isolation is

[4 Marks]

(A) preventing speciation

(B) speciation through reproductive isolation

(C) random creation of new species

(D) no change in the isolated fauna.

Explanation:

Speciation takes place via reproductive isolation which is the most important consequence of geographical isolation.

Question 172.

Among the human ancestors the brain size was more that 1000 cc in

[4 Marks]

(A) Homo erectus

(B) Ramapithecus

(C) Homo habilis

(D) Homo neanderthalensis

Explanation:

According to Hugo de Vries, mutations are random and directionless.
Hugo deVries believed that mutation caused speciation and hence called it saltation (single step large mutation).

Question 173.

Select the correct statements from the following?

[4 Marks]

(A) Fitness is the end result of the ability to adapt and get selected by nature

(B) All mammals except whales and camels have seven cervical vertebrae

(C) Mutations are random and directional

(D) Darwinian variations are small and directionless.

Explanation:

Brain capacity in decreasing order:-
Homo sapiens (1300 - 1600 c.c.)
Homo neanderthalensis (approx. 1400 c.c.)
Homo erectus (600 - 700 c.c.)
Homo habilis (550 - 687 c.c.)
Thus the lowest brain capacity is of *Homo habilis* as shown above. *Homo habilis* lived in early pleistocene period and used tools of chipped stones.

Question 174.

If you suspect major deficiency of antibodies in a person to which of the following would you look for confirmatory evidence?

[4 Marks]

(A) fibrinogen in the plasma

(B) serum globulins

(C) haemocytes

(D) serum albumins

Explanation:

Serum globulins → It makes 2 to 3% of plasma proteins. The α and β-globulin sent with the hormones to transport them the γ-globulin from antibodies.

Question 175.

Increased asthmatic attacks in certain seasons are related to

[4 Marks]

(A) eating fruits preserved in tin containers

(B) inhalation of seasonal pollen

(C) hot and humid environment.

(D) low temperature

Explanation:

Pollen-grain of many species are responsible for some of the severe allergies and bronchial affliction in some people often lead to chronic respiratory disorders - asthma, bronchitis.

Question 176.

Which one of the following pair is mismatched?

[4 Marks]

(A) Pila globosa - pearl

(B) Apis indica - honey

(C) Bombyx mori - silk

(D) Kenia lacca - lac

Explanation:

From *Pinctada vulgaris*, pearl is obtained.

Pearl muscles as Pearls are made by marine oysters and freshwater mussels; a natural defence against an irritant such as a parasite entering their shell or damage to the fragile body. This creates a material called nacre, also known as mother-of-pearl, which encases the irritant and protects the mollusc from it.

Question 177.

Compared to a bull a bullock is docile because of

[4 Marks]

(A) higher levels of cortisone

(B) lower levels of blood testosterone

(C) lower levels of adrenaline/noradrenaline in its blood

(D) higher levels of thyroxine.

Explanation:

A bullock is docile (less aggressive animal which is easy to handle) because it has degenerated testes due to which it has low testosterone levels in blood.

NOTE
Testosterone is a sex hormone and principal androgen secreted in males by testes. It stimulates the development of secondary sex organs, sexual characters and body tissues like muscles.

Question 178.

Which one of the following is a viral disease of poultry?

[4 Marks]

(A) Coryza

(B) New castle disease

(C) Pasteurellosis

(D) Salmonellosis.

Explanation:

New castle disease (ND) is a highly contagious, generalised viral disease of domestic poultry and wild birds characterised by gastrointestinal, respiratory and nervous signs.

NOTE
New castle disease is caused by the virus belongs to Paramyxoviruses.

Question 179.

Which one of the following is being utilized as a source of biodiesel in the Indian countryside?

[4 Marks]

(A) Sugarcane

(B) Pongamia

(C) Euphorbia

(D) Beetroot

Explanation:

Pongamia pinnata is one of the few nitrogen fixing trees (NFTs) to produce seeds containing 30-40% oil. It is often planted as an ornamental and shade tree but now-a-days it is considered an alternative

source for Bio-Diesel. This species is commonly called pongam, kanajra, or a derivation of these names. *Pongam, Jatropha, Euphorbia* are petrocrops. However, in the Indian countryside, pongamia (kanjra) is being utilized as a source of biodiesel.

Question 180.

In maize, hybrid vigour is exploited by

[4 Marks]

(A) crossing of two inbred parental lines

(B) bombarding the seeds with DNA.

(C) harvesting seeds from the most productive plants

(D) inducing mutations

Explanation:

Hybrid vigour is also called Heterosis which is measured in terms of size growth rate / field and number of other characters. Hybridization increases vigour and fertility. It is exploited by crossing of two inbred parental lines. It is best maintained in vegetatively reproducing crops because of genetic recombinations.

Question 181.

Probiotics are

[4 Marks]

(A) new kind of food allergens

(B) cancer inducing microbes

(C) live microbial food supplement

(D) safe antibiotics

Explanation:

Probiotics are defined as live microorganisms, including *Lactobacillus* species, *Bifidobacterium* species and yeasts, that may beneficially affect the host upon ingestion by improving the balance of the intestinal microflora. The dietary use of live microorganisms has a long history.

Question 182.

Which one of the following pairs is wrongly matched?

[4 Marks]

(A) Streptomyces - antibiotic

(B) Yeast - ethanol

(C) Methanogens - gobar gas

(D) Coliforms - vinegar

Explanation:

Coliforms are a broad class of bacteria found in our environment, including the feces of man and other warm-blooded animals. The presence of coliform bacteria in drinking water may indicate a possible presence of harmful, disease-causing organisms.

Question 183.

Ultrasound of how much frequency is beamed into human body for sonography ?

[4 Marks]

(A) 15 - 300 MHz

(B) 1 - 15 MHZ

(C) 45 - 70 MHZ

(D) 30 - 45 MHZ

Explanation:

Ultrasound imaging has frequency range 1 - 15 MHz which has become part of our lives in the last decade. We are now all familiar with the blurry black and white sonograms (ultrasound pictures) that show the unborn baby inside the mother’s uterus. Although it may take a little imagination on our part to understand that a round circle is the baby’s head, that does not prevent a proud mother-to-be from showing off her first baby picture.

Question 184.

Geometric representation of age structure is a characteristic of population.

[4 Marks]

(A) landscape

(B) biotic community.

(C) ecosystem

(D) population

Explanation:

Geometric representation of age structure is a characteristic of population.

Question 185.

The population of an insect species shown an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show?

[4 Marks]

(A) S-shaped or sigmoid growth of this insect.

(B) The population of its predators increases enormously

(C) Its population growth curve is of J-type

(D) The food plants mature and die at the end of the rainy season

Explanation:

If a population (e.g reindeer population) is allowed to grow in a predator free environment, the population grows beyond carrying capacity and there occurs population crash due to sudden shortage of food. Such growth curves also occur in insect populations during rainy season and in algal blooms.

Question 186.

Two plants can be conclusively said to belong to the same species if they

[4 Marks]

(A) have more than 90 per cent similar genes

(B) look similar and possess identical secondary metabolites

(C) can reproduce freely with each other and form seeds.

(D) have same number of chromosomes

Explanation:

When the members of a species are inter - fertile and produce fertile offsprings.

Question 187.

A high density of elephant population in an area can result in

[4 Marks]

(A) intra specific competition

(B) predation on one another

(C) inter specific competition

(D) mutualism.

Explanation:

It is competition between individuals of same species. The intraspecific competition may be very severe because all the members of a species have similar requirements of food, habitat mate, etc. and they also have similar adaptations to get their needs.

Question 188.

Which one of the following ecosystem types has the highest annual net primary productivity?

[4 Marks]

(A) tropical deciduous forest

(B) temperate evergreen forest

(C) temperate deciduous forest

(D) tropical rain forest.

Explanation:

They are found in the equatorial regions rainfall exceeds 140 cm. The warm humid climate supports broad leaved evergreen plants. Productivity is very high (12000 kcal/m^2/year). The vegetation show stratification into two or more well defined layers.

Question 189.

One of endangered species of Indian medicinal plants is that of

[4 Marks]

(A) Nepenthes

(B) Podophyllum

(C) Garlic

(D) Ocimum

Explanation:

Podophyllum is one of the endangered species of Indian medicinal plants. It is used to remove benign (not cancer) growths, such as certain kinds of warts. It works by destroying the tissue of the growth.

Question 190.

Identify the odd combination of habitat and the particular animal concerned.

[4 Marks]

(A) Sunderbans - Bengal Tiger

(B) Periyar - Elephant

(C) Dachigam National park - Snow Leopard

(D) Rann of kutch - Wild Ass

Explanation:

Dachigam national park is for conservation of Hangul which is one of India's most scenically beautiful wildlife reserve. It is located only 22 kilometers from Srinagar, the capital city of the northern state of Jammu and Kashmir. It covers an area of 141 square kilometers.

Question 191.

Which one of the following pairs of organisms are exotic species introduced in India?

[4 Marks]

(A) Lantana camara, water hyacinth

(B) Water hyacinth, Prosopis cineria

(C) Nile perch, Ficus religiosa

(D) Ficus religiosa, Lantana camara

Explanation:

Exotic Species - a species that has been introduced from another geographic region to an area outside its natural range. Examples are water hyacinth, *Lantana camara*.

Question 192.

In a coal fired power plant electrostatic precipitators are installed to control emission of

[4 Marks]

(A) NO_x

(B) SPM

(C) CO

(D) SO_2

Explanation:

In recent years, the increases in toxic substances of NO_x and/or SPM (Suspended Particulate Matter) from vehicles come to be serious problem. About the correlation between the traffic volume in our model and the real volume, we obtained the correlation coefficient of 0.74. Simultaneously, we got the result that the concentration of NO_x was approximately 70 to 230 ppm. The total mass was approximately 40 to 100 μg/m³.

Question 193.

Which one of the following is not a bioindicator of water pollution?

[4 Marks]

(A) Blood-worms

(B) Stone flies

(C) Sludge-worms.

(D) Sewage fungus

Explanation:

Stone files are not bio-indicators on polluted or range of techniques to assess the impacts of air pollution from reactive nitrogen (N) compounds on statutory nature conservation site. They complement physical monitoring of atmospheric concentrations and deposition and risk assessment based on the critical loads approach by providing site-based information on atmospheric N concentrations, N deposition and/or ecological impacts.

NOTES
Stone flies, mayflies and caddisflies are aquatic insects and are important indicators of water quality.

Question 194.

Which one of the following statements is correct?

[4 Marks]

(A) Both Azotobacter and Rhizobium fix atmospheric nitrogen in root nodules of plants.

(B) Cyanobacteria such as Anabaena and Nostoc are important mobilisers of phosphates and for plant nutrition in soil

(C) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

(D) At present it is not possible to grow maize without chemical fertilizers

Explanation:

Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

Question 195.

If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur:-

[4 Marks]

(A) A normal distribution

(B) A skewed curve

(C) a T-shaped curve

(D) A bi-modal distribution

Explanation:

In statistics, a bimodal distribution is a continuous probability distribution with two different modes. These appear as distinct peaks in the probability density functions. If the distribution is symmetric then the mean is equal to the median and the distribution will have zero skewness. Since bimodal distribution may not be symmetric both mean and mode fall in the center but it has two modes.

Question 196.

In which one of the following the BOD (Biochemical Oxygen Demand) of sewage (S), distillery effluent (DE), paper mill effluent (PE) and sugar mill effluent (SE) have been arranged in ascending order?

[4 Marks]

(A) S < DE < PE < SE

(B) SE < S < PE < DE

(C) SE < PE < S < DE

(D) PE < S < SE < DE

Explanation:

Sewage strength of degree for water pollution is measured in terms of BOD (Biological oxygen demand) value.
BOD may be defined as, number of milligrams of oxygen required for decomposition of one liter of waste or water by decomposing micro-organisms (bacteria). According to central pollution control board, limit of BOD prescribed is 30 ppm (mg/d) for 3 days at 27 degree C.

The BOD of the given pollutants in ascending order is PE < S < SE < DE.

Question 197.

Which one of the following is not a part of a renal pyramid?

[4 Marks]

(A) Peritubular capillaries

(B) Loops of Henle

(C) Convoluted tubules

(D) Collecting ducts

Explanation:

The medulla is divided into a few conical masses called medullary pyramids projecting into the calyces. The cortex extends in between the medullary pyramids as renal columns called Columns of Bertini. Hence convoluted tubules are not a part of the renal tubule.

Question 198.

Arteries are best defined as the vessel which :

[4 Marks]

(A) supply oxygenated blood to the different organs

(B) carry blood from one visceral organ to another visceral organ

(C) carry blood away from the heart to different organs

(D) break up into capillaries which reunite to form a vein

Explanation:

Arteries and veins are main blood vessels. Arteries carry blood from the heart to different body parts. Veins bring blood from different body parts to the heart.

Question 199.

Match the source gland with its respective hormone as well as the function

[4 Marks]

	Source Gland	Hormone	Function
(a)	Thyroid	Thyroxine	Regulates blood calcium level
(b)	Anterior pituitary	Oxytocin	Contraction of uterus muscles during child birth
(c)	Posterior pituitary	Vasopressin	Stimulates resorption of water in the distal tubules in the nephron
(d)	Corpus luteum	Estrogen	Supports pregnancy

(A) a

(B) c

(C) b

(D) d

Explanation:

source Gland- Anterior pituitary ,

Hormone - oxytocin, Function - Contraction of uterus muscles during child birth

Question 200.

What is common to whale, seal and shark?

[4 Marks]

(A) Convergent evolution

(B) Homoiothermy

(C) Seasonal migration.

(D) Thick subcutaneous fat

Explanation:

The analogous organs show convergent evolution due to similar adaptation. They do not support organic evolution. Whale, seal and shark shows convergent evolution due to similar habitats.