CUET-UG Agriculture Sample Paper - 12

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. A plant with genotype $AaBb$ is test-crossed. What will be the phenotypic ratio of the progeny, assuming independent assortment?

(A) 9:3:3:1

(B) 1:1:1:1

(C) 3:1

(D) 1:2:1

Q2. Which of the following is a "C-4" plant known for high photosynthetic efficiency under high temperatures?

(A) Rice

(B) Wheat

(C) Sugarcane

(D) Barley

Q3. The specific gravity of cow milk is generally:

(A) 1.028 to 1.030

(B) 1.032 to 1.034

(C) 1.010 to 1.015

(D) 1.040 to 1.045

Q4. "Ranikhet" (Newcastle Disease) in poultry is caused by:

(A) Bacteria

(B) Virus

(C) Protozoa

(D) Fungi

Q5. Which irrigation method is most suitable for saline soils to leach out salts?

(A) Drip irrigation

(B) Sprinkler irrigation

(C) Flood irrigation

(D) Furrow irrigation

Q6. In the DNA molecule, the ratio of $(A + G)/(T + C)$ is always:

(A) 0.5

(B) 1.0

(C) 1.5

(D) 2.0

Q7. The "Pusa Nanha" is a dwarf variety of which fruit crop?

(A) Mango

(B) Guava

(C) Papaya

(D) Citrus

Q8. "Golden Rice" is genetically modified to be rich in:

(A) Vitamin C

(B) Vitamin A

(C) Iron

(D) Essential Amino Acids

Q9. Which nutrient deficiency causes "Khaira" disease in Rice?

(A) Iron

(B) Nitrogen

(C) Zinc

(D) Copper

Q10. The process of removing male reproductive parts (Anthers) before they mature is called:

(A) Selection

(B) Emasculation

(C) Bagging

(D) Tagging

Q11. Which breed of buffalo is known for the highest fat content in milk?

(A) Murrah

(B) Surti

(C) Bhadawari

(D) Mehsana

Q12. The most critical stage for irrigation in Wheat is:

(A) Tillering stage

(B) Flowering stage

(C) Crown Root Initiation (CRI)

(D) Jointing stage

Q13. Which of the following is a non-selective, contact herbicide?

(A) Atrazine

(B) 2,4-D

(C) Paraquat

(D) Pendimethalin

Q14. The fruit type of Mustard is known as:

(A) Caryopsis

(B) Pod

(C) Siliqua

(D) Capsule

Q15. In livestock, "Pica" or eating of non-edible objects is a symptom of:

(A) Calcium deficiency

(B) Phosphorus deficiency

(C) Vitamin A deficiency

(D) Iron deficiency

Q16. Which enzyme is responsible for the curdling of milk?

(A) Amylase

(B) Pepsin

(C) Rennin

(D) Lipase

Q17. The optimal soil pH for the cultivation of most field crops is:

(A) 6.5 – 7.5

(B) 4.0 – 5.0

(C) 8.5 – 9.5

(D) 3.0 – 4.0

Q18. What is the seed rate (kg/ha) for True Potato Seed (TPS)?

(A) 100 – 150 g

(B) 10 – 15 kg

(C) 40 – 50 kg

(D) 1000 kg

Q19. Which gas is predominantly released from paddy fields?

(A) CO_2

(B) CH_4

(C) N_2O

(D) SO_2

Q20. The "Air-layering" method of propagation is most commercially successful in:

(A) Mango

(B) Guava

(C) Litchi

(D) Banana

Q21. Which part of the plant is used for virus-free culture in Tissue Culture?

(A) Root tip

(B) Anther

(C) Meristem

(D) Pollen

Q22. The "Law of Minimum" was proposed by:

(A) J.V. Liebig

(B) Gregor Mendel

(C) M.S. Swaminathan

(D) Norman Borlaug

Q23. "A-line" in hybrid seed production refers to:

(A) Restorer line

(B) Male sterile line

(C) Maintainer line

(D) Inbred line

Q24. The protein content in pulses generally ranges between:

(A) 10 – 12%

(B) 20 – 25%

(C) 40 – 45%

(D) 5 – 8%

Q25. "Kurnool 3" is a variety of:

(A) Rice

(B) Maize

(C) Sorghum

(D) Bajra

Q26. The instrument used to measure Solar Radiation is:

(A) Anemometer

(B) Pyranometer

(C) Psychrometer

(D) Lysimeter

Q27. Which of the following is a micronutrient?

(A) Magnesium

(B) Calcium

(C) Boron

(D) Sulfur

Q28. The gestation period of a Goat is approximately:

(A) 150 days

(B) 280 days

(C) 310 days

(D) 114 days

Q29. "Pusa Jwala" is a famous variety of:

(A) Tomato

(B) Chilli

(C) Brinjal

(D) Onion

Q30. In genetics, when a single gene influences multiple traits, it is called:

(A) Epistasis

(B) Pleiotropy

(C) Polygeny

(D) Codominance

Q31. Which fertilizer contains the highest percentage of Nitrogen?

(A) Ammonium Nitrate

(B) Urea

(C) Anhydrous Ammonia

(D) CAN

Q32. The process of loosening and turning of soil is called:

(A) Sowing

(B) Tilling

(C) Threshing

(D) Winnowing

Q33. Which of the following is a biennial vegetable?

(A) Tomato

(B) Okra

(C) Cabbage

(D) Chilli

Q34. "Anthrax" in cattle is caused by:

(A) *Bacillus anthracis*

(B) *Pasteurella multocida*

(C) *Clostridium chauvoei*

(D) *Brucella abortus*

Q35. The relative humidity is measured using:

(A) Hygrometer

(B) Tensiometer

(C) Barometer

(D) Altimeter

Q36. Which crop is known as "King of Fodders"?

(A) Lucerne

(B) Berseem

(C) Oat

(D) Napier Grass

Q37. The percentage of fat in Double Toned Milk is:

(A) 3.0%

(B) 1.5%

(C) 0.5%

(D) 4.5%

Q38. "Finger printing" in plants is used to:

(A) Measure height

(B) Identify varieties

(C) Measure leaf area

(D) Count seeds

Q39. The fruit of Tomato is botanically a:

(A) Drupe

(B) Berry

(C) Pome

(D) Pepo

Q40. Nitrogen fixation by Rhizobium occurs in:

(A) Cereal crops

(B) Legume crops

(C) Oilseed crops

(D) Fiber crops

Q41. "Blue tag" is issued for which class of seeds?

(A) Breeder seed

(B) Foundation seed

(C) Certified seed

(D) Nucleus seed

Q42. The state of India with the highest area under organic farming is:

(A) Punjab

(B) Sikkim

(C) Kerala

(D) Gujarat

Q43. In poultry, the storage of sperm occurs in:

(A) Infundibulum

(B) Uterus

(C) Vaginal glands

(D) Isthmus

Q44. Which weed is known as "Terror of Bengal"?

(A) Parthenium

(B) Water Hyacinth

(C) Lantana

(D) Phalaris minor

Q45. The ideal temperature for the preservation of most fruits is:

(A) $0 - 5°C$

(B) $10 - 15°C$

(C) $20 - 25°C$

(D) $-10°C$

Q46. Which of the following is a salt-tolerant crop?

(A) Pea

(B) Barley

(C) Maize

(D) Beans

Q47. The "Central Institute of Horticulture" is located in:

(A) Shimla

(B) Nagaland (Medziphema)

(C) Lucknow

(D) Bengaluru

Q48. The cross between F_1 and its homozygous recessive parent is:

(A) Back cross

(B) Test cross

(C) Reciprocal cross

(D) Natural cross

Q49. Which acid is used in the "Gerber Method" for fat estimation?

(A) HCl

(B) H_2SO_4

(C) HNO_3

(D) Acetic Acid

Q50. The "White Revolution" is related to:

(A) Eggs

(B) Milk

(C) Fish

(D) Fertilizers

Detailed Solutions

Q1.

Solution

Concept:

This question is centered on Mendelian Genetics and the application of a Dihybrid Test Cross. A test cross is a cross between an F_1 individual (showing dominant traits) and the homozygous recessive parent. This method is used to determine the frequency of recombination and the independent assortment of alleles.

Solution:

1. Identification of Parental Genotypes: The F_1 hybrid genotype is given as $AaBb$. The test-cross parent (homozygous recessive) is $aabb$.

2. Formation of Gametes: According to the Law of Independent Assortment, the heterozygous parent ($AaBb$) produces four types of gametes in equal proportions (1/4 or 25% each): - AB - Ab - aB - ab The recessive parent ($aabb$) can produce only one type of gamete: ab.

3. Genetic Cross (Progeny Genotypes): - $AB+ab \rightarrow AaBb$ - $Ab+ab \rightarrow Aabb$ - $aB+ab \rightarrow aaBb$ - $ab + ab \rightarrow aabb$

4. Analysis of Phenotypes: Since each of these four genotypes appears with the same probability, the physical traits (phenotypes) will also be distributed equally. This leads to a standard ratio.

Final Answer: The phenotypic ratio of the progeny in a dihybrid test cross is 1:1:1:1.

Answer: (B)

Q2.

Solution

Concept:

Plants are categorized by their carbon fixation pathways (C_3, C_4, and CAM). C_4 plants have evolved specialized leaf anatomy (Kranz Anatomy) and a unique biochemical pathway to minimize photorespiration. This allows them to thrive in high temperatures and low CO_2 environments with greater efficiency than C_3 plants.

Solution:

1. Biochemical Pathway: In C_4 plants, the first stable product is a 4-carbon compound (Oxaloacetic Acid). They use the enzyme PEP carboxylase, which has a much higher affinity for CO_2 than the RuBisCO enzyme found in C_3 plants.

2. Comparison of the Options: - Rice, Wheat, and Barley are classic C_3 plants. They are more efficient in cool, moist environments but lose efficiency in high heat. - Sugarcane (*Saccharum officinarum*) is a highly efficient C_4 plant. It is capable of rapid biomass accumulation in tropical and subtropical regions.

3. Efficiency: C_4 plants exhibit higher photosynthetic rates, higher water-use efficiency, and zero photorespiration, making them "high-yield" crops in warm climates.

Final Answer: Sugarcane is the C_4 plant known for high photosynthetic efficiency.

Answer: (C)

Q3.

Solution

Concept:

Specific gravity is a physical property defined as the ratio of the density of milk to the density of water at a standard temperature ($15.5°C$). In dairy science, it is an essential measurement for detecting the addition of water or the removal of fat (skimming), as it depends on the balance of solids-not-fat (SNF) and milk fat.

Solution:

1. Role of Milk Constituents: - Milk fat has a specific gravity of ≈ 0.93 (lighter than water). - Solids-not-fat (proteins, lactose, minerals) have a specific gravity of ≈ 1.616 (heavier than water).
2. Average Values: Because cow milk has a specific ratio of these components, its average density is higher than water (1.000) but lower than that of buffalo milk (which has more solids).
3. Standard Range: For pure cow milk, the specific gravity typically ranges between 1.028 and 1.030.
4. Practical Application: Adding water will pull the specific gravity closer to 1.000, while removing fat will increase the value, as the lighter fat is no longer present to offset the heavier SNF.

Final Answer: The specific gravity of cow milk is generally 1.028 to 1.030.

Answer: (A)

Q4.

Solution

Concept:

Ranikhet disease, officially known as Newcastle Disease (ND), is a devastating illness in the poultry industry. It is highly contagious and characterized by severe respiratory, digestive, and nervous system symptoms. It is classified based on its virulence as lentogenic (mild), mesogenic (moderate), or velogenic (highly fatal).

Solution:

1. Pathogen Identification: Ranikhet disease is not caused by bacteria, fungi, or parasites. It is caused by a virus, specifically the Avian Paramyxovirus type 1 (APMV-1).
2. Mode of Transmission: The virus is shed in the feces and respiratory secretions of infected birds. It spreads through contaminated air, water, and direct contact.
3. Clinical Manifestations: Common symptoms include gasping, coughing, greenish watery diarrhea, and characteristic neurological signs like "torticolis" (twisting of the neck) and paralysis of the wings or legs.
4. Control: Since it is a viral disease, it does not respond to antibiotics. Control is achieved through rigorous vaccination programs (e.g., F_1 or Lasota strains).

Final Answer: Ranikhet disease in poultry is caused by a Virus.

Answer: (B)

Q5.

Solution

Concept:

Saline soils are characterized by an excess of neutral soluble salts (chlorides and sulfates of sodium, calcium, and magnesium). These salts increase the osmotic pressure of the soil solution, making it difficult for plants to take up water. The primary reclamation technique is "Leaching," which involves washing these salts into deeper soil layers.

Solution:

1. Requirements for Reclamation: To successfully reclaim saline soil, a large volume of water must move vertically downward through the soil profile to dissolve and carry the salts away from the root zone.

2. Comparison of Methods: - Drip Irrigation: Provides water only at the root base and does not provide enough volume for overall leaching. - Sprinkler Irrigation: Can be used, but it is less effective than flooding for moving large salt loads deep into the soil. - Flood Irrigation: This method covers the entire field with a layer of water. The resulting downward percolation of a large volume of water is the most efficient and practical way to leach soluble salts below the root zone.

3. Drainage: For leaching to be effective, proper sub-surface drainage must be present to ensure the salt-laden water is actually removed from the area.

Final Answer: Flood irrigation is the most suitable method for leaching salts in saline soils.

Answer: (C)

Q6.

Solution

Concept:

The chemical structure of the DNA double helix is maintained by specific base-pairing rules known as Chargaff's rules. These rules state that in any double-stranded DNA molecule, the molar concentration of purines is always equal to the molar concentration of pyrimidines. This is because a purine (large) must always pair with a pyrimidine (small) to keep the diameter of the helix constant.

Solution:

1. Base Identities: - Purines: Adenine (A) and Guanine (G). - Pyrimidines: Thymine (T) and Cytosine (C).

2. Pair Equality: Since A always pairs with T ($A = T$) and G always pairs with C ($G \equiv C$), the total number of $A + G$ must equal the total number of $T + C$.

3. Mathematical Derivation:

$$A + G = T + C$$

Dividing both sides by $(T + C)$:

$$\frac{A + G}{T + C} = 1.0$$

4. Biological Significance: This ratio of 1.0 is a universal constant for all double-stranded DNA, regardless of whether the DNA comes from a plant, animal, or bacteria.

Final Answer: The ratio of $(A + G)/(T + C)$ is always 1.0.

Answer: (B)

Q7.

Solution

Concept:

Horticultural breeding often focuses on creating "dwarf" varieties to facilitate high-density planting (HDP). Dwarf plants allow for more plants per hectare, easier intercultural operations, and safer harvesting. In Papaya (*Carica papaya*), mutation breeding has been a successful tool to achieve this structural change.

Solution:

1. Variety Identification: "Pusa Nanha" is a renowned dwarf variety of Papaya developed at the Indian Agricultural Research Institute (IARI).
2. Development: It was developed through mutation breeding using gamma rays, which effectively reduced the internodal length of the plant.
3. Characteristics: It is a dioecious variety. The most striking feature is its extremely short stature; the plant starts bearing fruits at a height of just 60 to 90 cm from the ground.
4. Planting Density: While traditional varieties require wide spacing, Pusa Nanha can be planted at a very close spacing of 1.25 m $\times$ 1.25 m, allowing for a much higher population density (6400 plants/ha).

Final Answer: Pusa Nanha is a dwarf variety of Papaya.

Answer: (C)

Q8.

Solution

Concept:

Biofortification through genetic engineering aims to solve nutritional deficiencies in regions where a single crop is a staple. "Golden Rice" is a transgenic variety of rice (*Oryza sativa*) designed to provide a critical vitamin that is naturally absent in the endosperm of the rice grain.

Solution:

1. Genetic Modification: Scientists inserted genes from the daffodil plant and a soil bacterium (*Erwinia*) into the rice DNA.
2. Pathway Completion: These genes allow the rice plant to produce beta-carotene (the precursor of Vitamin A) in the grain.
3. Nutrient Purpose: Once consumed, the human body converts beta-carotene into Retinol (Vitamin A). This is intended to prevent Vitamin A Deficiency (VAD), which causes childhood blindness.
4. Visual Appearance: The name "Golden Rice" comes from the yellow-orange color of the grains, which is the natural color of the accumulated beta-carotene.

Final Answer: Golden Rice is genetically modified to be rich in Vitamin A.

Answer: (B)

Q9.

Solution

Concept:

Khaira disease is a major physiological disorder of Rice that occurs due to the unavailability of essential micronutrients in the soil. It is not caused by any pathogen (fungi, bacteria, or virus) but is a nutritional deficiency often linked to high soil pH or intensive cropping without adequate micronutrient replenishment.

Solution:

1. Historical Background: The disease was first identified by Dr. Y.L. Nene in 1966 in the Tarai region of Uttarakhand/Uttar Pradesh, India.
2. Symptoms: The primary symptom is the appearance of brownish, rusty, or bronze-colored spots on the older leaves of the rice seedlings. The plant growth becomes severely stunted (dwarfed), and the roots turn brownish.
3. Nutritive Cause: The disorder is caused specifically by a deficiency of Zinc (Zn).
4. Correction: The disease is easily managed by the application of Zinc Sulfate ($ZnSO_4$) to the soil or through foliar sprays.

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

Answer: (C)

Q10.

Solution

Concept:

In the production of hybrid seeds, controlled pollination is essential. To ensure that a female parent plant does not pollinate itself (selfing), the male reproductive organs of the flower must be removed before they can release pollen. This manual or chemical intervention is a critical step in the crossing process.

Solution:

1. Definition: Emasculation is the process of removing the anthers or stamens from a bisexual (hermaphrodite) flower before they reach maturity and dehisce (shed pollen).
2. Target: This is performed on the plant chosen to be the "female" parent in a controlled cross.
3. Methodology: In crops with large flowers (like cotton or hibiscus), anthers are removed with forceps. In small-flowered cereals, hot water or cold water treatment may be used to kill the pollen.
4. Next Steps: After emasculation, the flower is "bagged" to prevent random pollination from the environment until the desired pollen is manually applied.

Final Answer: The process of removing male reproductive parts is called Emasculation.

Answer: (B)

Q11.

Solution

Concept:

The physical characteristics of milk are heavily influenced by its chemical composition. One of the most important breeds of buffalo in India is the Bhadawari. While other breeds like the Murrah are famous for high total milk yield, the Bhadawari breed is specifically recognized for the concentrated energy content of its milk.

Solution:

1. Breed Characteristics: - Murrah: Known for the highest overall milk production and jet-black color. - Surti: Known for sickle-shaped horns and moderate fat. - Bhadawari: Originating from the Agra and Etawah regions, this breed is identified by its copper-colored (copperish) coat.
2. Fat Content Analysis: Bhadawari buffalo milk is unique because it contains the highest fat percentage among all buffalo breeds. The fat content in Bhadawari milk generally ranges from 8% to 13%, which is significantly higher than the 6.5% to 7.5% usually found in the Murrah breed.
3. Economic Importance: Due to the high fat content, this breed is highly valued for the production of Ghee (clarified butter), as the recovery rate of fat per liter of milk is superior.

Final Answer: The Bhadawari breed of buffalo is known for the highest fat content in milk.

Answer: (C)

Q12.

Solution

Concept:

Irrigation scheduling is critical for maximizing crop yield and water-use efficiency. In Wheat (*Triticum aestivum*), certain growth stages are highly sensitive to water stress. If water is not supplied at these "Critical Stages," the yield loss is permanent and cannot be recovered by late irrigation.

Solution:

1. Critical Stages in Wheat: Wheat requires 4 to 6 irrigations depending on the soil type. The stages are: - Crown Root Initiation (CRI) - Tillering - Late Jointing - Flowering - Milking - Dough stage
2. The CRI Stage: The Crown Root Initiation (CRI) stage occurs approximately 21 days after sowing (DAS). This is the stage where the permanent "crown roots" begin to develop above the primary (seminal) roots.
3. Impact of Stress: The CRI stage is considered the most critical. If the plant faces moisture stress at this time, root development is stunted, leading to poor nutrient uptake and significantly fewer tillers, which directly reduces the final grain yield.

Final Answer: The most critical stage for irrigation in Wheat is Crown Root Initiation (CRI).

Answer: (C)

Q13.

Solution

Concept:

Herbicides are classified based on their "Selectivity" (selective vs. non-selective) and "Mode of Action" (contact vs. systemic). A non-selective herbicide kills all green plant tissue it comes into contact with, regardless of the species, making it useful for general weed clearance or zero-tillage farming.

Solution:

1. Types of Herbicides: - Selective (e.g., 2,4-D or Atrazine): Kills specific weeds while sparing the crop. - Non-Selective (e.g., Paraquat or Glyphosate): Kills all vegetation.
2. Contact vs. Systemic: - Systemic (e.g., Glyphosate): Absorbed by the plant and moves to the roots; takes several days to kill. - Contact (e.g., Paraquat): Kills only the part of the plant it touches; results are visible within hours.
3. Paraquat Characteristics: Paraquat is a fast-acting, non-selective contact herbicide. It interferes with photosynthesis (Photosystem I) and destroys cell membranes rapidly. It is often used for controlling weeds in non-crop areas or for pre-planting weed control.

Final Answer: Paraquat is a non-selective, contact herbicide.

Answer: (C)

Q14.

Solution

Concept:

Botanical classification of fruits is based on the structure of the ovary and the way the seeds are attached. The family Brassicaceae (formerly Cruciferae), which includes Mustard, Cabbage, and Radish, is characterized by a unique type of dry, dehiscent fruit.

Solution:

1. Fruit Types: - Caryopsis: A dry one-seeded fruit where the ovary wall is fused with the seed coat (characteristic of cereals like Rice and Wheat). - Pod (Legume): A fruit that splits along two seams (characteristic of pulses like Pea). - Siliqua: A long, thin fruit that develops from a bicarpellary ovary and dehisces from the bottom upward, with seeds attached to a central false septum called the "replum."
2. Mustard Fruit: In Mustard (*Brassica spp.*), the fruit is a Siliqua. When the siliqua is short and broad (as in Shepherd's purse), it is called a "Silicula."
3. Identification: The presence of the "replum" (false septum) is the defining botanical feature of the siliqua fruit in the Mustard family.

Final Answer: The fruit type of Mustard is Siliqua.

Answer: (C)

Q15.

Solution

Concept:

Livestock nutrition requires a balance of macro and micro-elements. When an animal suffers from a specific mineral deficiency, it may exhibit abnormal behavioral patterns. One such condition is "Pica," where the animal develops a perverted appetite for non-food items.

Solution:

1. Symptom Description: Pica is characterized by the animal chewing or eating unusual materials like bones, wood, soil, stones, or rags.

2. Mineral Linkage: While multiple deficiencies can cause metabolic issues, Pica is most classically and specifically associated with a deficiency of Phosphorus (P).

3. Physiological Impact: Phosphorus is essential for energy metabolism (ATP) and bone formation. A lack of Phosphorus leads to "Osteophagia" (bone-eating), which is the animal's instinctive attempt to recover minerals.

4. Prevention: This can be corrected by providing mineral blocks or adding Di-calcium Phosphate (DCP) to the animal's daily feed ration.

Final Answer: In livestock, Pica is a symptom of Phosphorus deficiency.

Answer: (B)

Q16.

Solution

Concept:

The coagulation of milk is a fundamental process in dairy technology, particularly for the production of cheese. This process involves the destabilization of the casein micelle. In the digestive system of young mammals, specific enzymes are secreted to slow down the passage of milk, allowing for better protein digestion.

Solution:

1. Enzyme Identification: - Amylase: Breaks down starch into sugars. - Pepsin: Breaks down proteins into smaller peptides in the stomach. - Rennin (Chymosin): A proteolytic enzyme found in the gastric juice of young ruminants.

2. Mechanism of Action: Rennin acts specifically on κ-casein, a protein that stabilizes the milk colloid. By cleaving the κ-casein molecule, Rennin causes the milk to "clot" or "curdle," turning it into a semi-solid mass.

3. Commercial Use: A commercial form of this enzyme, known as Rennet, is used extensively in the cheese-making industry to separate milk into curds (solids) and whey (liquid).

Final Answer: Rennin is the enzyme responsible for the curdling of milk.

Answer: (C)

Q17.

Solution

Concept:

Soil pH is a measure of the acidity or alkalinity of the soil solution. It is often referred to as the "master variable" because it significantly influences the availability of essential plant nutrients, the activity of soil microorganisms, and the solubility of toxic elements like aluminum.

Solution:

1. Nutrient Availability: Most essential nutrients (Nitrogen, Phosphorus, Potassium, Calcium, and Magnesium) are at their maximum availability when the soil is slightly acidic to neutral.

2. Range Analysis: - pH < 5.5: Soil is strongly acidic; nutrients like Phosphorus become fixed, and Aluminum toxicity may occur. - pH > 8.5: Soil is alkaline/saline; micronutrients like Iron and Zinc become unavailable.

3. Ideal Range: A pH range of 6.5 to 7.5 is considered ideal for the majority of field crops (such as Wheat, Maize, and Pulses) because it balances nutrient solubility with beneficial microbial activity (like Nitrogen-fixing bacteria).

Final Answer: The optimal soil pH for the cultivation of most field crops is 6.5 – 7.5.

Answer: (A)

Q18.

Solution

Concept:

True Potato Seed (TPS) is a technology used as an alternative to the traditional method of planting whole or cut potato tubers. While traditional tuber planting requires nearly 2.5 to 3 tonnes of seed tubers per hectare, TPS technology significantly reduces the logistics and cost of "seed" material.

Solution:

1. Comparison with Tubers: - Traditional Seed Tubers: Requirement is ≈ 2500–3000 kg/ha. - True Potato Seed (TPS): Refers to the actual botanical seeds produced in the fruit (berries) of the potato plant.

2. Seed Rate: Because the seeds are very small, the quantity required to cover one hectare is very low. The standard recommended seed rate for TPS is only 100 to 150 grams per hectare.

3. Advantages: Using TPS eliminates the transmission of tuber-borne diseases and drastically reduces the cost of transportation and storage of bulky seed tubers.

Final Answer: The seed rate for True Potato Seed (TPS) is 100 – 150 g.

Answer: (A)

Q19.

Solution

Concept:

Agricultural activities are a significant source of greenhouse gas (GHG) emissions. Paddy (Rice) fields are unique because they are kept under submerged (anaerobic) conditions for most of the growing season. This environment favors the activity of specific microorganisms.

Solution:

1. Microbial Activity: Under anaerobic (oxygen-free) conditions in flooded rice fields, Methanogenic bacteria break down organic matter.
2. Gas Production: The primary byproduct of this anaerobic decomposition is Methane (CH_4).
3. Emission Mechanism: The methane produced in the soil is transported to the atmosphere through the aerenchyma tissues (internal air channels) of the rice plants.
4. Global Impact: Rice cultivation is considered one of the largest anthropogenic sources of atmospheric methane, contributing significantly to global warming.

Final Answer: Methane (CH_4) is the gas predominantly released from paddy fields.

Answer: (B)

Q20.

Solution

Concept:

Vegetative propagation ensures that the offspring are genetically identical to the parent plant. Air-layering (also known as Gootee) is a method where a portion of a stem is wounded and covered with a moist rooting medium (like sphagnum moss) to induce root formation while the stem is still attached to the parent plant.

Solution:

1. Suitability of Crops: - Mango: Usually propagated by Veneer grafting or Inarching. - Guava: Successfully air-layered, but stooling is more common. - Litchi: Air-layering is the most successful and commercial method of propagation for Litchi.
2. The Process: A ring of bark is removed from a healthy branch, covered with moss and plastic, and tied. Once roots are visible, the branch is severed and planted.
3. Commercial Success: In Litchi cultivation, this method ensures high survival rates and maintains the superior fruit quality of the mother tree.

Final Answer: Air-layering is most commercially successful in Litchi.

Answer: (C)

Q21.

Solution

Concept:

Plant tissue culture is a technique used to grow plant cells, tissues, or organs under sterile (in vitro) conditions. One of the primary applications of this technology in agriculture is the production of "disease-free" or "virus-free" planting material. Viruses are often systemic, but they are unable to keep pace with the rapid cell division occurring at the growing tips of the plant.

Solution:

1. Anatomical Basis: The apical and axillary meristems are the regions of active cell division. In these areas, the vascular system (xylem and phloem), through which viruses usually travel, is not yet fully developed.
2. Viral Concentration: Research has shown that the concentration of viruses decreases as one moves toward the tip of the shoot. The extreme tip (meristematic dome) is typically free from viral particles.
3. Technique: By excising the meristematic tissue (0.1 to 0.5 mm in size) and culturing it on a nutrient medium, a complete plantlet can be regenerated. Since the starting material was virus-free, the resulting plant is also healthy.
4. Application: This is widely used for crops like Potato, Sugarcane, and Banana to clean up infected stocks.

Final Answer: Meristem is the part of the plant used for virus-free culture in Tissue Culture.

Answer: (C)

Q22.

Solution

Concept:

The growth of a plant is not determined by the total amount of resources available, but by the scarcest resource (the limiting factor). This fundamental principle in plant nutrition is known as the "Law of the Minimum." It implies that adding more of a nutrient that is already abundant will not increase growth if another essential nutrient is deficient.

Solution:

1. Historical Development: While the concept was partially understood by earlier scientists, it was popularized and mathematically applied to agriculture by a German chemist.
2. The Scientist: Justus von Liebig (J.V. Liebig) published this law in 1840. He used the famous "Liebig's Barrel" analogy to explain the concept: a barrel can only hold water up to the height of its shortest stave.
3. Practical Application: In modern farming, this law serves as the basis for balanced fertilization. It reminds farmers to identify and correct the specific nutrient deficiency that is limiting the yield potential.

Final Answer: The Law of Minimum was proposed by J.V. Liebig.

Answer: (A)

Q23.

Solution

Concept:

Hybrid seed production relies on preventing the female parent from self-pollinating. In many crops, "Cytoplasmic Genetic Male Sterility" (CGMS) is used to eliminate the need for manual emasculation. This system involves three specific lines: the A-line, the B-line, and the R-line.

Solution:

1. Definition of Lines: - A-line: The male sterile line. It has sterile cytoplasm and recessive nuclear genes. It produces no functional pollen. - B-line (Maintainer line): It is genetically identical to the A-line but has fertile cytoplasm. It is used to pollinate the A-line to produce more A-line seeds. - R-line (Restorer line): It has dominant genes that "restore" fertility in the next generation.
2. Role of the A-line: The A-line serves as the "female parent" in the actual hybrid seed production field. Because it is male sterile, any seed harvested from it must be a hybrid (provided it was pollinated by the R-line).

Final Answer: A-line in hybrid seed production refers to the Male sterile line.

Answer: (B)

Q24.

Solution

Concept:

Pulses (Legumes) are an essential part of the human diet, particularly in vegetarian populations, because they are the primary source of plant-based protein. Unlike cereal crops (Rice/Wheat), pulses have a unique ability to fix atmospheric nitrogen, which contributes to their higher nitrogen and protein content.

Solution:

1. Composition Comparison: - Cereals: Usually contain 7 – 12% protein. - Pulses: Contain roughly double or triple the amount of protein found in cereals.
2. Standard Range: Most common pulses like Pigeon pea (Arhar), Chickpea (Gram), Mung bean, and Urd bean have a protein content ranging between 20% and 25%.
3. Outliers: Soybean is a notable exception, containing nearly 40 – 42% protein, but it is technically classified as both a pulse and an oilseed. For the general category of pulses, the 20 – 25% range is the standard.

Final Answer: The protein content in pulses generally ranges between 20 – 25%.

Answer: (B)

Q25.

Solution

Concept:

Varietal identification is a key part of agricultural knowledge. Crops like Sorghum (Jowar) and Pearl Millet (Bajra) have specific varieties developed for different agro-climatic zones in India. Kurnool is a region in Andhra Pradesh known for its cultivation of specific millets.

Solution:

1. Crop Identification: Kurnool 3 (also referred to as K-3) is a specific variety associated with Sorghum (*Sorghum bicolor*).

2. Characteristics: Sorghum is a drought-tolerant "C-4" cereal crop. Varieties like Kurnool 3 are often selected for their suitability to semi-arid regions and their resistance to local pests and diseases.

3. Confusion Check: While many varieties have regional names, "Kurnool 3" is a standard textbook example of an improved variety of Sorghum used in South Indian agriculture.

Final Answer: Kurnool 3 is a variety of Sorghum.

Answer: (C)

Q26.

Solution

Concept:

Agrometeorology involves the study of weather and climate in relation to agriculture. Solar radiation is the primary energy source for photosynthesis and evapotranspiration. Measuring the intensity of total (global) solar radiation reaching the earth's surface is essential for calculating a crop's potential yield and water requirements.

Solution:

1. Comparison of Instruments: - Anemometer: Used to measure wind speed. - Psychrometer: Used to measure relative humidity (using dry and wet bulb thermometers). - Lysimeter: Used to measure evapotranspiration and the percolation of water through soil. - Pyranometer: A specialized actinometer used for measuring solar irradiance on a planar surface.

2. Working Principle: A Pyranometer measures the flux density of solar radiation (in Watts per square meter) from the entire hemisphere (180-degree field of view). It typically uses a thermopile sensor under a glass dome to convert heat from the sun into an electrical signal.

Final Answer: The instrument used to measure Solar Radiation is the Pyranometer.

Answer: (B)

Q27.

Solution

Concept:

Essential plant nutrients are classified into two categories based on the quantity required by the plant: Macronutrients and Micronutrients. While both are equally important for the plant's life cycle, micronutrients are needed only in trace amounts (usually less than 100 ppm in dry matter).

Solution:

1. Classification: - Macronutrients: Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), and Sulfur (S). - Micronutrients: Iron (Fe), Manganese (Mn), Copper (Cu), Zinc (Zn), Boron (B), Molybdenum (Mo), Chlorine (Cl), and Nickel (Ni).
2. Analyzing Options: Magnesium, Calcium, and Sulfur are considered "Secondary Macronutrients." Boron is required in very small quantities for cell wall formation and pollen germination.
3. Conclusion: Among the listed options, Boron is the only element that fits the definition of a micronutrient.

Final Answer: Boron is a micronutrient.

Answer: (C)

Q28.

Solution

Concept:

The gestation period is the duration of pregnancy in an animal, from the time of successful conception (fertilization) to the time of birth (parturition). Knowledge of the gestation period is vital for livestock management to prepare for the care of the mother and the newborn.

Solution:

1. Species Comparison: - Cow: $\approx 280 - 285$ days. - Buffalo: ≈ 310 days. - Pig: ≈ 114 days (3 months, 3 weeks, 3 days). - Sheep/Goat: Both have very similar gestation periods.
2. Goat Gestation: The average gestation period for a goat (doe) is approximately 150 days (roughly 5 months).
3. Variations: This can vary slightly by 2–3 days depending on the breed and the number of kids (twins/triplets), but 150 days is the standard biological value.

Final Answer: The gestation period of a Goat is approximately 150 days.

Answer: (A)

Q29.

Solution

Concept:

Varietal selection in vegetable crops depends on the purpose (fresh market, processing, or export) and resistance to pests. Chilli (*Capsicum annuum*) varieties are often selected based on their "pungency" (capsaicin content) and their resistance to viruses like Leaf Curl.

Solution:

1. Variety Background: "Pusa Jwala" is a highly popular and widely cultivated variety of Chilli in India.

2. Characteristics: It was developed at the IARI, New Delhi. The fruits are thin, long, and curved. It is known for its high degree of pungency and is relatively tolerant to the Chilli Leaf Curl virus and Mosaic virus.

3. Usage: It is used both for green chillies and for the production of red chilli powder.

Final Answer: Pusa Jwala is a famous variety of Chilli.

Answer: (B)

Q30.

Solution

Concept:

In classical genetics, the relationship between genes and traits is not always one-to-one. There are instances where a single genetic locus affects multiple, seemingly unrelated phenotypic traits. This phenomenon is a departure from simple Mendelian inheritance where one gene affects one character.

Solution:

1. Definitions: - Epistasis: One gene hides or masks the expression of another gene at a different locus. - Polygeny: Multiple genes contribute to a single trait (e.g., human skin color). - Codominance: Both alleles of a gene are expressed equally (e.g., AB blood group). - Pleiotropy: A single gene has multiple phenotypic effects.

2. Example in Agriculture: In some plants, a gene that controls the color of the flower might also influence the color of the seed coat or the presence of spots on the leaf axils. This is a classic case of pleiotropy.

Final Answer: When a single gene influences multiple traits, it is called Pleiotropy.

Answer: (B)

Q31.

Solution

Concept:

Fertilizers are concentrated sources of plant nutrients. Nitrogenous fertilizers are categorized based on the form of nitrogen they contain (Ammoniacal, Nitrate, or Amide). The nutrient "grade" or analysis of a fertilizer indicates the percentage of the primary nutrient present by weight.

Solution:

1. Analyzing Nitrogen Content: - Ammonium Nitrate: Contains $\approx 33 - 34\%$ Nitrogen. - Urea: Contains 46% Nitrogen. - Calcium Ammonium Nitrate (CAN): Contains $\approx 25 - 26\%$ Nitrogen. - Anhydrous Ammonia: Contains 82% Nitrogen.
2. Commercial Context: While Urea is the most commonly used solid nitrogenous fertilizer in India due to its 46% concentration, Anhydrous Ammonia has the absolute highest concentration of Nitrogen (82%) among all fertilizers.
3. Physical State: Anhydrous ammonia is a gas at standard temperature and pressure and must be stored under high pressure as a liquid and injected into the soil.

Final Answer: Anhydrous Ammonia contains the highest percentage of Nitrogen.

Answer: (C)

Q32.

Solution

Concept:

Soil management begins with physical manipulation to create a favorable environment for seed germination and root growth. This process, known as tillage, improves soil aeration, enhances water infiltration, and helps in weed control.

Solution:

1. Definitions: - Sowing: The act of placing seeds in the soil. - Threshing: Separating the grain from the straw or chaff after harvest. - Winnowing: Separating grain from chaff using wind/air. - Tilling (Tillage): The mechanical manipulation of soil.
2. Mechanics of Tilling: Tilling involves cutting, loosening, and turning the soil. This breaks the soil crust, incorporates organic matter (crop residues), and destroys the established root systems of weeds.
3. Tools: This is typically performed using primary tillage implements like the M.B. plough or secondary tillage tools like cultivators and harrows.

Final Answer: The process of loosening and turning of soil is called Tilling.

Answer: (B)

Q33.

Solution

Concept:

Plants are classified as annuals, biennials, or perennials based on their life cycle duration. A biennial plant is one that requires two growing seasons to complete its biological life cycle (vegetative growth in the first year and reproductive growth/flowering in the second).

Solution:

1. Life Cycle Analysis: - Tomato, Okra, and Chilli: These are treated as annuals in cultivation; they flower and produce fruit in a single season. - Cabbage (*Brassica oleracea* var. *capitata*): It is a biennial plant.

2. Commercial vs. Biological Cycle: In vegetable production, cabbage is harvested at the end of its first year when the "head" (vegetative part) is formed. However, if left in the field, it requires a period of cold (vernalization) to produce a flower stalk and seeds in the second year.

3. Conclusion: Among the given options, Cabbage is the only biennial vegetable.

Final Answer: Cabbage is a biennial vegetable.

Answer: (C)

Q34.

Solution

Concept:

Anthrax is a severe, zoonotic (can spread to humans) disease that primarily affects herbivores like cattle, sheep, and goats. It is characterized by sudden death and the oozing of tarry, non-clotting blood from natural body openings. It is caused by a spore-forming microorganism.

Solution:

1. Pathogen Identification: - *Pasteurella multocida*: Causes Haemorrhagic Septicaemia. - *Clostridium chauvoei*: Causes Black Quarter. - *Brucella abortus*: Causes Brucellosis (contagious abortion). - *Bacillus anthracis*: A gram-positive, rod-shaped bacterium that causes Anthrax.

2. Nature of the Bacterium: *Bacillus anthracis* is unique because it forms highly resilient spores that can survive in the soil for decades.

3. Critical Rule: Post-mortems should never be performed on suspected Anthrax carcasses to prevent the bacteria from forming spores upon exposure to oxygen.

Final Answer: Anthrax in cattle is caused by *Bacillus anthracis*.

Answer: (A)

Q35.

Solution

Concept:

Relative Humidity (RH) is the ratio of the actual amount of water vapor present in the air to the maximum amount of water vapor the air can hold at a given temperature, expressed as a percentage. It is a vital parameter for determining crop transpiration rates and the likelihood of disease outbreaks.

Solution:

1. Instruments and their Uses: - Tensiometer: Measures soil moisture tension. - Barometer: Measures atmospheric pressure. - Altimeter: Measures altitude. - Hygrometer: A specialized instrument used for measuring the moisture content in the atmosphere.

2. Psychrometer: A common type of hygrometer is the "Sling Psychrometer," which uses a pair of dry-bulb and wet-bulb thermometers to determine humidity based on the cooling effect of evaporation.

3. Importance: High RH (above 80%) generally favors the growth of fungal pathogens in crops.

Final Answer: Relative humidity is measured using a Hygrometer.

Answer: (A)

Q36.

Solution

Concept:

Fodder crops are essential for the sustenance of livestock. In India, two crops dominate the forage landscape: Berseem and Lucerne. The "King" of fodder is chosen based on its popularity, nutritional value (high protein), and its widespread cultivation during the winter (Rabi) season in northern and central India.

Solution:

1. Comparison of Fodder Crops: - Lucerne (Alfalfa): Often called the "Queen of Fodders" due to its perennial nature and high protein. - Oat: A high-energy cereal fodder. - Napier Grass: A high-yielding perennial grass. - Berseem ($Trifolium\ alexandrinum$): A succulent, highly palatable legume.

2. Why Berseem is "King": Berseem is preferred for its high protein content ($\approx$ 20%), high digestibility, and its ability to provide multiple "cuttings" (usually 5 to 6) throughout the winter season.

3. Soil Health: Being a legume, it also fixes atmospheric nitrogen, improving soil fertility for the following crop in the rotation.

Final Answer: Berseem is known as the "King of Fodders".

Answer: (B)

Q37.

Solution

Concept:

Market milk is standardized to ensure consumers receive consistent nutritional value. The Food Safety and Standards Authority of India (FSSAI) defines specific categories of milk based on their Fat and Solids-Not-Fat (SNF) content. "Double Toned Milk" is a low-fat version of regular toned milk.

Solution:

1. Comparison of Milk Types: - Full Cream Milk: Minimum 6.0% Fat and 9.0% SNF. - Toned Milk: Minimum 3.0% Fat and 8.5% SNF. - Double Toned Milk: Minimum 1.5% Fat and 9.0% SNF. - Skimmed Milk: Not more than 0.5% Fat and 8.7% SNF.

2. Preparation: Double toned milk is usually prepared by mixing whole milk with skimmed milk or reconstituted spray-dried skimmed milk powder.

3. Nutritional Purpose: It is ideal for individuals requiring a low-calorie diet while still providing high-quality proteins and minerals.

Final Answer: The percentage of fat in Double Toned Milk is 1.5%.

Answer: (B)

Q38.

Solution

Concept:

DNA Fingerprinting (or molecular profiling) is a laboratory technique used to identify the unique genetic makeup of an organism. While physical traits (phenotypes) can change based on the environment, the DNA sequence remains constant, making it a reliable tool for distinguishing between very similar organisms.

Solution:

1. Application in Agriculture: In plant breeding and seed technology, "varietal purity" is crucial. Many modern varieties look identical in the field but have different yield potentials or resistance genes.

2. Mechanism: Fingerprinting uses molecular markers (like SSRs, SNPs, or RAPDs) to create a unique "barcode" of the plant's DNA.

3. Primary Objective: The technique is used to identify and distinguish different varieties, protect Intellectual Property Rights (IPR) of breeders, and detect "seed piracy" or adulteration in commercial seed lots.

Final Answer: Finger printing in plants is used to identify varieties.

Answer: (B)

Q39.

Solution

Concept:

In botany, a "fruit" is the matured ovary of a flower. Fruits are classified into various types based on the structure of the pericarp (fruit wall) and whether they develop from a single or multiple ovaries. Vegetables like Tomato are, botanically speaking, fruits.

Solution:

1. Analysis of Fruit Types: - Drupe: A fleshy fruit with a single hard stone (e.g., Mango, Peach). - Pome: A fruit where the edible part is the enlarged receptacle (e.g., Apple). - Pepo: A fruit with a hard rind (e.g., Watermelon, Cucumber). - Berry: A fleshy fruit developed from a single ovary, usually with multiple seeds embedded in a pulpy mass.

2. Tomato Classification: The Tomato (*Solanum lycopersicum*) develops from a superior, multicarpellary ovary. The entire fruit wall (exocarp, mesocarp, and endocarp) is fleshy and edible, and the seeds are distributed throughout the pulp.

3. Conclusion: By botanical definition, the tomato is a true Berry.

Final Answer: The fruit of Tomato is botanically a Berry.

Answer: (B)

Q40.

Solution

Concept:

Biological Nitrogen Fixation (BNF) is a process where atmospheric nitrogen (N_2) is converted into ammonia (NH_3) by specific microorganisms. This is a symbiotic relationship where the plant provides energy (carbohydrates) to the bacteria, and the bacteria provide nitrogen to the plant.

Solution:

1. Microorganism Specificity: *Rhizobium* is a genus of Gram-negative soil bacteria that is highly specific to a particular group of plants.

2. The Symbiosis: *Rhizobium* bacteria infect the root hairs of "Legume" crops (pulses like Gram, Pea, Soybean, and Arhar) to form specialized structures called "Root Nodules."

3. Mechanism: Inside these nodules, the enzyme nitrogenase facilitates the fixation of nitrogen. This is why legume crops generally require less nitrogenous fertilizer and are essential for crop rotation to maintain soil health.

4. Contrast: Cereal crops (like Rice and Wheat) do not form nodules with *Rhizobium*, although they may benefit from other free-living or associative bacteria like *Azotobacter* or *Azospirillum*.

Final Answer: Nitrogen fixation by Rhizobium occurs in legume crops.

Answer: (B)

Q41.

Solution

Concept:

The Indian Minimum Seed Certification Standards (IMSCS) ensure that farmers receive high-quality seeds of known pedigree. To easily identify the quality and stage of the seed, the Department of Agriculture uses a color-coding system involving specific tags attached to the seed bags.

Solution:

1. Seed Classes and Tag Colors: - Nucleus and Breeder Seed: Golden Yellow tag. - Foundation Seed: White tag. - Certified Seed: Azure Blue tag. - Registered Seed: Purple tag.
2. Certified Seed Significance: Certified seed is the progeny of foundation seed and is the generation of seed that is actually sold to farmers for commercial crop production.
3. Verification: The blue tag confirms that the seed lot has met the minimum physical and genetic purity standards and has been inspected by the State Seed Certification Agency (SSCA).

Final Answer: "Blue tag" is issued for Certified seed.

Answer: (C)

Q42.

Solution

Concept:

Organic farming is a production system that avoids the use of synthetic fertilizers, pesticides, and growth regulators. In India, certain states have taken a lead in converting their entire agricultural area to organic practices to protect the environment and provide healthier food.

Solution:

1. Historical Milestone: In January 2016, the Prime Minister of India officially declared Sikkim as the first "100% Organic State" in the country.
2. State Policy: Sikkim achieved this by gradually phasing out the use of chemical fertilizers and pesticides and providing legal and technical support to its farmers to adopt traditional organic methods.
3. Current Status: While other states like Kerala and Uttarakhand have large areas under organic cultivation, Sikkim remains the unique example where the entire state's cultivated land is certified organic.

Final Answer: Sikkim is the state with the highest area (proportionally) under organic farming.

Answer: (B)

Q43.

Solution

Concept:

The reproductive physiology of poultry (birds) is unique compared to mammals. After mating, the female bird (hen) can continue to lay fertile eggs for several days or even weeks without further mating because of specialized anatomical structures that store live sperm.

Solution:

1. Avian Oviduct Anatomy: The oviduct consists of five parts: Infundibulum, Magnum, Isthmus, Uterus (Shell gland), and Vagina.
2. Storage Mechanism: Sperm storage tubules (SST) are located at the junction of the vagina and the uterus, often referred to as the vaginal-uterovaginal junction or simply vaginal glands.
3. Function: These tubules provide a favorable environment that keeps the sperm viable at body temperature. When an egg is laid, some sperm are released from these glands and migrate up the oviduct to the Infundibulum to fertilize the next ovum.

Final Answer: In poultry, the storage of sperm occurs in the Vaginal glands (at the uterovaginal junction).

Answer: (C)

Q44.

Solution

Concept:

Invasive alien species are plants that are introduced to a new environment where they have no natural enemies, allowing them to spread rapidly and choke local ecosystems. One particular aquatic weed is famous for its rapid growth and its devastating effect on the water bodies of West Bengal.

Solution:

1. Weed Identification: The Water Hyacinth (*Eichhornia crassipes*) was introduced to India as an ornamental plant due to its beautiful violet flowers.
2. Environmental Impact: It grows so fast that it can double its population in two weeks. It forms a thick mat over the water surface, blocking sunlight and depleting oxygen, which kills fish and other aquatic life.
3. Nomenclature: Due to the massive economic and ecological loss it caused to the fisheries and waterways of Bengal, it earned the nickname "Terror of Bengal."

Final Answer: Water Hyacinth is known as the "Terror of Bengal."

Answer: (B)

Q45.

Solution

Concept:

Post-harvest management of fruits is essential to reduce spoilage and extend shelf life. Cold storage works by slowing down the respiration rate of the fruit and inhibiting the growth of decay-causing microorganisms.

Solution:

1. Physiological Principle: Most temperate and some tropical fruits can be stored for extended periods just above the freezing point of water.

2. Temperature Range: A temperature range of 0 to $5^{\circ}C$ is ideal for the preservation of a wide variety of fruits (like Apple, Pear, and various berries).

3. Chilling Injury: Note that some tropical fruits (like Mango or Banana) are sensitive to very low temperatures and may suffer "chilling injury" if stored below $10^{\circ}C$. However, for the general category of preservation, $0 - 5^{\circ}C$ is the most standard refrigerated range.

Final Answer: The ideal temperature for the preservation of most fruits is $0 - 5^{\circ}C$.

Answer: (A)

Q46.

Solution

Concept:

Soil salinity is a major abiotic stress that limits crop productivity globally. Crops are categorized as sensitive, semi-tolerant, or tolerant based on their ability to survive and produce economic yields in soils with high electrical conductivity (EC).

Solution:

1. Crop Sensitivity Analysis: - Highly Sensitive: Pulses like Pea, Chickpea, and Beans are very sensitive to salt. Even a slight increase in soil salinity leads to poor germination and plant death. - Semi-Tolerant: Maize and Wheat can tolerate moderate levels of salinity. - Tolerant: Barley (*Hordeum vulgare*) and Sugarbeet are highly salt-tolerant.

2. Physiological Mechanism: Barley has evolved efficient mechanisms to exclude sodium ions (Na^{+}) from its tissues or sequester them in vacuoles, allowing it to maintain metabolic processes in saline environments.

3. Practical Use: Barley is often the first crop planted during the reclamation of saline-alkali soils after initial leaching.

Final Answer: Barley is a salt-tolerant crop.

Answer: (B)

Q47.

Solution

Concept:

Institutional knowledge is a standard part of agricultural examinations. The Central Institute of Horticulture (CIH) was established to provide holistic support for the development of the horticulture sector, specifically in regions with high potential but limited infrastructure.

Solution:

1. Location Details: The Central Institute of Horticulture was established in 2006 under the Ministry of Agriculture and Farmers Welfare.

2. Geographical Focus: It is located at Medziphema in the state of Nagaland.

3. Mandate: The institute focuses on the North East Region (NER) to promote organic horticulture, provide technical training to farmers, and improve post-harvest management and marketing of regional specialty fruits and vegetables.

Final Answer: The Central Institute of Horticulture is located in Nagaland (Medziphema).

Answer: (B)

Q48.

Solution

Concept:

In genetics, crosses are categorized by the parental genotypes involved. A specific type of cross is used by breeders to determine whether a dominant phenotype is homozygous or heterozygous, or to facilitate backcross breeding.

Solution:

1. Definitions: - Back Cross: Crossing the F_1 hybrid back to either of its parents. - Reciprocal Cross: A pair of crosses where the phenotypes of the male and female are reversed to check for cytoplasmic inheritance. - Test Cross: A specific type of back cross where the F_1 hybrid is crossed with the homozygous recessive parent (aa or $aabb$).

2. Genetic Utility: Because the recessive parent only produces recessive alleles, the phenotype of the offspring directly reveals the gametic contribution of the F_1 parent.

3. Outcome: If the F_1 is heterozygous (Aa), the test cross results in a 1:1 ratio.

Final Answer: The cross between F_1 and its homozygous recessive parent is a Test cross.

Answer: (B)

Q49.

Solution

Concept:

The estimation of fat in milk is traditionally done using the Gerber Method (also known as the Sulfuric Acid Method). This method relies on the chemical digestion of milk proteins to release the fat, which is then separated by centrifugation.

Solution:

1. Reagents Used: The Gerber method requires two primary reagents: Concentrated Sulfuric Acid (H_2SO_4) and Iso-Amyl Alcohol.

2. Role of H_2SO_4: The acid (with a specific gravity of ≈ 1.82) is added to the milk to digest (oxidize) the milk proteins (casein) and generate heat. This reduces the viscosity of the mixture and keeps the fat in a liquid state.

3. Role of Amyl Alcohol: Amyl alcohol is added to prevent the charring of sugar and to help the fat globules coalesce and separate clearly into the neck of the butyrometer for measurement.

Final Answer: H_2SO_4 (Sulfuric Acid) is used in the Gerber Method for fat estimation.

Answer: (B)

Q50.

Solution

Concept:

Agricultural revolutions in India are named by color to denote the specific commodity they targeted. These revolutions represent periods of rapid increases in production through the adoption of modern technology, improved varieties, and government policy support.

Solution:

1. Revolution Mapping: - Green Revolution: Food grains (Wheat and Rice). - Blue Revolution: Fish and aquatic products. - Yellow Revolution: Oilseeds. - White Revolution: Milk and dairy products.

2. Operation Flood: The White Revolution was spearheaded by the "Operation Flood" program, launched in 1970 by the National Dairy Development Board (NDDB) under the leadership of Dr. Verghese Kurien (the Father of White Revolution).

3. Impact: This initiative transformed India from a milk-deficient nation into the world's largest milk producer.

Final Answer: The White Revolution is related to Milk.

Answer: (B)

Answer Key

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