



Time Allowed :70 Minutes	Maximum Marks :60	Total Questions :60
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The question paper consists of **60 multiple-choice questions (MCQs)**.
2. Each correct answer carries **1 mark**, and there is **no negative marking**.
3. Use a **blue or black ballpoint pen** to mark answers.
4. Fill your **roll number, question paper code**, and other details accurately on the OMR sheet.
5. The total duration of this section is **70 minutes**. Manage your time effectively.
6. Only **pens, admit cards, and photo ID proofs** are allowed. **Electronic devices** like calculators and mobile phones are **prohibited**.

Question 1.

Which among the following is used to treat Emphysema?

Options:

- (A) Human Hormone - α -Antitrypsin
- (B) Human α -Interferon
- (C) Human protein - α -Antitrypsin
- (D) Human α -Lactalbumin

Correct Answer: (C) Human protein - α -Antitrypsin

Solution:

Human protein α -Antitrypsin is a critical treatment for Emphysema as it helps regulate the enzymes that cause damage to the lungs.

Quick Tip

Understanding the function of proteins like α -Antitrypsin is crucial for developing effective treatments.

Question 2.

Homeostasis is a condition where the organisms:

Options:

- (A) Maintain a constant internal environment in an ever-changing external environment
- (B) Do not maintain a constant internal environment
- (C) Change their internal environment according to their external environment
- (D) Change their internal environment when the external environment is constant

Correct Answer: (A) Maintain a constant internal environment in an ever-changing external environment

Solution:

Homeostasis refers to the ability of an organism to maintain a stable internal environment despite external changes, ensuring optimal functioning.

Quick Tip

Homeostasis is essential for survival in dynamic environments.

Question 3.

Which of the following is not a parasitic adaptation?

Options:

- (A) Loss of unnecessary sense organs
- (B) Absence of adhesive organs or suckers
- (C) Loss of digestive system
- (D) High reproductive capacity

Correct Answer: (B) Absence of adhesive organs or suckers

Solution:

Parasites typically develop adhesive organs or suckers as adaptations to attach to their hosts and derive nutrition.

Quick Tip

Adaptations like adhesive organs enhance parasitic efficiency.

Question 4.

DNA polymerase of *Thermus aquaticus* is:

Options:

- (A) Thermolabile
- (B) Thermophobic

- (C) Exonuclease
- (D) Thermostable

Correct Answer: (D) Thermostable

Solution:

The DNA polymerase of *Thermus aquaticus* (Taq polymerase) is thermostable, making it ideal for PCR applications as it can withstand high temperatures.

Quick Tip

Thermostable enzymes are vital for high-temperature biological processes.

Question 5.

If a recombinant DNA bearing a gene for resistance to Ampicillin is transferred into *E.coli* cells, host cells become transformed into Ampicillin-resistant cells. What happens when these *E.coli* are grown on a medium containing Ampicillin?

Options:

- (A) Non-transformants will grow and transformants will die
- (B) Non-transformants will die and transformants will grow
- (C) Both non-transformants and transformants will die
- (D) Both non-transformants and transformants will grow

Correct Answer: (B) Non-transformants will die and transformants will grow

Solution:

Transformants carry the resistance gene, allowing them to survive and grow in the presence of Ampicillin, whereas non-transformants die.

Quick Tip

Antibiotic resistance markers are commonly used to identify transformed cells in molecular biology.

Question 6.

Which of the following is based on the principle of antigen-antibody interaction?

Options:

- (A) PCR
- (B) ELISA
- (C) rDNA technology

(D) Gel Electrophoresis

Correct Answer: (B) ELISA

Solution:

ELISA (Enzyme-Linked Immunosorbent Assay) relies on the antigen-antibody interaction to detect specific biomolecules, commonly used for diagnostics.

Quick Tip

ELISA is a powerful tool in medical diagnostics for detecting diseases.

Question 7.

A strict protection of biodiversity hotspots could reduce the ongoing mass extinction by almost:

Options:

- (A) 20%
- (B) 25%
- (C) 30%
- (D) 35%

Correct Answer: (C) 30%

Solution:

Strict protection of biodiversity hotspots, areas rich in endemic species and facing significant threats, can reduce the rate of extinction significantly, with studies suggesting up to 30%.

Quick Tip

Biodiversity hotspots are critical for conserving Earth's biological wealth.

Question 8.

Identify the incorrect match with respect to recently extinct animals and their place of extinction according to the IUCN Red List:

Options:

- (A) Dodo - Mauritius
- (B) Quagga - Africa
- (C) Thylacine - Australia
- (D) Steller's Sea Cow - North America

Correct Answer: (D) Steller's Sea Cow - North America

Solution:

Steller's Sea Cow was native to the Bering Sea, not North America. This makes option (D) incorrect.

Quick Tip

Accurate historical records are essential for understanding extinction patterns.

Question 9.

According to the hypothesis proposed by environmental biologists, a relatively constant environment in tropics promotes:

Options:

- (A) Niche specialization and lesser species diversity
- (B) Niche specialization and greater species diversity
- (C) Niche diversity and lesser species specialization
- (D) Niche diversity and greater species specialization

Correct Answer: (B) Niche specialization and greater species diversity

Solution:

The stable tropical environment fosters niche specialization, which allows for greater species diversity as species adapt specifically to their ecological roles.

Quick Tip

Tropical ecosystems are biodiversity hotspots due to their stable climate.

Question 10.

In the prevention of air pollution, the role of a scrubber is to remove:

Options:

- (A) Particulate SO_2
- (B) Liquid SO_2
- (C) Gaseous SO_2
- (D) Liquid SO_3

Correct Answer: (C) Gaseous SO_2

Solution:

Scrubbers are devices used in industrial setups to remove harmful gaseous pollutants like SO_2 from emissions before they are released into the atmosphere.

Quick Tip

Scrubbers are a critical component of air pollution control technologies.

Question 11.

Match List-I with List-II and choose the correct answer.

List-I:

- 1) Nitrogen rich fertilizers
- 2) Carbon dioxide
- 3) Carbon monoxide
- 4) CFC's

List-II:

- p) Ozone depletion
- q) Eutrophication
- r) Greenhouse effect
- s) Air pollutant

Options:

- (A) 1-p, 2-q, 3-r, 4-s
- (B) 1-q, 2-r, 3-s, 4-p
- (C) 1-r, 2-s, 3-p, 4-q
- (D) 1-s, 2-p, 3-q, 4-r

Correct Answer: (B) 1-q, 2-r, 3-s, 4-p

Solution:

The correct matches are:

- Nitrogen rich fertilizers lead to eutrophication.
- Carbon dioxide contributes to the greenhouse effect.
- Carbon monoxide is an air pollutant.
- CFCs are responsible for ozone depletion.

Quick Tip

Understanding the environmental impacts of these substances is critical for sustainable living.

Question 12.

Following representations P, Q, and R denote few steps of Griffith Experiment. Identify the

correct one(s).

Steps:

P. R strain → Inject into mice → Mice die

Q. S strain (Heat killed) → Inject into mice → Mice die

R. R strain → Inject into mice → Mice live

Options:

(A) P only

(B) R only

(C) P and R

(D) Q and R

Correct Answer: (B) R only

Solution:

In Griffith's experiment, live R strain does not cause the death of mice unless mixed with heat-killed S strain, as R strain alone is non-virulent.

Quick Tip

Griffith's experiment laid the foundation for the discovery of DNA as the genetic material.

Question 13.

In tRNA, the region that binds with mRNA is:

Options:

(A) Anticodon loop of tRNA

(B) Amino acid acceptor end of tRNA

(C) Amino acyl synthetase loop of tRNA

(D) Ribosomal binding loop of tRNA

Correct Answer: (A) Anticodon loop of tRNA

Solution:

The anticodon loop of tRNA contains a triplet of nucleotides that is complementary to the codon on the mRNA, enabling proper alignment during protein synthesis.

Quick Tip

The anticodon-codon interaction ensures the fidelity of protein translation.

Question 14.

The mRNA has Untranslated Regions (UTRs):

Options:

- (A) At 3' -end beyond Terminator codon
- (B) At 5' -end before AUG
- (C) At both 3' -end and 5' -end beyond Terminator codon and before AUG respectively
- (D) AUG and Terminator codon flanks the UTR

Correct Answer: (C) At both 3' -end and 5' -end beyond Terminator codon and before AUG respectively

Solution:

UTRs are non-coding sequences at the ends of mRNA that regulate translation and stability. They are present at both the 5' -end (before AUG) and the 3' -end (beyond the terminator codon).

Quick Tip

UTRs play crucial roles in gene expression regulation.

Question 15.

In a structural gene, the template DNA strand has nucleotide sequences:

3' ATGCATGCATGCATGC 5'.

Find the correct and complementary nucleotide sequence on the coding strand.

Options:

- (A) 5' ATGCATGCATGCATGC 3'
- (B) 3' GCATGCATGCATGCAT 5'
- (C) 5' TACGTACGTACGTACG 3'
- (D) 3' TACGTACGTACGTACG 5'

Correct Answer: (C) 5' TACGTACGTACGTACG 3'

Solution:

The coding strand of DNA has the same sequence as the RNA (except for thymine instead of uracil) and is complementary to the template strand.

Quick Tip

DNA strands complement each other to maintain genetic fidelity.

Question 16.

Read the following statements:

Statement I: All vertebrates develop a row of vestigial gill slits during embryonic stage.

Statement II: Embryos always pass through the adult stages of other animals.

Options:

(A) Statement I is correct, Statement II is incorrect.

(B) Statement I is incorrect, Statement II is correct.

(C) Both Statements I and II are correct.

(D) Both Statements I and II are incorrect.

Correct Answer: (A) Statement I is correct, Statement II is incorrect.

Solution:

Vestigial gill slits are observed during the embryonic stage of vertebrates, which demonstrates their evolutionary connection. However, embryos do not pass through the adult stages of other animals, contrary to the recapitulation theory.

Quick Tip

Embryology provides evidence for evolution by showing common developmental features among vertebrates.

Question 17.

Which of the following exhibits a haplodiplontic lifecycle?

Options:

(A) Fucus

(B) Chlamydomonas

(C) Gelidium

(D) Ectocarpus

Correct Answer: (D) Ectocarpus

Solution:

Ectocarpus exhibits a haplodiplontic lifecycle, where both haploid and diploid phases are multicellular and alternately occur during its life cycle.

Quick Tip

Haplodiplontic lifecycles are characteristic of some algae and bryophytes.

Question 18.

Identify the phylum which shows the following characteristics:

1. Animals are exclusively marine, radially symmetrical, and diploblastic.
2. Body bears eight external rows of ciliated comb plates which help in locomotion.
3. Digestion is both extracellular and intracellular.
4. Reproduction only by sexual modes.

Options:

- (A) Coelenterata
- (B) Mollusca
- (C) Arthropoda
- (D) Ctenophora

Correct Answer: (D) Ctenophora

Solution:

Ctenophores, commonly called comb jellies, are unique in their locomotion via ciliary comb plates and their marine habitat.

Quick Tip

Ctenophora is known for its bioluminescence and comb-like cilia.

Question 19.

When a flower has both stamens and carpels, it is described as:

Options:

- (A) Asexual
- (B) Unisexual
- (C) Bisexual
- (D) Dioecious

Correct Answer: (C) Bisexual

Solution:

A bisexual flower contains both male (stamens) and female (carpels) reproductive structures, enabling self-pollination.

Quick Tip

Bisexual flowers are common in angiosperms, promoting reproduction efficiency.

Question 20.

Ciliated epithelial cells are present in:

Options:

- (A) Kidneys
- (B) Intestines
- (C) Blood Vessels
- (D) Bronchioles

Correct Answer: (D) Bronchioles

Solution:

Ciliated epithelial cells in the bronchioles help in moving mucus and trapped particles out of the respiratory tract.

Quick Tip

Ciliated epithelium is vital for maintaining clean and functional respiratory pathways.

Question 21.

Which of the following statements is correct with reference to vacuoles?

Options:

- (A) It is membrane bound and contains storage proteins and lipids.
- (B) It is membrane bound and contains water and excretory substances.
- (C) It lacks membrane and contains air.
- (D) It lacks membrane and contains water and excretory substances.

Correct Answer: (B) It is membrane bound and contains water and excretory substances.

Solution:

Vacuoles are membrane-bound organelles in plant cells that primarily store water, excretory substances, and sometimes nutrients.

Quick Tip

Vacuoles play a crucial role in maintaining turgor pressure in plant cells.

Question 22.

Exoskeleton of Arthropods is made up of a unique complex polysaccharide known as:

Options:

- (A) Hyaluronic Acid

- (B) Chitin
- (C) Waxes
- (D) Cellulose

Correct Answer: (B) Chitin

Solution:

Chitin is a tough, flexible polysaccharide that forms the exoskeleton of arthropods, providing protection and support.

Quick Tip

Chitin is also found in the cell walls of fungi.

Question 23.

The enzyme Recombinase is required at which stage of Meiosis I?

Options:

- (A) Pachytene
- (B) Zygotene
- (C) Diplotene
- (D) Diakinesis

Correct Answer: (A) Pachytene

Solution:

During the Pachytene stage of Meiosis I, recombinase facilitates the process of genetic recombination or crossing over.

Quick Tip

Crossing over during meiosis increases genetic diversity in sexually reproducing organisms.

Question 24.

The water potential of pure water is:

Options:

- (A) One
- (B) More than one
- (C) Zero
- (D) Less than zero

Correct Answer: (C) Zero

Solution:

Pure water has a water potential of zero, as it does not contain any solutes to reduce its potential energy.

Quick Tip

Water potential decreases with the addition of solutes, becoming more negative.

Question 25.

Match the pigments given in List I with their colour in the chromatogram given in List II.

List I (Pigments):

1. Chlorophyll 'b'
2. Carotenoids
3. Chlorophyll 'a'
4. Xanthophylls

List II (Colour in chromatogram):

- p. Yellow orange
- q. Orange red
- r. Yellow
- s. Blue green
- t. Yellow green

Options:

- (A) 1-s, 2-t, 3-r, 4-q
- (B) 1-p, 2-q, 3-r, 4-t
- (C) 1-t, 2-p, 3-s, 4-r
- (D) 1-t, 2-p, 3-r, 4-s

Correct Answer: (B) 1-p, 2-q, 3-r, 4-t

Solution:

The colours of pigments in the chromatogram correspond to their chemical composition, aiding in their identification.

Quick Tip

Chromatography helps separate plant pigments based on their solubility and interaction with the solvent.

Question 26.

Which is the intermediate compound that links the end product of Glycolysis with TCA Cycle?

Options:

- (A) Acetyl CoA
- (B) Pyruvic Acid
- (C) OAA
- (D) Citric Acid

Correct Answer: (A) Acetyl CoA

Solution:

Acetyl CoA is the intermediate molecule formed from pyruvic acid, which enters the TCA cycle for further energy production.

Quick Tip

The conversion of pyruvic acid to Acetyl CoA is catalyzed by the enzyme pyruvate dehydrogenase.

Question 27.

Auxins : Apical dominance : : Gibberellins :

Options:

- (A) Adventitious shoot formation
- (B) Accelerates abscission
- (C) Closure of stomata
- (D) Bolting

Correct Answer: (D) Bolting

Solution:

Gibberellins promote bolting, which is the rapid elongation of the stem in plants like lettuce and cabbage under certain conditions.

Quick Tip

Bolting is often triggered by exposure to long days or cold temperatures.

Question 28.

The term Uremia refers to:

Options:

- (A) Accumulation of Urea in blood.
- (B) Presence of Glucose in the urine.
- (C) Accumulation of Uric acid in blood.
- (D) Accumulation of Uric acid in kidneys.

Correct Answer: (A) Accumulation of Urea in blood.

Solution:

Uremia is a clinical condition caused by the accumulation of urea and other nitrogenous wastes in the bloodstream, typically due to kidney dysfunction.

Quick Tip

Symptoms of uremia include fatigue, confusion, and nausea.

Question 29.

The typical 'lub-dub' sounds heard during heartbeat are produced due to:

Options:

- (A) Closure of semilunar valves
- (B) Closure of bicuspid and tricuspid valves
- (C) Closure of bicuspid and tricuspid valves followed by semilunar valves
- (D) Opening of bicuspid and tricuspid valves followed by semilunar valves

Correct Answer: (C) Closure of bicuspid and tricuspid valves followed by semilunar valves

Solution:

The "lub" sound is caused by the closure of the bicuspid and tricuspid valves, while the "dub" sound is due to the closure of the semilunar valves.

Quick Tip

Heart sounds provide vital clues about the functioning of heart valves.

Question 30.

The functional unit of contraction is a:

Options:

- (A) Portion of myofibril between two successive Z-lines
- (B) Portion of myofibril between two successive M-lines
- (C) Centre of the H-zone

(D) Centre of the I-band

Correct Answer: (A) Portion of myofibril between two successive Z-lines

Solution:

A sarcomere, the functional unit of muscle contraction, is defined as the region between two Z-lines in a myofibril.

Quick Tip

Muscle contraction is driven by the sliding filament theory, involving actin and myosin filaments.

Question 31.

Match the parts of the brain given in List I with their functions given in List II.

List I: (Parts of the brain)

1. Medulla oblongata
2. Hypothalamus
3. Cerebral cortex
4. Limbic system

List II: (Functions)

- p. Body temperature
- q. Olfaction
- r. Respiration
- s. Motor function

Options:

- (A) 1-p, 2-r, 3-s, 4-q
- (B) 1-q, 2-s, 3-r, 4-p
- (C) 1-s, 2-p, 3-q, 4-r
- (D) 1-r, 2-p, 3-s, 4-q

Correct Answer: (D) 1-r, 2-p, 3-s, 4-q

Solution:

Medulla oblongata controls respiration, the hypothalamus regulates body temperature, the cerebral cortex governs motor functions, and the limbic system is associated with olfaction.

Quick Tip

Understanding brain functions is critical for diagnosing neurological conditions.

Question 32.

Hydra reproduces asexually by producing:

Options:

- (A) Zoospores
- (B) Conidia
- (C) Buds
- (D) Gemmule

Correct Answer: (C) Buds

Solution:

Hydra reproduces asexually through budding, where a new organism develops from an outgrowth of a parent and detaches when mature.

Quick Tip
Asexual reproduction in Hydra ensures rapid population growth under favorable conditions.

Question 33.

When male and female gametes are morphologically distinct, the condition is known as:

Options:

- (A) Homogametes
- (B) Heterogametes
- (C) Hermaphrodites
- (D) Sexual Dimorphism

Correct Answer: (B) Heterogametes

Solution:

Heterogametes refer to gametes that are dissimilar in morphology, such as sperm and ovum in humans.

Quick Tip
Heterogamy promotes genetic diversity in sexually reproducing organisms.

Question 34.

The role of Filiform apparatus in synergids is to:

Options:

- (A) Protect the egg apparatus
- (B) Endosperm formation
- (C) Guide the entry of pollen tube
- (D) Prevention of gamete entry

Correct Answer: (C) Guide the entry of pollen tube

Solution:

The Filiform apparatus helps in guiding the pollen tube toward the egg apparatus during fertilization.

Quick Tip

The precise guidance of pollen tubes is essential for successful fertilization.

Question 35.

Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called:

Options:

- (A) Xenogamy
- (B) Autogamy
- (C) Cleistogamy
- (D) Geitonogamy

Correct Answer: (D) Geitonogamy

Solution:

Geitonogamy involves the transfer of pollen from the anther of one flower to the stigma of another flower on the same plant.

Quick Tip

Geitonogamy results in genetic uniformity as both flowers belong to the same plant.

Question 36.

Match the content of List I with List II:

List I:

1. Polyembryony
2. Perisperm
3. False fruit
4. Parthenocarpy

List II:

- p. Black pepper
q. Banana
r. Lemon
s. Apple

Options:

- (A) 1-r, 2-p, 3-s, 4-q
(B) 1-p, 2-r, 3-s, 4-q
(C) 1-q, 2-p, 3-s, 4-r
(D) 1-r, 2-s, 3-p, 4-q

Correct Answer: (A) 1-r, 2-p, 3-s, 4-q

Solution:

Polyembryony occurs in lemon, perisperm is found in black pepper, false fruits include apple, and parthenocarpy is seen in banana.

Quick Tip

Understanding plant structures aids in identifying their biological functions and economic importance.

Question 37.

Which of the following hormones is not secreted by human placenta?

Options:

- (A) Progesterone
(B) HCG
(C) Estrogen
(D) LH

Correct Answer: (D) LH

Solution:

The human placenta secretes hormones such as progesterone, HCG, and estrogen, but not LH, which is secreted by the pituitary gland.

Quick Tip

Placental hormones play a vital role in maintaining pregnancy and supporting fetal development.

Question 38.

In human females, the endometrium of the uterus consists of:

Options:

- (A) Smooth muscle
- (B) Glandular layer
- (C) Adipose layer
- (D) Cartilaginous layer

Correct Answer: (B) Glandular layer

Solution:

The endometrium of the uterus is a glandular layer that undergoes cyclic changes during the menstrual cycle to prepare for potential implantation.

Quick Tip

The endometrium's condition is a key factor in successful implantation and pregnancy.

Question 39.

If two primary spermatocytes and two primary oocytes undergo meiosis simultaneously, what will be the ratio of spermatozoa and ova produced at the end of gametogenesis?

Options:

- (A) 2:1
- (B) 4:1
- (C) 6:2
- (D) 1:2

Correct Answer: (B) 4:1

Solution:

Each primary spermatocyte produces four spermatozoa, while each primary oocyte produces one ovum. Thus, the ratio is 4:1.

Quick Tip

The difference in gamete production reflects the reproductive strategies of males and females.

Question 40.

The Government of India legalized MTP with some strict regulations in the year:

Options:

- (A) 1951
- (B) 1961
- (C) 1971
- (D) 2001

Correct Answer: (C) 1971

Solution:

The Medical Termination of Pregnancy (MTP) Act was passed in India in 1971 to provide safe and legal options for abortion under specific conditions.

Quick Tip

Legal regulations for medical procedures ensure both safety and ethical considerations.

Question 41.

The process in which a small part of the vas deferens is removed or tied up through a small incision, is called:

Options:

- (A) MTP
- (B) Vasectomy
- (C) Tubectomy
- (D) GIFT

Correct Answer: (B) Vasectomy

Solution:

Vasectomy is a surgical procedure for male sterilization or permanent contraception. It involves cutting and sealing the vas deferens to prevent sperm from entering the ejaculate.

Quick Tip

Permanent contraception methods are designed for individuals seeking long-term reproductive control.

Question 42.

Test cross in pea plant is:

Options:

- (A) A cross between F2 tall plant and recessive parent.
- (B) A cross between F2 dwarf plant and recessive parent.
- (C) A cross between F2 tall plant with dominant parent.
- (D) A cross between two F1 plants.

Correct Answer: (A) A cross between F2 tall plant and recessive parent.

Solution:

A test cross determines the genotype of an organism exhibiting a dominant phenotype by crossing it with a recessive parent. This reveals if the organism is homozygous or heterozygous.

Quick Tip

Test crosses are fundamental tools in genetic analysis to infer the genetic composition of an organism.

Question 43.

The genotype ratio of incomplete dominance is:

Options:

- (A) 3:1
- (B) 1:2:1
- (C) 1:1:2
- (D) 9:3:3:1

Correct Answer: (B) 1:2:1

Solution:

In incomplete dominance, the heterozygous phenotype is intermediate between the two homozygous phenotypes, leading to a genotype ratio of 1:2:1.

Quick Tip

Incomplete dominance illustrates the blending of traits in heterozygous individuals.

Question 44.

Find the incorrect statement among the following:

Options:

- (A) In sex-linked recessive traits, the gene is transmitted from an unaffected carrier female to some of the male progeny.
- (B) Accumulation of phenylpyruvic acid in the brain results in mental retardation.
- (C) Individuals affected by Down's Syndrome will have congenital heart defects and are more intelligent.
- (D) Turner's Syndrome is caused due to the absence of one X chromosome.

Correct Answer: (C) Individuals affected by Down's Syndrome will have congenital heart defects and are more intelligent.

Solution:

Down's Syndrome is characterized by intellectual disability and other physical and developmental abnormalities. The statement regarding increased intelligence is incorrect.

Quick Tip

Accurate knowledge of genetic disorders aids in diagnosis and management.

Question 45.

In a dihybrid cross between a true breeding round yellow seeded and true breeding wrinkled green seeded pea plant, the ratio of segregation of round and wrinkled seed traits in F₂ is:

Options:

- (A) 9:1
- (B) 3:1
- (C) 9:3
- (D) 3:3

Correct Answer: (B) 3:1

Solution:

In F₂ of a dihybrid cross, the seed traits segregate in a 3:1 ratio for round (dominant) to wrinkled (recessive) traits.

Quick Tip

Mendelian principles explain predictable inheritance patterns in dihybrid crosses.

Question 46.

Stanley Miller simulated the conditions of pre-biotic Earth using a spark-discharge apparatus. Which organic compounds were observed by him on analyzing the end product of his experiment?

Options:

- (A) Pigments
- (B) Fats
- (C) Nitrogen bases
- (D) Amino acids

Correct Answer: (D) Amino acids

Solution:

Stanley Miller's experiment demonstrated the synthesis of amino acids under pre-biotic conditions, supporting theories on the origin of life.

Quick Tip

Experiments simulating Earth's early conditions provide insights into abiogenesis.

Question 47.

The most ape-like ancestral primate was:

Options:

- (A) Dryopithecus
- (B) Ramapithecus
- (C) Australopithecus
- (D) Neanderthal man

Correct Answer: (A) Dryopithecus

Solution:

Dryopithecus, an early ape-like ancestor, exhibited primitive traits and is considered among the common ancestors of apes and humans.

Quick Tip

Fossil evidence bridges the evolutionary lineage of primates.

Question 48.

The principle of vaccination is based on which property of the immune system?

Options:

- (A) Memory
- (B) Specificity
- (C) Diversity
- (D) Plasticity

Correct Answer: (A) Memory

Solution:

Vaccines stimulate immune memory, enabling the body to mount a faster and stronger response upon exposure to the pathogen.

Quick Tip

Immune memory is the cornerstone of vaccine efficacy.

Question 49.

The genome of HIV replicates in the macrophages with the help of an enzyme called:

Options:

- (A) DNA Polymerase
- (B) RNA Polymerase
- (C) Reverse Transcriptase
- (D) DNA Ligase

Correct Answer: (C) Reverse Transcriptase

Solution:

HIV utilizes reverse transcriptase to synthesize DNA from its RNA genome, a critical step in its replication cycle.

Quick Tip

Targeting enzymes like reverse transcriptase is central to HIV therapy.

Question 50.

Read the following statements:

Statement I: Morphine is obtained by acetylation of Heroin.

Statement II: Cannabinoids are known for their effect on the cardiovascular system.

Which of the following options is correct with reference to these statements?

Options:

- (A) Both Statements I and II are correct.
- (B) Statement I is correct and Statement II is incorrect.
- (C) Statement I is incorrect and Statement II is correct.
- (D) Both Statements I and II are incorrect.

Correct Answer: (C) Statement I is incorrect and Statement II is correct.

Solution:

Morphine is a natural opiate obtained from opium, whereas heroin is synthesized by acetylation of morphine. Cannabinoids affect various systems, including the cardiovascular system.

Quick Tip

Understanding drug origins and effects supports informed therapeutic use.

Question 51.

Mule is the result of:

Options:

- (A) Out-crossing
- (B) Cross-breeding
- (C) Interspecific hybridization
- (D) Out-breeding

Correct Answer: (C) Interspecific hybridization

Solution:

A mule is an offspring of a male donkey and a female horse. It is an example of interspecific hybridization where individuals from two different species mate.

Quick Tip

Interspecific hybridization often results in sterile offspring due to genetic incompatibility.

Question 52.

Identify the bacterial disease among the following:

Options:

- (A) Brown rust of wheat
- (B) Tobacco mosaic disease
- (C) Black rot of crucifers
- (D) Late blight of potato

Correct Answer: (C) Black rot of crucifers

Solution:

Black rot of crucifers is caused by the bacterium *Xanthomonas campestris*, affecting crops like cabbage and cauliflower.

Quick Tip

Early identification of bacterial diseases is key to effective crop management.

Question 53.

Match the nutrients given in List-I with the source in List-II:

List-I:

- 1. Vitamin A
- 2. Single cell protein
- 3. Vitamin C
- 4. Protein

List-II:

- p. Bitter gourd
- q. Beans
- r. Carrots
- s. Spirulina spp

Options:

- (A) 1-p, 2-q, 3-r, 4-s
- (B) 1-r, 2-s, 3-p, 4-q
- (C) 1-p, 2-r, 3-s, 4-q
- (D) 1-q, 2-s, 3-p, 4-r

Correct Answer: (B) 1-r, 2-s, 3-p, 4-q

Solution:

Vitamin A is found in carrots (r), single-cell protein from *Spirulina* (s), vitamin C in bitter

gourd (p), and protein in beans (q).

Quick Tip

Balanced diets incorporating various sources ensure adequate nutrient intake.

Question 54.

The chemical substances produced by some microbes which can kill or retard the growth of other microbes are known as:

Options:

- (A) Statins
- (B) Streptokinases
- (C) Cyclosporins
- (D) Antibiotics

Correct Answer: (D) Antibiotics

Solution:

Antibiotics like penicillin are natural substances produced by microorganisms to inhibit or destroy other microbes.

Quick Tip

Antibiotics revolutionized medicine by providing effective treatments for bacterial infections.

Question 55.

Select the correct statement from the following:

Options:

- (A) *Methanobacterium* is an aerobic bacterium found in the rumen of cattle.
- (B) Biogas is produced by the activity of aerobic bacteria.
- (C) Biogas is pure methane.
- (D) Activated sludge in sediment tanks is a rich source of aerobic bacteria.

Correct Answer: (D) Activated sludge in sediment tanks is a rich source of aerobic bacteria.

Solution:

Activated sludge contains aerobic bacteria used in sewage treatment to break down organic matter.

Quick Tip

Aerobic bacteria play a vital role in wastewater management.

Question 56.

Which of these enzymes is required to cleave a plasmid?

Options:

- (A) Ligase
- (B) Endonuclease
- (C) Exonuclease
- (D) Polymerase

Correct Answer: (B) Endonuclease

Solution:

Endonucleases cleave DNA at specific sites and are essential for genetic engineering techniques.

Quick Tip

Restriction enzymes are indispensable tools in molecular biology.

Question 57.

The natural reservoir of phosphorus is:

Options:

- (A) Rocks
- (B) Soil solution
- (C) Detritus
- (D) Atmosphere

Correct Answer: (A) Rocks

Solution:

Phosphorus primarily originates from the weathering of rocks, which releases phosphates into the soil and water.

Quick Tip

Phosphorus is a critical nutrient in ecosystems but lacks a gaseous phase.

Question 58.

The sequence of communities of primary succession in water is:

Options:

- (A) Phytoplanktons → Scrubs → Free floating hydrophytes → Rooted hydrophytes → Grasses → Trees.
(B) Phytoplanktons → Free floating hydrophytes → Rooted hydrophytes → Trees → Scrubs.
(C) Free floating hydrophytes → Scrubs → Phytoplanktons → Rooted hydrophytes → Grasses → Trees.
(D) Phytoplanktons → Rooted hydrophytes → Free floating hydrophytes → Reed swamps → Marsh meadows → Scrubs → Trees.

Correct Answer: (D) Phytoplanktons → Rooted hydrophytes → Free floating hydrophytes → Reed swamps → Marsh meadows → Scrubs → Trees.

Solution:

Primary succession in water bodies follows a predictable series of stages, leading from aquatic to terrestrial ecosystems.

Quick Tip

Succession reflects the dynamic and adaptive nature of ecosystems.

Question 59.

Match the type of adaptation given in List-I with their examples given in List-II:

List-I (Types of adaptation):

1. Biochemical adaptation
2. Behavioural adaptation
3. Physiological adaptation
4. Morphological adaptation

List-II (Examples):

- p. Desert lizards
- q. Deep sea fishes
- r. *Opuntia*
- s. Kangaroo rats

Options:

- (A) 1-q, 2-r, 3-s, 4-p
(B) 1-p, 2-q, 3-r, 4-s
(C) 1-q, 2-p, 3-s, 4-r
(D) 1-s, 2-r, 3-q, 4-p

Correct Answer: (C) 1-q, 2-p, 3-s, 4-r

Solution:

Biochemical adaptations are seen in deep-sea fishes (q), behavioral in desert lizards (p), physiological in kangaroo rats (s), and morphological in *Opuntia* (r).

Quick Tip

Adaptations enable organisms to thrive in diverse environmental conditions.

Question 60.

The annual net primary productivity of the biosphere is approximately:

Options:

- (A) 170 billion tons
- (B) 55 billion tons
- (C) 170 million tons
- (D) 55 million tons

Correct Answer: (A) 170 billion tons

Solution:

The biosphere's net primary productivity, the total biomass produced annually, is estimated at 170 billion tons.

Quick Tip

Understanding productivity is crucial for ecosystem management and sustainability.