CUET-UG Agriculture Sample Paper-4

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 breeder is working on a self-pollinated crop and wants to develop a pure-line variety. If the initial population is heterozygous (Aa), what will be the percentage of homozygosity in the population after 5 generations of continuous selfing?

(A) 93.75%

(B) 96.875%

(C) 98.43%

(D) 99.21%

Q2. Given the following atmospheric conditions: dry bulb temperature is 35°C and wet bulb temperature is 25°C. If the wet bulb depression decreases while the dry bulb temperature remains constant, what can be inferred about the relative humidity?

(A) Relative humidity remains constant

(B) Relative humidity decreases

(C) Relative humidity increases

(D) Relative humidity becomes zero

Q3. In the context of soil microbiology, which of the following sequences correctly represents the descending order of microbial population density in a typical productive upland soil?

(A) Bacteria > Actinomycetes > Fungi > Algae

(B) Fungi > Bacteria > Actinomycetes > Algae

(C) Bacteria > Fungi > Actinomycetes > Algae

(D) Actinomycetes > Bacteria > Fungi > Algae

Q4. A dairy farmer observes that a high-yielding crossbred cow is showing symptoms of "pica" (eating non-edible items like stones and bones). This metabolic disorder is primarily associated with the deficiency of which mineral in the balanced ration?

(A) Calcium

(B) Phosphorus

(C) Magnesium

(D) Iron

Q5. Calculate the quantity of Urea (containing 46% N) required to provide 120 kg of Nitrogen for a one-hectare wheat field.

(A) 260.8 kg

(B) 120 kg

(C) 55.2 kg

(D) 460 kg

Q6. Which of the following breeding methods is most suitable for transferring a specific disease-resistance gene from a wild relative into a high-yielding but susceptible commercial variety?

(A) Pedigree Method

(B) Bulk Method

(C) Backcross Method

(D) Mass Selection

Q7. In the context of the "Law of Limiting Factors" and nutrient mobility, which of the following scenarios would most likely result in "Hidden Hunger" within a high-yielding cereal crop?

(A) The visual manifestation of interveinal chlorosis in older leaves due to Nitrogen deficiency.

(B) A significant reduction in yield without the appearance of any identifiable deficiency symptoms due to sub-optimal Potassium levels.

(C) The rapid death of the growing apex (terminal bud) due to the immobile nature of Boron.

(D) The accumulation of anthocyanin pigments causing purple coloration in stems under Phosphorus stress.

Q8. If the total global solar radiation received at the crop canopy is 400 cal/cm^2/day, and the albedo of the crop surface is 0.25, how much radiation is actually absorbed by the surface (ignoring transmission)?

(A) 100 cal/cm^2/day

(B) 200 cal/cm^2/day

(C) 300 cal/cm^2/day

(D) 400 cal/cm^2/day

Q9. In the DNA double helix structure, if a sample contains 20% Cytosine, what will be the percentage of Adenine according to Chargaff's rule?

(A) 20%

(B) 30%

(C) 40%

(D) 60%

Q10. Which enzyme is responsible for the "fixation" of Carbon dioxide in C_3 plants during the Calvin cycle?

(A) PEP Carboxylase

(B) RuBisCO

(C) Alcohol Dehydrogenase

(D) Carbonic Anhydrase

Q11. The disease "Ranikhet" (Newcastle Disease) in poultry is caused by which of the following agents?

(A) Bacteria

(B) Virus

(C) Protozoa

(D) Fungus

Q12. A soil has a pH value of 4.5. Which of the following amendments is most appropriate to neutralize the acidity and improve crop growth?

(A) Gypsum

(B) Elemental Sulphur

(C) Lime (Calcium Carbonate)

(D) Urea

Q13. Which irrigation method is considered most efficient for fruit orchard crops in water-scarce arid regions?

(A) Furrow Irrigation

(B) Check Basin

(C) Drip Irrigation

(D) Flood Irrigation

Q14. Which of the following is a non-selective, post-emergence herbicide commonly used for total weed control in non-cropped areas?

(A) Atrazine

(B) Pendimethalin

(C) Glyphosate

(D) Butachlor

Q15. The indigenous cattle breed known for its "high heat tolerance" and distinct "loose skin" (dewlap), often referred to as the "Lola" breed, is:

(A) Sahiwal

(B) Gir

(C) Red Sindhi

(D) Tharparkar

Q16. The process of conversion of organic nitrogen into inorganic forms like ammonia by soil microbes is known as:

(A) Nitrification

(B) Denitrification

(C) Ammonification

(D) Nitrogen Fixation

Q17. In the cultivation of Mango, the commercial method of propagation used in most parts of India is:

(A) Shield Budding

(B) Air Layering

(C) Veneer Grafting

(D) T-Budding

Q18. A vitamin that is synthesized by the rumen microorganisms in cattle and is essential for blood coagulation is:

(A) Vitamin A

(B) Vitamin D

(C) Vitamin E

(D) Vitamin K

Q19. The removal of the apical bud to promote lateral branching and better flowering in crops like Chickpea (Gram) is called:

(A) Topping

(B) Nipping

(C) Pruning

(D) Thinning

Q20. Which of the following irrigation efficiencies accounts for the losses due to deep percolation and runoff from the farm?

(A) Water Conveyance Efficiency

(B) Water Application Efficiency

(C) Water Storage Efficiency

(D) Water Distribution Efficiency

Q21. The protein content in the milk of which of the following animals is generally highest?

(A) Cow

(B) Buffalo

(C) Sheep

(D) Goat

Q22. Which type of soil structure is considered most desirable for the growth of cereal crops due to its balanced aeration and water-holding capacity?

(A) Platy

(B) Prismatic

(C) Crumb/Granular

(D) Massive

Q23. The first stable product formed in C_4 plants like Sugarcane and Maize after CO_2 fixation is:

(A) 3-Phosphoglyceric acid

(B) Oxaloacetic acid

(C) Phosphoenol pyruvate

(D) Ribulose bisphosphate

Q24. In a poultry farm, the 'deep litter' system involves keeping birds on a floor covered with bedding material. What is the ideal thickness of the litter material in summer?

(A) 2˜3 inches

(B) 6˜8 inches

(C) 10˜12 inches

(D) 15 inches

Q25. In the commercial production of fruit jellies, a "syneresis" or "weeping" effect is sometimes observed where water exudes from the gel structure. This physiological defect is most likely caused by:

(A) The use of over-ripe fruits which are deficient in pectin.

(B) An excessive amount of sugar leading to dehydration of the pectin network.

(C) An excess of acid or a deficiency of sugar, causing the pectin network to contract.

(D) Insufficient boiling time, which prevents the proper hydrolysis of protopectin.

Q26. If a farmer applies 100 kg of Single Super Phosphate (16% P_2O_5) to a field, how much elemental Phosphorus (P) is being added? (Conversion factor: $P = P_2O_5 \times 0.44$)

(A) 16 kg

(B) 7.04 kg

(C) 36.36 kg

(D) 100 kg

Q27. The 'White Revolution' in India is primarily associated with the increase in the production of:

(A) Eggs

(B) Fish

(C) Milk

(D) Wool

Q28. Which of the following is a symptom of Zinc deficiency in Rice plants?

(A) Khaira disease

(B) Brown heart

(C) Whip tail

(D) Dieback

Q29. The process of 'Retting' is associated with the extraction of fibers from which of the following crops?

(A) Cotton

(B) Jute

(C) Sunnhemp

(D) Both (B) and (C)

Q30. Which breeding method is most effective for improving highly cross-pollinated crops by exploiting heterosis?

(A) Pure Line Selection

(B) Hybridization

(C) Mass Selection

(D) Clonal Selection

Q31. The recommended seed rate for transplanting Kharif rice (Fine variety) per hectare is approximately:

(A) 10˘15 kg

(B) 30˘40 kg

(C) 60˘80 kg

(D) 100 kg

Q32. Which of the following implements is used for primary tillage operations?

(A) Harrow

(B) Cultivator

(C) Mould Board Plough

(D) Leveller

Q33. The 'Gilt' refers to a young female of which livestock species that has not yet farrowed?

(A) Sheep

(B) Goat

(C) Pig

(D) Poultry

(E) Buffalo

Q34. Which nutrient is known as the 'Energy Currency' of the plant cell?

(A) Nitrogen

(B) Phosphorus

(C) Potassium

(D) Magnesium

Q35. The process of 'De-navelling' in Banana cultivation refers to:

(A) Removal of male bud

(B) Removal of side suckers

(C) Providing support to the plant

(D) Removal of dry leaves

Q36. During the preservation of fruit juices, Potassium Metabisulphite (KMS) is widely used; however, it is strictly avoided for certain products like Jamun or Pomegranate juice. What is the biochemical reason for this exclusion?

(A) It reacts with the acids to form a toxic precipitate.

(B) The sulfur dioxide released by KMS acts as a bleaching agent and destroys the anthocyanin pigments.

(C) It increases the rate of enzymatic browning in dark-colored fruits.

(D) It fails to inhibit the specific osmophilic yeasts found in high-sugar juices.

Q37. Which microbial agent is widely used as a 'bio-control' against many soil-borne fungal pathogens?

(A) Rhizobium

(B) Trichoderma

(C) Azotobacter

(D) Aspergillus

Q38. The gestation period of a Buffalo is approximately:

(A) 280 days

(B) 310 days

(C) 150 days

(D) 365 days

Q39. Which of the following is a 'Cation Exchange' capacity related phenomenon in soil?

(A) Nutrient leaching

(B) Nutrient retention

(C) Soil erosion

(D) Water logging

Q40. The 'Avenue' planting system in landscaping is characterized by:

(A) Planting in a circle

(B) Planting along roads/paths

(C) Planting in a square

(D) Planting on hills

Q41. The method of fruit preservation that involves heating the product to a specific temperature for a short time to kill pathogenic microorganisms without significantly altering the flavor is:

(A) Sterilization

(B) Pasteurization

(C) Blanching

(D) Canning

Q42. Which of the following poultry breeds is famous for its black-colored meat, which is believed to have medicinal properties?

(A) White Leghorn

(B) Rhode Island Red

(C) Kadaknath

(D) Aseel

Q43. In 'Precision Farming', the technology used to determine the exact geographical location of a tractor or implement in the field is:

(A) GIS

(B) GPS

(C) VRT

(D) Remote Sensing

Q44. Which of the following is a 'Neutral' fertilizer that does not change the soil pH significantly even after repeated applications?

(A) Urea

(B) Ammonium Sulphate

(C) Calcium Ammonium Nitrate (CAN)

(D) Sodium Nitrate

Q45. The specific practice of 'Earthing-up' is most essential in which of the following crops to prevent lodging and encourage tuber/rhizome development?

(A) Wheat

(B) Sugarcane and Potato

(C) Mustard

(D) Moong bean

Q46. In Mendel's dihybrid cross, what is the phenotypic ratio observed in the F_2 generation?

(A) 3 : 1

(B) 1 : 2 : 1

(C) 9 : 3 : 3 : 1

(D) 1 : 1 : 1 : 1

Q47. Which irrigation system is most suitable for 'Undulating' or uneven topography where leveling is not economically feasible?

(A) Furrow Irrigation

(B) Sprinkler Irrigation

(C) Check Basin

(D) Border Strip

Q48. The major component of 'Biogas' produced through the anaerobic digestion of animal dung is:

(A) Carbon dioxide

(B) Hydrogen

(C) Methane

(D) Nitrogen

Q49. Which of the following is a primary objective of 'Plant Quarantine' regulations in agriculture?

(A) To increase crop yield

(B) To prevent the entry of exotic pests and diseases

(C) To provide subsidies to farmers

(D) To develop new hybrid varieties

Q50. The instrument used to measure the 'Rate of Transpiration' in plants is:

(A) Auxanometer

(B) Potometer

(C) Piezometer

(D) Lysimeter

Detailed Solutions

Q1.

Solution

Concept:

In plant genetics, self-pollination of a heterozygous individual (Aa) results in a 50% reduction of heterozygosity in each successive generation. The percentage of homozygosity in the n^{th} generation can be calculated using the following formula:

$$\text{Homozygosity } \% = \left[1 - \left(\frac{1}{2}\right)^n\right] \times 100$$

where n represents the number of generations of selfing.

Solution:

1. The problem specifies 5 generations of continuous selfing ($n = 5$). 2. First, calculate the proportion of heterozygotes remaining in the population:

$$\text{Heterozygosity} = \left(\frac{1}{2}\right)^5 = \frac{1}{32}$$

3. Convert the fraction to a decimal value:

$$\frac{1}{32} = 0.03125$$

4. To find the proportion of homozygotes, subtract the heterozygosity from the total population (1):

$$\text{Homozygosity} = 1 - 0.03125 = 0.96875$$

5. Convert this value to a percentage to match the options:

$$0.96875 \times 100 = 96.875\%$$

Final Answer: The percentage of homozygosity after 5 generations is 96.875%.

Answer: (B)

Q2.

Solution

Concept:

Wet bulb depression is defined as the difference between the Dry Bulb Temperature (DBT) and the Wet Bulb Temperature (WBT). This physical parameter is a critical indicator of the air's moisture content. There is an inverse relationship between wet bulb depression and relative humidity (RH).

Solution:

1. The Dry Bulb Temperature (35°C) represents the actual air temperature, while the Wet Bulb Temperature (25°C) reflects the cooling effect of evaporation. 2. The initial wet bulb depression is 35°C – 25°C = 10°C. 3. Evaporation occurs more rapidly when the air is dry (low RH), leading to a lower WBT and a higher depression. 4. If the wet bulb depression decreases while DBT is constant, it means the WBT is rising and getting closer to the DBT. 5. A smaller gap between DBT and WBT indicates that the air is more saturated and its capacity to hold more moisture is decreasing. 6. Therefore, a decrease in depression signifies an increase in the relative humidity of the atmosphere.

Final Answer: The relative humidity increases.

Answer: (C)

Q3.

Solution

Concept:

Soil health and productivity are governed by the population of various microorganisms. While biomass might differ, the absolute number of individual microbial cells per gram of soil follows a specific hierarchical order in standard upland agricultural soils.

Solution:

1. Bacteria: These are the most dominant group in terms of numbers. In a fertile soil, there are typically 10^8 to 10^9 bacteria per gram of soil. They are essential for nutrient cycling and organic matter decomposition. 2. Actinomycetes: Often classified between bacteria and fungi, they are the second most numerous group, with populations ranging from 10^7 to 10^8 per gram. They are responsible for the degradation of complex organic compounds. 3. Fungi: Though they possess the largest biomass due to their extensive mycelial networks, their individual "count" or colony-forming units are lower, usually 10^5 to 10^6 per gram. 4. Algae: Found primarily in the upper millimeters of the soil where light is available for photosynthesis, they have the lowest population density among these four, typically 10^4 to 10^5 per gram.

Final Answer: The descending order is Bacteria > Actinomycetes > Fungi > Algae.

Answer: (A)

Q4.

Solution

Concept:

Pica is a depraved appetite or metabolic disorder characterized by the licking or eating of non-nutritive materials. In livestock production, observing such behavioral abnormalities is a key diagnostic tool for identifying specific nutritional deficiencies in the ration.

Solution:

1. Animals require a balanced ratio of macro and micro minerals for physiological functions. 2. Phosphorus deficiency is a widespread issue in cattle, particularly when they are fed on low-quality forages or grazed on soils deficient in phosphorus. 3. A clinical sign of chronic phosphorus deficiency is "Pica." Affected cows will chew on foreign objects like wood, stones, rags, or even bones (a condition called osteophagia). 4. This behavior is the animal's instinctive attempt to compensate for the lack of phosphorus in its diet. 5. Calcium deficiency usually leads to skeletal issues or milk fever, and Magnesium deficiency leads to grass tetany, but Pica is the specific indicator for Phosphorus.

Final Answer: The symptoms are associated with the deficiency of Phosphorus.

Answer: (B)

Q5.

Solution

Concept:

Calculating the amount of fertilizer needed to meet a specific nutrient requirement is a fundamental task in crop production. The quantity of fertilizer is determined by dividing the required nutrient weight by the nutrient percentage present in that specific fertilizer.

Solution:

1. The target amount of Nitrogen (N) to be applied to the wheat field is 120 kg. 2. The available fertilizer is Urea. It is chemically known as $CO(NH_2)_2$ and industrially contains 46% Nitrogen. 3. The formula for the calculation is:

$$\text{Weight of Urea} = \frac{\text{Required Nitrogen}}{\text{Percentage of N in Urea}} \times 100$$

4. Substitute the given values into the formula:

$$\text{Weight of Urea} = \frac{120}{46} \times 100$$

5. Calculate the result:

$$\text{Weight of Urea} = 2.60869... \times 100 \approx 260.87 \text{ kg}$$

6. Rounding to one decimal place as per standard agricultural practice gives 260.8 kg.

Final Answer: The quantity of Urea required is 260.8 kg.

Answer: (A)

Q6.

Solution

Concept:

In plant breeding, when a desirable trait (like disease resistance) needs to be transferred from a donor parent (often a wild relative) to a recipient parent (a high-yielding commercial variety) without losing the recipient's original qualities, a specific method is used. This involves repeated crossing of the hybrid progeny back to the recipient parent.

Solution:

1. The Backcross Method is specifically designed to improve a specific defect in an otherwise elite variety. 2. The high-yielding commercial variety is the "Recurrent Parent," and the donor of the resistance gene is the "Non-recurrent Parent." 3. By crossing the offspring back to the Recurrent Parent for 6 to 7 generations, the breeder ensures that 98% to 99% of the genetic background of the commercial variety is recovered. 4. Only the specific gene for disease resistance from the donor is retained through selection in each generation. 5. Pedigree and Bulk methods are generally used for developing new varieties from crosses, not for specific gene transfer.

Final Answer: The most suitable method is the Backcross Method.

Answer: (C)

Q7.

Solution

Concept: "Hidden Hunger" in plants refers to a specific state of nutrient deficiency where the plant's growth and yield potential are restricted, yet the plant does not show any visible symptoms (like chlorosis or necrosis). This occurs when the nutrient concentration is above the "critical deficiency level" (where symptoms appear) but below the "critical nutrient range" required for maximum yield.

Solution: 1. **Option (A):** Interveinal chlorosis in older leaves due to Nitrogen is a visible symptom, so it cannot be "hidden" hunger. 2. **Option (B):** This describes the exact definition of Hidden Hunger. Potassium is a common element where plants may look healthy but lack enough of the nutrient to reach maximum reproductive potential, leading to a yield gap. 3. **Option (C):** The death of the terminal bud is a clear visual diagnostic symptom of Boron or Calcium deficiency. 4. **Option (D):** Anthocyanin accumulation (purpling) is a characteristic visual symptom of Phosphorus stress.

Final Answer: A significant reduction in yield without the appearance of any identifiable deficiency symptoms due to sub-optimal Potassium levels.

Answer: (B)

Q8.

Solution

Concept:

Albedo is the fraction of incident solar radiation that is reflected by a surface. The amount of radiation absorbed by a surface is the total incident radiation minus the reflected portion.

$$\text{Absorbed Radiation} = \text{Total Incident Radiation} \times (1 - \text{Albedo})$$

Solution:

1. The incident global solar radiation is given as 400 cal/cm^2/day. 2. The albedo (α) of the crop surface is 0.25 (which means 25% of light is reflected). 3. First, calculate the reflected radiation:

$$\text{Reflected} = 400 \times 0.25 = 100 \text{ cal/cm}^2\text{/day}$$

4. Now, calculate the absorbed radiation by subtracting the reflected portion from the total:

$$\text{Absorbed} = 400 - 100 = 300 \text{ cal/cm}^2\text{/day}$$

5. Alternatively, use the direct formula:

$$\text{Absorbed} = 400 \times (1 - 0.25) = 400 \times 0.75 = 300 \text{ cal/cm}^2\text{/day}$$

Final Answer: The radiation absorbed by the surface is 300 cal/cm^2/day.

Answer: (C)

Q9.

Solution

Concept:

Chargaff's rules state that in a double-stranded DNA molecule, the amount of Adenine (A) equals Thymine (T), and the amount of Guanine (G) equals Cytosine (C). Therefore, the sum of purines equals the sum of pyrimidines ($A + G = T + C = 50\%$).

Solution:

1. Given that Cytosine (C) = 20%. 2. According to the base-pairing rule ($G = C$), Guanine (G) must also be 20%. 3. The total percentage of G + C is:

$$20\% + 20\% = 40\%$$

4. The remaining percentage for A + T is:

$$100\% - 40\% = 60\%$$

5. Since $A = T$, we divide the remaining percentage by 2:

$$\text{Adenine (A)} = 60\%/2 = 30\%$$

6. Therefore, Adenine is 30% and Thymine is 30%.

Final Answer: The percentage of Adenine is 30%.

Answer: (B)

Q10.

Solution

Concept:

In C_3 plants, the first stable product of carbon fixation is a 3-carbon compound (3-PGA). The process is catalyzed by a specific enzyme that facilitates the reaction between CO_2 and Ribulose-1,5-bisphosphate (RuBP).

Solution:

1. The enzyme RuBisCO (Ribulose-1,5-bisphosphate carboxylase-oxygenase) is the most abundant protein on Earth. 2. In the Calvin cycle of C_3 plants (like wheat and rice), RuBisCO fixes CO_2 into RuBP to produce two molecules of 3-phosphoglycerate (3-PGA). 3. PEP Carboxylase is the fixing enzyme for C_4 plants (like maize and sugarcane). 4. Alcohol Dehydrogenase is involved in fermentation, and Carbonic Anhydrase is involved in the conversion of CO_2 to bicarbonate in blood and tissues.

Final Answer: The enzyme responsible is RuBisCO.

Answer: (B)

Q11.

Solution

Concept: Ranikhet disease, also known internationally as Newcastle Disease (ND), is a highly contagious and fatal viral disease affecting poultry such as chickens, turkeys, and ducks. It is one of the most serious diseases of the poultry industry globally due to its high mortality rate and rapid spread.

Solution: 1. **Causative Agent:** The disease is caused by the Newcastle Disease Virus (NDV), which is a single-stranded RNA virus belonging to the family *Paramyxoviridae*. 2. **Symptoms:** Typical signs include respiratory distress (gasping, coughing), nervous symptoms (twisted necks, paralysis), and digestive issues (greenish watery diarrhea). In layers, a sharp drop in egg production is observed. 3. **Management:** Since it is a viral infection, there is no effective antibiotic treatment. Control is primarily managed through strict vaccination protocols using strains like Lasota or F1.

Final Answer: The disease is caused by a Virus.

Answer: (B)

Q12.

Solution

Concept:

Soil pH is a measure of acidity or alkalinity. A soil with a pH of 4.5 is considered strongly acidic. Acidic soils contain high concentrations of H^+ and Al^{3+} ions, which can be toxic to most field crops. To neutralize this acidity, a basic (alkaline) amendment must be added.

Solution:

1. Lime (primarily Calcium Carbonate, $CaCO_3$) is the most common amendment used to reclaim acidic soils. 2. When lime is added to moist soil, it reacts to neutralize the hydrogen ions, thereby increasing the pH level. 3. Gypsum is used for reclaiming sodic (alkaline) soils, not acidic ones, as it helps remove sodium but does not significantly change the pH. 4. Elemental Sulphur and Urea actually increase soil acidity over time; therefore, they would be counterproductive in this scenario. 5. Adding lime also improves the availability of essential nutrients like Phosphorus and Calcium which are often "locked" in acidic conditions.

Final Answer: The most appropriate amendment is Lime (Calcium Carbonate).

Answer: (C)

Q13.

Solution

Concept:

Irrigation efficiency refers to the ratio of water stored in the root zone to the water delivered from the source. In arid regions, minimizing evaporation and deep percolation is crucial for sustainable agriculture, especially for high-value orchard crops.

Solution:

1. Drip Irrigation (or Trickle Irrigation) delivers water directly to the base or root zone of individual plants through a network of pipes and emitters. 2. It has the highest water-use efficiency (often above 90%) because it minimizes losses due to surface evaporation and runoff. 3. For orchards, where trees are spaced widely apart, drip irrigation is ideal because it only wets the soil near the tree, leaving the inter-row spaces dry, which also helps in weed control. 4. Flood and Furrow irrigation methods are "surface" methods with very low efficiency (around 30% to 50%) due to heavy water loss. 5. Check basin is commonly used for closely sown crops but is less efficient than drip for perennial fruit trees.

Final Answer: Drip Irrigation is the most efficient method.

Answer: (C)

Q14.

Solution

Concept:

Herbicides are classified based on their selectivity and time of application. A non-selective herbicide kills or damages all green plant tissue it comes into contact with, regardless of the species. Post-emergence means the chemical is applied after the weeds have already sprouted from the soil.

Solution:

1. Glyphosate is a world-renowned non-selective, systemic, post-emergence herbicide. 2. It works by inhibiting a specific enzyme (EPSPS) involved in the synthesis of essential amino acids in plants. 3. Because it is non-selective, it is widely used for "total weed control" in industrial sites, railway tracks, and non-cropped lands. 4. Atrazine and Butachlor are selective herbicides used in specific crops (like maize and rice, respectively). 5. Pendimethalin is a selective pre-emergence herbicide, meaning it must be applied before the weeds emerge.

Final Answer: The correct herbicide is Glyphosate.

Answer: (C)

Q15.

Solution

Concept:

India possesses a rich diversity of indigenous cattle breeds (Zebu/Bos indicus), each adapted to specific agro-climatic zones. These breeds are characterized by a hump, a well-developed dewlap (loose skin under the neck), and high resistance to tropical heat and diseases.

Solution:

1. Sahiwal is considered one of the best dairy breeds of the Indian subcontinent. 2. It originated in the Montgomery district (now in Pakistan) and is known for its high milk fat content. 3. Due to its very loose and pliable skin, it was traditionally nicknamed "Lola" (meaning "loose" or "hanging"). 4. Sahiwal cattle are reddish-brown in color and exhibit extreme heat tolerance, making them popular for crossbreeding programs globally. 5. While Gir is famous for its "convex forehead" and Tharparkar for being a dual-purpose "white" breed, the specific moniker "Lola" belongs to Sahiwal.

Final Answer: The breed is Sahiwal.

Answer: (A)

Q16.

Solution

Concept:

Nitrogen in the soil exists in both organic (humus, plant residues) and inorganic (nitrates, ammonium) forms. The nitrogen cycle involves several microbial transformations that make nitrogen available to plants.

Solution:

1. Ammonification is the process where microscopic organisms, such as bacteria and fungi, break down complex organic nitrogenous compounds (like proteins and amino acids from dead matter) into simpler inorganic ammonia (NH_3) or ammonium ions (NH_4^+). 2. This is a crucial step because plants cannot directly absorb large organic molecules. 3. Nitrification is the subsequent step where ammonia is converted into nitrites and then nitrates. 4. Denitrification is the conversion of nitrates back into gaseous nitrogen (N_2). 5. Nitrogen Fixation is the conversion of atmospheric N_2 into ammonia.

Final Answer: The process is called Ammonification.

Answer: (C)

Q17.

Solution

Concept:

Asexual propagation is essential in fruit crops like Mango to maintain the genetic purity of the variety and ensure early fruiting. While several methods exist, one specific grafting technique has become the standard for commercial nurseries in India.

Solution:

1. Veneer Grafting is the most common commercial method of mango propagation in India due to its high success rate and ease of operation. 2. It involves preparing a "veneer" or slice on the rootstock and fitting a matching scion stick into it. 3. Although Epicotyl (Stone) grafting is gaining popularity for its speed, and Inarching was the traditional method, Veneer grafting remains the mainstay for producing quality saplings. 4. Air layering is more common in Guava and Litchi, while T-budding is the standard for Citrus and Roses.

Final Answer: The commercial method is Veneer Grafting.

Answer: (C)

Q18.

Solution

Concept:

Ruminants (like cattle and buffalo) have a unique symbiotic relationship with microorganisms in their rumen. these microbes can synthesize almost all B-complex vitamins and one specific fat-soluble vitamin.

Solution:

1. Vitamin K is essential for the synthesis of prothrombin, a protein required for blood clotting (coagulation). 2. In ruminants, the microbial flora in the rumen can synthesize Vitamin K in sufficient quantities to meet the animal's requirements under normal conditions. 3. Vitamins A, D, and E are generally not synthesized in the rumen and must be provided through the diet (e.g., green fodder for Vit A, sunlight/forage for Vit D). 4. Deficiency of Vitamin K leads to prolonged clotting time and internal hemorrhages.

Final Answer: The vitamin is Vitamin K.

Answer: (D)

Q19.

Solution

Concept:

Apical dominance is a phenomenon where the main central stem grows more strongly than the side stems. By removing the growing tip (apical bud), the influence of the hormone auxin is reduced, allowing lateral buds to grow.

Solution:

1. In Chickpea (Gram) cultivation, "Nipping" is a vital intercultural operation. 2. It involves plucking the top young shoots when the plants are about 20˜25 cm high (usually 30˜40 days after sowing). 3. This process stops vertical growth and stimulates the development of more lateral branches (prolific branching). 4. More branches lead to more flowers and eventually a higher number of pods, significantly increasing the grain yield. 5. "Topping" is a similar term used in Cotton or Tobacco, but for Chickpea, "Nipping" is the standard technical term.

Final Answer: The process is called Nipping.

Answer: (B)

Q20.

Solution

Concept:

Irrigation efficiencies are calculated at different levels of the water delivery chain. The "Application Efficiency" focuses specifically on how much of the water delivered to the farm actually reaches and stays in the crop's root zone.

Solution:

1. Water Application Efficiency (η_a) is the ratio of water stored in the root zone during irrigation to the water delivered to the farm. 2. It accounts for losses that occur after the water has entered the field, primarily surface runoff (water that flows off the end of the field) and deep percolation (water that seeps below the root zone). 3. Conveyance efficiency accounts for losses in canals and pipes (seepage/evaporation). 4. Storage efficiency measures how well the root zone was filled compared to its capacity. 5. Distribution efficiency measures how uniformly water was spread across the field.

Final Answer: It is Water Application Efficiency.

Answer: (B)

Q21.

Solution

Concept:

The nutritional composition of milk varies significantly between different species of livestock. This variation is influenced by the physiological needs of the offspring and the evolutionary adaptation of the animal.

Solution:

1. Among common farm animals (Cow, Buffalo, Sheep, and Goat), Sheep milk is the most concentrated in terms of total solids. 2. Sheep milk contains approximately 5.5% – 6.0% protein, which is significantly higher than the average protein content of Buffalo milk (approx. 4.0% – 4.5%) and Cow milk (approx. 3.2% – 3.5%). 3. Goat milk protein content is generally similar to Cow milk, ranging around 3.0% – 3.5%. 4. Due to this high protein and fat content, Sheep milk is exceptionally well-suited for high-yield cheese production.

Final Answer: The protein content is generally highest in Sheep.

Answer: (C)

Q22.

Solution

Concept:

Soil structure refers to the arrangement of primary soil particles (sand, silt, clay) into aggregates or peds. The shape and size of these peds determine the pore space, which in turn controls the movement of air and water—essential factors for root development.

Solution:

1. Crumb and Granular structures consist of spherical or polyhedral aggregates that are relatively non-porous (granular) or very porous (crumb). 2. These structures are ideal for cereal crops because they provide a high proportion of "macropores" for aeration and "micropores" for water retention. 3. Platy structures restrict downward water movement and root penetration. 4. Prismatic and Massive structures are often too dense, leading to poor drainage and inadequate aeration for sensitive cereal root systems.

Final Answer: The most desirable structure is Crumb/Granular.

Answer: (C)

Q23.

Solution

Concept:

Plants are categorized into C_3, C_4, and CAM based on their carbon fixation pathways. C_4 plants have evolved a specialized leaf anatomy (Kranz anatomy) to minimize photorespiration and increase efficiency in high-temperature environments.

Solution:

1. In C_4 plants like Sugarcane, Maize, and Sorghum, the initial fixation of CO_2 occurs in the mesophyll cells. 2. The CO_2 is accepted by Phosphoenol pyruvate (PEP) with the help of the enzyme PEP carboxylase. 3. This reaction produces a 4-carbon organic acid called Oxaloacetic acid (OAA). 4. Because the first stable product has 4 carbons, these plants are called C_4 plants. 5. In contrast, C_3 plants produce 3-Phosphoglyceric acid (3-PGA) as their first stable product.

Final Answer: The first stable product is Oxaloacetic acid.

Answer: (B)

Q24.

Solution

Concept:

The deep litter system is a popular poultry housing method where birds are kept on a floor covered with organic bedding material (litter). Proper management of litter thickness is crucial for moisture control, bird comfort, and hygiene, especially during seasonal temperature shifts.

Solution:

1. In the deep litter system, the litter acts as an insulator and a medium for the decomposition of bird droppings. 2. During summer, thin litter is preferred to prevent the buildup of excessive heat. If the litter is too thick, the heat generated by microbial decomposition can increase the floor temperature, leading to heat stress in the birds. 3. The ideal thickness in summer is 2˜3 inches. 4. In winter, the thickness is increased to 6 inches or more to provide warmth to the birds through insulation and fermentation heat.

Final Answer: The ideal thickness in summer is 2˜3 inches.

Answer: (A)

Q25.

Solution

Concept: Jelly formation depends on the correct balance of Pectin, Sugar, and Acid (known as the Pectin-Sugar-Acid ratio). "Syneresis," commonly referred to as "weeping of jelly," is a defect where the gel structure fails to hold all the liquid, causing water/juice to ooze out of the jelly.

Solution: 1. **Cause of Syneresis:** This defect occurs primarily when there is an **excess of acid**. High acidity causes the pectin network to contract or "squeeze" itself, forcing the entrapped liquid out of the fibrillar structure. 2. **Sugar influence:** A deficiency of sugar can also contribute to this, as sugar acts as a dehydrating agent that helps the pectin filaments to come together; without enough sugar, the network is too weak to hold the liquid. 3. **Other options:** Over-ripe fruits (Option A) usually result in a failure to set (syrup-like consistency) rather than syneresis. Excessive sugar (Option B) typically leads to a "tough" or "rubbery" jelly. Insufficient boiling (Option D) results in a cloudy or thin jelly.

Final Answer: An excess of acid or a deficiency of sugar, causing the pectin network to contract.

Answer: (B)

Q26.

Solution

Concept:

Fertilizer calculations often involve converting the weight of the compound form (like P_2O_5) to the weight of the actual element (P). This is necessary for precise nutrient management. The standard conversion factor is based on the molecular weights of P and O.

Solution:

1. Single Super Phosphate (SSP) is stated to contain 16% P_2O_5. 2. In 100 kg of SSP, the amount of P_2O_5 is:

$$100 \times 0.16 = 16 \text{ kg}$$

3. To convert the oxide form (P_2O_5) to the elemental form (P), we use the provided conversion factor of 0.44:

$$\text{P} = \text{P}_2\text{O}_5 \times 0.44$$

4. Substitute the values:

$$\text{P} = 16 \times 0.44$$

5. Performing the multiplication:

$$16 \times 0.44 = 7.04 \text{ kg}$$

6. This means for every 100 kg of SSP applied, the soil receives 7.04 kg of actual elemental phosphorus.

Final Answer: The amount of elemental Phosphorus added is 7.04 kg.

Answer: (B)

Q27.

Solution

Concept:

The "Revolutions" in Indian agriculture refer to specialized missions aimed at achieving self-sufficiency in specific commodities. These missions involved the adoption of modern technology, high-yielding breeds, and improved management practices.

Solution:

1. The White Revolution, also known as "Operation Flood," was launched in 1970 to make India a self-sufficient milk-producing nation. 2. It was spearheaded by Dr. Verghese Kurien, who is known as the "Father of the White Revolution" in India. 3. This revolution transformed India from a milk-deficient nation into the world's largest milk producer. 4. For comparison: - Yellow Revolution: Oilseeds - Blue Revolution: Fish - Silver Revolution: Eggs/Poultry - Green Revolution: Food grains (Wheat and Rice)

Final Answer: The White Revolution is associated with Milk production.

Answer: (C)

Q28.

Solution

Concept:

Micronutrient deficiencies in rice lead to specific physiological disorders that significantly impact yield. These disorders are often identified by characteristic visual symptoms on the leaves or the overall stature of the plant.

Solution:

1. Khaira disease is a world-famous nutritional disorder in rice caused by the deficiency of Zinc (Zn). 2. It was first reported by Dr. Y.L. Nene at Pantnagar, India. 3. Symptoms usually appear 2˘3 weeks after transplanting. The leaves show rusty brown or bronzed spots/streaks, and the plant growth is severely stunted. 4. Other options explained: - Brown heart: Boron deficiency in Turnip/Beetroot. - Whip tail: Molybdenum deficiency in Cauliflower. - Dieback: Copper deficiency in Citrus.

Final Answer: Zinc deficiency causes Khaira disease.

Answer: (A)

Q29.

Solution

Concept:

Retting is a biological or chemical process used to separate the fiber from the woody core or stem of fiber crops. It involves the action of moisture and microorganisms to dissolve the pectin and gums that bind the fibers together.

Solution:

1. In Jute cultivation, retting is the most critical post-harvest operation. Stems are bundled and submerged in slow-moving water for 12˘25 days. 2. Similarly, for Sunnhemp (Crotalaria juncea), retting is employed to extract the bast fibers from the stems. 3. Microbes like *Clostridium* and *Bacillus* species play a major role in breaking down the cellular tissues during this process. 4. Cotton, however, does not require retting as the fiber (lint) is attached to the seed and is separated via "Ginning." 5. Therefore, both Jute and Sunnhemp utilize retting for fiber extraction.

Final Answer: Retting is associated with both Jute and Sunnhemp.

Answer: (D)

Q30.

Solution

Concept:

Heterosis, or hybrid vigor, refers to the phenomenon where the F_1 offspring of a cross between genetically diverse parents performs better than the average of the parents. In cross-pollinated crops, where natural variability is high, exploiting this vigor is a primary goal.

Solution:

1. Hybridization is the most effective method for exploiting heterosis. It involves crossing two inbred lines to produce a hybrid (F_1). 2. Highly cross-pollinated crops like Maize and Bajra (Pearl Millet) show significant hybrid vigor, making this method commercially very successful. 3. Pure Line Selection and Mass Selection are better suited for improving existing populations or self-pollinated crops, but they do not "exploit" heterosis in the way creating specific hybrids does. 4. Clonal selection is used for vegetatively propagated crops (like Sugarcane or Potato).

Final Answer: The most effective method for exploiting heterosis is Hybridization.

Answer: (B)

Q31.

Solution

Concept:

The seed rate of a crop depends on the variety (fine vs. coarse), the method of sowing (broadcasting vs. transplanting), and the spacing. For rice, different varieties have specific requirements to ensure the optimum plant population in the main field.

Solution:

1. For transplanting traditional fine varieties of rice in the Kharif season, the seed rate is generally lower than that of coarse varieties because fine grains are smaller and lighter. 2. The standard recommended seed rate for a nursery meant to cover one hectare of the main field is approximately 30˜40 kg. 3. Coarse varieties typically require 40˜50 kg/ha, while hybrids only require 12˜15 kg/ha due to their higher tillering capacity and single-seedling transplanting. 4. If a farmer uses 100 kg, it is considered broadcasting rate, and 10˜15 kg would be for hybrids or SRI (System of Rice Intensification) methods.

Final Answer: The recommended seed rate is 30˜40 kg.

Answer: (B)

Q32.

Solution

Concept:

Tillage is the mechanical manipulation of soil. It is divided into primary and secondary tillage. Primary tillage is the first soil-cutting operation performed after harvest to open up the compact soil and incorporate organic matter.

Solution:

1. The Mould Board (MB) Plough is a classic primary tillage implement. It is designed to cut, lift, and partially or completely invert the soil. 2. It is particularly effective for breaking deep-seated hard pans and burying weeds or crop residues deep into the soil. 3. Harrows and Cultivators are secondary tillage implements used for pulverizing the soil, breaking clods, and preparing the final seedbed. 4. A Leveller is used after tillage to ensure the field is flat for uniform irrigation.

Final Answer: The Mould Board Plough is used for primary tillage.

Answer: (C)

Q33.

Solution

Concept:

Livestock terminology is specific to the age, sex, and reproductive status of the animal. Understanding these terms is essential for proper farm records and management practices in swine (pig) husbandry.

Solution:

1. A 'Gilt' is a young female pig that has not yet produced a litter (has not farrowed). 2. Once a gilt gives birth to her first litter, she is referred to as a 'Sow'. 3. For comparison in other species: - Sheep: A young female is an Ewe Lamb. - Goat: A young female is a Doe-kid or Nanny-kid. - Poultry: A young female is a Pullet. 4. Farrowing is the specific term for the act of giving birth in pigs.

Final Answer: A Gilt refers to a young female Pig.

Answer: (C)

Q34.

Solution

Concept:

Certain nutrients play a structural role, while others are involved in metabolic energy transfer. The "Energy Currency" refers to the molecule ATP (Adenosine Triphosphate), and the element that forms its backbone is critical for all energy-requiring processes in the plant.

Solution:

1. Phosphorus is an essential component of ATP, ADP, and nucleic acids (DNA/RNA). 2. Since ATP is the universal energy currency for biological reactions (like photosynthesis and respiration), Phosphorus is aptly called the "Energy Currency" of the plant cell. 3. It helps in the transformation of solar energy into chemical energy and its subsequent transport within the plant. 4. While Nitrogen is for vegetative growth and Potassium for osmotic regulation, Phosphorus is the key to energy storage and transfer.

Final Answer: Phosphorus is known as the Energy Currency.

Answer: (B)

Q35.

Solution

Concept:

Horticultural practices involve various specialized operations to improve fruit quality and plant health. In Banana cultivation, the "bunch" requires specific care after the fruits have set to ensure maximum development of the fingers.

Solution:

1. De-navelling is the process of removing the "navel" or the male bud (the purple heart-shaped structure) after the female flowers have finished forming the fruit hands. 2. The male bud continues to grow and consume nutrients even after it has no functional purpose for fruit production. 3. Removing it (De-navelling) diverts the nutrients toward the developing fruit bunch, resulting in an increase in fruit size and weight. 4. Desuckering (removal of side suckers) and Propping (providing support) are other important banana operations, but they are distinct from de-navelling.

Final Answer: De-navelling refers to the removal of the male bud.

Answer: (A)

Q36.

Solution

Concept: Chemical preservatives like Potassium Metabisulphite (KMS) work by releasing Sulfur Dioxide (SO_2) when added to fruit products. While highly effective against spoilage, SO_2 is a strong reducing agent that can react with natural pigments, particularly anthocyanins, leading to unwanted color changes.

Solution: 1. **Mechanism of KMS:** When KMS is added to acidic fruit juices, it liberates Sulfur Dioxide. This gas inhibits the growth of bacteria, yeasts, and molds. 2. **Effect on Pigments:** Anthocyanins are the water-soluble vacuolar pigments responsible for the deep red, purple, and blue colors in fruits like Jamun, Pomegranate, and Grapes. 3. **Bleaching Action:** The SO_2 released by KMS reacts with the anthocyanin molecules, breaking the conjugated system responsible for their color. This results in the bleaching of the juice, turning a vibrant purple or red product into a pale or colorless one. 4. **Alternative:** For such colored juices, Sodium Benzoate is preferred as it does not possess the same bleaching properties.

Final Answer: The sulfur dioxide released by KMS acts as a bleaching agent and destroys the anthocyanin pigments.

Answer: (B)

Q37.

Solution

Concept:

Bio-control agents are living organisms used to suppress the population of pests or pathogens. They offer an eco-friendly alternative to chemical pesticides and are a core component of Integrated Pest Management (IPM).

Solution:

1. *Trichoderma* (specifically *T. harzianum* and *T. viride*) is a genus of free-living fungi that are common in soil and root ecosystems. 2. It acts as a bio-fungicide by through various mechanisms: mycoparasitism (attacking other fungi), competition for nutrients, and antibiosis. 3. It is highly effective against soil-borne pathogens that cause "Damping off," root rot, and wilt in various crops. 4. *Rhizobium* and *Azotobacter* are bio-fertilizers (nitrogen fixers), not bio-control agents. 5. *Aspergillus* is a common soil fungus, but it is generally not used as a specialized bio-control agent in agriculture.

Final Answer: The microbial agent used is Trichoderma.

Answer: (B)

Q38.

Solution

Concept:

The gestation period is the duration of pregnancy, from the time of successful conception to the time of parturition (giving birth). This period varies among livestock species and is a critical factor for breeding planning and herd management.

Solution:

1. The gestation period for a Buffalo (*Bubalus bubalis*) is approximately 310 days (ranging from 305 to 315 days). 2. This is significantly longer than the gestation period of a Cow, which is approximately 280˜285 days. 3. For comparison: - Goat and Sheep: Approx. 150 days (5 months). - Pig: Approx. 114 days (3 months, 3 weeks, 3 days). 4. Knowing this period helps the farmer in "drying off" the buffalo (stopping milking) 2 months before calving to ensure a healthy calf and a productive next lactation.

Final Answer: The gestation period of a Buffalo is 310 days.

Answer: (B)

Q39.

Solution

Concept:

Cation Exchange Capacity (CEC) is a measure of a soil's ability to hold onto essential nutrients and prevent them from being washed away. It is primarily a function of the soil's clay and organic matter content, which carry negative charges.

Solution:

1. Nutrient retention is the primary phenomenon associated with Cation Exchange. 2. Soil particles (clay and humus) are negatively charged and attract positively charged ions (cations) like K^+, Ca^{2+}, and Mg^{2+}. 3. These cations are held on the surface of soil particles, preventing them from being leached (washed away) by rainwater or irrigation. 4. Plants can then swap these held cations with hydrogen ions (H^+) to absorb the nutrients. 5. Therefore, a high CEC is a sign of a fertile soil with high nutrient retention capacity.

Final Answer: Cation exchange is related to Nutrient retention.

Answer: (B)

Q40.

Solution

Concept:

In landscaping and floriculture, different planting systems are used to achieve aesthetic and functional goals. An "Avenue" refers to a specific design element used in urban planning and large-scale gardening.

Solution:

1. An Avenue planting system involves the systematic planting of trees or shrubs in rows along both sides of a road, pathway, or canal. 2. The primary purpose is to provide shade to travelers, reduce road noise, and improve the visual appeal of the landscape. 3. In India, common avenue trees include Neem, Cassia fistula (Amaltas), and Jacaranda. 4. Planting in a circle is a "circular" or "bed" system, while planting in a square is a common "orchard" layout. 5. Planting on hills follows the "contour" system to prevent soil erosion.

Final Answer: The Avenue system is characterized by planting along roads or paths.

Answer: (B)

Q41.

Solution

Concept:

Preservation techniques vary based on the intensity of heat applied and the desired shelf-life. While some methods aim for total microbial destruction, others aim to make the product safe while maintaining its organoleptic (sensory) qualities.

Solution:

1. Pasteurization is a heat treatment process named after Louis Pasteur. It involves heating liquids (like fruit juices or milk) to a temperature usually below 100°C. 2. The primary goal is to destroy pathogenic (disease-causing) microorganisms and reduce the number of spoilage organisms. 3. Because the temperature is relatively low and the duration is short, the natural flavor and nutritional value of the fruit product are largely preserved. 4. Sterilization involves temperatures above 100°C and kills all forms of life, often changing the flavor. 5. Blanching is a pre-treatment (usually for vegetables) to inactivate enzymes, not a final preservation method.

Final Answer: The method is Pasteurization.

Answer: (B)

Q42.

Solution

Concept:

Indian poultry science recognizes several indigenous (Desi) breeds known for their hardiness and unique characteristics. Certain breeds have gained GI (Geographical Indication) tags due to their specific biological traits.

Solution:

1. Kadaknath is a famous indigenous breed of chicken originating from the Jhabua district of Madhya Pradesh. 2. It is uniquely characterized by "melanism"—its skin, beak, legs, comb, and even internal organs and meat are black in color. 3. The black color is due to the excessive deposition of the pigment melanin. 4. The meat is highly valued for its low cholesterol and high protein content, and it is traditionally believed to possess medicinal properties for treating various ailments. 5. White Leghorn is an exotic egg-laying breed, and Aseel is famous for its fighting spirit (cockfighting).

Final Answer: The breed is Kadaknath.

Answer: (C)

Q43.

Solution

Concept:

Precision agriculture relies on a suite of technologies to manage field variability. To apply inputs (seeds, fertilizers, water) precisely, the system must "know" exactly where the equipment is located within the field at any given second.

Solution:

1. GPS (Global Positioning System) is a satellite-based navigation system that provides location and time information. 2. In a tractor, a GPS receiver allows the operator or an automated system to navigate along specific paths with centimeter-level accuracy. 3. This is essential for "Auto-steer" systems and for creating "Yield Maps." 4. GIS (Geographic Information System) is the software used to analyze and display the spatial data, but GPS provides the actual coordinates. 5. VRT (Variable Rate Technology) is the mechanism that changes the application rate based on the location provided by the GPS.

Final Answer: The technology used for location is GPS.

Answer: (B)

Q44.

Solution

Concept:

Fertilizers are classified as acidic, basic, or neutral based on their "Residual Effect" on soil pH. Repeated use of certain fertilizers can lead to soil acidification or alkalization, requiring corrective amendments.

Solution:

1. Calcium Ammonium Nitrate (CAN) is widely known as a "Neutral" fertilizer. 2. It is a combination of Ammonium Nitrate and Calcium Carbonate (limestone). 3. The acidifying effect of the ammonium is neutralized by the presence of the calcium carbonate (lime). 4. Because it does not significantly alter the soil pH, it is safe for use in a wide variety of soils and is often called "Kisan Khad." 5. Urea and Ammonium Sulphate are physiologically acidic, while Sodium Nitrate has a basic residual effect.

Final Answer: The neutral fertilizer is Calcium Ammonium Nitrate (CAN).

Answer: (C)

Q45.

Solution

Concept:

'Earthing-up' is a cultural practice where soil is drawn up around the base of the plant. This provides physical support and creates a favorable environment for underground modified stems.

Solution:

1. In Sugarcane, earthing-up is done twice or thrice to provide better anchorage to the heavy stalks, preventing "lodging" (falling over) during high winds. 2. In Potato, earthing-up is critical because it ensures that the developing tubers are completely covered by soil. 3. If potato tubers are exposed to sunlight, they turn green due to the formation of "Solanine," which is toxic. 4. The loose soil provided by earthing-up also facilitates better tuber expansion and aeration. 5. Crops like wheat and moong bean do not require this labor-intensive practice.

Final Answer: Earthing-up is essential in Sugarcane and Potato.

Answer: (B)

Q46.

Solution

Concept:

Gregor Mendel's dihybrid cross involves the study of two pairs of contrasting traits simultaneously (e.g., seed shape and seed color). This cross demonstrates the Law of Independent Assortment, which states that the alleles of two or more different genes get sorted into gametes independently of one another.

Solution:

1. In the F_1 generation of a cross between homozygous dominant (RRYY - Round Yellow) and homozygous recessive (rryy - Wrinkled Green) parents, all offspring are heterozygous (RrYy - Round Yellow). 2. When the F_1 individuals are self-pollinated, the F_2 generation is produced. 3. According to the Punnett square for a dihybrid cross, there are 16 possible combinations. 4. The resulting phenotypes are: - Round and Yellow: 9 - Round and Green: 3 - Wrinkled and Yellow: 3 - Wrinkled and Green: 1 5. This leads to the classic Mendelian dihybrid phenotypic ratio.

Final Answer: The phenotypic ratio is 9 : 3 : 3 : 1.

Answer: (C)

Q47.

Solution

Concept:

Topography plays a major role in selecting an irrigation method. Surface irrigation methods like furrow or check-basin require nearly level land to ensure uniform water distribution. On uneven or sloping lands, these methods result in high runoff or poor water coverage.

Solution:

1. Sprinkler Irrigation mimics natural rainfall by spraying water into the air through nozzles. 2. Because the water is delivered through a pressurized pipe network, it does not rely on the soil surface to guide the water flow. 3. This makes it the most suitable and efficient system for "Undulating" (wavy/uneven) topography and sandy soils where land leveling is difficult or expensive. 4. It ensures uniform application across the entire field regardless of the elevation changes. 5. Furrow, Check Basin, and Border Strip are all surface methods that require extensive land shaping and leveling to function effectively.

Final Answer: Sprinkler Irrigation is most suitable for undulating topography.

Answer: (B)

Q48.

Solution

Concept:

Biogas is a renewable fuel produced by the breakdown of organic matter (like cow dung or plant waste) by anaerobic bacteria. This process takes place in a biogas plant or digester in the absence of oxygen.

Solution:

1. Biogas is a mixture of different gases, but its primary and most important constituent is Methane (CH_4). 2. A typical composition of biogas produced from animal dung is: - Methane: 50% – 70% - Carbon dioxide: 30% – 40% - Trace amounts of Hydrogen, Nitrogen, and Hydrogen Sulphide. 3. Methane is the flammable component that provides the energy for cooking or lighting. 4. The remaining slurry after gas production is a high-quality organic manure rich in Nitrogen and Phosphorus.

Final Answer: The major component of Biogas is Methane.

Answer: (C)

Q49.

Solution

Concept:

Plant Quarantine is a legal enforcement designed to prevent the introduction and spread of harmful pests, diseases, and weeds from one geographical area to another (especially across international borders).

Solution:

1. With the increase in global trade, there is a high risk of "Exotic" (alien) pests being introduced into a new country where they might not have natural predators. 2. Plant Quarantine involves the inspection and treatment of imported seeds, plants, and plant products at ports and airports. 3. If an infestation is found, the material is either treated, returned, or destroyed. 4. Historical examples like the introduction of Parthenium (carrot grass) or Late Blight of Potato illustrate the disaster that occurs when quarantine fails. 5. Its primary goal is the protection of the nation's agricultural biodiversity and economy from foreign biological threats.

Final Answer: The objective is to prevent the entry of exotic pests and diseases.

Answer: (B)

Q50.

Solution

Concept:

Physiological processes in plants are measured using specific instruments. Transpiration is the loss of water vapor from the aerial parts of the plant (mainly leaves), and measuring its rate helps in understanding the plant's water requirement and stomatal behavior.

Solution:

1. A Potometer is the standard instrument used to measure the rate of water uptake by a leafy shoot, which is almost equal to the amount of water lost through transpiration. 2. Common types include Ganong's Potometer and Farmer's Potometer. 3. For comparison: - Auxanometer: Measures the rate of growth in plants. - Piezometer: Measures the pressure or level of groundwater. - Lysimeter: Measures total evapotranspiration and deep percolation from a soil-plant system. 4. Therefore, for specifically measuring transpiration rate at the shoot level, a potometer is used.

Final Answer: The instrument used is a Potometer.

Answer: (B)

Answer Key

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