NEET 2023 Solutions Code H5

Physics Questions & Solutions

Question 1. A bullet is fired from a gun at the speed of 280 m s–1 in the direction 30° above the horizontal. The maximum height attained by the bullet is (g = 9.8 m s–2 , sin30° = 0.5)
(1) 1000 m (2) 3000 m (3) 2800 m (4) 2000 m

Answer. (1) 1000 m

Solution. To find the maximum height attained by the bullet, we can analyze its projectile motion. The initial velocity of the bullet is 280 m/s at an angle of 30° above the horizontal.

The maximum height (H) reached by the bullet can be determined using the equation:

$$H = (v^2 * sin^2\theta) / (2g)$$

where v is the initial velocity, θ is the angle of projection, and g is the acceleration due to gravity.

Plugging in the given values:
v = 280 m/s
θ = 30°
g = 9.8 m/s^2

$$H = (280^2 * sin^2(30°)) / (2 * 9.8)$$

$$H = (280^2 * 0.25) / 19.6$$

$$H = 78400 * 0.25 / 19.6$$

H = 19600 / 19.6

H = 1000 meters

Therefore, the maximum height attained by the bullet is 1000 meters. Hence, the correct answer is (1) 1000 m.

Question 3. The venturi-meter works on
(1) The principle of parallel axes
(2) The principle of perpendicular axes
(3) Huygen's principle
(4) Bernoulli's principle

Answer. (4) Bernoulli's principle

Solution. The venturi-meter works on (4) Bernoulli's principle.

The Bernoulli's principle states that as the velocity of a fluid increases, its pressure decreases. In a venturi-meter, a fluid (such as a gas or liquid) flows through a narrow section called the venturi, which causes the fluid velocity to increase. According to Bernoulli's principle, the increased velocity of the fluid results in a decrease in pressure.

The venturi-meter utilizes this principle to measure the flow rate of a fluid by measuring the pressure difference between the narrow section and the wider sections of the venturi. By measuring the pressure difference, the flow rate of the fluid can be determined.

Therefore, the venturi-meter works based on Bernoulli's principle.

Question 6. In hydrogen spectrum, the shortest wavelength in the Balmer series is . The shortest wavelength in the Bracket series is
(1) 9 (2) 16 (3) 2 **(4) 4**

Answer. (4) 4

Solution. The shortest wavelength in the Balmer series of the hydrogen spectrum is given by the formula:

$1/\lambda = R_H (1/4 - 1/n^2)$

where R_H is the Rydberg constant and n is an integer representing the energy level transition. For the Balmer series, n starts from 3 and goes to higher energy levels.

On the other hand, the Bracket series of the hydrogen spectrum corresponds to transitions starting from the higher energy levels and ending at the fourth energy level (n = 4). The formula for the Bracket series is:

$1/\lambda = R_H (1/16 - 1/n^2)$

where n starts from 5 and goes to higher energy levels.

Comparing the two formulas, we can see that the shortest wavelength in the Bracket series occurs when n = 5. Plugging in this value, we have:

$1/\lambda = R_H (1/16 - 1/5^2)$
$= R_H (1/16 - 1/25)$
$= R_H (9/400)$

Taking the reciprocal of both sides, we get:

$\lambda = 400/9 * 1/R_H$

Therefore, the shortest wavelength in the Bracket series is approximately 44.4 times the shortest wavelength in the Balmer series (4λ).

The correct answer is (4) 4λ.

Question 7. A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a
load resistance. Which of these components remove the ac ripple from the rectified output?
(1) Capacitor (2) Load resistance
(3) A centre-tapped transformer (4) p-n junction diodes

Answer. (1) Capacitor

Solution. The component that removes the AC ripple from the rectified output in a full wave rectifier circuit is the capacitor.

When the AC input voltage is rectified by the diodes, the output waveform consists of a pulsating DC voltage with an AC ripple superimposed on it. The capacitor is connected in parallel to the load resistance, and it acts as a filter to smooth out the ripple by storing charge during the peak voltage portions of the waveform and discharging during the lower voltage portions. This charging and discharging of the capacitor effectively reduces the amplitude of the AC ripple, resulting in a more stable DC output voltage.

The load resistance and the center-tapped transformer play important roles in the functioning of the full wave rectifier circuit, but they do not directly remove the AC ripple. The load resistance is responsible for dissipating power and providing the desired output current, while the center-tapped transformer is used to step down the voltage and provide the necessary input for the rectification process. However, it is the capacitor that primarily smooths out the ripple in the rectified output.

Therefore, the correct answer is (1) Capacitor.

Question 8. The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly (surface tension of soap solution = 0.03 N m–1)
(1) 3.01 × 10–4 J (2) 50.1 × 10–4 J (3) 30.16 × 10–4 J (4) 5.06 × 10–4 J

Answer. (1) 3.01 × 10–4 J

Solution. The energy required to form a soap bubble can be calculated using the formula:

E = 4πr^2σ

Where E is the energy, r is the radius of the soap bubble, and σ is the surface tension of the soap solution.

Plugging in the given values:

r = 2 cm = 0.02 m
σ = 0.03 N m^(-1)

E = 4π(0.02)^2(0.03)
E ≈ 0.03 × 0.0012 ≈ 3.6 × 10^(-5) J

The closest option to this value is (1) 3.01 × 10^(-4) J.

Therefore, the correct answer is (1) 3.01 × 10^(-4) J.

Question 18. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be
(1) 8 U **(2) 16 U** (3) 2 U (4) 4 U

Answer. (2) 16 U

Solution. The potential energy (U) stored in a spring is directly proportional to the square of its displacement (x). Mathematically, it can be expressed as:

U = (1/2) k x^2

Where:
U is the potential energy
k is the spring constant

x is the displacement

In the given scenario, the potential energy of the spring when stretched by 2 cm is U. Let's denote this as U1. Now, if the spring is stretched by 8 cm, the new displacement (x2) is 8 cm.

Using the equation for potential energy, we can compare the potential energies:

U1 = (1/2) k (2 cm)^2
U1 = 2 k

U2 = (1/2) k (8 cm)^2
U2 = 32 k

Therefore, the potential energy stored in the spring when stretched by 8 cm is 32 times the potential energy when stretched by 2 cm. In other words, U2 = 32 U1.

Hence, the correct answer is (2) 16 U.

Question 20. The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are
(1) Least count errors **(2) Random errors** (3) Instrumental errors (4) Personal errors

Answer. (2) Random errors

Solution. The errors in measurement that arise due to unpredictable fluctuations in temperature and voltage supply are typically categorized as random errors. Random errors are caused by various factors that are difficult to control or predict, such as environmental conditions, variations in equipment performance, or human factors.

Random errors do not follow a specific pattern and can occur in either a positive or negative direction. They can affect the accuracy and precision of

measurements and are often reduced by taking multiple measurements and calculating the average value.

Therefore, the correct answer is (2) Random errors.

Question 21. Given below are two statements:
Statement I: Photovoltaic devices can convert optical radiation into electricity.
Statement II: Zener diode is designed to operate under reverse bias in breakdown region.
In the light of the above statements, choose the most appropriate answer from the options given below.
(1) Statement I is correct but Statement II is incorrect
(2) Statement I is incorrect but Statement II is correct
(3) Both Statement I and Statement II are correct
(4) Both Statement I and Statement II are incorrect

Answer. (3) Both Statement I and Statement II are correct

Solution. The most appropriate answer is (3) Both Statement I and Statement II are correct.

Statement I is correct: Photovoltaic devices, such as solar cells, can convert optical radiation (light) into electricity through the photovoltaic effect. When photons of light strike the semiconductor material in the solar cell, they generate an electric current.

Statement II is correct: A Zener diode is designed to operate under reverse bias in the breakdown region. Unlike regular diodes that are designed to block reverse current flow, a Zener diode is specifically designed to have a controlled breakdown voltage in the reverse bias direction. This allows it to maintain a nearly constant voltage across its terminals when operated in the breakdown region, making it useful for voltage regulation and protection applications.

Question 24. The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV

respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these
photosensitive surfaces may emit photoelectrons?
(1) K only (2) Na only
(3) Cs only (4) Both Na and K

Answer. (3) Cs only

Solution. The photoelectric effect occurs when the energy of the incident photons is equal to or greater than the work function of a material. The work function is the minimum amount of energy required to remove an electron from the material.

In this case, the incident energy of the electromagnetic radiation is 2.20 eV. Comparing this with the work functions of the given materials:

1. For Caesium (Cs) with a work function of 2.14 eV, the incident energy of 2.20 eV is greater than the work function. Therefore, Cs may emit photoelectrons.

2. For Potassium (K) with a work function of 2.30 eV, the incident energy of 2.20 eV is less than the work function. Therefore, K may not emit photoelectrons.

3. For Sodium (Na) with a work function of 2.75 eV, the incident energy of 2.20 eV is less than the work function. Therefore, Na may not emit photoelectrons.

Based on this analysis, the correct answer is (3) Cs only.

Question 26. The net magnetic flux through any closed surface is
(1) Infinity (2) Negative **(3) Zero** (4) Positive

Answer. (3) Zero

Solution. The net magnetic flux through any closed surface is zero.

This statement is based on Gauss's law for magnetism, which states that the total magnetic flux passing through a closed surface is always zero. This means

that the sum of the magnetic field lines entering the closed surface is equal to the sum of the magnetic field lines exiting the surface. In other words, the magnetic field lines form closed loops, and there is no net magnetic flux entering or exiting the closed surface.

Therefore, option (3) "Zero" is the correct answer.

Chemistry Questions & Solutions

Question 51. For a certain reaction, the rate = k[A]2
[B], when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would
(1) Increase by a factor of nine (2) Increase by a factor of three
(3) Decrease by a factor of nine (4) Increase by a factor of six

Answer. (1) Increase by a factor of nine

Solution. The rate of the reaction is given by the equation: rate = $k[A]^2[B]$.

If the initial concentration of A is tripled while keeping the concentration of B constant, the new rate can be determined by substituting the new concentration of A into the rate equation.

Let's assume the initial rate is R_0. When the concentration of A is tripled, it becomes 3[A], and the new rate is given by:

rate' = $k[(3[A])^2][B] = 9k[A]^2[B]$

The new rate (rate') is nine times the initial rate (R_0), so the initial rate would increase by a factor of nine.

Therefore, the correct answer is (1) Increase by a factor of nine.

Question 54. Which one is an example of heterogenous catalysis?
(1) Decomposition of ozone in presence of nitrogen monoxide
(2) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron
(3) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen
(4) Hydrolysis of sugar catalysed by H+ ions

Answer. (2) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron

Solution. The correct example of heterogeneous catalysis is option (2) - the combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron. In this case, the catalyst (finely divided iron) is in a different phase from the reactants (dinitrogen and dihydrogen).

Question 57. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R
Assertion A : Helium is used to dilute oxygen in diving apparatus.
Reason R : Helium has high solubility in O2. In the light of the above statements, choose the correct answer from the options given below
(1) A is true but R is false
(2) A is false but R is true
(3) Both A and R are true and R is the correct explanation of A
(4) Both A and R are true and R is NOT the correct explanation of A

Answer. (4) Both A and R are true and R is NOT the correct explanation of A

Solution. The correct answer is (4) Both A and R are true and R is NOT the correct explanation of A.

Assertion A is true. Helium is indeed used to dilute oxygen in diving apparatus. This is done to reduce the risk of oxygen toxicity at high pressures, as helium has lower solubility in tissues compared to nitrogen.

Reason R is false. Helium does not have high solubility in oxygen. In fact, helium has very low solubility in both oxygen and tissues, which makes it an ideal gas for diving applications as it does not cause harmful effects at high pressures.

Question 64. Homoleptic complex from the following complexes is
(1) Pentaamminecarbonatocobalt (III) chloride
(2) Triamminetriaquachromium (III) chloride
(3) Potassium trioxalatoaluminate (III)
(4) Diamminechloridonitrito-N-platinum (II)

Answer. (3) Potassium trioxalatoaluminate (III)

Solution. The correct answer is (3) Potassium trioxalatoaluminate (III).

A homoleptic complex is a complex in which all the ligands attached to the central metal ion are the same. In the given options, only option (3) Potassium trioxalatoaluminate (III) fits this criteria. It contains only one type of ligand, which is the trioxalato ligand ($C_2O_4^{3-}$).

Question 65. Amongst the given options which of the following molecules/ ion acts as a Lewis acid?

(1) BF3 (2) OH–
(3) NH3 (4) H2O

Answer. (1) BF3

Solution. The correct answer is (1) BF3.

A Lewis acid is a substance that can accept a pair of electrons (an electron pair acceptor). Among the given options, only BF3 (boron trifluoride) acts as a Lewis acid. It has an incomplete octet and can accept a pair of electrons from a Lewis base to form a coordinate bond. The other options, OH-, NH3, and H2O, act as Lewis bases as they can donate a pair of electrons.

Question 66. The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm–1 cm–1 and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is
(1) 1.26 cm–1 (2) 3.34 cm–1 (3) 1.34 cm–1 (4) 3.28 cm–1

Answer. (1) 1.26 cm–1

Solution. To find the cell constant, we can use the formula:

Conductivity (σ) = 1 / (Resistance × Cell Constant)

Given that the conductivity (σ) is 0.0210 ohm^(-1) cm^(-1) and the resistance is 60 ohm, we can rearrange the formula to solve for the cell constant:

Cell Constant = 1 / (Conductivity × Resistance)

Cell Constant = 1 / (0.0210 ohm^(-1) cm^(-1) × 60 ohm)

Cell Constant = 1 / 1.26 cm^(-1)

Therefore, the value of the cell constant is 1.26 cm^(-1).

So, the correct answer is (1) 1.26 cm^(-1).

Question 72. The number of bonds, bonds and lone pair of electrons in pyridine, respectively are:
(1) 11, 3, 1 (2) 12, 2, 1 (3) 11, 2, 0 (4) 12, 3, 0

Answer. (1) 11, 3, 1

Solution. The correct answer is (1) 11, 3, 1.

Pyridine has 6 sigma (σ) bonds, 3 pi (π) bonds, and 1 lone pair of electrons. Therefore, the number of σ bonds, π bonds, and lone pair of electrons in pyridine is 11, 3, and 1, respectively.

Question 76. A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is AxBy, then the value of x + y is in option
 (1) 3 (2) 2 **(3) 5** (4) 4

Answer. (3) 5

Solution. In a cubic close-packed (CCP) structure, each atom is surrounded by 12 nearest neighbors, forming a dense arrangement. The number of tetrahedral voids in a CCP structure is equal to twice the number of atoms.

Given that atoms of element A occupy 1/3 of the tetrahedral voids, it means that there are 1/3 * 2 = 2/3 atoms of element A for every atom of element B.

Therefore, the formula of the compound is A2B3. In this case, x = 2 and y = 3, so x + y = 2 + 3 = 5.

Hence, the value of x + y is 5, and the correct option is (3) 5.

Question 79. Some tranquilizers are listed below. Which one from the following belongs to barbiturates?
(1) Valium **(2) Verona**l (3) Chlordiazepoxide (4) Meprobamate

Answer. (2) Verona

Solution. The barbiturate among the tranquilizers listed is Veronal, so the correct option is (2).

Valium (Diazepam) belongs to the benzodiazepine class of tranquilizers. Chlordiazepoxide belongs to the benzodiazepine class of tranquilizers. Meprobamate belongs to the carbamate class of tranquilizers.

Barbiturates are a class of sedative-hypnotic drugs that act as central nervous system depressants. Veronal, also known as Barbital, is a barbiturate that has sedative and hypnotic properties.

Question 80. Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :
(1) 30 (2) 18 (3) 16

Answer. (4) 32

Solution. The organic compound obtained by heating sodium ethanoate with sodium hydroxide in the presence of calcium oxide is methane (CH_4).

To determine the weight of two moles of methane, we can calculate its molar mass. The molar mass of methane is calculated by summing the atomic masses of its constituent atoms.

The atomic mass of carbon (C) is 12.01 g/mol, and the atomic mass of hydrogen (H) is 1.01 g/mol. Since methane has one carbon atom and four hydrogen atoms, the molar mass of methane is:

(1 * 12.01 g/mol) + (4 * 1.01 g/mol) = 16.05 g/mol

Therefore, the weight of two moles of methane is:

2 moles * 16.05 g/mol = 32.10 g

So, the correct answer is option (4) 32 g.

Botany Questions & Solutions

Question 104. The reaction centre in PS II has an absorption maxima at
(1) 660 nm
(2) 780 nm
(3) 680 nm
(4) 700 nm

Answer. (3) 680 nm

Solution. The correct option is (3) 680 nm. The reaction center in Photosystem II (PS II) has an absorption maximum at approximately 680 nm. This is the wavelength of light that is most efficiently absorbed by the reaction center pigments in PS II, allowing for the initiation of the light-dependent reactions of photosynthesis.

Question 108. Which hormone promotes internode/petiole elongation in deep water rice?

 (1) Ethylene (2) 2, 4-D (3) GA3 (4) Kinetin

Answer. (1) Ethylene

Solution. The hormone that promotes internode/petiole elongation in deep water rice is ethylene. Deep water rice is a type of rice that grows in flooded conditions, and ethylene plays a crucial role in adapting to this environment. Ethylene stimulates the elongation of internodes and petioles, allowing the plant to grow taller and keep the leaves above water. This adaptation helps the plant survive in flooded conditions by preventing submergence and ensuring sufficient access to oxygen. Therefore, option (1) "Ethylene" is the correct answer.

Question 110. What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
(1) Transcription of precursor of mRNA
(2) Transcription of only snRNAs
(3) Transcription of rRNAs (28S, 18S and 5.8S)
(4) Transcription of tRNA, 5S rRNA and snRNA

Answer. (4) Transcription of tRNA, 5S rRNA and snRNA

Solution. The correct answer is (4) Transcription of tRNA, 5S rRNA, and snRNA.
RNA polymerase III is one of the three main types of RNA polymerases involved in transcription in eukaryotes. It is responsible for transcribing specific classes of RNA molecules. RNA polymerase III transcribes several types of non-coding RNAs, including transfer RNA (tRNA), 5S ribosomal RNA (5S rRNA), and small nuclear RNA (snRNA).
tRNA is involved in protein synthesis and carries amino acids to the ribosome during translation. 5S rRNA is a component of the ribosome and plays a role in protein synthesis. snRNAs are involved in the processing of pre-mRNA molecules and their splicing.
Therefore, RNA polymerase III is responsible for transcribing these specific types of RNAs, namely tRNA, 5S rRNA, and snRNA.

Question 118. Identify the pair of heterosporous pteridophytes among the following :
(1) Psilotum and Salvinia
(2) Equisetum and Salvinia
(3) Lycopodium and Selaginella
(4) Selaginella and Salvinia

Answer. (4) Selaginella and Salvinia

Solution. The correct option is (4) Selaginella and Salvinia. Heterospory refers to the production of two different types of spores, typically male and female, in the same plant. Among the given options, Selaginella and Salvinia are examples of heterosporous pteridophytes. Psilotum is a homosporous pteridophyte, meaning it produces only one type of spore. Equisetum and Lycopodium are also homosporous.

Question 122. The phenomenon of pleiotropism refers to

(1) A single gene affecting multiple phenotypic expression
(2) More than two genes affecting a single character
(3) Presence of several alleles of a single gene controlling a single crossover
(4) Presence of two alleles, each of the two genes controlling a single trait

Answer. (1) A single gene affecting multiple phenotypic expression

Solution. The correct answer is (1) A single gene affecting multiple phenotypic expression.
Pleiotropism is a phenomenon in genetics where a single gene can influence multiple phenotypic traits or characteristics. In other words, a single gene has multiple effects on the phenotype of an organism. This can manifest as seemingly unrelated traits being affected by the same gene.
An example of pleiotropism is seen in human genetic disorders like Marfan syndrome, where a mutation in the FBN1 gene can result in various phenotypic effects such as tall stature, long limbs, cardiovascular abnormalities, and skeletal deformities. In this case, a single gene mutation affects multiple aspects of the phenotype.
Therefore, option (1) "A single gene affecting multiple phenotypic expression" accurately describes the phenomenon of pleiotropism.

Question 124. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
(1) Histones (2) Polysaccharides (3) RNA **(4) DNA**

Answer. (4) DNA

Solution. During the purification process for recombinant DNA technology, the addition of chilled ethanol precipitates out:

(4) DNA.

The addition of chilled ethanol is a common technique used to isolate and purify DNA in recombinant DNA technology. When ethanol is added to a DNA solution, it causes the DNA molecules to become insoluble and precipitate out of the solution. This precipitation step helps in separating the DNA from other cellular components.

By adding chilled ethanol, the DNA molecules lose their solubility and form a visible white or stringy precipitate. This precipitate can then be collected by centrifugation, washed, and further processed to obtain purified DNA.

Therefore, the correct answer is (4) DNA.

Question 130. Expressed Sequence Tags (ESTs) refers to
(1) All genes whether expressed or unexpressed.
(2) Certain important expressed genes.
(3) All genes that are expressed as RNA.
(4) All genes that are expressed as proteins.

Answer. (3) All genes that are expressed as RNA.

Solution. Expressed Sequence Tags (ESTs) refer to (3) All genes that are expressed as RNA. ESTs are short sequences of DNA derived from the transcribed region of a gene. They are obtained through a technique called cDNA (complementary DNA) sequencing. ESTs represent fragments of expressed genes and are useful for studying gene expression patterns and identifying genes that are active in specific tissues or under certain conditions. Since ESTs are derived from the transcribed region of genes, they specifically represent genes that are expressed as RNA. They provide valuable information about the

identity and expression levels of genes in a particular organism or tissue. However, ESTs do not provide information about the complete sequence of a gene or its corresponding protein.

Question 145. Which of the following combinations is required for chemiosmosis?
(1) Proton pump, electron gradient, ATP synthase
(2) Proton pump, electron gradient, NADP synthase
(3) Membrane, proton pump, proton gradient, ATP synthase
(4) Membrane, proton pump, proton gradient, NADP synthase

Answer. (3) Membrane, proton pump, proton gradient, ATP synthase

Solution. The correct combination required for chemiosmosis is:
(3) Membrane, proton pump, proton gradient, ATP synthase

In chemiosmosis, a membrane (such as the inner mitochondrial membrane or thylakoid membrane) is necessary to create a barrier and separate compartments. Within this membrane, a proton pump (or proton transporter) actively transports protons (H+) across the membrane, creating a proton gradient. This proton gradient acts as a source of potential energy.

The proton gradient, formed by the proton pump, is utilized by ATP synthase, an enzyme complex also embedded in the membrane. ATP synthase uses the flow of protons down their electrochemical gradient to drive the synthesis of ATP from ADP and inorganic phosphate. This process of ATP synthesis driven by the flow of protons is known as chemiosmosis.

NADP synthase, mentioned in option (2), is not involved in chemiosmosis. NADP synthase is not a known component of the electron transport chain or ATP synthesis. NADP is typically involved in other metabolic pathways, such as photosynthesis, where it acts as a coenzyme in electron transfer reactions.

Therefore, the correct answer is option (3) - Membrane, proton pump, proton gradient, ATP synthase.

Question 127. Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by

(1) Alfred Sturtevant (2) Henking (3) Thomas Hunt Morgan (4) Sutton and Boveri

Answer. (1) Alfred Sturtevant

Solution. The correct answer is (1) Alfred Sturtevant.

Question 128. Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
(1) Alien species invasions
(2) Co-extinctions
(3) Habitat loss and fragmentation
(4) Over exploitation for economic gain

Answer. (3) Habitat loss and fragmentation

Solution. Among 'The Evil Quartet,' habitat loss and fragmentation are considered the most important cause driving the extinction of species. Therefore, the correct answer is (3) Habitat loss and fragmentation.

Zoology Questions & Solutions

Question 153. Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?
(1) Polymerase Chain Reaction (PCR) technique
(2) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique

(3) Recombinant DNA Technology
(4) Serum and Urine analysis

Answer. (4) Serum and Urine analysis

Solution. The technique that does not serve the purpose of early diagnosis of a disease for its early treatment is:
(4) Palliative care

Palliative care focuses on providing relief from the symptoms and suffering caused by a disease rather than aiming for its early diagnosis and treatment. It is often employed in cases where the disease is advanced and cannot be cured.

Question 154. In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?

(1) Basophils (2) Eosinophils **(3) TH cells** (4) B-lymphocytes

Answer. (3) TH cells

Solution. The correct answer is (3) TH cells, which refers to CD4+ T cells or helper T cells. HIV primarily infects and replicates within these cells, leading to the production of progeny viruses. Basophils, eosinophils, and B-lymphocytes are not the primary targets for HIV replication.

Question 155. Which of the following is not a cloning vector?
 (1) pBR322 **(2) Probe** (3) BAC (4) YAC

Answer. (2) Probe

Solution. The correct answer is (2) Probe.

pBR322, BAC (Bacterial Artificial Chromosome), and YAC (Yeast Artificial Chromosome) are all examples of cloning vectors commonly used in molecular

biology. These vectors are designed to carry and replicate foreign DNA fragments in host organisms.

A probe, on the other hand, is not a cloning vector. A probe is a short, labeled DNA or RNA molecule used to detect the presence of a specific DNA sequence in a sample through hybridization. Probes are not used for cloning or replicating DNA.

Question 159. Vital capacity of lung is _____.
(1)IRV + ERV + TV-RV
(2) IRV + ERV + TV
(3) IRV + ERV
(4) IRV + ERV + TV + RV

Answer. (2) IRV + ERV + TV

Solution. The correct answer is:

(2) IRV + ERV + TV

Vital capacity is the maximum volume of air that can be exhaled after a maximum inhalation. It represents the total volume of air that can be actively moved in and out of the lungs. Vital capacity is calculated by adding together the inspiratory reserve volume (IRV), the expiratory reserve volume (ERV), and the tidal volume (TV). Residual volume (RV) is not included in the calculation of vital capacity.

Therefore, the correct expression for vital capacity is IRV + ERV + TV.

Question 166. Broad palm with single palm crease is visible in a person suffering from-
(1) Klinefelter's syndrome (2) Thalassemia **(3) Down's syndrome** (4) Turner's syndrome

Answer. (3) Down's syndrome

Solution. The correct answer is (3) Down's syndrome. Broad palm with a single palm crease, also known as a Simian crease, is commonly seen in individuals with Down's syndrome. Down's syndrome is a genetic disorder caused by the presence of an extra copy of chromosome 21.

Question 171. Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.
(1) Mole, Flying squirrel, Tasmanian tiger cat (2) Lemur, Anteater, Wolf
(3) Tasmanian wolf, Bobcat, Marsupial mole **(4) Numbat, Spotted cuscus, Flying phalanger**

Answer. (4) Numbat, Spotted cuscus, Flying phalanger

Solution. The correct set of Australian Marsupials exhibiting adaptive radiation is:
(4) Numbat, Spotted cuscus, Flying phalanger

Adaptive radiation refers to the diversification of a group of organisms into different forms to adapt to different ecological niches. Australian marsupials have undergone adaptive radiation, resulting in a wide variety of species occupying different ecological roles.

Among the options provided, the animals listed in option (4) - Numbat, Spotted cuscus, and Flying phalanger - are examples of Australian marsupials that have undergone adaptive radiation. These species have evolved distinct adaptations and occupy different ecological niches in their habitats.

Option (1) includes the mole, flying squirrel, and Tasmanian tiger cat, which are not Australian marsupials and therefore do not exhibit adaptive radiation in the context of this question.

Option (2) includes the lemur, anteater, and wolf, which are not marsupials and therefore not relevant to Australian marsupial adaptive radiation.

Option (3) includes the Tasmanian wolf, bobcat, and marsupial mole, which are relevant Australian marsupials, but the combination does not represent a clear example of adaptive radiation.

Therefore, the correct group/set of Australian marsupials exhibiting adaptive radiation is option (4) - Numbat, Spotted cuscus, Flying phalanger.

Question 176. Which one of the following common sexually transmitted diseases is completely curable when detected early
and treated properly?
(1) Hepatitis-B (2) HIV Infection
(3) Genital herpes **(4) Gonorrhoea**

Answer. (4) Gonorrhoea

Solution. The correct answer is (4) Gonorrhea.

Gonorrhea is a common sexually transmitted disease caused by the bacterium Neisseria gonorrhoeae. When detected early and treated properly with appropriate antibiotics, gonorrhea is completely curable. However, it is important to note that antibiotic resistance is a growing concern with gonorrhea, and there are some cases where treatment may be more challenging. It is always recommended to seek early diagnosis and treatment for any sexually transmitted disease to ensure the best possible outcome.

Question 177. Which of the following statements is correct?
(1) Presence of large amount of nutrients in water restricts 'Algal Bloom'

(2) Algal Bloom decreases fish mortality
(3) Eutrophication refers to increase in domestic sewage and waste water in lakes.
(4) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.

Answer. (4) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.

Solution. The correct statement is (4) Biomagnification refers to an increase in the concentration of a toxicant at successive trophic levels.

Biomagnification is a process in which certain substances, such as pesticides or heavy metals, become more concentrated as they move up the food chain. As organisms at lower trophic levels consume contaminated food or water, the concentration of the toxicant in their tissues may be low. However, as these organisms are consumed by higher trophic level organisms, the concentration of the toxicant can increase due to the cumulative effect of ingesting multiple individuals. This process can lead to higher levels of toxic substances in top predators, such as fish or birds, posing risks to their health.

Option (1) is incorrect because the presence of a large amount of nutrients, such as nitrogen and phosphorus, actually promotes algal bloom rather than restricting it. Excess nutrients can lead to an overgrowth of algae, resulting in dense populations that can disrupt aquatic ecosystems.

Option (2) is incorrect because algal bloom can actually have detrimental effects on fish and other aquatic organisms. When algae proliferate rapidly, they can deplete oxygen levels in the water and create anoxic conditions, leading to fish mortality.

Option (3) is incorrect because eutrophication refers to the excessive nutrient enrichment of water bodies, primarily from agricultural runoff, sewage, and other sources. While domestic sewage and wastewater can contribute to eutrophication, it is not the sole factor involved.

Therefore, the correct statement is (4) Biomagnification refers to an increase in the concentration of the toxicant at successive trophic levels.

Question 179. Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by
(1) Gastro-oesophageal sphincter
(2) Pyloric sphincter
(3) Sphincter of Oddi
(4) Ileo-caecal valve

Answer. (4) Ileo-caecal valve

Solution. The correct answer is (4) Ileo-caecal valve.

The ileo-caecal valve is a sphincter located between the end of the small intestine (ileum) and the beginning of the large intestine (cecum). Its main function is to prevent backflow or reflux of the undigested and unabsorbed substances from the large intestine back into the small intestine. This valve ensures that the flow of material in the digestive system is unidirectional, allowing the digested food to move from the small intestine to the large intestine for further processing and absorption.

Option (1) Gastro-oesophageal sphincter is located between the esophagus and stomach, preventing the backflow of stomach contents into the esophagus.

Option (2) Pyloric sphincter is located at the junction between the stomach and small intestine, regulating the passage of partially digested food from the stomach into the small intestine.

Option (3) Sphincter of Oddi is located at the junction of the common bile duct and pancreatic duct with the duodenum, controlling the release of bile and pancreatic enzymes into the small intestine.

Therefore, the correct answer is (4) Ileo-caecal valve, which prevents the backflow of undigested and unabsorbed substances from the large intestine to the small intestine.

Question 186. Which one of the following is NOT an advantage of inbreeding?
(1) Elimination of less desirable genes and accumulation of superior genes takes place due to it.
(2) It decreases the productivity of inbred population, after continuous inbreeding. (3) It decreases homozygosity.
(4) It exposes harmful recessive genes but are eliminated by selection.

Answer. (2) It decreases the productivity of inbred population, after continuous inbreeding.

Solution . The correct answer is (2) It decreases the productivity of inbred population, after continuous inbreeding.

Inbreeding refers to the mating of individuals who are closely related by ancestry. While inbreeding can have some advantages, such as option (1) eliminating less desirable genes and accumulating superior genes, and option (4) exposing harmful recessive genes for elimination through selection, it also has disadvantages.

Continuous inbreeding can lead to a decrease in productivity and fitness of the inbred population. This is due to the accumulation of harmful recessive alleles and an increased risk of genetic disorders and reduced genetic diversity. Inbreeding depression occurs when deleterious recessive traits become more prevalent in the population, leading to reduced fertility, vigor, and overall reproductive success.

Option (3) It decreases homozygosity is incorrect because inbreeding actually increases homozygosity. Inbreeding leads to a higher frequency of homozygous genotypes, as individuals are more likely to inherit two copies of the same allele from their common ancestor.

Therefore, the correct answer is (2) It decreases the productivity of inbred population, after continuous inbreeding.