CUET-UG Agriculture Sample Paper-17

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. According to Mendel's Law of Segregation, what is the ratio of phenotypes in the F_2 generation of a monohybrid cross?

(A) 1:2:1

(B) 3:1

(C) 9:3:3:1

(D) 1:1

Q2. When two genes are located very close to each other on the same chromosome and tend to be inherited together, the phenomenon is known as:

(A) Epistasis

(B) Linkage

(C) Mutation

(D) Dominance

Q3. In the DNA double helix structure, which nitrogenous base always pairs with Cytosine through three hydrogen bonds?

(A) Adenine

(B) Thymine

(C) Uracil

(D) Guanine

Q4. In plant breeding, the process of crossing two genetically different individuals to produce a progeny with superior traits is called:

(A) Inbreeding

(B) Hybridization

(C) Selection

(D) Pure line breeding

Q5. Which method of selection is most commonly used for improving self-pollinated crops by choosing the best individual plants?

(A) Mass Selection

(B) Recurrent Selection

(C) Pure Line Selection

(D) Clonal Selection

Q6. The ability of a plant cell to develop into a complete plant under suitable nutrient conditions in tissue culture is termed:

(A) Pluripotency

(B) Totipotency

(C) Regeneration

(D) Micropropagation

Q7. Which of the following serves as the 'Biological Catalyst' that lowers the activation energy of biochemical reactions in plants?

(A) Vitamins

(B) Carbohydrates

(C) Enzymes

(D) Hormones

Q8. Scurvy is a deficiency disease caused by the lack of which water-soluble vitamin in the diet?

(A) Vitamin A

(B) Vitamin D

(C) Vitamin C

(D) Vitamin K

Q9. Which organelle is known as the 'Powerhouse of the Cell' in microbial eukaryotic structures?

(A) Ribosome

(B) Mitochondria

(C) Nucleus

(D) Cell Wall

Q10. Which group of soil microorganisms is primarily responsible for the characteristic 'earthy' smell of soil after the first rain?

(A) Fungi

(B) Bacteria

(C) Actinomycetes

(D) Algae

Q11. Rhizobium bacteria found in the root nodules of leguminous plants help in the process of:

(A) Phosphorus solubilization

(B) Nitrogen fixation

(C) Carbon sequestration

(D) Potassium mobilization

Q12. Which instrument is specifically used to measure the intensity of solar radiation reaching the Earth's surface?

(A) Anemometer

(B) Pyranometer

(C) Psychrometer

(D) Hygrograph

Q13. A weather forecast that covers a period of 3 to 10 days is classified as a:

(A) Short-range forecast

(B) Medium-range forecast

(C) Long-range forecast

(D) Nowcasting

Q14. Which of the following is a dual-purpose Indian cattle breed known for both its milk production and draught capacity?

(A) Sahiwal

(B) Haryana

(C) Gir

(D) Red Sindhi

Q15. Which exotic cattle breed is recognized for having the highest average milk production per lactation?

(A) Jersey

(B) Brown Swiss

(C) Holstein Friesian

(D) Ayrshire

Q16. Which of the following is a popular Mediterranean poultry breed known for its excellent white-egg laying capacity?

(A) Rhode Island Red

(B) Leghorn

(C) Australorp

(D) Plymouth Rock

Q17. In a 'Tail-to-Tail' housing system for dairy cows, what is the minimum width recommended for the central cleaning passage?

(A) 0.5 meters

(B) 1.0 meters

(C) 1.5 meters

(D) 2.5 meters

Q18. Which of the following constitutes 'Roughage' in a livestock ration, characterized by high fiber and low TDN?

(A) Mustard cake

(B) Maize grain

(C) Berseem hay

(D) Rice polish

Q19. A 'Balanced Ration' for a dairy animal is formulated to provide all essential nutrients for a period of:

(A) 6 hours

(B) 12 hours

(C) 24 hours

(D) 48 hours

Q20. Foot and Mouth Disease (FMD) in livestock is caused by which of the following pathogens?

(A) Bacteria

(B) Virus

(C) Protozoa

(D) Fungus

Q21. Ranikhet disease, also known as Newcastle Disease, is a highly contagious and fatal illness found in:

(A) Sheep

(B) Poultry

(C) Buffalo

(D) Goats

Q22. Which protozoan disease in poultry leads to bloody diarrhea and damage to the intestinal lining (cysts in droppings)?

(A) Rinderpest

(B) Anthrax

(C) Coccidiosis

(D) Fowl Pox

Q23. What is the most commonly used cryoprotectant for preserving bovine semen in Liquid Nitrogen at $-196°C$?

(A) Formaldehyde

(B) Glycerol

(C) Chloroform

(D) Ethanol

Q24. The process of heating milk to $72°C$ for 15 seconds followed by rapid cooling to kill pathogens is called:

(A) Homogenization

(B) HTST Pasteurization

(C) LTLT Pasteurization

(D) Sterilization

Q25. Which soil textural class has the highest water-holding capacity due to its small pore spaces?

(A) Sandy soil

(B) Loamy soil

(C) Silty soil

(D) Clayey soil

Q26. If a soil has a pH value of 8.5, it is chemically classified as:

(A) Acidic

(B) Neutral

(C) Alkaline

(D) Highly Acidic

Q27. Which of the following is a 'Straight Fertilizer' that provides only Nitrogen to the plants?

(A) DAP

(B) Urea

(C) NPK 19:19:19

(D) Nitrophosphate

Q28. Which essential primary nutrient is responsible for root development and energy transfer (ATP) in plants?

(A) Nitrogen

(B) Phosphorus

(C) Potassium

(D) Zinc

Q29. Which irrigation method is considered most efficient for water conservation in arid regions by delivering water directly to the root zone?

(A) Furrow Irrigation

(B) Drip Irrigation

(C) Border Strip Irrigation

(D) Flooding

Q30. The total depth of water required by a crop during its entire growing period in the field is known as:

(A) Duty

(B) Delta

(C) Base Period

(D) Consumptive Use

Q31. The removal of excess salt-affected water from the soil surface or sub-surface to provide a better environment for plant growth is called:

(A) Infiltration

(B) Percolation

(C) Drainage

(D) Leaching

Q32. Which of the following is a cultural method of weed control used to suppress weed growth by covering the soil surface with organic or inorganic materials?

(A) Mulching

(B) Hand Hoeing

(C) Herbicide application

(D) Biological control

Q33. Integrated Pest Management (IPM) for weed control emphasizes:

(A) Exclusive use of chemical herbicides

(B) Manual weeding only

(C) A combination of cultural, mechanical, and chemical methods

(D) Increasing the seed rate of weeds

Q34. The 'System of Rice Intensification' (SRI) is a method of cultivation that primarily aims to:

(A) Increase water submergence

(B) Reduce seed rate and water requirement

(C) Use maximum chemical fertilizers

(D) Eliminate the need for transplanting

Q35. Which growth stage of the Wheat crop is considered the most critical for irrigation?

(A) Tillering stage

(B) Jointing stage

(C) Crown Root Initiation (CRI) stage

(D) Flowering stage

Q36. The practice of 'Earthing-up' is a crucial intercultural operation performed in Sugarcane primarily to:

(A) Increase sugar content

(B) Prevent lodging and facilitate irrigation

(C) Induce flowering

(D) Control leaf-spot disease

Q37. Which of the following crops is popularly known as the 'Nutri-Cereal' due to its high mineral and fiber content?

(A) Rice

(B) Sugarcane

(C) Pearl Millet (Bajra)

(D) Bread Wheat

Q38. What is the primary objective of 'Precision Farming' in modern agriculture?

(A) Maximizing the area under cultivation

(B) Using GPS and IoT to apply inputs based on spatial variability

(C) Growing only one type of crop globally

(D) Increasing the use of heavy machinery blindly

Q39. In Organic Farming, which of the following is strictly prohibited for maintaining soil fertility?

(A) Green Manure

(B) Vermicompost

(C) Synthetic Chemical Fertilizers

(D) Bio-fertilizers

(E)

Q40. Zero Budget Natural Farming (ZBNF), popularized in India, promotes the use of which fermented microbial culture?

(A) Urea solution

(B) Jeevamrut

(C) Formaldehyde

(D) Copper Sulphate

Q41. Which physiological disorder in Mango is characterized by the breakdown of fruit pulp and is a major constraint in the export of the 'Alphonso' variety?

(A) Black Tip

(B) Spongy Tissue

(C) Fruit Drop

(D) Clustering

Q42. 'Citrus Canker' is a serious disease in acid lime caused by which of the following pathogens?

(A) Xanthomonas citri

(B) Phytophthora citrophthora

(C) Colletotrichum gloeosporioides

(D) Viruses

Q43. Which plant growth regulator is commonly used in Tomato cultivation to improve fruit set during high or low-temperature conditions?

(A) Gibberellic Acid (GA3)

(B) NAA (Naphthalene Acetic Acid)

(C) Ethylene

(D) Abscisic Acid

Q44. The 'Potato Tuber' is botanically classified as a:

(A) Modified Root

(B) Modified Stem

(C) Modified Leaf

(D) Adventitious Root

Q45. Which propagation method involves joining a scion from a superior plant with the rootstock of a hardy plant to create a single plant?

(A) Layering

(B) Cutting

(C) Grafting

(D) Division

Q46. In 'Air Layering' (Gootie), which material is typically wrapped around the wounded branch to retain moisture and encourage root development?

(A) Sand

(B) Sphagnum Moss

(C) Dry Straw

(D) Polythene only

Q47. Which essential component is responsible for the 'setting' or gel formation in Jams and Jellies?

(A) Starch

(B) Pectin

(C) Cellulose

(D) Lactose

Q48. According to FPO (Fruit Products Order) specifications, what is the minimum Total Soluble Solids (TSS) percentage required for a product to be labeled as 'Jam'?

(A) 45%

(B) 55%

(C) 68%

(D) 75%

Q49. Which chemical preservative is most commonly used in the commercial production of Tomato Ketchup to prevent microbial spoilage?

(A) Potassium Metabisulphite (KMS)

(B) Sodium Benzoate

(C) Citric Acid

(D) Acetic Acid

Q50. The process of 'Propping' in Sugarcane cultivation is primarily practiced to:

(A) Increase the sucrose content in the stalks

(B) Protect the crop from lodging by tying the leaves of adjacent canes together

(C) Promote the growth of lateral buds for better yield

(D) Facilitate the process of mulching and moisture conservation

Detailed Solutions

Q1.

Solution

Concept: Mendel's Law of Segregation states that allele pairs separate during gamete formation, and each gamete receives only one allele. In a monohybrid cross, this leads to a characteristic phenotypic ratio in the F_2 generation.

Solution: In a monohybrid cross (Aa × Aa), the alleles segregate during gamete formation, producing gametes A and a in equal proportion. On selfing, the F_2 generation shows genotypic ratio 1:2:1 but the phenotypic ratio becomes 3:1, where three individuals show the dominant trait and one shows the recessive trait. This is a direct expression of Mendel's Law of Segregation. Therefore, the correct phenotypic ratio is 3:1.

Final Answer: 3:1

Answer: (B)

Q2.

Solution

Concept: Linkage refers to the tendency of genes located close together on the same chromosome to be inherited together due to reduced chances of recombination during meiosis.

Solution: When two genes are located very close to each other on the same chromosome, they do not assort independently. Instead, they are transmitted together more frequently because crossing over between them is rare. This phenomenon is called linkage. Epistasis refers to interaction between genes, mutation is a change in DNA sequence, and dominance is the expression of one allele over another. Therefore, the correct answer is linkage.

Final Answer: Linkage

Answer: (B)

Q3.

Solution

Concept: In the DNA double helix structure, nitrogenous bases pair in a specific complementary manner known as base pairing. According to Chargaff's rule, purines pair with pyrimidines to maintain uniform distance between DNA strands. Cytosine always pairs with Guanine through three hydrogen bonds, which provides greater stability to the DNA structure.

Solution: In DNA, four nitrogenous bases are present: Adenine, Thymine, Cytosine, and Guanine. Adenine pairs with Thymine via two hydrogen bonds, while Cytosine pairs with Guanine via three hydrogen bonds. Uracil is found in RNA, not DNA. The triple hydrogen bonding between Cytosine and Guanine makes this pairing stronger and more stable, contributing to the structural integrity of the DNA double helix during replication and transcription processes.

Final Answer: Guanine

Answer: (D)

Q4.

Solution

Concept: Plant breeding involves improving crop varieties by manipulating their genetic makeup. One of the most important methods is hybridization, which refers to the crossing of two genetically different individuals to obtain offspring with improved or desirable traits such as higher yield, disease resistance, or better quality.

Solution: Hybridization is widely used in crop improvement programs. It involves crossing two genetically diverse parents to combine their desirable traits into a single progeny. Unlike inbreeding, which involves closely related individuals, hybridization increases genetic variability. Selection is the process of choosing superior plants, while pure line breeding focuses on self-pollinated crops. Therefore, crossing genetically different individuals specifically refers to hybridization.

Final Answer: Hybridization

Answer: (B)

Q5.

Solution

Concept: In self-pollinated crops, genetic variation is limited, so improvement is achieved mainly through selection of superior plants. Pure line selection is a method in which the best individual plants are selected from a population and their progeny are grown separately to maintain uniformity and improved traits.

Solution: Pure line selection is the most effective method for improving self-pollinated crops. It involves selecting the best-performing individual plants and propagating their progeny separately over generations. This method maintains genetic purity and ensures uniformity in the crop. Mass selection selects a group of plants, recurrent selection is used mainly in cross-pollinated crops, and clonal selection is used in vegetatively propagated crops. Hence, pure line selection is the most appropriate method.

Final Answer: Pure Line Selection

Answer: (C)

Q6.

Solution

Concept: In plant tissue culture, the developmental potential of a plant cell is described by specific biological terms. This concept is fundamental in biotechnology and plant physiology, explaining how a single cell can regenerate into a whole plant under controlled conditions.

Solution: Totipotency is the unique ability of a plant cell to divide and differentiate into all cell types required to form a complete organism. In tissue culture, when a single plant cell is provided with proper nutrients, hormones, and environmental conditions, it can develop into a whole plant. Pluripotency refers to the ability to form many, but not all, cell types. Regeneration is the process of regrowth of tissues, while micropropagation is a technique used for rapid multiplication of plants. Hence, the correct term is totipotency.

Final Answer: Totipotency

Answer: (B)

Q7.

Solution

Concept: Biochemical reactions in living organisms require biological catalysts that accelerate reaction rates without being consumed. These catalysts are essential for metabolism and plant physiological processes.

Solution: Enzymes are biological catalysts that lower the activation energy required for biochemical reactions, thereby increasing the rate of reactions in plant and animal cells. Vitamins act as cofactors, carbohydrates provide energy, and hormones regulate physiological activities, but none of these directly act as catalysts. Enzymes are highly specific and essential for processes such as photosynthesis, respiration, and protein synthesis. Therefore, enzymes are the correct biological catalysts.

Final Answer: Enzymes

Answer: (C)

Q8.

Solution

Concept: Vitamins are essential micronutrients required in small amounts for normal growth and prevention of deficiency diseases. Each vitamin has a specific role in maintaining metabolic and structural functions in the human body.

Solution: Scurvy is a deficiency disease caused by the lack of Vitamin C, also known as ascorbic acid. Vitamin C is essential for collagen synthesis, wound healing, and maintaining healthy connective tissues. Deficiency of this vitamin leads to symptoms such as bleeding gums, weakness, and delayed wound healing. Vitamin A is related to vision, Vitamin D to bone health, and Vitamin K to blood clotting. Hence, Vitamin C deficiency causes scurvy.

Final Answer: Vitamin C

Answer: (C)

Q9.

Solution

Concept: Cellular organelles in microorganisms and eukaryotic cells perform specialized functions. One of the most important organelles is responsible for energy production through cellular respiration.

Solution: Mitochondria are known as the "powerhouse of the cell" because they generate ATP (adenosine triphosphate), which is the primary energy currency of the cell. In microbial eukaryotes, mitochondria perform oxidative phosphorylation and respiration. Ribosomes are involved in protein synthesis, the nucleus controls genetic material, and the cell wall provides structural support. Therefore, mitochondria are responsible for energy production.

Final Answer: Mitochondria

Answer: (B)

Q10.

Solution

Concept: Soil microorganisms play a vital role in decomposition, nutrient cycling, and production of characteristic soil odors. Different microbial groups contribute differently to soil ecology.

Solution: Actinomycetes are a group of filamentous bacteria that are primarily responsible for the characteristic earthy smell of soil, especially noticeable after the first rain. This smell is due to the release of geosmin produced by these organisms. Fungi contribute to decomposition, bacteria perform various soil functions, and algae are mainly involved in oxygen production in aquatic environments. Hence, actinomycetes are responsible for the earthy smell.

Final Answer: Actinomycetes

Answer: (C)

Q11.

Solution

Concept: Biological nitrogen fixation is an important process in agriculture where certain bacteria convert atmospheric nitrogen into a usable form for plants, enhancing soil fertility naturally.

Solution: Rhizobium is a symbiotic bacterium found in the root nodules of leguminous plants. It forms an association with plant roots and converts atmospheric nitrogen into ammonia through the process of nitrogen fixation. This nitrogen is then utilized by the plant for the synthesis of proteins and other important biomolecules. Other options like phosphorus solubilization, carbon sequestration, and potassium mobilization are performed by different soil microorganisms, but not Rhizobium. Therefore, Rhizobium is specifically involved in nitrogen fixation.

Final Answer: Nitrogen fixation

Answer: (B)

Q12.

Solution

Concept: Measurement of solar radiation is an important aspect of meteorology and agricultural sciences for understanding energy availability for plant growth and climate studies.

Solution: A pyranometer is an instrument used to measure the total solar radiation received on a horizontal surface, including both direct and diffuse radiation. It is widely used in meteorology, agriculture, and climate research. An anemometer measures wind speed, a psychrometer measures humidity using wet and dry bulb temperatures, and a hygrograph records humidity continuously. Hence, the correct instrument for measuring solar radiation is a pyranometer.

Final Answer: Pyranometer

Answer: (B)

Q13.

Solution

Concept: Weather forecasting is categorized based on the time duration for which predictions are made. Different types of forecasts help in planning agricultural and climatic activities.

Solution: A forecast that covers a period of 3 to 10 days is known as a medium-range forecast. Short-range forecasts typically cover up to 3 days, long-range forecasts extend beyond a month, and nowcasting refers to very short-term forecasts (minutes to a few hours). Medium-range forecasts are important for agricultural planning, irrigation scheduling, and disaster preparedness. Therefore, the correct classification is medium-range forecast.

Final Answer: Medium-range forecast

Answer: (B)

Q14.

Solution

Concept: Indian cattle breeds are classified based on their utility, such as milk production, draught power, or dual-purpose (both milk and work). These breeds are important in livestock management and agriculture.

Solution: Haryana cattle is a well-known dual-purpose breed in India, valued for both milk production and draught work. Sahiwal and Gir are primarily milch breeds, known for high milk yield, while Red Sindhi is also mainly a dairy breed. Haryana cattle are widely used in farming activities due to their strength and moderate milk-producing ability, making them suitable for both purposes.

Final Answer: Haryana

Answer: (B)

Q15.

Solution

Concept: Exotic cattle breeds are introduced breeds known for high milk productivity. Different breeds vary in milk yield, adaptability, and management requirements.

Solution: Holstein Friesian is the exotic cattle breed recognized for the highest average milk production per lactation. It is widely used in dairy farming worldwide due to its superior milk yield potential. Jersey cattle are known for high-fat milk, Brown Swiss for durability and moderate-high yield, and Ayrshire for balanced milk production. However, Holstein Friesian surpasses all in total milk output per lactation.

Final Answer: Holstein Friesian

Answer: (C)

Q16.

Solution

Concept: Poultry breeds are classified based on their origin and production traits, such as egg-laying capacity, meat production, or dual-purpose utility.

Solution: Leghorn is a Mediterranean poultry breed well known for its excellent white-egg production capacity. It is highly efficient in egg laying and is widely used in commercial poultry farming. Rhode Island Red and Plymouth Rock are dual-purpose breeds used for both eggs and meat, while Australorp is also known for both meat and egg production but not specifically for white eggs. Hence, Leghorn is the correct answer.

Final Answer: Leghorn

Answer: (B)

Q17.

Solution

Concept: Proper housing design in dairy farming is essential for maintaining hygiene, ease of cleaning, and animal comfort. Different housing systems are designed with specific dimensions to ensure efficient management and sanitation.

Solution: In a tail-to-tail housing system for dairy cows, animals are tied facing outward with a central passage for cleaning and manure removal. The central cleaning passage must be wide enough for easy movement of workers and equipment while maintaining hygiene. The recommended minimum width of this passage is 1.5 meters, which allows efficient cleaning and proper management of waste. Smaller widths restrict movement, while larger widths are unnecessary and uneconomical.

Final Answer: 1.5 meters

Answer: (C)

Q18.

Solution

Concept: Livestock feed is broadly classified into roughages and concentrates based on fiber content and nutritive value. Roughages are essential for proper digestion in ruminants.

Solution: Roughages are feeds that are high in fiber and low in Total Digestible Nutrients (TDN). They help in maintaining rumen health and proper digestion. Berseem hay is a green fodder that is rich in fiber and classified as roughage. In contrast, mustard cake and rice polish are protein-rich and energy-rich concentrates, respectively, while maize grain is a high-energy concentrate. Therefore, berseem hay is the correct example of roughage.

Final Answer: Berseem hay

Answer: (C)

Q19.

Solution

Concept: A balanced ration is a feed mixture that provides all essential nutrients such as carbohydrates, proteins, fats, vitamins, and minerals in proper proportions for the maintenance and production requirements of livestock.

Solution: A balanced ration is formulated to meet the daily nutritional requirements of an animal over a 24-hour period. It ensures proper growth, milk production, and overall health of dairy animals. Shorter time frames like 6, 12, or 48 hours are not used as standard feeding durations in ration formulation. Therefore, a balanced ration is designed for a 24-hour period.

Final Answer: 24 hours

Answer: (C)

Q20.

Solution

Concept: Foot and Mouth Disease (FMD) is one of the most economically important infectious diseases in livestock, affecting cattle, buffalo, sheep, goats, and pigs.

Solution: Foot and Mouth Disease is caused by a virus belonging to the family Picornaviridae. It is highly contagious and spreads rapidly among cloven-hoofed animals. The disease is characterized by fever, blisters in the mouth and feet, and reduced productivity. Since it is caused by a virus, antibacterial treatments are ineffective, and prevention through vaccination is important.

Final Answer: Virus

Answer: (B)

Q21.

Solution

Concept: Ranikhet disease, also known as Newcastle disease, is a viral infection that affects poultry birds and causes severe economic losses in poultry farming.

Solution: Ranikhet disease is a highly contagious viral disease found in poultry birds such as chickens. It affects the respiratory, nervous, and digestive systems and can lead to high mortality rates in infected flocks. Sheep, buffalo, and goats are not affected by this disease. Therefore, poultry is the correct answer.

Final Answer: Poultry

Answer: (B)

Q22.

Solution

Concept: Protozoan diseases in poultry are caused by microscopic single-celled organisms that infect the intestinal tract, leading to poor growth, diarrhea, and sometimes high mortality.

Solution: Coccidiosis is a protozoan disease in poultry caused by Eimeria species. It damages the intestinal lining, leading to bloody diarrhea, dehydration, and reduced growth performance. Rinderpest is a viral disease of cattle, anthrax is caused by bacteria, and fowl pox is a viral disease affecting skin and respiratory tissues. Hence, coccidiosis is the correct answer.

Final Answer: Coccidiosis

Answer: (C)

Q23.

Solution

Concept: Cryopreservation of bovine semen is an important technique in animal breeding and artificial insemination. It requires the use of cryoprotectants to protect sperm cells from damage caused by extreme low temperatures during storage in liquid nitrogen.

Solution: Glycerol is the most commonly used cryoprotectant for preserving bovine semen at ultra-low temperatures of $-196^{\circ}C$ in liquid nitrogen. It prevents the formation of ice crystals inside sperm cells, thereby protecting their membrane integrity and maintaining viability after thawing. Other substances like formaldehyde, chloroform, and ethanol are not used for semen preservation due to their toxic and damaging effects on cells.

Final Answer: Glycerol

Answer: (B)

Q24.

Solution

Concept: Milk pasteurization is a heat treatment process used to destroy pathogenic microorganisms while maintaining the nutritional and sensory quality of milk. Different methods of pasteurization are used based on temperature and time combinations.

Solution: High Temperature Short Time (HTST) pasteurization involves heating milk to 72°C for 15 seconds followed by rapid cooling. This method effectively kills harmful pathogens while preserving the quality of milk. Low Temperature Long Time (LTLT) pasteurization uses lower temperature for a longer duration, while sterilization involves much higher temperatures that can significantly alter milk quality. Homogenization is a physical process that breaks fat globules, not a heat treatment method.

Final Answer: HTST Pasteurization

Answer: (B)

Q25.

Solution

Concept: Soil texture refers to the relative proportion of sand, silt, and clay particles in soil. It greatly influences water retention, aeration, and nutrient availability.

Solution: Clayey soil has the highest water-holding capacity because it contains very fine particles with extremely small pore spaces. These small pores slow down water drainage and allow maximum water retention. Sandy soil has large particles and low water retention, loamy soil is balanced, and silty soil has moderate water-holding capacity. Therefore, clayey soil retains the most water.

Final Answer: Clayey soil

Answer: (D)

Q26.

Solution

Concept: Soil pH is a measure of acidity or alkalinity of soil, which affects nutrient availability and microbial activity in the soil.

Solution: A soil with a pH value of 8.5 is considered alkaline because its pH is greater than 7. Acidic soils have pH less than 7, neutral soil has pH equal to 7, and highly acidic soils have very low pH values. Alkaline soils may affect nutrient availability but are common in arid and semi-arid regions.

Final Answer: Alkaline

Answer: (C)

Q27.

Solution

Concept: Fertilizers are classified based on the nutrients they supply. Straight fertilizers contain only one primary nutrient, whereas compound or complex fertilizers supply multiple nutrients.

Solution: Urea is a straight fertilizer that provides only nitrogen to plants and is widely used in agriculture to promote vegetative growth. Diammonium phosphate (DAP) provides both nitrogen and phosphorus, NPK 19:19:19 is a balanced fertilizer containing nitrogen, phosphorus, and potassium, and nitrophosphate provides multiple nutrients. Therefore, urea is the correct straight nitrogen fertilizer.

Final Answer: Urea

Answer: (B)

Q28.

Solution

Concept: Essential primary nutrients (N, P, K) are required in large amounts by plants and play specific roles in growth, development, and metabolism. Each nutrient contributes to different physiological functions.

Solution: Phosphorus is the primary nutrient responsible for root development and energy transfer in plants. It is a key component of ATP (adenosine triphosphate), which acts as the energy currency of the cell. It also promotes strong root growth, flowering, and seed formation. Nitrogen mainly supports vegetative growth, potassium regulates water balance and enzyme activation, while zinc is a micronutrient involved in enzyme function. Therefore, phosphorus is the correct answer.

Final Answer: Phosphorus

Answer: (B)

Q29.

Solution

Concept: Efficient irrigation methods are essential for conserving water, especially in arid and semi-arid regions where water availability is limited. Modern irrigation systems aim to minimize water loss and maximize crop productivity.

Solution: Drip irrigation is the most efficient water-saving method as it delivers water directly to the root zone of plants in controlled amounts. This minimizes evaporation, runoff, and deep percolation losses. Furrow, border strip, and flooding irrigation methods distribute water over the field surface, leading to higher water wastage. Hence, drip irrigation is the most suitable method for water conservation in arid regions.

Final Answer: Drip Irrigation

Answer: (B)

Q30.

Solution

Concept: In irrigation engineering and agronomy, different terms are used to describe water requirements and crop-water relationships during the growing period of a crop.

Solution: Delta is defined as the total depth of water required by a crop during its entire growing period in the field. It represents the total consumptive use of water by the crop including evaporation and transpiration. Duty refers to the area irrigated per unit discharge of water, base period is the total time from sowing to harvest, and consumptive use refers to water used by plants through evapotranspiration. Therefore, delta is the correct term.

Final Answer: Delta

Answer: (B)

Q31.

Solution

Concept: Proper soil water management is essential for maintaining soil health and ensuring optimal plant growth. Excess water and salts in the soil can negatively affect crop productivity.

Solution: Drainage is the process of removing excess water, including salt-affected water, from the soil surface or sub-surface to improve soil conditions for plant growth. It helps in preventing waterlogging, improving aeration, and reducing salinity problems. Infiltration is the entry of water into the soil, percolation is the downward movement of water through soil layers, and leaching is the removal of soluble salts by water movement through soil. Hence, drainage is the correct answer.

Final Answer: Drainage

Answer: (C)

Q32.

Solution

Concept: Weed control in agriculture involves various methods such as cultural, mechanical, chemical, and biological approaches. Cultural methods modify the growing environment to suppress weed growth.

Solution: Mulching is a cultural method of weed control in which the soil surface is covered with organic materials (like straw, leaves) or inorganic materials (like plastic sheets). This covering blocks sunlight, reduces weed germination, conserves soil moisture, and improves soil temperature regulation. Hand hoeing is a mechanical method, herbicide application is chemical control, and biological control uses living organisms to suppress weeds. Therefore, mulching is the correct answer.

Final Answer: Mulching

Answer: (A)

Q33.

Solution

Concept: Integrated Pest Management (IPM) is a sustainable approach to pest and weed control that reduces dependence on chemical inputs and promotes environmental safety.

Solution: IPM emphasizes the integrated use of multiple control strategies including cultural practices, mechanical removal, biological agents, and judicious use of chemical herbicides when necessary. It does not rely solely on one method but combines different approaches to achieve effective and eco-friendly weed management. Therefore, the correct option is the combination of cultural, mechanical, and chemical methods.

Final Answer: A combination of cultural, mechanical, and chemical methods

Answer: (C)

Q34.

Solution

Concept: The System of Rice Intensification (SRI) is an innovative method of rice cultivation aimed at improving productivity while reducing input use such as water, seeds, and fertilizers.

Solution: SRI primarily focuses on reducing seed rate and water requirement while improving plant spacing, soil aeration, and root growth. It avoids continuous flooding and promotes intermittent irrigation. It does not aim to increase water submergence or chemical fertilizer use, nor does it eliminate transplanting. Instead, it uses careful transplanting of young seedlings. Hence, reducing seed rate and water requirement is the correct objective.

Final Answer: Reduce seed rate and water requirement

Answer: (B)

Q35.

Solution

Concept: Irrigation scheduling is critical in wheat production, and certain growth stages are more sensitive to water stress than others, affecting yield significantly.

Solution: The Crown Root Initiation (CRI) stage in wheat is considered the most critical stage for irrigation. At this stage, proper root development occurs, which determines plant vigor and yield potential. Water stress during this stage severely reduces tillering and overall productivity. Other stages like tillering, jointing, and flowering are also important, but CRI is the most sensitive stage for irrigation management.

Final Answer: Crown Root Initiation (CRI) stage

Answer: (C)

Q36.

Solution

Concept: Intercultural operations in sugarcane cultivation are important for improving plant support, soil aeration, and irrigation efficiency. One such practice is earthing-up, which involves piling soil around the base of the plant.

Solution: Earthing-up in sugarcane is primarily done to support the standing crop and prevent lodging, especially when the crop attains height and becomes heavy. It also helps in proper root development and facilitates irrigation and drainage by improving field structure. It does not directly increase sugar content, induce flowering, or control leaf-spot disease. Therefore, its main purpose is to prevent lodging and facilitate irrigation.

Final Answer: Prevent lodging and facilitate irrigation

Answer: (B)

Q37.

Solution

Concept: Nutri-cereals are grains that are rich in essential nutrients such as minerals, dietary fiber, and protein. They are increasingly promoted for their health benefits and adaptability to harsh climatic conditions.

Solution: Pearl millet (Bajra) is widely known as a nutri-cereal due to its high content of minerals like iron, calcium, and magnesium, along with dietary fiber. It is also drought-resistant and suitable for cultivation in arid regions. Rice and sugarcane are energy-rich crops but low in minerals and fiber, while wheat has moderate nutritional value. Therefore, pearl millet is the correct answer.

Final Answer: Pearl Millet (Bajra)

Answer: (C)

Q38.

Solution

Concept: Precision farming is a modern agricultural approach that uses advanced technologies to optimize field-level management regarding crop farming.

Solution: The primary objective of precision farming is to use technologies such as GPS, GIS, and IoT to apply inputs like water, fertilizers, and pesticides according to spatial and temporal variability in the field. This ensures efficient resource use, higher productivity, and reduced environmental impact. It does not focus on expanding cultivated area or blind use of machinery. Hence, technology-based variable input application is the correct objective.

Final Answer: Using GPS and IoT to apply inputs based on spatial variability

Answer: (B)

Q39.

Solution

Concept: Organic farming is an agricultural system that relies on natural inputs and processes to maintain soil fertility and ecological balance, avoiding synthetic chemicals.

Solution: In organic farming, the use of synthetic chemical fertilizers is strictly prohibited because they harm soil health, microbial activity, and long-term fertility. Instead, organic farming relies on green manure, vermicompost, and bio-fertilizers to maintain soil productivity naturally. These alternatives improve soil structure and nutrient availability without causing environmental damage.

Final Answer: Synthetic Chemical Fertilizers

Answer: (C)

Q40.

Solution

Concept: Zero Budget Natural Farming (ZBNF) is a sustainable farming approach that avoids chemical inputs and promotes the use of natural, locally prepared microbial formulations to enhance soil fertility and crop health.

Solution: Jeevamrut is a fermented microbial culture widely used in Zero Budget Natural Farming. It is prepared using cow dung, cow urine, jaggery, pulse flour, and soil, and it helps in enhancing soil microbial activity and nutrient availability. Urea solution is a chemical fertilizer, while formaldehyde and copper sulphate are toxic chemicals not used in sustainable farming systems. Therefore, Jeevamrut is the correct answer.

Final Answer: Jeevamrut

Answer: (B)

Q41.

Solution

Concept: Mango is an important fruit crop, and several physiological disorders affect its quality, yield, and export potential. These disorders are not caused by pathogens but by environmental or physiological imbalances.

Solution: Spongy tissue is a physiological disorder in mango, especially in the Alphonso variety, characterized by the breakdown and browning of fruit pulp making it unfit for consumption and export. Black tip is caused by industrial gases, fruit drop is a natural or stress-related phenomenon, and clustering refers to abnormal flower or fruit grouping. Therefore, spongy tissue is the correct answer.

Final Answer: Spongy Tissue

Answer: (B)

Q42.

Solution

Concept: Citrus canker is a bacterial disease affecting citrus crops such as acid lime, orange, and lemon. It causes severe yield and quality losses.

Solution: Citrus canker is caused by the bacterium *Xanthomonas citri*. It leads to the formation of raised lesions on leaves, fruits, and stems, reducing market value and yield. Other options include fungal pathogens like *Phytophthora* and *Colletotrichum*, and viruses, but citrus canker is specifically bacterial in nature. Hence, *Xanthomonas citri* is the correct pathogen.

Final Answer: *Xanthomonas citri*

Answer: (A)

Q43.

Solution

Concept: Plant growth regulators (PGRs) are used in horticultural crops to manipulate flowering, fruit set, and yield under different environmental conditions.

Solution: Gibberellic Acid (GA_3) is commonly used in tomato cultivation to improve fruit set, especially under unfavorable temperature conditions. It helps in overcoming poor pollination and enhances fruit development. NAA is mainly used for fruit thinning and preventing fruit drop, ethylene promotes ripening, and abscisic acid is associated with stress responses and dormancy. Therefore, GA_3 is the correct answer.

Final Answer: Gibberellic Acid (GA_3)

Answer: (A)

Q44.

Solution

Concept: In plant morphology, various underground plant parts are modified to perform storage functions. These structures are classified based on their origin, such as root or stem modifications.

Solution: The potato tuber is a modified stem, specifically an underground stem that stores food in the form of starch. It has nodes and internodes, and "eyes" which are actually axillary buds capable of sprouting into new plants. Since it arises from a stem and not a root or leaf, it is classified as a modified stem.

Final Answer: Modified Stem

Answer: (B)

Q45.

Solution

Concept: Vegetative propagation in horticulture involves various artificial methods to reproduce plants with desirable traits. Grafting is a widely used technique for combining advantages of two different plants.

Solution: Grafting is a method in which a scion (upper part) from a superior plant is joined with the rootstock of a hardy plant so that they unite and grow as a single plant. This technique helps in combining desirable traits such as disease resistance and high yield. Layering involves rooting a branch while still attached to the parent plant, cutting involves rooting separated plant parts, and division involves separating plant clumps. Therefore, grafting is the correct method.

Final Answer: Grafting

Answer: (C)

Q46.

Solution

Concept: Air layering (also called gootie) is a vegetative propagation method used in horticulture to induce root formation on a branch while it is still attached to the parent plant.

Solution: In air layering, a wounded branch is wrapped with a moist material to encourage root development. Sphagnum moss is commonly used because it retains moisture effectively and provides a suitable environment for root initiation. Sand and dry straw do not retain sufficient moisture, while polythene is used only as a covering material, not for moisture retention itself. Hence, sphagnum moss is the correct answer.

Final Answer: Sphagnum Moss

Answer: (B)

Q47.

Solution

Concept: In food processing, gelling agents are essential for the formation of structure and texture in products like jams and jellies. These substances interact with sugar and acid to form a gel network.

Solution: Pectin is the primary component responsible for the setting or gel formation in jams and jellies. It is a natural polysaccharide found in fruits that forms a gel in the presence of sugar and acid. Starch, cellulose, and lactose do not have the properties required for gel formation in jam processing. Therefore, pectin is the correct answer.

Final Answer: Pectin

Answer: (B)

Q48.

Solution

Concept: Food processing standards such as FPO (Fruit Products Order) define quality parameters for fruit-based products like jams, jellies, and squashes to ensure uniformity and consumer safety.
Solution: According to FPO specifications, the minimum Total Soluble Solids (TSS) required for a product to be labeled as jam is 68%. This ensures proper consistency, preservation, and sweetness in the final product. Lower TSS would affect gel formation and shelf stability, while higher values are not required for standard jam formulation. Therefore, 68% is the correct requirement.
Final Answer: 68%

Answer: (C)

Q49.

Solution

Concept: Food preservation in processed products like ketchup is essential to prevent microbial spoilage and extend shelf life. Chemical preservatives are commonly used for this purpose under regulated limits.
Solution: Sodium benzoate is the most commonly used chemical preservative in tomato ketchup. It effectively inhibits the growth of yeasts, molds, and some bacteria in acidic food products like ketchup. Potassium metabisulphite is mainly used in fruit juices and wines, citric acid acts as an acidulant, and acetic acid is primarily used in pickles. Therefore, sodium benzoate is the correct preservative for ketchup.
Final Answer: Sodium Benzoate

Answer: (B)

Q50.

Solution

Concept: Sugarcane cultivation requires certain intercultural operations to prevent lodging (falling of tall canes) and to maintain crop stability during growth stages.
Solution: Propping in sugarcane is the practice of tying the leaves of adjacent canes together to provide mutual support and prevent lodging caused by wind or heavy crop weight. This operation does not directly increase sucrose content or promote lateral buds but mainly ensures structural stability of the crop. It also helps in better field management and harvesting efficiency. Hence, protecting the crop from lodging is the correct purpose.
Final Answer: Protect the crop from lodging by tying the leaves of adjacent canes together

Answer: (B)

Answer Key

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