CUET-UG Agriculture Sample Paper-5

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

Instructions

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

Q1. The 'A-horizon' of a soil profile is often referred to as the zone of leaching. In pedogenic terms, the process of downward movement of silicate clays, iron, and aluminum oxides from this horizon to the 'B-horizon' is specifically called:

(A) Illuviation

(B) Eluviation

(C) Humification

(D) Podzolization

Q2. In a plant cell, if the Water Potential (Ψ_w) is -8 bars and the Osmotic Potential (Ψ_s) is -12 bars, what is the calculated turgor pressure (Pressure Potential, Ψ_p) of the cell?

(A) -20 bars

(B) -4 bars

(C) $+4$ bars

(D) $+20$ bars

Q3. Which of the following describes the 'Crassulacean Acid Metabolism' (CAM) pathway, an adaptation found in certain succulent plants to conserve water in arid environments?

(A) CO_2 fixation occurs during the day using RuBisCO only.

(B) Stomata remain open during the day and close at night.

(C) Initial CO_2 fixation occurs at night forming Malic acid, which is decarboxylated during the day.

(D) CO_2 is fixed directly into 3-phosphoglyceric acid in the bundle sheath cells.

Q4. In genetics, the 'Law of Independent Assortment' can be violated if two genes are located very close to each other on the same chromosome. This phenomenon is known as:

(A) Epistasis

(B) Linkage

(C) Crossing over

(D) Incomplete dominance

Q5. A farmer wants to apply 150 kg of P_2O_5 to a field using Diammonium Phosphate (DAP, 18:46:0). Approximately how much DAP is required for this application?

(A) 150 kg

(B) 326 kg

(C) 278 kg

(D) 833 kg

Q6. The physiological disorder in cauliflower characterized by the 'browning' of the curd and hollow stems is primarily caused by the deficiency of which micronutrient?

(A) Molybdenum

(B) Boron

(C) Zinc

(D) Copper

Q7. In the context of livestock management, 'Steaming up' refers to the practice of:

(A) Feeding extra concentrate to pregnant animals 3-4 weeks before calving.

(B) Providing warm water to calves during winter months.

(C) Cleaning the udder with steam to prevent mastitis.

(D) Increasing the fiber content in the ration of high-yielding cows.

Q8. Which of the following is a classic symptom of 'Haemorrhagic Septicaemia' in cattle and buffaloes?

(A) Sudden death with blood oozing from natural orifices.

(B) Swelling in the throat region and difficulty in breathing (snoring).

(C) Vesicles on the tongue and interdigital space.

(D) Persistent bloody diarrhea and dehydration.

Q9. The 'Double Cross' technique for the commercial production of hybrid seeds in Maize was first suggested by:

(A) G.H. Shull

(B) D.F. Jones

(C) E.M. East

(D) Sewall Wright

Q10. In agrometeorology, the 'Lapse Rate' refers to the rate at which:

(A) Atmospheric pressure decreases with height.

(B) Solar radiation decreases as it passes through the atmosphere.

(C) Air temperature decreases with an increase in altitude.

(D) Relative humidity increases with decreasing temperature.

Q11. Which of the following methods of irrigation is most suitable for saline soils as it helps in leaching salts away from the root zone?

(A) Drip Irrigation

(B) Sprinkler Irrigation

(C) Flood Irrigation

(D) Check Basin Irrigation

Q12. The viral disease of poultry that primarily affects the central nervous system, leading to paralysis of legs and wings, and is also known as 'Range Paralysis' is:

(A) Ranikhet Disease

(B) Marek's Disease

(C) Fowl Pox

(D) Gumboro Disease

Q13. If the moisture content of a soil is between Field Capacity and Permanent Wilting Point, the water available to plants is known as:

(A) Gravitational water

(B) Hygroscopic water

(C) Capillary water (Available water)

(D) Combined water

Q14. Which plant breeding method is most commonly used to transfer a specific qualitative trait (like disease resistance) from a donor parent to a high-yielding recurrent parent?

(A) Pedigree Method

(B) Bulk Method

(C) Backcross Method

(D) Mass Selection

Q15. In dairy technology, the 'HTST' (High Temperature Short Time) pasteurization of milk involves heating milk to:

(A) $63^{\circ}C$ for 30 minutes

(B) $72^{\circ}C$ for 15 seconds

(C) $100^{\circ}C$ for 1 second

(D) $145^{\circ}C$ for 2 seconds

Q16. Which of the following is a 'Climacteric' fruit that shows a sharp rise in respiration and ethylene production during the ripening process?

(A) Citrus

(B) Grapes

(C) Banana

(D) Pomegranate

Q17. The process of 'Retting' in Jute production, which involves the biochemical loosening of fibers from the woody stalk, is primarily carried out by the action of:

(A) Aerobic bacteria

(B) Anaerobic bacteria

(C) Fungi

(D) Yeasts

Q18. In the context of 'Organic Farming', which of the following is strictly prohibited for use as a source of nutrients?

(A) Vermicompost

(B) Rock Phosphate

(C) Urea

(D) Neem Cake

Q19. The 'Critical Period' of weed competition in most upland crops like Rice and Maize generally occurs during:

(A) First 10 days after sowing

(B) 20 to 45 days after sowing

(C) At the time of flowering

(D) During the grain filling stage

Q20. A genetic condition where a single gene influences multiple, seemingly unrelated phenotypic traits is known as:

(A) Polyploidy

(B) Pleiotropy

(C) Polycistronic

(D) Polygenic inheritance

Q21. The 'Isolating Distance' maintained during the production of certified seeds of a cross-pollinated crop like Bajra (Pearl Millet) is kept high primarily to prevent:

(A) Mechanical mixture

(B) Genetic contamination via cross-pollination

(C) Spread of seed-borne diseases

(D) Growth of noxious weeds

Q22. Which of the following irrigation methods is characterized by the highest water-use efficiency (up to 90-95%)?

(A) Furrow Irrigation

(B) Sprinkler Irrigation

(C) Drip Irrigation

(D) Border Strip Irrigation

Q23. The protein content in 'Colostrum' (the first milk after calving) is significantly higher than normal milk primarily due to the high concentration of:

(A) Casein

(B) Albumin

(C) Immunoglobulins

(D) Lactose

Q24. In a survey of a farm, the scale used is 1 : 2000. If a boundary measures 5 cm on the map, what is the actual length on the ground?

(A) 10 m

(B) 100 m

(C) 1000 m

(D) 200 m

Q25. Which of the following bio-fertilizers is specifically used for Nitrogen fixation in Lowland (Wetland) Rice cultivation?

(A) Rhizobium

(B) Azotobacter

(C) Azolla

(D) VAM Fungi

Q26. The 'Green Revolution' in India was primarily characterized by the introduction of 'Norin-10' genes. These genes were responsible for which trait in Wheat?

(A) Disease resistance

(B) High protein content

(C) Dwarfing (Short stature)

(D) Drought tolerance

Q27. In 'Precision Farming', the technology used to determine the exact geographical location of a tractor or equipment in the field is:

(A) GIS (Geographic Information System)

(B) GPS (Global Positioning System)

(C) VRT (Variable Rate Technology)

(D) Remote Sensing

Q28. Which of the following is an example of a 'Systemic Herbicide' that is absorbed by the roots or foliage and translocated throughout the plant system?

(A) Paraquat

(B) Glyphosate

(C) Diquat

(D) Propanil

Q29. The 'Curd' in cauliflower is the edible part. Botanically, what is the 'Curd'?

(A) An undeveloped flower bud

(B) A pre-floral fleshy apical meristem

(C) An elongated main stem

(D) A modified root system

Q30. In the 'Laban' method of milk testing, the percentage of which constituent is determined using a Gerber Butyrometer?

(A) Protein

(B) Lactose

(C) Fat

(D) Ash

Q31. The 'Dry Period' in a dairy cow's lactation cycle is the time between:

(A) Calving and first heat

(B) Calving and conception

(C) Cessation of milk production and the next calving

(D) Two consecutive heat periods

Q32. Which plant nutrient is considered 'Mobile' in the plant but 'Immobile' in the soil, leading to deficiency symptoms appearing first on older leaves?

(A) Calcium

(B) Phosphorus

(C) Boron

(D) Iron

Q33. The 'Central Agmark Laboratory' for testing and grading agricultural produce in India is located at:

(A) New Delhi

(B) Nagpur

(C) Mumbai

(D) Bengaluru

Q34. A 'C3' plant differs from a 'C4' plant in that the C3 plant:

(A) Has Kranz anatomy

(B) Possesses high photorespiration

(C) Shows higher water use efficiency

(D) Uses PEP Carboxylase as the primary CO_2 fixer

Q35. The breeding method used to produce a 'Synthetic Variety' involves the crossing of:

(A) Two pure lines

(B) Several inbred lines that have been tested for General Combining Ability (GCA)

(C) A hybrid with its recessive parent

(D) Unrelated wild species

Q36. Which of the following is a primary symptom of 'Zinc' deficiency in Rice, commonly known as 'Khaira' disease?

(A) Yellowing of the leaf tip

(B) Rusty brown spots on the older leaves

(C) Dead hearts and white heads

(D) Downward curling of leaves

Q37. The atmospheric layer where all weather phenomena (clouds, rain, storms) occur is the:

(A) Stratosphere

(B) Troposphere

(C) Mesosphere

(D) Thermosphere

Q38. In a 'Balanced Ration' for livestock, the ratio of concentrates to roughages for a high-yielding dairy cow is generally maintained at:

(A) 10 : 90

(B) 40 : 60

(C) 90 : 10

(D) 100 : 0

Q39. The chemical used for 'Degreening' of citrus fruits and bananas to improve their market appearance is:

(A) Gibberellic Acid

(B) Ethylene (or Ethephon)

(C) Abscisic Acid

(D) Cytokinin

Q40. Which of the following is a 'Short Day Plant' (SDP)?

(A) Wheat

(B) Rice

(C) Barley

(D) Oat

Q41. The 'Base Temperature' (T_{base}) for Rice, below which its physiological activities and growth significantly cease, is generally considered to be:

(A) $5^{\circ}C$

(B) $10^{\circ}C$

(C) $15°C$

(D) $20°C$

Q42. Which of the following describes the 'Law of Minimum' proposed by Justus von Liebig?

(A) Plant growth is controlled by the total amount of resources available.

(B) Plant growth is limited by the nutrient that is most deficient relative to the plant's needs.

(C) The increase in crop yield is proportional to the amount of limiting nutrient added.

(D) All nutrients contribute equally to the final yield of the crop.

Q43. The 'Pinching' operation in Marigold cultivation is performed primarily to:

(A) Induce early flowering

(B) Remove diseased leaves

(C) Encourage lateral branching and increase the number of flowers

(D) Reduce the water requirement of the plant

Q44. In DNA replication, the small fragments of DNA produced on the lagging strand are known as:

(A) Cistrons

(B) Introns

(C) Okazaki fragments

(D) Replicons

Q45. Which of the following is a 'Bio-control agent' used specifically to manage the larvae of lepidopteran pests like the Cotton Bollworm?

(A) *Trichoderma harzianum*

(B) *Bacillus thuringiensis* (Bt)

(C) *Rhizobium japonicum*

(D) *Azospirillum*

Q46. The process of 'Homogenization' of milk is carried out to:

(A) Kill all pathogenic bacteria

(B) Increase the vitamin content

(C) Prevent the formation of a cream layer by breaking down fat globules

(D) Separate the whey from the curd

Q47. Which soil structure is generally considered the most desirable for the cultivation of most field crops due to its balanced air-water relationship?

(A) Platy

(B) Prismatic

(C) Crumb or Granular

(D) Massive

Q48. A 'Pure Line' variety is the progeny of a single:

(A) Heterozygous cross-pollinated plant

(B) Homozygous self-pollinated plant

(C) Mutant plant

(D) F1 hybrid

Q49. The 'Yellow Vein Mosaic' (YVM) is a devastating viral disease of which vegetable crop?

(A) Tomato

(B) Brinjal

(C) Okra (Bhindi)

(D) Potato

Q50. In the 'NPK' complex fertilizers, if a bag is labeled 10-26-26, the number 10 represents the percentage of:

(A) Total Nitrogen

(B) Total Phosphorus (P_2O_5)

(C) Total Potassium (K_2O)

(D) Sulfur

Detailed Solutions

Q1.

Solution

Concept: Soil profile development involves the movement of materials between horizons. This movement is categorized into two main processes: the exit of materials from an upper horizon and their accumulation in a lower horizon.

Solution: 1. **Eluviation** is the process of removal of constituents (like clay, Fe, Al) from a soil horizon in suspension or solution. It usually occurs in the A-horizon. 2. **Illuviation** is the process of deposition of these materials in a lower horizon, typically the B-horizon. 3. Therefore, the "zone of leaching" from which materials move downward is the eluvial horizon.

Final Answer: The process is Eluviation.

Answer: (B)

Q2.

Solution

Concept: The Water Potential (Ψ_w) of a plant cell is determined by the sum of its Osmotic (Solute) Potential (Ψ_s) and its Pressure (Turgor) Potential (Ψ_p). The formula is:

$$\Psi_w = \Psi_s + \Psi_p$$

Solution: 1. We are given: $\Psi_w = -8$ bars and $\Psi_s = -12$ bars. 2. Rearranging the formula to find Ψ_p:

$$\Psi_p = \Psi_w - \Psi_s$$

3. Substitute the values:

$$\Psi_p = (-8) - (-12)$$

$$\Psi_p = -8 + 12 = +4 \text{ bars}$$

4. Turgor pressure is represented by a positive pressure potential in a turgid cell.

Final Answer: The turgor pressure is +4 bars.

Answer: (C)

Q3.

Solution

Concept: Crassulacean Acid Metabolism (CAM) is a photosynthetic adaptation in xeric plants (like cacti) to minimize evapotranspiration by staggering CO_2 uptake and the Calvin cycle.
Solution: 1. In CAM plants, stomata open at night to take in CO_2 when the temperature is lower and humidity higher. 2. This CO_2 is fixed by PEP carboxylase into organic acids (primarily Malic acid) and stored in vacuoles. 3. During the day, stomata close to save water. The stored Malic acid is decarboxylated to release CO_2 internally, which then enters the Calvin cycle using RuBisCO.
Final Answer: Initial CO_2 fixation occurs at night forming Malic acid.

Answer: (C)

Q4.

Solution

Concept: Mendel's Law of Independent Assortment states that the alleles of two or more different genes get sorted into gametes independently of one another. However, this only holds true if the genes are on different chromosomes or very far apart on the same chromosome.
Solution: 1. When two genes are physically situated close to each other on the same chromosome, they tend to be inherited together as a unit during meiosis. 2. This physical association of genes is called **Linkage**. 3. Because linked genes do not segregate independently, they violate the $9:3:3:1$ dihybrid ratio expected by Mendel. 4. The strength of linkage depends on the physical distance between the genes; the closer they are, the less likely they are to be separated by crossing over.
Final Answer: Linkage

Answer: (B)

Q5.

Solution

Concept: To calculate the amount of a specific fertilizer needed, use the formula:

$$\text{Fertilizer required (kg)} = \frac{\text{Recommended nutrient (kg)}}{\text{Percent of nutrient in fertilizer}} \times 100$$

Solution: 1. The recommended dose of P_2O_5 is 150 kg. 2. Diammonium Phosphate (DAP) contains $46\% P_2O_5$ (as indicated by the grade $18 : 46 : 0$). 3. Calculation:

$$\text{DAP required} = \frac{150}{46} \times 100$$

$$\text{DAP required} \approx 3.2608 \times 100 \approx 326.08 \text{ kg}$$

4. Therefore, approximately 326 kg of DAP is needed. Note that this application will also incidentally provide some Nitrogen (18% of 326 kg).

Final Answer: 326 kg

Answer: (B)

Q6.

Solution

Concept: Micronutrient deficiencies in high-demand vegetable crops like cauliflower often manifest as localized tissue death or structural abnormalities in the edible parts.

Solution: 1. **Browning** (also known as Brown Rot or Red Rot) in cauliflower starts as small water-soaked areas on the curd that eventually turn rusty brown. 2. This is often accompanied by the pith of the stem becoming **hollow** and darkened. 3. These symptoms are characteristic of **Boron** deficiency. 4. Boron is essential for cell wall formation and the translocation of sugars; its lack leads to the breakdown of internal tissues. 5. In contrast, Molybdenum deficiency causes "Whiptail," and Nitrogen deficiency causes "Buttoning."

Final Answer: Boron

Answer: (B)

Q7.

Solution

Concept: Nutritional management during the transition period of livestock is crucial for the health of both the dam and the calf.

Solution: 1. "Steaming up" is the practice of providing an enriched diet (extra concentrates) to pregnant cows or buffaloes during the last weeks of pregnancy. 2. The purpose is to build up body reserves for the upcoming lactation, ensure healthy fetal growth, and prevent metabolic diseases like milk fever or ketosis post-calving. 3. It helps the animal reach its peak milk production faster after delivery.

Final Answer: Feeding extra concentrate to pregnant animals before calving.

Answer: (A)

Q8.

Solution

Concept: Haemorrhagic Septicaemia (HS) is a severe, acute bacterial disease caused by *Pasteurella multocida*. It primarily affects cattle and buffaloes, especially during the monsoon season. It is characterized by high morbidity and rapid mortality.

Solution: 1. The most distinct clinical sign of HS is the acute **swelling of the throat** (submandibular edema) and the brisket region. 2. This swelling causes extreme pressure on the trachea, leading to severe respiratory distress and a characteristic **snoring sound** or "grunting" as the animal struggles to breathe. 3. Option (A) describes Anthrax, while Option (C) describes Foot and Mouth Disease (FMD). 4. Because the disease progresses so rapidly, animals often die within 24 hours of the onset of symptoms.

Final Answer: Swelling in the throat region and difficulty in breathing (snoring).

Answer: (B)

Q9.

Solution

Concept: Hybrid maize production initially utilized "Single Crosses" (A x B), but these were expensive because the seed was produced on low-yielding inbred lines. The "Double Cross" technique was developed to make hybrid seed more affordable for farmers.

Solution: 1. A Double Cross involves crossing two different single-cross hybrids: $(A \times B) \times (C \times D)$. 2. This technique was suggested by **D.F. Jones** in 1918. 3. The primary advantage is that the hybrid seed is harvested from a vigorous single-cross mother plant rather than a weak inbred line, resulting in higher seed yields and lower costs. 4. While G.H. Shull and E.M. East were pioneers in the study of heterosis and single crosses, Jones provided the practical solution for commercial scalability.

Final Answer: D.F. Jones

Answer: (B)

Q10.

Solution

Concept: In the Earth's atmosphere, particularly the troposphere, there is a predictable relationship between altitude and temperature. This vertical temperature gradient is essential for understanding cloud formation and weather patterns.

Solution: 1. The **Lapse Rate** is defined as the rate at which **air temperature decreases with an increase in altitude**. 2. The standard or "Environmental Lapse Rate" is approximately **$6.5^\circ C$ per kilometer** (or $3.6^\circ F$ per $1,000$ feet). 3. This happens because the atmosphere is heated from below by the Earth's surface, and air pressure decreases at higher altitudes, causing rising air to expand and cool. 4. If the temperature were to increase with height, it would be called a "Temperature Inversion."

Final Answer: Air temperature decreases with an increase in altitude.

Answer: (C)

Q11.

Solution

Concept: Saline soils contain high concentrations of soluble salts which inhibit plant growth. The management of these soils requires moving the salts below the root zone through a process called leaching.

Solution: 1. **Flood Irrigation** involves applying a large volume of water over the entire soil surface. 2. In saline soils, this excess water dissolves the accumulated surface salts and carries them deep into the soil profile (leaching). 3. While **Drip Irrigation** is efficient for water saving, it can actually lead to salt accumulation at the edges of the wetted bulb. 4. **Sprinkler Irrigation** can cause foliar injury if the irrigation water itself contains some salts. 5. Therefore, heavy flooding is the traditional and effective method for reclaiming saline patches.

Final Answer: Flood irrigation is most suitable for leaching salts.

Answer: (C)

Q12.

Solution

Concept: Poultry diseases are often classified by their primary symptoms. Certain viral infections target the peripheral nerves, leading to characteristic physical postures and paralysis in young birds.

Solution: 1. **Marek's Disease** is caused by a herpesvirus. It is highly contagious and characterized by the infiltration of lymphocytes into the nerves and various organs. 2. The most common symptom is the paralysis of the legs and wings, often resulting in a bird with one leg stretched forward and the other backward. 3. Because this paralysis was historically observed in birds kept in open ranges, it is commonly referred to as **"Range Paralysis."** 4. Ranikhet disease (Newcastle Disease) primarily causes respiratory and nervous symptoms like twisting of the neck, while Gumboro (IBD) targets the immune system (Bursa of Fabricius).

Final Answer: Marek's Disease

Answer: (B)

Q13.

Solution

Concept: Soil water is classified based on the physical force with which it is held by soil particles. Only a specific fraction of this water can be extracted by plant roots.

Solution: 1. **Field Capacity (FC)** is the maximum water held after drainage of gravitational water. 2. **Permanent Wilting Point (PWP)** is the lower limit of soil moisture where plants can no longer extract water. 3. Water held between FC and PWP is held by surface tension in the small soil pores (micro-pores) and is called **Capillary water**. 4. This is the only form of soil water that is readily **available** for plant uptake. Gravitational water drains away too quickly, and hygroscopic water is held too tightly for plants to use.

Final Answer: Capillary water (Available water)

Answer: (C)

Q14.

Solution

Concept: When a plant breeder has a high-quality variety that lacks only one specific trait (like resistance to a particular disease), they use a method designed to "fix" that specific flaw while keeping the rest of the genetic background intact.

Solution: 1. The **Backcross Method** involves crossing a high-yielding variety (Recurrent Parent) with a donor parent that has the desired trait. 2. The resulting offspring are repeatedly crossed back to the Recurrent Parent over several generations. 3. In each generation, the breeder selects only the plants that possess the donor trait (e.g., disease resistance). 4. Eventually, the new variety is 99% identical to the original high-yielding parent but now contains the specific trait from the donor.

Final Answer: Backcross Method

Answer: (C)

Q15.

Solution

Concept: Pasteurization is the process of heating milk to a specific temperature for a set time to kill pathogenic bacteria without significantly altering the flavor or nutritional value of the milk.

Solution: 1. There are two primary methods of pasteurization: * **LTLT** (Low Temperature Long Time): $63^{\circ}C$ for 30 minutes. * **HTST** (High Temperature Short Time): A continuous process using plate heat exchangers. 2. The standard for **HTST** pasteurization is heating milk to at least **$72^{\circ}C$** and holding it for at least **15 seconds**. 3. This method is preferred in modern dairy plants because it is faster and more energy-efficient than the batch (LTLT) method.

Final Answer: $72^{\circ}C\,for\,15 seconds$

Answer: (B)

Q16.

Solution

Concept: Fruits are classified into two categories based on their ripening behavior: Climacteric and Non-climacteric. Climacteric fruits are characterized by a sudden burst in respiration (called the respiratory climacteric) and a massive increase in ethylene production during the ripening process.

Solution: 1. **Banana** is a classic example of a **Climacteric** fruit. Once harvested, it undergoes a rapid physiological change that allows it to ripen off the plant, triggered by its own ethylene production. 2. Other examples include Mango, Papaya, Apple, and Tomato. 3. **Citrus, Grapes, and Pomegranate** are **Non-climacteric** fruits. They do not show a sharp rise in respiration and must generally remain on the plant to reach full sweetness, as they produce very little ethylene and do not ripen significantly after harvest.

Final Answer: Banana

Answer: (C)

Q17.

Solution

Concept: Retting is a critical post-harvest process in fiber crops like Jute and Flax. It involves submerging the stalks in water to loosen the fiber bundles from the rest of the stem (the woody core and bark).

Solution: 1. When jute bundles are submerged in slow-moving or stagnant water, the oxygen is quickly depleted, creating an environment for **Anaerobic bacteria** (such as *Clostridium* species). 2. These bacteria produce enzymes that degrade the pectins and gums (the "glue") that hold the fibers to the stem. 3. If the process is carried out by aerobic bacteria, it is usually much slower or happens through "dew retting," but the standard water-immersion retting used in India is primarily an anaerobic biochemical process.

Final Answer: Anaerobic bacteria

Answer: (B)

Q18.

Solution

Concept: Organic farming is a production system that avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives.

Solution: 1. **Urea** is a concentrated nitrogenous fertilizer ($46\%N$) produced synthetically using the Haber-Bosch process. As a synthetic chemical fertilizer, its use is **strictly prohibited** in organic farming standards. 2. Vermicompost and Neem Cake are organic manures derived from biological sources and are highly encouraged. 3. Rock Phosphate is a natural mineral (crushed rock) and is permitted in organic farming as a slow-release source of phosphorus, provided it has not been chemically treated with acids.

Final Answer: Urea

Answer: (C)

Q19.

Solution

Concept: The "Critical Period of Weed Competition" is the window during the crop's life cycle when weeds cause the maximum reduction in yield. If the crop is kept weed-free during this specific period, later weed growth will have a negligible effect on the final harvest.

Solution: 1. For most upland field crops like Rice and Maize, the critical period is neither the very beginning nor the end of the season. 2. It typically occurs between **20 to 45 days after sowing (DAS)**. 3. During this time, the crop seedlings are small and are establishing their root systems and leaf area. If weeds compete for light, water, and nutrients during this specific window, the crop will be permanently stunted, leading to significant yield loss.

Final Answer: 20 to 45 days after sowing

Answer: (B)

Q20.

Solution

Concept: In classical genetics, we often study one gene affecting one trait. However, many genes have multiple effects. When one single gene locus affects two or more distinct and seemingly unrelated phenotypic characters, it is called pleiotropy.

Solution: 1. **Pleiotropy** occurs when a single gene product is used in different biological pathways or has a signaling function that affects various body systems. 2. A classic example is **Sickle Cell Anemia** in humans; a single mutation in the hemoglobin gene causes not only misshapen red blood cells but also leads to spleen damage, heart failure, and joint pain. 3. In agriculture, a gene for seed coat color might also influence the color of the flowers or the axils of the leaves. 4. **Polygenic inheritance** (Option D) is the opposite: where many genes contribute to a single trait (like human height or grain yield).

Final Answer: Pleiotropy

Answer: (B)

Q21.

Solution

Concept: To maintain the genetic purity of a variety during seed production, the seed plot must be separated from other fields of the same crop by a certain distance. This is known as the "Isolation Distance."

Solution: 1. In **cross-pollinated crops** like Bajra, pollen is carried easily by wind or insects over long distances. 2. If a certified seed plot is too close to a local or different variety of Bajra, "foreign" pollen will fertilize the flowers, leading to **genetic contamination**. 3. This contamination results in offspring that do not breed true to the specific characteristics of the certified variety. 4. Therefore, high isolation distances (often 200–1000 meters depending on the crop and seed class) are maintained to ensure that only the desired pollen fertilizes the crop.

Final Answer: Genetic contamination via cross-pollination

Answer: (B)

Q22.

Solution

Concept: Water-use efficiency (WUE) refers to the ratio of water effectively used by the crop to the total water applied. Different irrigation systems lose varying amounts of water to evaporation, runoff, or deep percolation.

Solution: 1. **Drip Irrigation** (also called trickle irrigation) delivers water directly to the root zone of the plant through a network of valves, pipes, and emitters. 2. Because it applies water drop-by-drop and only where needed, it drastically reduces evaporation from the soil surface and eliminates surface runoff. 3. It achieves the highest efficiency, often between **904. In contrast, Sprinkler irrigation has an efficiency of about 70–80

Final Answer: Drip Irrigation

Answer: (C)

Q23.

Solution

Concept: Colostrum is the first secretion from the mammary glands after parturition. It is biologically designed to provide the newborn calf with essential nutrients and immediate protection against diseases.

Solution: 1. The total protein in colostrum (approx. 17–182. This increase is almost entirely due to **Immunoglobulins** (antibodies like IgG, IgA, and IgM). 3. Calves are born with almost no immunity; the immunoglobulins in colostrum provide **passive immunity** by being absorbed directly through the intestinal wall in the first few hours of life. 4. While Casein is the primary protein in normal milk, its relative proportion is actually lower in colostrum compared to the massive surge in antibodies.

Final Answer: Immunoglobulins

Answer: (C)

Q24.

Solution

Concept: Map scales represent the ratio between a distance on a map and the corresponding distance on the ground.

$$\text{Actual Distance} = \text{Map Distance} \times \text{Scale Factor}$$

Solution: 1. The given scale is 1 : 2000. This means 1 cm on the map represents 2000 cm on the ground. 2. Map distance = 5 cm. 3. Ground distance = $5 \times 2000 = 10,000$ cm. 4. Convert centimeters to meters:

$$10,000 \text{ cm} \div 100 = 100 \text{ meters}$$

Final Answer: The actual length is 100 m.

Answer: (B)

Q25.

Solution

Concept: Nitrogen fixation in agriculture can be symbiotic, non-symbiotic, or associative. In the unique anaerobic environment of flooded (lowland) rice fields, specific biological systems are employed to harness atmospheric nitrogen.

Solution: 1. **Azolla** is a small, free-floating aquatic fern. It maintains a symbiotic relationship with the blue-green alga (cyanobacterium) *Anabaena azollae*, which lives in its leaf cavities. 2. This alga fixes atmospheric nitrogen, which is then utilized by the Azolla plant. When Azolla is incorporated into the flooded soil, it decomposes and releases nitrogen for the rice crop. 3. **Rhizobium** is specific to legumes. **Azotobacter** is a free-living aerobic bacterium used primarily in upland (aerobic) crops. **VAM Fungi** (Vesicular Arbuscular Mycorrhizae) help in Phosphorus uptake, not Nitrogen fixation.

Final Answer: Azolla

Answer: (C)

Q26.

Solution

Concept: The Green Revolution of the 1960s relied on the development of "High-Yielding Varieties" (HYVs). A major bottleneck in traditional wheat varieties was their tall, weak stems, which would fall over (lodge) when heavy fertilizers were applied.

Solution: 1. **Norin-10** is a Japanese wheat variety that contained specific genes for **Dwarfing (short stature)**. 2. These genes were incorporated into Mexican wheat varieties by Dr. Norman Borlaug. 3. The resulting semi-dwarf plants had stiff, short stems that could support heavy grain heads and respond efficiently to irrigation and chemical fertilizers without lodging. 4. This allowed for a massive increase in yield per hectare, forming the backbone of the Green Revolution in India.

Final Answer: Dwarfing (Short stature)

Answer: (C)

Q27.

Solution

Concept: Precision Farming (or Satellite Farming) relies on several integrated technologies to manage field variability. To apply inputs like seeds or fertilizers at a variable rate, the system must first know exactly where the machinery is located within the field.

Solution: 1. **GPS (Global Positioning System)** is the specific satellite-based navigation system used to provide precise **geographical coordinates** (latitude, longitude, and altitude) in real-time. 2. In a tractor, a GPS receiver allows for "Auto-steer" capabilities and creates "yield maps." 3. **GIS** is the software used to store and analyze the spatial data. **VRT** is the hardware that actually changes the rate of application based on the location. **Remote Sensing** involves collecting data from a distance (via satellites or drones) to assess crop health.

Final Answer: GPS (Global Positioning System)

Answer: (B)

Q28.

Solution

Concept: Herbicides are classified by their mode of action. Contact herbicides kill only the tissue they touch, while systemic herbicides move through the plant.

Solution: 1. **Glyphosate** is a broad-spectrum, non-selective, systemic herbicide. It is absorbed by the green foliage and translocated through the phloem to the roots and growing points (meristems). 2. It inhibits the EPSPS enzyme, which is essential for amino acid synthesis, eventually killing the entire plant, including the roots. 3. **Paraquat** and **Diquat** are classic contact herbicides that cause rapid drying (desiccation) but do not translocate to the roots.

Final Answer: Glyphosate is an example of a systemic herbicide.

Answer: (B)

Q29.

Solution

Concept: The edible portion of cauliflower, commonly known as the "curd," is a unique botanical structure. Unlike broccoli, where the edible part consists of fully differentiated flower buds, the cauliflower curd represents an earlier stage of development.

Solution: 1. Botanically, the curd is a **pre-floral fleshy apical meristem**. 2. It is composed of a massive, repeated branching of the terminal shoot system where the meristems have not yet transitioned into individual flowers. 3. If left in the field past the harvest stage, the curd "bolts," meaning the branches elongate and eventually produce true flowers and seeds. 4. This differentiates it from "undeveloped flower buds," which are more characteristic of crops like clove or broccoli.

Final Answer: A pre-floral fleshy apical meristem

Answer: (B)

Q30.

Solution

Concept: The Gerber method is a rapid and widely used chemical test in the dairy industry to determine the lipid content in milk and milk products.

Solution: 1. The Gerber Butyrometer is a specialized glass instrument used to measure the **Fat** percentage in milk. 2. In this test, sulfuric acid (H_2SO_4) is used to dissolve the milk proteins and release the fat. 3. Amyl alcohol is added to help separate the fat from the mixture and provide a clear reading. 4. After centrifuging, the fat collects in the graduated neck of the butyrometer, allowing for a direct percentage reading.

Final Answer: Fat

Answer: (C)

Q31.

Solution

Concept: The lactation cycle of a dairy animal consists of several phases. The "Dry Period" is a crucial phase intended for the physiological recovery of the mammary tissues and the development of the growing fetus.

Solution: 1. The **Dry Period** is the interval between the **cessation of milk production (drying off)** and the **next calving**. 2. An ideal dry period is generally considered to be **60 days**. 3. This rest period allows the cow to replenish her body reserves and ensures a higher milk yield in the subsequent lactation. 4. The period between calving and conception is known as the "Service Period," and the interval between two calvings is the "Calving Interval."

Final Answer: Cessation of milk production and the next calving

Answer: (C)

Q32.

Solution

Concept: Nutrient mobility determines where deficiency symptoms first appear. If a nutrient is mobile within the plant, the plant can "rob" the nutrient from older leaves to support the growth of new, young leaves.

Solution: 1. **Phosphorus (P)** is highly **mobile in the plant** but relatively **immobile in the soil** (due to its tendency to get fixed/precipitated). 2. Because it is mobile within the plant, when a deficiency occurs, the Phosphorus moves from the older (lower) leaves to the growing points. 3. Consequently, deficiency symptoms (like purple or dark green coloration) appear first on the **older leaves**. 4. In contrast, nutrients like **Calcium** and **Boron** are immobile in the plant, so their deficiency symptoms appear first on the youngest leaves or growing tips.

Final Answer: Phosphorus

Answer: (B)

Q33.

Solution

Concept: The Directorate of Marketing and Inspection (DMI) enforces the Agricultural Produce (Grading and Marking) Act, 1937. The certification mark "AGMARK" ensures the quality and purity of agricultural products. This system is supported by a network of laboratories across India.
Solution: 1. The **Central Agmark Laboratory (CAL)** serves as the apex laboratory for the analysis and standardization of agricultural commodities. 2. It is located in **Nagpur**, Maharashtra. 3. In addition to the CAL at Nagpur, there are several Regional Agmark Laboratories (RALs) situated in major cities like Mumbai, New Delhi, and Chennai, but the primary central facility is in Nagpur.
Final Answer: Nagpur

Answer: (B)

Q34.

Solution

Concept: Plants are classified as C_3, C_4, or CAM based on their carbon fixation pathways. These pathways determine how efficiently a plant can perform photosynthesis under different environmental conditions, specifically regarding the loss of energy through photorespiration.
Solution: 1. In **C_3 plants** (like Rice and Wheat), the first stable product is a 3-carbon compound (PGA). The enzyme RuBisCO facilitates CO_2 fixation but also reacts with Oxygen when CO_2 levels are low, leading to a wasteful process called **photorespiration**. 2. **C_4 plants** (like Maize and Sugarcane) have evolved **Kranz anatomy** and use the enzyme **PEP Carboxylase** to concentrate CO_2 around RuBisCO, effectively suppressing photorespiration. 3. Therefore, a major difference is that C_3 plants possess **high photorespiration** and lower water-use efficiency compared to C_4 plants.
Final Answer: Possesses high photorespiration

Answer: (B)

Q35.

Solution

Concept: A synthetic variety is a population produced by crossing a set of specific components (inbreds, clones, or open-pollinated lines) that have been previously evaluated for their ability to perform well in various combinations.

Solution: 1. The key to creating a **Synthetic Variety** is evaluating the **General Combining Ability (GCA)** of the parent lines. 2. GCA refers to the average performance of a line in a series of crosses. 3. Once the best-performing lines (usually **several inbred lines**) are identified based on their GCA, they are mixed and allowed to inter-pollinate freely. 4. This method is common in crops like Maize, Alfalfa, and Bajra where commercial hybrid seed production might be too expensive or difficult.

Final Answer: Several inbred lines that have been tested for General Combining Ability (GCA)

Answer: (B)

Q36.

Solution

Concept: "Khaira" is a famous nutritional disorder in rice first identified by Dr. Y.L. Nene at Pantnagar, India. It is caused by the deficiency of Zinc (Zn), which is often unavailable in high pH or calcareous soils.

Solution: 1. Zinc is a somewhat mobile nutrient within the plant, but its deficiency symptoms typically appear on the middle or older leaves first. 2. The characteristic symptom of Khaira is the appearance of **rusty brown (bronze-colored) spots** or streaks on the leaves, starting about 2–3 weeks after transplanting. 3. These spots can eventually cover the entire leaf blade, and the affected plants appear stunted with reduced tillering. 4. "Dead hearts" (Option C) are symptoms of stem borer insect attack, not a nutrient deficiency.

Final Answer: Rusty brown spots on the older leaves

Answer: (B)

Q37.

Solution

Concept: The atmosphere is divided into several layers based on temperature gradients. Each layer has distinct physical characteristics and roles in the Earth's ecosystem.

Solution: 1. The **Troposphere** is the lowest layer of the atmosphere, extending from the Earth's surface to about 8-18 km. 2. It contains approximately 75% of the atmosphere's mass and 99% of its water vapor and aerosols. 3. Because of the presence of water vapor and vertical convection currents, **all weather phenomena** (clouds, rain, snow, lightning, and storms) are confined to this layer. 4. The Stratosphere, which lies above it, is where the ozone layer is located and is generally free of weather disturbances.

Final Answer: All weather phenomena occur in the Troposphere.

Answer: (B)

Q38.

Solution

Concept: A balanced ration is the amount of feed allowed to an animal during a 24-hour period which contains all the nutrients in such proportions and amounts as are required to properly nourish the animal. For high-yielding dairy cows, a balance between roughages (high fiber, low energy) and concentrates (low fiber, high energy) is essential for both milk production and rumen health.
Solution: 1. **Roughages** (like green fodder and silage) provide the necessary bulk and fiber to maintain rumen fermentation. 2. **Concentrates** (like oil cakes and grains) provide the dense energy and protein required for high milk yields. 3. For a high-yielding cow, a common recommendation is a **40:60** or **60:40** ratio of concentrates to roughages on a dry matter basis. 4. If the concentrate ratio is too low (10:90), the cow cannot meet its energy needs for high production. If it is too high (90:10), it can lead to metabolic disorders like acidosis and a drop in milk fat percentage. 5. In most standard management practices, the **40:60** ratio is considered a balanced starting point to sustain high yields while maintaining digestive health.
Final Answer: 40 : 60

Answer: (B)

Q39.

Solution

Concept: "Degreening" is a commercial process used to remove the green chlorophyll pigment from the skin of certain fruits, making the underlying yellow or orange pigments visible. This is often done for aesthetic reasons when the fruit is internally ripe but the peel remains green due to environmental conditions.
Solution: 1. **Ethylene** is the natural plant hormone responsible for ripening and senescence. 2. In a controlled degreening room, **Ethylene gas** (or its liquid precursor, **Ethephon**) is applied to the fruit. 3. Ethylene triggers the breakdown of chlorophyll by the enzyme chlorophyllase, allowing the carotenoids (yellow/orange pigments) to show through. 4. Gibberellic Acid and Cytokinins are actually used to *delay* senescence and keep fruits green longer, while Abscisic Acid is primarily a stress hormone.
Final Answer: Ethylene (or Ethephon)

Answer: (B)

Q40.

Solution

Concept: Photoperiodism is the physiological reaction of organisms to the length of night or a dark period. Plants are classified based on the critical day length required to trigger flowering.
Solution: 1. **Short Day Plants (SDP)** require a day length shorter than a critical period (and conversely, a long uninterrupted night) to flower. These are typically "Kharif" season crops in India. 2. **Rice** is a classic **Short Day Plant**. It generally flowers as the days become shorter in the late summer or autumn. 3. **Wheat, Barley, and Oat** are **Long Day Plants (LDP)**. They require longer day lengths to flower and are typically grown as "Rabi" crops, flowering during the spring when day length increases.
Final Answer: Rice

Answer: (B)

Q41.

Solution

Concept: Base temperature (or threshold temperature) is the minimum temperature required for a plant to continue its metabolic activities and growth. It is a critical parameter in calculating Growing Degree Days (GDD).
Solution: 1. Most tropical and sub-tropical crops like Rice and Maize have a higher base temperature compared to temperate crops like Wheat. 2. For **Rice**, the base temperature is widely accepted as **$10^{\circ}C$**. 3. Below this temperature, the enzymatic activities slow down significantly, and the plant may suffer from chilling injury or dormant growth. 4. For Wheat, the base temperature is much lower, typically around $4.5^{\circ}C$ to $5^{\circ}C$.
Final Answer: The base temperature for Rice is $10^{\circ}C$.

Answer: (B)

Q42.

Solution

Concept: Liebig's Law of the Minimum states that growth is dictated not by total resources available, but by the scarcest resource (limiting factor). This principle is fundamental in understanding how specific nutrient deficiencies impact agricultural productivity.
Solution: 1. This law is famously visualized through **"Liebig's Barrel."** The barrel is made of staves of unequal lengths, each representing a different nutrient. 2. The capacity of the barrel (the crop yield) is limited by the shortest stave (the most deficient nutrient). 3. Adding more of a nutrient that is already abundant will not increase the yield if another nutrient remains deficient. 4. Therefore, growth is limited by the specific nutrient that is most deficient relative to what the plant requires.
Final Answer: Plant growth is limited by the nutrient that is most deficient relative to the plant's needs.

Answer: (B)

Q43.

Solution

Concept: Pinching is a common horticultural practice used to manipulate plant architecture by breaking apical dominance.

Solution: 1. In many plants, the terminal (top) bud produces auxins that prevent lateral (side) buds from growing. This is called apical dominance. 2. When the terminal growing tip is **pinched off**, the source of these auxins is removed. 3. This allows the lateral buds to develop, resulting in a bushier plant with more branches. 4. In Marigold, more branches mean more terminal sites for flower development, thereby increasing the total flower count.

Final Answer: Encourage lateral branching and increase the number of flowers

Answer: (C)

Q44.

Solution

Concept: DNA replication is a semi-discontinuous process due to the antiparallel nature of the DNA double helix and the fact that DNA polymerase can only synthesize in the $5' \rightarrow 3'$ direction.

Solution: 1. The **leading strand** is synthesized continuously toward the replication fork. 2. The **lagging strand** is synthesized discontinuously in the direction away from the fork. 3. These short, discontinuous segments of DNA are called **Okazaki fragments**. 4. These fragments are later joined together by the enzyme DNA ligase to form a continuous strand.

Final Answer: Okazaki fragments

Answer: (C)

Q45.

Solution

Concept: Biological control involves using living organisms to suppress pest populations. Microbial insecticides are highly specific, targeting only certain types of pests without harming beneficial insects.

Solution: 1. ***Bacillus thuringiensis* (Bt)** is a soil bacterium that produces "Cry" protein crystals. 2. When the larvae of **lepidopteran** insects (like the Cotton Bollworm) ingest these crystals, the toxins are activated in their alkaline gut. 3. This causes the gut wall to break down, leading to the death of the pest. 4. *Trichoderma* is a bio-fungicide, while *Rhizobium* is a nitrogen-fixing bio-fertilizer.

Final Answer: Bacillus thuringiensis (Bt)

Answer: (B)

Q46.

Solution

Concept: Milk processing involves physical treatments to ensure a consistent quality and appearance for the consumer. Fat in milk naturally tends to rise to the top to form a cream layer because fat globules are lighter than the surrounding milk serum.

Solution: 1. **Homogenization** is a mechanical process where milk is forced through a small orifice at very high pressure. 2. This pressure breaks the large fat globules into much smaller, uniform particles (usually less than 2 microns in diameter). 3. According to Stokes' Law, reducing the size of the particles significantly slows down their upward movement. 4. As a result, the fat stays suspended throughout the milk, preventing the formation of a distinct cream layer and giving the milk a whiter, creamier appearance.

Final Answer: To prevent the formation of a cream layer.

Answer: (C)

Q47.

Solution

Concept: Soil structure refers to the arrangement of primary soil particles (sand, silt, clay) into secondary units called aggregates or peds. The shape of these peds determines the pore space available for air and water.

Solution: 1. **Crumb or Granular** structures consist of individual peds that are small, non-porous (granular) or porous (crumb) and more or less spherical. 2. This structure allows for a high proportion of "macro-pores" which facilitate good aeration and "micro-pores" which retain water. 3. It also provides the least resistance to root penetration and allows for easy seedling emergence. 4. Platy or Massive structures, in contrast, restrict water movement and air circulation, making them poor for crop growth.

Final Answer: Crumb or Granular structure is most desirable.

Answer: (C)

Q48.

Solution

Concept: In plant breeding, a "Pure Line" is a foundational concept established by W.L. Johannsen. It represents the highest level of genetic uniformity achievable in a variety.

Solution: 1. A **Pure Line** is defined as the progeny of a single, self-pollinated, homozygous individual. 2. Because the parent is homozygous (e.g., AA or aa) and self-pollinated, all the offspring will be genetically identical to the parent and to each other. 3. This ensures that the variety remains stable and "true-to-seed" over many generations. 4. Selection within a pure line is ineffective because there is no genetic variation to select from; any observed differences are purely environmental.

Final Answer: The progeny of a single homozygous self-pollinated plant.

Answer: (B)

Q49.

Solution

Concept: Yellow Vein Mosaic (YVM) is one of the most economically significant viral diseases in tropical vegetable production. It is primarily transmitted by the Whitefly (*Bemisia tabaci*).
Solution: 1. **Yellow Vein Mosaic Virus (YVMV)** specifically targets **Okra (Bhindi)**. 2. The symptoms include a characteristic yellowing of the veins and veinlets, while the rest of the leaf blade remains green initially. 3. In severe cases, the entire leaf turns yellow, the fruits become small, yellowish-white, and tough, making them unfit for consumption. 4. Managing the whitefly vector is the primary way to control the spread of this virus in the field.
Final Answer: It is a devastating disease of Okra (Bhindi).

Answer: (C)

Q50.

Solution

Concept: The "NPK" ratio on a fertilizer bag represents the percentage by weight of the three primary macronutrients: Nitrogen (N), Phosphorus (expressed as P_2O_5), and Potassium (expressed as K_2O).
Solution: 1. The numbers are always listed in the order N-P-K. 2. In a 10-26-26 fertilizer: - The first number (10) represents **10% Total Nitrogen**. - The second number (26) represents **26% P_2O_5**. - The third number (26) represents **26% K_2O**. 3. This type of complex fertilizer is popular because it provides a balanced start for crops, especially during the sowing/basal application stage.
Final Answer: The number 10 represents the percentage of Total Nitrogen.

Answer: (A)

Answer Key

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