CUET-UG Agriculture Sample Paper - 14

Duration: 1 Hour **Maximum Marks: 250**

Instructions

- This paper contains a total of 50 Multiple Choice Questions.
- Each correct answer carries **+5 marks**.
- Each incorrect answer carries **-1 mark**.
- No negative marking for unattempted questions.

Q1. The term "Linkage" was first introduced and demonstrated in Drosophila by which scientist?

(A) Gregor Mendel

(B) T.H. Morgan

(C) C.B. Bridges

(D) Hugo de Vries

Q2. The technique of "Emasculation" in plant breeding refers to:

(A) Removal of petals

(B) Removal of stigma

(C) Removal of anthers before dehiscence

(D) Removal of the entire flower

Q3. Which of the following enzymes is responsible for "fixing" atmospheric nitrogen in root nodules?

(A) Amylase

(B) Nitrogenase

(C) Invertase

(D) Cellulase

Q4. The science of "Agrometeorology" primarily deals with the study of:

(A) Soil minerals

(B) Relationship between climatic factors and agricultural crops

(C) Insect life cycles

(D) Irrigation engineering

Q5. Which breed of cattle is known for its "Lola" (loose skin) and is the highest milk producer among indigenous breeds?

(A) Gir

(B) Sahiwal

(C) Red Sindhi

(D) Haryana

Q6. The first "Artificial Insemination" (AI) in India was successfully performed at:

(A) NDRI, Karnal

(B) IVRI, Izatnagar

(C) IARI, New Delhi

(D) Dairy Farm, Mysore

Q7. "Ranikhet" (New Castle Disease) is a highly fatal viral disease of:

(A) Cattle

(B) Sheep

(C) Poultry

(D) Pigs

Q8. What is the average "Dry Period" recommended for a dairy cow?

(A) 15 days
(B) 30 days
(C) 60 days
(D) 120 days

Q9. The "Vertical section" of the soil showing different layers is called:

(A) Soil texture
(B) Soil structure
(C) Soil profile
(D) Soil horizon

Q10. Which nutrient is essential for the synthesis of "Chlorophyll" and acts as the central atom?

(A) Iron
(B) Magnesium
(C) Zinc
(D) Manganese

Q11. The most suitable method of irrigation for "Saline Soils" is:

(A) Sprinkler method
(B) Check basin method
(C) Flood irrigation
(D) Drip irrigation

Q12. Which herbicide is specifically used to control "Phalaris minor" in wheat?

(A) 2,4-D

(B) Isoproturon

(C) Atrazine

(D) Butachlor

Q13. The "SRI" (System of Rice Intensification) technique originated in which country?

(A) India

(B) Philippines

(C) Madagascar

(D) Japan

Q14. Which type of farming focuses on maintaining soil health by avoiding all synthetic chemicals?

(A) Intensive farming

(B) Organic farming

(C) Mixed farming

(D) Shifting cultivation

Q15. "Khaira" disease of Rice is caused due to the deficiency of:

(A) Copper

(B) Iron

(C) Zinc

(D) Nitrogen

Q16. The "King of Fruits" in India is:

(A) Apple

(B) Banana

(C) Mango

(D) Citrus

Q17. Which method of propagation is most commonly used in "Citrus" plants?

(A) T-Budding

(B) Air layering

(C) Hardwood cutting

(D) Veneer grafting

Q18. "Pectin" content is most important for the preparation of:

(A) Jam

(B) Jelly

(C) Ketchup

(D) Candy

Q19. The specific gravity of pure milk is measured by using a:

(A) Thermometer

(B) Lactometer

(C) Butyrometer

(D) Hydrometer

Q20. Which stage of the "Monsoon" is most critical for Kharif crops in India?

(A) Withdrawal

(B) Onset

(C) Break in monsoon

(D) North-East monsoon

Q21. DNA replication occurs during which phase of the cell cycle?

(A) G1 phase

(B) S phase

(C) G2 phase

(D) M phase

Q22. The "Double Helix" structure of DNA was proposed by:

(A) Watson and Crick

(B) Robert Hooke

(C) Schleiden and Schwann

(D) Mendel

Q23. Which vitamin is also known as "Ascorbic Acid"?

(A) Vitamin A

(B) Vitamin B12

(C) Vitamin C

(D) Vitamin D

Q24. The "Panchagavya" in organic farming consists of how many ingredients from the cow?

(A) Three

(B) Five

(C) Seven

(D) Nine

Q25. Which breed of buffalo is known for its "Jet Black" color and tightly curved horns?

(A) Surti

(B) Mehsana

(C) Murrah

(D) Jaffrabadi

Q26. What is the "Colostrum" given to a newborn calf?

(A) First milk after calving

(B) Concentrated feed

(C) Mineral mixture

(D) Synthetic protein

Q27. "Coccidiosis" in poultry is caused by:

(A) Virus

(B) Protozoa

(C) Bacteria

(D) Deficiency of Vitamin E

Q28. The process of separating cream from milk is based on the principle of:

(A) Filtration

(B) Centrifugal force

(C) Evaporation

(D) Distillation

Q29. A soil with a "pH of 4.5" is classified as:

(A) Strongly Alkaline

(B) Neutral

(C) Strongly Acidic

(D) Saline

(E)

Q30. The most essential element for "Fruit set" and pollen tube growth is:

(A) Boron

(B) Calcium

(C) Sulfur

(D) Chlorine

Q31. "Transpiration" in plants primarily occurs through:

(A) Roots

(B) Stem

(C) Stomata

(D) Flowers

Q32. The "Golden Rice" variety is genetically modified to be rich in:

(A) Vitamin C

(B) Iron

(C) Vitamin A (Beta-carotene)

(D) Lysine

Q33. Which of the following is a "C4 Plant"?

(A) Wheat

(B) Rice

(C) Sugarcane

(D) Potato

Q34. The "Queen of Spices" is:

(A) Black Pepper

(B) Cardamom

(C) Clove

(D) Turmeric

Q35. "Zero Tillage" was first successfully practiced in which country?

(A) India

(B) USA

(C) UK

(D) Brazil

Q36. The "Law of Independent Assortment" is Mendel's:

(A) First Law

(B) Second Law

(C) Third Law

(D) Fourth Law

Q37. Which microorganism is used in the production of "Curd"?

(A) *Rhizobium*

(B) *Lactobacillus*

(C) *Azotobacter*

(D) *Aspergillus*

Q38. The relative proportion of sand, silt, and clay is called:

(A) Soil Structure

(B) Soil Texture

(C) Soil Density

(D) Soil Porosity

Q39. "Finger Millet" is the common name for which crop?

(A) Jowar

(B) Bajra

(C) Ragi

(D) Kodo

Q40. Which chemical is used to test the "Viability" of seeds?

(A) Tetrazolium Chloride

(B) Sulfuric Acid

(C) Ethyl Alcohol

(D) Iodine Solution

Q41. "Milk Fever" in dairy cows is caused by the deficiency of:

(A) Phosphorus

(B) Calcium

(C) Magnesium

(D) Iron

Q42. The "White Fly" acts as a vector for which disease in many crops?

(A) Rust

(B) Smut

(C) Yellow Vein Mosaic

(D) Blight

Q43. Which instrument is used to measure "Atmospheric Pressure"?

(A) Hygrometer

(B) Barometer

(C) Thermometer

(D) Anemometer

Q44. The process of "Thinning" in crops is done to:

(A) Increase plant population

(B) Remove excess plants for proper spacing

(C) Add fertilizers

(D) Control insects

Q45. Which fruit is known as the "Poor Man's Apple"?

(A) Ber (Jujube)

(B) Guava

(C) Banana

(D) Custard Apple

Q46. The "Central Tobacco Research Institute" (CTRI) is located at:

(A) Shimla

(B) Rajahmundry

(C) Coimbatore

(D) Guntur

Q47. Which hormone is used to induce "Rooting" in cuttings?

(A) NAA/IBA

(B) Gibberellins

(C) Cytokinins

(D) Ethylene

Q48. What is the main objective of "Blanching" in vegetables?

(A) To increase weight

(B) To inactivate enzymes

(C) To add flavor

(D) To kill all bacteria

Q49. The "Blue Revolution" is related to:

(A) Oilseeds

(B) Fertilizers

(C) Fish Production

(D) Pulses

Q50. Which of the following is a "Day Neutral Plant"?

(A) Wheat

(B) Rice

(C) Tomato

(D) Soyabean

Detailed Solutions

Q1.

Solution

Concept:

Linkage refers to the tendency of genes located close together on the same chromosome to be inherited together during meiosis. This phenomenon is an exception to Mendel's Law of Independent Assortment.

Solution:

1. Historical Development: While Bateson and Punnett first noticed "coupling and repulsion," they could not explain the physical basis.
2. The Scientist: Thomas Hunt Morgan (T.H. Morgan), working with the fruit fly *Drosophila melanogaster*, provided the experimental evidence for linkage.
3. Key Findings: Morgan demonstrated that certain traits (like eye color and wing shape) were linked because they were located on the same X-chromosome. He also introduced the concept of "Crossing Over" to explain how linked genes occasionally separate.
4. Recognition: For his discoveries concerning the role of the chromosome in heredity, Morgan was awarded the Nobel Prize in 1933.

Final Answer: The term "Linkage" was introduced and demonstrated by T.H. Morgan.

Answer: (B)

Q2.

Solution

Concept:

Hybridization is the process of crossing two genetically different individuals. To prevent a bisexual (hermaphrodite) flower from self-pollinating during a cross, the male reproductive organs must be removed before they can release pollen.

Solution:

1. Definition: Emasculation is the removal of the stamens or anthers from a flower before they mature (dehisce) and release pollen.
2. Procedure: It is typically performed in the "bud stage" of the female parent. This ensures that the only pollen that reaches the stigma is the desired pollen from the selected male parent.
3. Techniques: Common methods include the use of forceps, suction, or even hot water/alcohol treatments for flowers with very small anthers.
4. Aftercare: Once emasculated, the flower is usually covered with a bag (bagging) to prevent accidental pollination by insects or wind.

Final Answer: Emasculation refers to the removal of anthers before dehiscence.

Answer: (C)

Q3.

Solution

Concept:

Biological Nitrogen Fixation (BNF) is a complex biochemical process where atmospheric nitrogen (N_2) is reduced to ammonia. This reaction is extremely energy-intensive and requires a specific biological catalyst.

Solution:

1. Enzyme Identification: The enzyme Nitrogenase is the only enzyme known to be capable of breaking the triple bond of the N_2 molecule.
2. Symbiosis: In legume root nodules, the enzyme is produced by *Rhizobium* bacteria. The plant provides the anaerobic environment (via Leghaemoglobin) necessary for the enzyme to function.
3. Composition: Nitrogenase is a complex protein containing Iron (Fe) and Molybdenum (Mo) atoms, which act as active sites for the reaction.
4. Contrast: - Amylase: Breaks down starch. - Cellulase: Breaks down cellulose. - Invertase: Breaks down sucrose into glucose and fructose.

Final Answer: Nitrogenase is responsible for fixing atmospheric nitrogen.

Answer: (B)

Q4.

Solution

Concept:

Agriculture is heavily dependent on weather. Agrometeorology (Agricultural Meteorology) is an applied science that bridges the gap between the atmospheric sciences and the plant/animal sciences.

Solution:

1. Core Definition: It is the study of the interaction between meteorological and hydrological factors on one hand, and agriculture (including horticulture, animal husbandry, and forestry) on the other.
2. Scope: It covers weather elements like temperature, rainfall, solar radiation, and wind speed and how they influence: - Sowing and harvest dates. - Irrigation requirements (Evapotranspiration). - Pest and disease outbreaks. - Yield forecasting.
3. Practical Application: Farmers use agromet advisories to make tactical decisions, such as delaying a spray if rain is predicted or irrigating if a frost is expected.

Final Answer: Agrometeorology deals with the relationship between climatic factors and agricultural crops.

Answer: (B)

Q5.

Solution

Concept:

Indigenous (Desi) cattle breeds of India are highly valued for their resilience and heat tolerance. The Sahiwal is considered the premier dairy breed among all Indian zebu cattle.

Solution:

1. Physical Characteristics: The Sahiwal breed is reddish-brown in color. It has a characteristic very loose skin, which earned it the nickname "Lola."

2. Productivity: It is the best indigenous milch breed. A Sahiwal cow can produce between 2,000 and 3,000 kg of milk per lactation under good management.

3. Global Reach: Due to its high milk yield and resistance to ticks/heat, it has been exported to many tropical countries, including Australia and Africa, to improve their local cattle stocks.

4. Other Breeds: - Gir: Known for its convex forehead and drooping ears. - Haryana: A dual-purpose (milk and work) breed.

Final Answer: Sahiwal is known for its "Lola" (loose skin) and high milk production.

Answer: (B)

Q6.

Solution

Concept:

Artificial Insemination (AI) is the process of collecting sperm cells from a male animal and manually depositing them into the reproductive tract of a female. It is the most effective tool for the genetic improvement of livestock.

Solution:

1. Historical Milestone: The credit for the first successful Artificial Insemination in India goes to Dr. Sampath Kumaran.

2. Location and Year: This landmark event took place in 1939 at the Palace Dairy Farm in Mysore (Karnataka).

3. Impact: Initially, it was used to cross-breed local Hallikar cows with Holstein Friesian bulls. Today, India performs millions of AI procedures annually through a vast network of centers under the NDDB and State Animal Husbandry departments.

4. Contrast: While the Indian Veterinary Research Institute (IVRI) and National Dairy Research Institute (NDRI) are major hubs for AI research now, the very first instance was in Mysore.

Final Answer: The first AI in India was performed at the Dairy Farm, Mysore.

Answer: (D)

Q7.

Solution

Concept:

Ranikhet disease, globally known as Newcastle Disease (ND), is a highly contagious and fatal viral disease affecting birds of all ages, particularly domestic poultry. It is one of the biggest threats to the poultry industry.

Solution:

1. Pathogen: The disease is caused by a virulent strain of Avian Paramyxovirus type 1 (APMV-1).
2. Symptoms: Infected birds show respiratory distress (gasping), digestive issues (greenish diarrhea), and characteristic nervous symptoms (twisting of the head and neck, known as torticollis).
3. Nomenclature: In India, it is called "Ranikhet" because it was first reported in 1928 in the Ranikhet region of Uttarakhand.
4. Prevention: Since it is a viral disease, there is no effective treatment once symptoms appear. Control is achieved solely through strict vaccination schedules (e.g., Lasota and R2B strains).

Final Answer: Ranikhet is a highly fatal viral disease of Poultry.

Answer: (C)

Q8.

Solution

Concept:

The "Dry Period" is the phase of a cow's lactation cycle when she is not producing milk, typically the period between the end of one lactation and the birth of the next calf. This "rest" is essential for the health of the cow and the development of the unborn calf.

Solution:

1. Physiological Purpose: - Allows the mammary gland tissues to repair and regenerate. - Enables the cow to replenish body mineral reserves (like Calcium and Phosphorus). - Supports the rapid growth of the fetus during the final two months of pregnancy.
2. Recommended Duration: The standard recommended dry period is 60 days (2 months).
3. Consequences: - If the dry period is too short (< 40 days), the subsequent milk yield will be significantly lower. - If it is too long (> 90 days), the cow may become over-conditioned (obese), leading to metabolic issues like ketosis or milk fever after calving.

Final Answer: The recommended dry period for a dairy cow is 60 days.

Answer: (C)

Q9.

Solution

Concept:

A soil is not a uniform mass; it develops distinct horizontal layers over time due to the action of climate, organisms, and relief on the parent material. This vertical organization is a key focus of Pedology.

Solution:

1. Identification: The "Soil Profile" is the vertical section of the soil from the ground surface down to where the soil meets the underlying rock.
2. Components: Individual layers within the profile are called "Horizons" (e.g., O, A, E, B, and C horizons).
3. Importance: A well-developed soil profile tells scientists about the age of the soil, its drainage capacity, and the depth of the fertile topsoil (A-horizon).
4. Distinction: - Texture refers to the feel (sand/silt/clay). - Structure refers to the arrangement of particles into aggregates.

Final Answer: The vertical section of the soil is called the Soil Profile.

Answer: (C)

Q10.

Solution

Concept:

Chlorophyll is the green pigment in plants that captures light energy for photosynthesis. The molecule has a specific chemical structure similar to the heme in human blood, but with a different metal atom at its core.

Solution:

1. Chemical Structure: The chlorophyll molecule consists of a porphyrin ring with a central metallic ion.
2. The Element: Magnesium (Mg) is the central atom of the chlorophyll molecule. Without magnesium, the plant cannot synthesize chlorophyll, leading to a condition called "Chlorosis" (yellowing of leaves).
3. Deficiency Symptom: Magnesium deficiency typically causes "Interveinal Chlorosis" in older leaves, where the veins remain green but the area between them turns yellow.
4. Other Elements: While Iron (Fe) is essential for the *synthesis* of chlorophyll, it is not part of the molecule's actual structure.

Final Answer: Magnesium is the central atom essential for chlorophyll synthesis.

Answer: (B)

Q11.

Solution

Concept:

Saline soils are characterized by an excess of soluble salts, which increases the osmotic pressure of the soil solution, making it difficult for plants to absorb water. Management of these soils requires "leaching"—applying enough water to wash the salts below the root zone.

Solution:

1. Comparison of Methods: - Sprinkler and Drip: While efficient for water conservation, they do not provide the volume of water necessary to flush accumulated salts deep into the soil. - Check Basin Method: This involves dividing the field into several small plots (basins) surrounded by bunds and filling them with water.

2. Why Check Basin is Preferred: This method allows for a uniform "flooding" of the soil surface. The standing water creates a downward pressure that leaches the soluble salts (Na^+, Cl^-, SO_4^{2-}) out of the topsoil.

3. Practical Application: It is the most common and effective method used during the reclamation phase of saline patches in a field.

Final Answer: The Check basin method is the most suitable for irrigating saline soils.

Answer: (B)

Q12.

Solution

Concept:

Chemical weed control involves the use of herbicides. In some cases, a weed becomes so similar to the crop (mimicry) or so prevalent that specific, selective herbicides are required to target the weed without harming the main crop.

Solution:

1. The Problem: *Phalaris minor* (Canary grass) is a devastating weed in wheat fields, especially in the rice-wheat cropping system of North India.

2. The Chemical: Isoproturon is a substituted urea herbicide that was the "gold standard" for controlling *Phalaris minor* for decades. It is absorbed by the roots and inhibits photosynthesis in the weed.

3. Current Context: In recent years, *Phalaris minor* has developed resistance to Isoproturon in many areas, leading farmers to shift to newer chemicals like Sulfosulfuron or Clodinafop-propargyl. However, in the context of classic agronomy questions, Isoproturon is the historically correct association.

Final Answer: Isoproturon is used to control *Phalaris minor* in wheat.

Answer: (B)

Q13.

Solution

Concept:

The System of Rice Intensification (SRI) is a climate-smart, agro-ecological methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water, and nutrients.

Solution:

1. Origin: SRI was developed in the 1980s by Father Henri de Laulanié, a Jesuit priest.
2. Location: The technique originated in Madagascar.
3. Key Principles: - Planting very young seedlings (8–12 days old). - Planting single seedlings per hill with wide spacing. - Keeping the soil moist but not continuously flooded (Alternate Wetting and Drying). - Using a mechanical weeder to aerate the soil.
4. Benefit: SRI uses significantly less water and seed while often resulting in higher yields compared to traditional flooding methods.

Final Answer: The SRI technique originated in Madagascar.

Answer: (C)

Q14.

Solution

Concept:

Modern agriculture is exploring ways to produce food sustainably. Various farming systems exist, ranging from chemical-intensive to entirely natural approaches.

Solution:

1. Identification: Organic farming is a production system that sustains the health of soils, ecosystems, and people.
2. Key Characteristics: It relies on ecological processes, biodiversity, and cycles adapted to local conditions, rather than the use of inputs with adverse effects.
3. Prohibited Inputs: The use of synthetic fertilizers, synthetic pesticides, growth regulators, and genetically modified organisms (GMOs) is strictly prohibited.
4. Permitted Inputs: Instead, it uses Green Manures, Farm Yard Manure (FYM), Bio-fertilizers, and biological pest control (like Neem oil or Trichoderma).

Final Answer: Organic farming focuses on maintaining soil health by avoiding synthetic chemicals.

Answer: (B)

Q15.

Solution

Concept:

Micronutrient deficiencies often manifest as specific, identifiable symptoms in crops. "Khaira" is one of the most famous nutritional disorders in Indian agriculture, particularly affecting the rice-growing regions of the Indo-Gangetic plains.

Solution:

1. Symptoms: Khaira disease appears in the nursery or shortly after transplanting. The leaves develop brownish-red (rust-colored) spots and streaks, and the plant's growth is severely stunted.
2. Discovery: It was first identified and described by Dr. Y.L. Nene in 1966 at Pantnagar, Uttarakhand.
3. Cause: It is caused by the deficiency of Zinc (Zn). This deficiency is common in calcareous soils or where intensive cropping has depleted soil micronutrients.
4. Treatment: The disease is easily controlled by the foliar spray of Zinc Sulfate ($ZnSO_4$) mixed with lime.

Final Answer: Khaira disease of Rice is caused by Zinc deficiency.

Answer: (C)

Q16.

Solution

Concept:

In many cultures, certain fruits are given honorary titles based on their historical significance, economic importance, and popularity. Mango ($Mangifera\ indica$) is deeply rooted in the culture and mythology of the Indian subcontinent.

Solution:

1. Identification: Mango is known as the "King of Fruits" in India. It is also the National Fruit of India, Pakistan, and the Philippines.
2. Diversity: India is the home of over 1,000 varieties of mango, including world-famous ones like Alphonso, Dashehari, Langra, and Chausa.
3. Economic Role: India is the largest producer of mangoes in the world, accounting for nearly 50% of the global production.
4. Other Titles: - Apple: King of Temperate Fruits. - Ber: King of Arid Fruits (or Poor Man's Apple).

Final Answer: The "King of Fruits" in India is Mango.

Answer: (C)

Q17.

Solution

Concept:

Budding is a form of grafting where a single bud (scion) is inserted into the bark of a rootstock. For Citrus fruits, this method is preferred because it ensures the clonal propagation of desired varieties while utilizing the disease resistance of specific rootstocks.

Solution:

1. The Technique: T-Budding (also called Shield Budding) is the standard method for Citrus. A "T" shaped incision is made in the bark of the rootstock, and a shield-shaped piece of bark containing a bud is tucked into it.
2. Timing: It is most successful when the "bark is slipping," meaning the bark can be easily peeled away from the wood, which occurs during periods of active growth (spring or early autumn).
3. Rootstocks: Common rootstocks used in India include Rangpur Lime and Rough Lemon (*Citrus jambhiri*).
4. Alternative: While Air layering is used for Acid Lime (Kagzi Nimboo), T-Budding is the dominant method for Sweet Orange (Mosambi) and Mandarin (Santra).

Final Answer: T-Budding is the most common method of propagation in Citrus.

Answer: (A)

Q18.

Solution

Concept:

Food preservation often relies on the natural chemical properties of fruits. Pectin is a structural heteropolysaccharide contained in the primary cell walls of terrestrial plants. When heated with sugar and acid, it forms a gel.

Solution:

1. Gel Formation: Jelly is a semi-solid product prepared by boiling a clear fruit extract with sugar and acid. The characteristic "set" or "firmness" of a good jelly depends entirely on the pectin content.
2. Source: Guava is considered the best fruit for jelly making because it is naturally rich in both pectin and acid.
3. Testing: The "Alcohol Test" or a "Jelmeter" is used to determine the amount of pectin in the fruit extract to decide how much sugar needs to be added.
4. Jam vs. Jelly: Jam is made from the whole fruit pulp, while Jelly is made only from the clear strained juice/extract.

Final Answer: Pectin content is most important for the preparation of Jelly.

Answer: (B)

Q19.

Solution

Concept:

Specific gravity is a measure of the density of a substance compared to the density of water. In the dairy industry, this measurement is used to check the purity of milk and detect the common practice of adulteration with water.

Solution:

1. Instrument: A Lactometer is a specialized hydrometer used to measure the specific gravity of milk.
2. Reading: The average specific gravity of cow milk is 1.028 to 1.030, while for buffalo milk it is 1.030 to 1.032.
3. Principle: Since water has a specific gravity of 1.000, adding water to milk will lower its specific gravity reading on the lactometer.
4. Distinction: - Butyrometer: Measures fat content. - Thermometer: Measures temperature.

Final Answer: The specific gravity of milk is measured by using a Lactometer.

Answer: (B)

Q20.

Solution

Concept:

The South-West Monsoon (June to September) provides nearly 75% of India's total annual rainfall. Kharif crops (like Rice, Maize, and Soyabean) are almost entirely dependent on this monsoon.

Solution:

1. Critical Phase: The "Onset" of the monsoon is the most critical stage. It determines the timing of sowing.
2. Impact of Delay: A delay in the onset can lead to a shorter growing season, forcing farmers to switch to less productive, short-duration varieties or face total crop failure.
3. Break in Monsoon: A prolonged "break" (dry spell) after sowing is also dangerous, but the initial arrival (onset) sets the foundation for the entire agricultural calendar.
4. Withdrawal: The withdrawal phase affects the residual moisture available for the following Rabi season.

Final Answer: The Onset of the monsoon is the most critical stage for Kharif crops.

Answer: (B)

Q21.

Solution

Concept: The cell cycle is a series of events that take place in a cell as it grows and divides. It is divided into Interphase and the Mitotic (M) phase. Interphase is further subdivided into three stages: G_1, S, and G_2.

Solution: 1. **Phase Identification:** The Synthesis phase, or **S phase**, is the specific period during which the cell's DNA is replicated. 2. **Process:** During this stage, the amount of DNA in the cell doubles (from $2C$ to $4C$), though the chromosome number remains the same. This ensures that when the cell eventually divides, each daughter cell receives a complete set of genetic instructions. 3. **Other Phases:** - **G_1 (Gap 1):** Cell growth and preparation for DNA replication. - **G_2 (Gap 2):** Protein synthesis and preparation for mitosis. - **M phase:** Physical division of the nucleus and cytoplasm.

Final Answer: DNA replication occurs during the S phase.

Answer: (B)

Q22.

Solution

Concept: The molecular structure of Deoxyribonucleic Acid (DNA) is the blueprint for life. Understanding how the nitrogenous bases, sugars, and phosphates are arranged was one of the greatest scientific breakthroughs of the 20th century.

Solution: 1. **The Discovery:** In 1953, **James Watson** and **Francis Crick** proposed the double helix model of DNA. 2. **The Structure:** They described it as a "twisted ladder" where the rungs are made of base pairs (Adenine-Thymine and Guanine-Cytosine) and the sides are a sugar-phosphate backbone. 3. **Support:** Their model was heavily based on the X-ray diffraction data produced by Rosalind Franklin and Maurice Wilkins. 4. **Recognition:** Watson, Crick, and Wilkins shared the Nobel Prize in Physiology or Medicine in 1962.

Final Answer: The Double Helix structure of DNA was proposed by Watson and Crick.

Answer: (A)

Q23.

Solution

Concept: Vitamins are often referred to by their chemical names. These names usually reflect their chemical structure or the specific biological activity they perform in the body.

Solution: 1. **Chemical Name:** **Ascorbic Acid** is the chemical name for **Vitamin C**. 2. **Properties:** It is a water-soluble vitamin and a powerful antioxidant. It is essential for the synthesis of collagen, which helps in wound healing and maintaining the health of skin, teeth, and bones. 3. **Sources:** Found abundantly in citrus fruits (Amla, Lemon, Orange) and green leafy vegetables. 4. **Deficiency:** A lack of Vitamin C leads to **Scurvy**, characterized by bleeding gums and weakness.

Final Answer: Vitamin C is also known as Ascorbic Acid.

Answer: (C)

Q24.

Solution

Concept: Panchagavya is an ancient organic formulation used in Indian agriculture as a bio-enhancer and liquid fertilizer. It is derived from the term "Pancha" (Five) and "Gavya" (derived from the cow).

Solution: 1. **The Five Cow Products:** The core of the mixture consists of: - Cow dung - Cow urine - Cow milk - Cow curd - Cow ghee (clarified butter) 2. **Additional Ingredients:** In modern organic practice, other items like jaggery, banana, and tender coconut water are often added to ferment the mixture, but the name strictly refers to the **five** primary cow products. 3. **Benefits:** It acts as a growth promoter, provides immunity to plants, and improves soil microbial activity.

Final Answer: Panchagavya consists of five ingredients from the cow.

Answer: (B)

Q25.

Solution

Concept: India is the home to many high-quality buffalo breeds. Identifying these breeds based on their physical characteristics is a key skill in animal husbandry.

Solution: 1. **The Breed:** The **Murrah** buffalo is the most famous dairy buffalo breed in the world. 2. **Physical Traits:** It is easily identified by its deep **"Jet Black"** color and its distinctively **tightly curved horns**, often described as "spiral" or "coiled." 3. **Origin:** It originated in the Rohtak, Hisar, and Jind districts of Haryana. 4. **Nickname:** Due to its high milk productivity and fat content, it is often called the "Black Gold" of India.

Final Answer: Murrah is the buffalo breed known for its jet black color and tightly curved horns.

Answer: (C)

Q26.

Solution

Concept: Colostrum is the first milk produced by the mammary glands of mammals (including cows) immediately after giving birth. It is biologically distinct from regular milk and is vital for the survival of the newborn.

Solution: 1. **Composition:** Colostrum is thick, yellowish, and extremely rich in proteins, minerals, and vitamins, while being lower in fat than regular milk. 2. **Immunity:** Its most critical role is providing **Immunoglobulins (antibodies)**. Since calves are born without an active immune system, they must ingest colostrum within the first 1-2 hours of life to gain passive immunity against local diseases. 3. **Laxative Effect:** It also acts as a natural laxative, helping the calf clear its first stool, called meconium.

Final Answer: Colostrum is the first milk produced after calving.

Answer: (A)

Q27.

Solution

Concept: Coccidiosis is a major parasitic disease in the poultry industry. It affects the intestinal tract of birds, leading to tissue damage, reduced nutrient absorption, and high mortality rates if left untreated.

Solution: 1. **Pathogen:** It is caused by microscopic, single-celled organisms called **Protozoa** (specifically of the genus *Eimeria*). 2. **Transmission:** The disease spreads through the ingestion of "oocysts" found in contaminated litter, feed, or water. 3. **Symptoms:** Characteristic signs include bloody droppings, ruffled feathers, and a sudden drop in weight gain. 4. **Management:** It is managed using "Coccidiostats" mixed in the poultry feed or through vaccination.

Final Answer: Coccidiosis in poultry is caused by Protozoa.

Answer: (B)

Q28.

Solution

Concept: Cream is the fat-rich portion of milk. Because milk fat (lipids) has a lower density than the surrounding milk serum (water and proteins), the two components can be separated using physical forces.

Solution: 1. **Density Difference:** Milk fat has a specific gravity of about 0.93, while milk serum is about 1.036. 2. **The Process:** In a cream separator, milk is rotated at very high speeds. This creates a powerful **Centrifugal Force**. 3. **Action:** The heavier skim milk is thrown toward the outer walls of the bowl, while the lighter cream particles are forced toward the center (the axis of rotation) where they are collected. 4. **Efficiency:** Centrifugal separation is much faster and more hygienic than the traditional "gravity method" (letting milk stand overnight).

Final Answer: Cream separation is based on the principle of Centrifugal force.

Answer: (B)

Q29.

Solution

Concept: The pH scale ranges from 0 to 14. In agricultural science, the pH of the soil determines the availability of nutrients and the activity of soil microorganisms.
Solution: 1. **Classification:** - pH 7.0: Neutral. - pH > 7.0: Alkaline/Basic. - pH < 7.0: Acidic. 2. **Soil pH 4.5:** A value of 4.5 is significantly lower than 7.0, classifying the soil as **Strongly Acidic**. 3. **Implications:** At this low pH, aluminum and manganese can become toxic to plants, and essential nutrients like phosphorus, calcium, and magnesium become less available. Such soils often require "liming" to raise the pH.
Final Answer: A soil with a pH of 4.5 is Strongly Acidic.

Answer: (C)

Q30.

Solution

Concept: While plants require large amounts of macronutrients (N, P, K), certain micronutrients play vital roles in the reproductive phases of a plant's life cycle.
Solution: 1. **The Element:** **Boron (B)** is the micronutrient most closely linked to reproduction. 2. **Function:** It is essential for the germination of pollen grains and the successful growth of the **pollen tube** down the style to the ovary. 3. **Fruit Set:** Without sufficient boron, fertilization fails, leading to poor fruit set or "hollow" fruits. 4. **Symptoms:** Boron deficiency often causes "cracking" of fruits (like in tomatoes or citrus) and "hollow heart" in cauliflower.
Final Answer: Boron is essential for fruit set and pollen tube growth.

Answer: (A)

Q31.

Solution

Concept: Transpiration is the biological process by which water is lost from the aerial parts of the plant, mainly leaves, in the form of water vapor. This process creates a "transpiration pull" that helps in the upward movement of water and minerals from the roots.
Solution: 1. **The Organelle:** Most transpiration (90% – 95%) occurs through **Stomata**, which are tiny pores found primarily on the underside of leaves. 2. **Mechanism:** Each stoma is surrounded by two **guard cells** that regulate its opening and closing. When the stomata are open for CO_2 intake (photosynthesis), water vapor escapes into the atmosphere. 3. **Other Types:** - **Cuticular:** Through the leaf cuticle. - **Lenticular:** Through small openings in the bark of woody stems. 4. **Importance:** It helps in cooling the plant surface and maintaining turgidity.
[Image of the structure of a stoma showing guard cells and the stomatal pore]
Final Answer: Transpiration primarily occurs through the Stomata.

Answer: (C)

Q32.

Solution

Concept: Biofortification is the process of increasing the nutritional value of food crops through genetic engineering or selective breeding. Golden Rice was developed as a humanitarian tool to combat Vitamin A Deficiency (VAD) in developing nations.

Solution: 1. **Modification:** Golden Rice (*Oryza sativa*) is engineered to produce **Beta-carotene** in the edible part (endosperm) of the grain. 2. **Conversion:** When consumed, the human body converts beta-carotene into **Vitamin A**. 3. **Appearance:** The presence of beta-carotene gives the rice grains a characteristic golden-yellow color, hence the name. 4. **Creators:** It was developed by Ingo Potrykus and Peter Beyer.

Final Answer: Golden Rice is genetically modified to be rich in Vitamin A (Beta-carotene).

Answer: (C)

Q33.

Solution

Concept: Plants are classified as C3, C4, or CAM based on their pathway for carbon fixation during photosynthesis. C4 plants are adapted to high temperatures and intense sunlight, as they have a mechanism to minimize photorespiration.

Solution: 1. **Identification:** **Sugarcane** is a classic example of a C4 plant. 2. **Anatomy:** C4 plants possess a specialized leaf anatomy known as **Kranz anatomy**, where the vascular bundles are surrounded by bundle sheath cells. 3. **Efficiency:** They are more water-efficient and productive than C3 plants in tropical climates. 4. **Other Examples:** Maize, Sorghum, and Pearl Millet are also C4 plants. Wheat, Rice, and Potato are C3 plants.

Final Answer: Sugarcane is a C4 plant.

Answer: (C)

Q34.

Solution

Concept: The spice trade has historically categorized major spices with honorary titles based on their value, utility, and flavor profile.

Solution: 1. **The Spice:** **Cardamom** (*Elettaria cardamomum*) is known as the **"Queen of Spices"** due to its delicate aroma and diverse uses in both culinary and medicinal fields. 2. **The King:** In contrast, **Black Pepper** is known as the **"King of Spices"** (or "Black Gold") because of its historical dominance in global trade and pungent flavor. 3. **Origin:** Both spices are native to the Western Ghats of India.

Final Answer: Cardamom is known as the "Queen of Spices."

Answer: (B)

Q35.

Solution

Concept: Zero Tillage (No-Till) is an agricultural technique where the soil is not disturbed through ploughing. Seeds are deposited directly into the untilled soil that has the residues of the previous crop.

Solution: 1. **Origin:** While traditional societies may have used similar methods, modern commercial **Zero Tillage** was first successfully practiced and popularized in the **USA** (United States of America) during the 1960s to combat soil erosion. 2. **Pioneer:** Edward Faulkner is often associated with the early philosophy, while the herbicide revolution (with chemicals like Paraquat) made it commercially viable. 3. **Benefits:** It saves fuel, reduces labor, conserves soil moisture, and reduces carbon emissions from the soil.

Final Answer: Zero Tillage was first successfully practiced in the USA.

Answer: (B)

Q36.

Solution

Concept: Gregor Mendel formulated three fundamental laws of inheritance based on his experiments with pea plants. These laws describe how traits are passed from parents to offspring.

Solution: 1. **The Laws:** - **First Law:** Law of Dominance. - **Second Law:** Law of Segregation (purity of gametes). - **Third Law:** **Law of Independent Assortment**. 2. **Definition:** The Law of Independent Assortment states that the alleles of two (or more) different genes get sorted into gametes independently of one another. In other words, the allele a gamete receives for one gene does not influence the allele received for another gene. 3. **Requirement:** This law is best demonstrated using a **Dihybrid Cross** (tracking two traits at once).

Final Answer: The Law of Independent Assortment is Mendel's Third Law.

Answer: (C)

Q37.

Solution

Concept: Fermentation is a metabolic process that produces chemical changes in organic substrates through the action of enzymes. In dairy science, specific bacteria are used to convert milk into various products.

Solution: 1. **The Microorganism:** ***Lactobacillus*** (specifically *Lactobacillus bulgaricus* or *L. acidophilus*) is the primary bacterium used to make curd (yogurt). 2. **The Process:** These bacteria convert the milk sugar (**Lactose**) into **Lactic Acid**. 3. **Result:** The production of lactic acid lowers the pH of the milk, causing the milk protein (**Casein**) to coagulate and thicken, resulting in the texture of curd. 4. **Others:** *Rhizobium* and *Azotobacter* are nitrogen-fixing bacteria, not used in food processing.

Final Answer: *Lactobacillus* is used in the production of Curd.

Answer: (B)

Q38.

Solution

Concept: Soil is composed of particles of various sizes. Soil classification is based on the percentages of these differently sized particles.

Solution: 1. **Identification:** The relative proportion of sand, silt, and clay in a soil mass is called **Soil Texture**. 2. **The Particles:** - **Sand:** Largest particles (2.00 – 0.05 mm). - **Silt:** Medium particles (0.05 – 0.002 mm). - **Clay:** Smallest particles (< 0.002 mm). 3. **Stability:** Soil texture is a permanent property of the soil and cannot be easily changed by farming practices, unlike soil structure.

Final Answer: The relative proportion of sand, silt, and clay is called Soil Texture.

Answer: (B)

Q39.

Solution

Concept: Millets are small-seeded grasses widely grown around the world as cereal crops or grains for fodder and human food. They are highly nutritious and drought-tolerant.

Solution: 1. **Identification:** **Ragi** (*Eleusine coracana*) is the common name for **Finger Millet**. 2. **Appearance:** It is called finger millet because the seed head (inflorescence) consists of five to seven "spikes" that resemble the fingers of a human hand. 3. **Nutritional Value:** It is exceptionally rich in **Calcium** and is an important staple in South India and parts of Africa. 4. **Other Millets:** *Jowar* is Sorghum; *Bajra* is Pearl Millet.

Final Answer: Ragi is the common name for Finger Millet.

Answer: (C)

Q40.

Solution

Concept: Seed viability refers to the ability of a seed to germinate under favorable conditions. Before sowing, it is important for farmers and researchers to know if the embryo inside the seed is alive and metabolically active.

Solution: 1. **The Test:** The **Tetrazolium Test** (TZ Test) is a biochemical method used to determine seed viability. 2. **Chemical:** It uses a solution of **2,3,5-triphenyl tetrazolium chloride**. 3. **Mechanism:** When a seed is soaked in this colorless solution, the hydrogen ions released by the respiration process of a **living embryo** react with the chemical to turn it into a stable, non-diffusible **red** compound called formazan. 4. **Interpretation:** If the embryo stains red, the seed is viable. If it remains colorless, the seed is dead.

Final Answer: Tetrazolium Chloride is used to test the viability of seeds.

Answer: (A)

Q41.

Solution

Concept: Milk Fever (also known as Parturient Paresis) is a metabolic disorder commonly seen in high-yielding dairy cows shortly before or after calving. Despite its name, the animal usually has a subnormal body temperature rather than a fever.

Solution: 1. **Cause:** It is caused by a sudden drop in blood calcium levels (**Hypocalcemia**). 2. **Physiology:** At the onset of lactation, the cow's demand for calcium to produce colostrum and milk exceeds her body's ability to mobilize calcium from her bones or absorb it from her diet. 3. **Symptoms:** The cow becomes weak, unable to stand, and often tucks her head into her flank (the "S" shaped neck posture). 4. **Treatment:** It is an emergency condition treated by the intravenous administration of **Calcium Borogluconate**.

Final Answer: Milk Fever is caused by the deficiency of Calcium.

Answer: (B)

Q42.

Solution

Concept: In plant pathology and entomology, a "vector" is an organism (usually an insect) that carries and transmits a pathogen (like a virus or bacteria) from an infected plant to a healthy one.

Solution: 1. **The Insect:** The Whitefly (*Bemisia tabaci*) is one of the most significant vectors in agriculture. 2. **Disease Transmission:** It is the primary vector for **Yellow Vein Mosaic Virus (YVMV)**, particularly in Okra (Bhindi). It also transmits various leaf curl viruses in crops like cotton, tomato, and tobacco. 3. **Feeding Habit:** Whiteflies possess piercing-sucking mouthparts. As they feed on the sap of an infected plant, they pick up the virus and inject it into the next plant they visit.

Final Answer: The White Fly acts as a vector for Yellow Vein Mosaic.

Answer: (C)

Q43.

Solution

Concept: Meteorology relies on various specialized instruments to measure the physical properties of the atmosphere.

Solution: 1. **Identification:** The **Barometer** is the instrument used to measure atmospheric (air) pressure. 2. **Types:** - **Mercury Barometer:** Uses a column of mercury. - **Aneroid Barometer:** Uses a small, flexible metal box called an aneroid cell. 3. **Usage:** Changes in air pressure are used by meteorologists to predict short-term changes in the weather (e.g., falling pressure often indicates an approaching storm). 4. **Others:** - **Hygrometer:** Measures humidity. - **Anemometer:** Measures wind speed.

Final Answer: A Barometer is used to measure Atmospheric Pressure.

Answer: (B)

Q44.

Solution

Concept: Thinning is an important intercultural operation in agronomy, especially for crops that are direct-seeded or have very small seeds.

Solution: 1. **The Process:** Thinning involves the removal of excess, weak, or overcrowded seedlings from a row or hill. 2. **Objective:** The primary goal is to maintain the **optimum plant population** and ensure that each remaining plant has enough space, sunlight, water, and nutrients to grow vigorously. 3. **Timing:** It is usually done 10–15 days after germination. 4. **Benefit:** It prevents competition between plants and ensures a uniform crop stand, which eventually leads to higher yields and better quality.

Final Answer: Thinning is done to remove excess plants for proper spacing.

Answer: (B)

Q45.

Solution

Concept: In agricultural terminology, fruits are sometimes nicknamed after more expensive or famous fruits if they share similar nutritional characteristics or local popularity.

Solution: 1. **The Fruit:** **Ber** (Indian Jujube, *Ziziphus mauritiana*) is famously known as the **"Poor Man's Apple."** 2. **Reasoning:** This is because the Ber is rich in Vitamin C and minerals, similar to an apple, but it is much cheaper and can grow easily in dry, arid regions where temperate apples cannot survive. 3. **Characteristics:** It is a hardy fruit tree that is highly drought-tolerant and produces nutritious, crisp fruits. 4. **Alternative:** Note that **Guava** is sometimes called the "Apple of the Tropics," but "Poor Man's Apple" is the specific title for Ber.

Final Answer: Ber is known as the "Poor Man's Apple."

Answer: (A)

Q46.

Solution

Concept: The Indian Council of Agricultural Research (ICAR) establishes specialized research institutes for specific crops to focus on their breeding, management, and industrial application.

Solution: 1. **Location:** The Central Tobacco Research Institute (CTRI) was established in 1947. 2. **City:** It is located in **Rajahmundry**, Andhra Pradesh. 3. **Significance:** Andhra Pradesh is one of the leading producers of tobacco in India, particularly Flue-Cured Virginia (FCV) tobacco. The institute works on improving leaf quality for export and domestic use. 4. **Others:** - **Shimla:** Central Potato Research Institute (CPRI). - **Coimbatore:** Sugarcane Breeding Institute (SBI).

Final Answer: The CTRI is located at Rajahmundry.

Answer: (B)

Q47.

Solution

Concept: Plant growth regulators (hormones) are used in horticulture to manipulate plant growth. Auxins are a class of hormones specifically involved in cell elongation and root initiation.
Solution: 1. **The Hormones:** **IBA** (Indole-3-butyric acid) and **NAA** (Naphthalene acetic acid) are the most effective synthetic auxins used to induce roots. 2. **Usage:** When a stem cutting is dipped in a powder or solution of these chemicals, it stimulates the undifferentiated cells to form adventitious roots. 3. **Commercial Names:** In the market, these are often sold under brand names like 'Seradix' or 'Rootex'. 4. **IBA vs. NAA:** IBA is generally considered the best and most widely used "root-promoting" hormone for a wide range of plant species.
Final Answer: NAA/IBA are hormones used to induce rooting in cuttings.

Answer: (A)

Q48.

Solution

Concept: Blanching is a preliminary heat treatment used in the food processing and canning industry, specifically for fruits and vegetables.
Solution: 1. **The Process:** It involves immersing the product in boiling water or steam for a very short period (1 – 5 minutes), followed by immediate cooling. 2. **Main Objective:** The primary purpose is to **inactivate enzymes** (like catalase and peroxidase) that would otherwise cause undesirable changes in color, flavor, and texture during storage. 3. **Secondary Benefits:** - Removes trapped air from the tissues (important for canning). - Softens the tissue for easier packing. - Cleans the surface of the product. - Preserves the natural color of the vegetable.
Final Answer: The main objective of Blanching is to inactivate enzymes.

Answer: (B)

Q49.

Solution

Concept: Economic revolutions in India were launched to achieve self-sufficiency in various agricultural sectors. These are named based on the "color" of the commodity they represent.
Solution: 1. **Identification:** The **Blue Revolution** (Neel Kranti) refers to the rapid increase in the production of **Fish** and marine products. 2. **Objective:** It was launched to improve the productivity of aquaculture and the livelihoods of fishermen. 3. **Father of the Revolution:** Dr. Hiralal Chaudhuri and Dr. Arun Krishnan are considered the fathers of the Blue Revolution in India. 4. **Others:** - **Yellow:** Oilseeds. - **Grey:** Fertilizers. - **White:** Milk.
Final Answer: The Blue Revolution is related to Fish Production.

Answer: (C)

Q50.

Solution

Concept: Photoperiodism is the physiological reaction of organisms to the length of day or night. In plants, it determines when the plant will transition from vegetative growth to flowering.

Solution: 1. **Classification:** - **Short Day Plants (SDP):** Flower when day length is shorter than a critical period (e.g., Rice, Soyabean). - **Long Day Plants (LDP):** Flower when day length is longer than a critical period (e.g., Wheat, Radish). - **Day Neutral Plants (DNP):** Flowering is not affected by the length of the day. 2. **The Crop:** **Tomato** is a classic example of a **Day Neutral Plant**. It will flower regardless of the day length as long as it has reached a certain stage of physiological maturity. 3. **Other DNPs:** Cucumber, Sunflower, and Maize are also considered day-neutral.

Final Answer: Tomato is a Day Neutral Plant.

Answer: (C)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	B	4	B	5	B
6	D	7	C	8	C	9	C	10	B
11	B	12	B	13	C	14	B	15	C
16	C	17	A	18	B	19	B	20	B
21	B	22	A	23	C	24	B	25	C
26	A	27	B	28	B	29	C	30	A
31	C	32	C	33	C	34	B	35	B
36	C	37	B	38	B	39	C	40	A
41	B	42	C	43	B	44	B	45	A
46	B	47	A	48	B	49	C	50	C