CUET UG Agriculture Sample Paper - 9

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 the concept of gene mapping, if the recombination frequency between two genes P and Q is 12%, the map distance between them on the chromosome is:

(A) 6 cM

(B) 12 cM

(C) 24 cM

(D) 100 cM

Q2. The term 'Okazaki fragments' refers to short DNA segments synthesized during replication on the:

(A) Leading strand in $5' \rightarrow 3'$ direction

(B) Lagging strand in $5' \rightarrow 3'$ direction

(C) Leading strand in $3' \rightarrow 5'$ direction

(D) Lagging strand in $3' \rightarrow 5'$ direction

Q3. In a typical Mendelian dihybrid cross involving seed shape and color, what is the probability of obtaining a progeny that is homozygous recessive for both traits in the F_2 generation?

(A) 1/16

(B) 3/16

(C) 9/16

(D) 1/4

Q4. The 'C-value paradox' in genetics refers to the lack of correlation between:

(A) Genome size and organism complexity

(B) DNA content and mutation rate

(C) Chromosome number and fertility

(D) Protein diversity and RNA levels

Q5. In plant breeding, the 'Ear-to-Row' selection method is primarily an improvement over mass selection because it:

(A) Is faster to implement

(B) Involves progeny testing

(C) Requires less land area

(D) Does not require pollination control

Q6. The specific type of tissue culture used to produce virus-free plants from an infected mother plant is:

(A) Anther culture

(B) Meristem culture

(C) Embryo rescue

(D) Protoplast fusion

Q7. Which breeding method is most suitable for transferring a specific oligogenic trait, like disease resistance, from a donor parent to an elite susceptible variety?

(A) Pedigree method

(B) Bulk method

(C) Backcross method

(D) Pure line selection

Q8. The enzyme 'Nitrogenase', responsible for biological nitrogen fixation, is highly sensitive to the presence of:

(A) Nitrogen gas

(B) Oxygen

(C) Carbon dioxide

(D) Hydrogen

Q9. Which of the following vitamins contains Cobalt as a central metal atom and is essential for red blood cell formation in animals?

(A) Vitamin B_1

(B) Vitamin B_6

(C) Vitamin B_{12}

(D) Vitamin K

Q10. A 'Psychrometer' is a meteorological instrument used to measure:

(A) Solar radiation intensity

(B) Relative humidity

(C) Wind pressure

(D) Soil moisture tension

Q11. The 'Brown Swiss' breed of cattle, known for its high milk yield and sturdy built, originated in:

(A) Scotland

(B) Switzerland

(C) Netherlands

(D) Denmark

Q12. In poultry, the 'Karan-CRI' is a synthetic strain developed for:

(A) High egg production

(B) Meat quality (Broilers)

(C) Ornamental purposes

(D) Fighting ability

Q13. The optimal floor space requirement for an adult cow in a loose housing system (covered area) is approximately:

(A) 1.5 m^2

(B) 3.5 m^2

(C) 7.0 m^2

(D) 12.0 m^2

(E) 1.5 m^2

Q14. The 'Lumpy Skin Disease' (LSD) in cattle is caused by a virus belonging to the genus:

(A) Lyssavirus

(B) Capripoxvirus

(C) Aphthovirus

(D) Avipoxvirus

Q15. In 'Standardized Milk', the minimum legal requirement for Fat and Solids-Not-Fat (SNF) in India is:

(A) 3.0% Fat and 8.5% SNF

(B) 4.5% Fat and 8.5% SNF

(C) 6.0% Fat and 9.0% SNF

(D) 1.5% Fat and 9.0% SNF

Q16. The '1:1' ratio of clay minerals, where one tetrahedral sheet is linked to one octahedral sheet, is characteristic of:

(A) Montmorillonite

(B) Illite

(C) Kaolinite

(D) Vermiculite

Q17. If a fertilizer bag is marked as '18:46:0', it indicates that the fertilizer is:

(A) Urea

(B) Muriate of Potash

(C) Diammonium Phosphate (DAP)

(D) Single Super Phosphate

Q18. The 'Tensiometer' is most effective for measuring soil moisture tension in:

(A) Clayey soils

(B) Sandy soils

(C) Saline soils

(D) Heavy loams

Q19. Which irrigation method is characterized by the highest water application efficiency (above 90%) by delivering water directly to the root zone?

(A) Check Basin

(B) Sprinkler Irrigation

(C) Drip Irrigation

(D) Furrow Irrigation

Q20. The herbicide 'Pendimethalin' is generally applied in pulse crops as a:

(A) Pre-plant incorporation

(B) Pre-emergence spray

(C) Post-emergence spray

(D) Late-season desiccant

Q21. The critical stage for irrigation in Wheat, which occurs about 21 days after sowing, is:

(A) Tillering stage

(B) Crown Root Initiation (CRI)

(C) Jointing stage

(D) Milk stage

Q22. 'Golden Rice' was genetically engineered to provide a high content of:

(A) Iron

(B) Vitamin C

(C) Beta-carotene (Pro-vitamin A)

(D) Lysine

Q23. The practice of 'Green Manuring' involves turning under undecomposed green plant tissue into the soil. Which of the following is the most common green manure crop?

(A) Maize

(B) Dhaincha (Sesbania)

(C) Wheat

(D) Mustard

Q24. In Precision Agriculture, the 'NDVI' (Normalized Difference Vegetation Index) is used to assess:

(A) Soil texture

(B) Plant health and biomass

(C) Depth of water table

(D) Wind speed

Q25. The 'Alphonso' variety of Mango, highly prized for export, is most susceptible to which physiological disorder?

(A) Fruit drop

(B) Black tip

(C) Spongy tissue

(D) Alternate bearing

Q26. The commercial propagation method for Banana is:

(A) Seed

(B) Sword Suckers

(C) Air Layering

(D) Stem Cutting

Q27. In the preservation of fruit juices, 'Sodium Benzoate' is used as a chemical preservative primarily because it is effective against:

(A) Bacteria

(B) Yeasts

(C) Molds

(D) All of the above

Q28. The 'Ketchup' must contain a minimum total soluble solids (TSS) percentage of:

(A) 15%

(B) 25%

(C) 40%

(D) 68%

Q29. Which of the following is a 'Climacteric' fruit that continues to ripen after being harvested?

(A) Citrus

(B) Grape

(C) Sapota

(D) Pomegranate

Q30. The hormone responsible for 'Fruit Ripening' is:

(A) Auxin

(B) Gibberellin

(C) Ethylene

(D) Abscisic Acid

Q31. The 'Gilt' refers to a:

(A) Young female pig that has not yet farrowed

(B) Castrated male pig

(C) Mature female sheep

(D) Adult male goat

Q32. In Livestock, 'Bloat' (Tympany) is primarily caused by:

(A) Deficiency of Vitamin A

(B) Accumulation of gas in the rumen

(C) Bacterial infection of the udder

(D) High temperature in the shed

Q33. The vaccine used for the prevention of 'Ranikhet' disease in 1-day old chicks is:

(A) F1 / Lasota

(B) R2B

(C) HVT

(D) BCG

Q34. Which element is a constituent of Chlorophyll and its deficiency causes interveinal chlorosis in older leaves?

(A) Iron

(B) Magnesium

(C) Manganese

(D) Zinc

Q35. The conversion of Organic Nitrogen to Inorganic Nitrogen (Ammonia) by soil microbes is called:

(A) Nitrification

(B) Denitrification

(C) Ammonification

(D) Nitrogen Fixation

Q36. The 'Khaira' disease of Rice is caused by the deficiency of:

(A) Nitrogen

(B) Phosphorus

(C) Zinc

(D) Iron

Q37. Which type of rainfall is common in the mountainous regions where moist air is forced to rise over a topographic barrier?

(A) Convectional

(B) Cyclonic

(C) Orographic

(D) Frontal

Q38. The 'Dead Heart' and 'White Ear' symptoms in Rice are caused by:

(A) Brown Plant Hopper

(B) Yellow Stem Borer

(C) Gall Midge

(D) Gundhi Bug

Q39. The price of a 50 kg bag of Urea is ₹266.50. What is the cost per kg of Nitrogen in Urea (containing 46% N)?

(A) ₹5.33

(B) ₹11.58

(C) ₹26.65

(D) ₹50.00

Q40. The preservation method that uses high concentrations of sugar (around 65–70%) to inhibit microbial growth is:

(A) Drying

(B) Osmotic dehydration (Jams/Jellies)

(C) Pickling

(D) Canning

Q41. A cross between an F_1 hybrid and its homozygous recessive parent is known as:

(A) Backcross

(B) Testcross

(C) Reciprocal cross

(D) Monohybrid cross

Q42. The 'Central Dogma' of molecular biology describes the flow of genetic information as:

(A) RNA $\rightarrow$ DNA $\rightarrow$ Protein

(B) DNA $\rightarrow$ RNA $\rightarrow$ Protein

(C) Protein $\rightarrow$ RNA $\rightarrow$ DNA

(D) DNA $\rightarrow$ Protein $\rightarrow$ RNA

Q43. In Biochemistry, 'Enzymes' lower the:

(A) Free energy of the products

(B) Activation energy of the reaction

(C) Equilibrium constant

(D) Temperature of the system

Q44. The 'Rhizosphere' is the region of soil:

(A) Deep below the water table

(B) Immediately surrounding the plant roots

(C) Rich in volcanic ash

(D) Devoid of any microbial life

Q45. The 'Gir' breed of cattle is mainly found in the Gir forests of:

(A) Rajasthan

(B) Gujarat

(C) Maharashtra

(D) Haryana

Q46. In 'Artificial Insemination', the site of semen deposition in the cow is usually the:

(A) Vagina

(B) Cervix

(C) Body of the Uterus

(D) Fallopian Tubes

Q47. Which of the following is a non-symbiotic (free-living) nitrogen-fixing bacterium?

(A) Rhizobium

(B) Azotobacter

(C) Bradyrhizobium

(D) Frankia

Q48. The 'Puddling' operation in rice fields is done primarily to:

(A) Increase soil porosity

(B) Reduce deep percolation of water

(C) Kill all beneficial bacteria

(D) Increase soil pH

Q49. 'Coccidiosis' in poultry is typically managed using:

(A) Antibiotics

(B) Coccidiostats in feed

(C) Antifungal sprays

(D) High protein diet

Q50. The 'Vegetable Force' or 'Olericulture' deals with the study of:

(A) Fruits

(B) Flowers

(C) Vegetables

(D) Spices

Detailed Solutions

Q1.

Solution

Concept:

The concept of gene mapping is based on the principle that the frequency of recombination between two linked genes is directly proportional to the physical distance between them on a chromosome. This distance is measured in map units or centimorgans (cM). One centimorgan is defined as the distance between genes for which one product of meiosis out of one hundred is recombinant.

Solution:

1. The problem states that the recombination frequency between genes P and Q is 12%. 2. By definition, 1% recombination frequency is equal to 1 cM (centimorgan) on the genetic map. 3. Therefore, a recombination frequency of 12% directly translates to a map distance of 12 cM. 4. This relationship holds true for smaller distances (typically under 50 cM) where double crossovers are less likely to interfere with the linear relationship between distance and frequency.

Final Answer: The map distance between genes P and Q is 12 cM.

Answer: (B)

Q2.

Solution

Concept:

DNA replication is semi-discontinuous. DNA polymerase can only synthesize DNA in the $5' \rightarrow 3'$ direction. Because the two strands of the DNA double helix are antiparallel, one strand (leading strand) is synthesized continuously, while the other strand (lagging strand) is synthesized in short, discontinuous segments.

Solution:

1. The lagging strand template runs in the $5' \rightarrow 3'$ direction relative to the replication fork, but synthesis must occur in the $5' \rightarrow 3'$ direction. 2. As the replication fork opens, DNA polymerase must wait for enough template to be exposed to start synthesis "backwards" away from the fork. 3. These short, newly synthesized DNA fragments are called Okazaki fragments. 4. Each Okazaki fragment is initiated by an RNA primer and is eventually joined together by the enzyme DNA ligase to form a continuous strand. 5. Thus, Okazaki fragments are found specifically on the lagging strand and are synthesized in the $5' \rightarrow 3'$ direction.

Final Answer: Okazaki fragments are synthesized on the lagging strand in the $5' \rightarrow 3'$ direction.

Answer: (B)

Q3.

Solution

Concept:

In a Mendelian dihybrid cross, we track two traits simultaneously. If we cross a pure-breeding dominant plant (e.g., Round Yellow - RRYY) with a pure-breeding recessive plant (e.g., Wrinkled Green - rryy), the F_1 is heterozygous (RrYy). The F_2 generation results from the selfing of F_1.

Solution:

1. The F_1 genotype is RrYy. When selfed, it produces four types of gametes: RY, Ry, rY, and ry. 2. A 4×4 Punnett square for the F_2 generation results in 16 possible combinations. 3. The phenotype ratio is 9:3:3:1. 4. The question asks for the probability of a progeny being homozygous recessive for both traits. 5. The only genotype that fits this description is "rryy". 6. In the Punnett square, the "rryy" genotype appears exactly once out of the 16 possible outcomes. 7. Therefore, the probability is $1/16$.

Final Answer: The probability of obtaining a homozygous recessive progeny is $1/16$.

Answer: (A)

Q4.

Solution

Concept:

The C-value is the amount of DNA contained within a haploid nucleus (e.g., a gamete) of a eukaryotic organism. It was originally expected that more "complex" organisms would require more DNA (a larger genome) to function.

Solution:

1. Scientific observations revealed that genome size does not always correlate with the complexity of the organism or the number of genes it contains. 2. For example, some single-celled protozoa or certain amphibians have genomes many times larger than the human genome. 3. This observation is known as the "C-value Paradox." 4. The paradox is largely explained by the presence of large amounts of non-coding, repetitive DNA sequences (often called "junk DNA") in the genomes of higher eukaryotes, which contribute to the size without necessarily adding to the biological complexity.

Final Answer: The C-value paradox refers to the lack of correlation between genome size and organism complexity.

Answer: (A)

Q5.

Solution

Concept:

Mass selection involves selecting plants based on their phenotype and mixing their seeds to grow the next generation. It is simple but limited because it does not distinguish between genetic and environmental effects on the phenotype.

Solution:

1. The 'Ear-to-Row' method, developed by Hopkins, is a modification of mass selection used primarily in cross-pollinated crops like maize. 2. In this method, selected ears (fruits/seeds) are not mixed. Instead, seeds from each individual ear are planted in a separate row (a progeny row). 3. By observing the performance of the entire row, the breeder can evaluate the breeding value of the parent plant. 4. This process is known as **progeny testing**. 5. If the entire row shows the desired trait, it confirms that the parent plant had a superior genotype, not just a lucky phenotype due to favorable environmental conditions. 6. This makes Ear-to-Row selection much more efficient than simple mass selection.

Final Answer: The Ear-to-Row method is an improvement because it involves progeny testing.

Answer: (B)

Q6.

Solution

Concept:

Plant tissue culture is a technique used to grow plant cells, tissues, or organs on a nutrient medium under sterile conditions. Different types of explants (starting tissue) are used depending on the objective. Meristem culture is a specific technique where the apical or axillary meristem (the growing tip of the shoot) is used as the explant.

Solution:

1. In many plants infected by viruses, the virus does not reach the growing tips (meristems). 2. This is because the meristematic tissue lacks vascular tissues (xylem and phloem) through which viruses typically travel. 3. Additionally, the high rate of cell division in the meristem often outpaces the rate of viral replication. 4. By carefully excising the meristematic dome and culturing it in vitro, a breeder can regenerate an entirely new plant that is completely free of the virus present in the parent plant. 5. This technique is widely used commercially for the "cleaning" of stocks in crops like Potato, Banana, and Sugarcane.

Final Answer: Meristem culture is used to produce virus-free plants.

Answer: (B)

Q7.

Solution

Concept:

The backcross method is a form of recurrent hybridization where a cross is made between a hybrid and one of its parents. The goal is to improve a specific trait in an otherwise excellent variety (the recurrent parent) by introducing a gene from a donor parent (the non-recurrent parent).

Solution:

1. If an elite variety is perfect in all aspects but lacks disease resistance, it is used as the recurrent parent. 2. A donor parent that possesses the resistance gene is crossed with the elite variety. 3. The resulting F_1 is crossed back to the elite variety. 4. This process of crossing and selection for the resistance trait is repeated for 6–7 generations. 5. In each step, the genetic background of the elite variety is recovered while retaining the specific gene (oligogenic trait) from the donor. 6. This is the most efficient method for transferring vertical resistance or specific quality traits.

Final Answer: The backcross method is most suitable for transferring specific oligogenic traits.

Answer: (C)

Q8.

Solution

Concept:

Biological Nitrogen Fixation (BNF) is the process where atmospheric nitrogen (N_2) is converted into ammonia (NH_3) by specialized bacteria. The key enzyme facilitating this reaction is Nitrogenase.

Solution:

1. The Nitrogenase enzyme complex is extremely sensitive to oxygen (O_2). 2. Oxygen irreversibly inactivates the enzyme because it reacts with the iron-sulfur clusters within the enzyme structure. 3. To protect this enzyme from oxygen while still allowing for aerobic respiration, nitrogen-fixing organisms have evolved various strategies. 4. In legume nodules, a protein called **Leghaemoglobin** acts as an oxygen scavenger, maintaining low free-oxygen levels around the nitrogen-fixing bacteria (Rhizobium). 5. In cyanobacteria, specialized cells called heterocysts provide an anaerobic environment for the enzyme.

Final Answer: Nitrogenase is highly sensitive to the presence of Oxygen.

Answer: (B)

Q9.

Solution

Concept:

Vitamins are organic micronutrients essential for the metabolism of animals. Some vitamins contain specific metallic elements in their molecular structure. Vitamin B_{12} (Cobalamin) is unique among vitamins for containing a metal ion.

Solution:

1. Vitamin B_{12} has a complex "corrin ring" structure with a Cobalt (Co) atom at its center. 2. It is essential for DNA synthesis and the maturation of red blood cells in the bone marrow. 3. Deficiency of this vitamin leads to Pernicious Anemia. 4. In livestock, especially ruminants, Cobalt must be present in the diet or soil because rumen microbes use it to synthesize Vitamin B_{12} for the host animal. 5. Other vitamins mentioned (like B_1 or K) do not contain Cobalt.

Final Answer: Vitamin B_{12} contains Cobalt and is essential for red blood cell formation.

Answer: (C)

Q10.

Solution

Concept:

Agrometeorology involves the measurement of various atmospheric parameters that affect crop growth. Humidity is a measure of water vapor in the air, which directly influences transpiration and disease spread.

Solution:

1. A Psychrometer is a specific type of hygrometer used to measure atmospheric humidity. 2. It consists of two thermometers: a "Dry Bulb" thermometer and a "Wet Bulb" thermometer (the bulb of which is kept moist with a cloth wick). 3. As water evaporates from the wet bulb, it cools the thermometer. The rate of evaporation depends on the humidity of the surrounding air. 4. By comparing the temperature difference between the dry bulb and wet bulb (the wet-bulb depression), the **Relative Humidity** can be calculated using psychrometric tables. 5. Solar radiation is measured by a Pyranometer, and wind speed is measured by an Anemometer.

Final Answer: A Psychrometer is used to measure Relative Humidity.

Answer: (B)

Q11.

Solution

Concept:

Livestock breeds are often classified based on their utility (dairy, draught, or dual-purpose) and their place of origin. Exotic breeds are those that have been imported into India from foreign countries to improve local stock through crossbreeding.

Solution:

1. The 'Brown Swiss' is one of the oldest and most popular dairy breeds in the world. 2. As the name suggests, this breed originated in the mountain valleys of **Switzerland**. 3. It is characterized by its light brown to silver-grey color, large frame, and sturdy hooves, which were developed for the rugged Alpine terrain. 4. It is highly valued for its high milk production with a good protein-to-fat ratio, making its milk excellent for cheese production. 5. In India, it has been used in various crossbreeding programs (like the 'Karan Swiss' developed at NDRI) to enhance the milk yield of indigenous cattle.

Final Answer: The Brown Swiss breed of cattle originated in Switzerland.

Answer: (B)

Q12.

Solution

Concept:

Poultry breeding in India involves the development of high-yielding strains and hybrids that are adapted to tropical climates. These strains are categorized as either "Layers" (for eggs) or "Broilers" (for meat).

Solution:

1. The 'Karan-CRI' is a specialized synthetic strain of poultry. 2. It was developed through intensive selection and breeding programs at the Central Poultry Breeding Farm. 3. The primary objective of developing this specific strain was to maximize **egg production**. 4. These birds are known for their high feed conversion efficiency, meaning they require less feed to produce a large number of eggs compared to indigenous "Desi" breeds. 5. While some strains are developed for meat (like 'Vencobb'), Karan-CRI remains a prominent name in the layer industry.

Final Answer: The Karan-CRI strain was developed for high egg production.

Answer: (A)

Q13.

Solution

Concept:

Scientific housing for livestock is essential to ensure animal welfare, hygiene, and maximum productivity. In a "Loose Housing System," animals are kept loose in an open paddock with a sheltered (covered) area for protection against extreme weather.

Solution:

1. The floor space requirement varies depending on the age and type of the animal. 2. For an adult cow, the standard recommendation for the **covered area** (shed) is approximately 3.5 m^2 per animal. 3. In addition to the covered area, an open paddock (uncovered area) of about 7.0 m^2 is typically provided to allow for movement and sunlight. 4. Providing adequate space prevents overcrowding, reduces the spread of diseases, and minimizes stress, which directly correlates to better milk yield.

Final Answer: The optimal covered floor space for an adult cow is 3.5 m^2.

Answer: (B)

Q14.

Solution

Concept:

Lumpy Skin Disease (LSD) is a devastating viral disease of cattle and buffaloes. It causes fever, nodules on the skin, and can lead to death or significant loss in productivity. Understanding the causative agent is crucial for vaccination and control.

Solution:

1. LSD is caused by the Lumpy Skin Disease Virus (LSDV). 2. This virus belongs to the family **Poxviridae**. 3. Within this family, it is classified under the genus **Capripoxvirus**. 4. This genus also includes the viruses that cause Sheep Pox and Goat Pox. 5. Because these viruses are closely related, the "Goat Pox Vaccine" was frequently used as a heterologous vaccine to protect cattle during LSD outbreaks before specific LSD vaccines became widely available.

Final Answer: Lumpy Skin Disease is caused by a virus in the genus Capripoxvirus.

Answer: (B)

Q15.

Solution

Concept:

Milk standardization is the process of adjusting the fat and SNF (Solids-Not-Fat) levels of milk to meet legal standards defined by the Food Safety and Standards Authority of India (FSSAI). This ensures consistency for the consumer.

Solution:

1. Different types of milk have different legal requirements (e.g., Toned, Double Toned, Full Cream, Standardized). 2. For milk labeled specifically as **Standardized Milk** in India: - The minimum **Milk Fat** content must be 4.5%. - The minimum **SNF (Solids-Not-Fat)** content must be 8.5%. 3. This is usually achieved by mixing high-fat buffalo milk with low-fat cow milk or by adding skim milk powder/cream as needed. 4. In contrast, "Toned Milk" requires 3.0% Fat and 8.5% SNF.

Final Answer: Standardized milk must contain 4.5% Fat and 8.5% SNF.

Answer: (B)

Q16.

Solution

Concept:

Clay minerals are crystalline substances that make up the silicate fraction of the soil. They are classified based on the arrangement of tetrahedral (silica) and octahedral (alumina) sheets. A '1:1' clay mineral consists of one silica sheet and one alumina sheet bonded together into a single layer.

Solution:

1. **Kaolinite** is the most common example of a 1:1 type silicate clay. 2. In Kaolinite, the layers are held together tightly by hydrogen bonding. Because this bond is very strong, the layers do not expand when wet. 3. This leads to low plasticity, low stickiness, and low cation exchange capacity (CEC) compared to other minerals. 4. In contrast, Montmorillonite and Illite are 2:1 type minerals, meaning they have two tetrahedral sheets sandwiching one octahedral sheet. 5. Kaolinite is typically found in highly weathered soils of tropical regions (like Alfisols and Ultisols).

Final Answer: The 1:1 ratio is characteristic of Kaolinite.

Answer: (C)

Q17.

Solution

Concept:

Fertilizers are labeled using an N-P-K grade system, which represents the percentage of Nitrogen (N), Phosphorus (as P_2O_5), and Potassium (as K_2O) by weight in the product.

Solution:

1. The grade '18:46:0' means the fertilizer contains 18% Nitrogen, 46% Phosphorus, and 0% Potassium. 2. This specific grade is the global standard for **Diammonium Phosphate (DAP)**. 3. DAP is a complex fertilizer because it provides more than one primary nutrient. 4. For comparison: - Urea is 46:0:0. - Muriate of Potash (MOP) is 0:0:60. - Single Super Phosphate (SSP) is 0:16:0 (usually). 5. DAP is highly water-soluble and is primarily used as a basal dose to provide early-stage phosphorus for root development.

Final Answer: 18:46:0 indicates Diammonium Phosphate (DAP).

Answer: (C)

Q18.

Solution

Concept:

A tensiometer is an instrument used to measure the "soil moisture tension" or matric potential. It consists of a water-filled tube with a porous ceramic cup at the bottom and a vacuum gauge at the top.

Solution:

1. As the soil dries out, it pulls water through the ceramic cup, creating a vacuum inside the tube that is measured by the gauge. 2. Tensiometers work best in the tension range of 0 to 0.85 bars. 3. In **Sandy soils**, most of the plant-available water is held at low tensions (within the tensiometer's operating range). 4. In Clayey soils, much of the water is held at tensions far exceeding 0.85 bars (up to 15 bars at the permanent wilting point). Once the tension exceeds the limit, air enters the ceramic cup, and the tensiometer fails to provide a reading. 5. Therefore, tensiometers are most effective and practical for irrigation scheduling in sandy or coarse-textured soils.

Final Answer: Tensiometers are most effective in sandy soils.

Answer: (B)

Q19.

Solution

Concept:

Irrigation efficiency refers to the percentage of water delivered that is actually used by the plant. Losses usually occur through evaporation, runoff, and deep percolation.

Solution:

1. **Drip Irrigation** (also known as trickle irrigation) involves the slow application of water drop by drop directly to the root zone of the plants through emitters. 2. Since the water is applied precisely where the roots are located and at a low rate, evaporation losses from the soil surface are minimized. 3. There is almost zero runoff or deep percolation loss compared to surface methods like flooding or check basins. 4. Drip irrigation can achieve an application efficiency of $90 - 95\%$, making it the most water-efficient method available, especially in water-scarce regions or for high-value horticultural crops.

Final Answer: Drip Irrigation has the highest water application efficiency.

Answer: (C)

Q20.

Solution

Concept:

Herbicides are classified by their timing of application. Pre-plant incorporation (PPI) is done before sowing, Pre-emergence (PE) is done after sowing but before the crop/weeds emerge, and Post-emergence is done after the plants are visible.

Solution:

1. **Pendimethalin** is a selective herbicide used widely in pulse crops (like Moong, Urad, and Chickpea). 2. It acts by inhibiting cell division in the roots and shoots of germinating weed seeds. 3. For it to be effective, it must be present in the top layer of the soil when the weeds begin to germinate. 4. Therefore, it is applied as a **Pre-emergence** spray, usually within 24 to 48 hours after sowing the crop. 5. This creates a chemical barrier that kills germinating weeds while the larger crop seeds, planted deeper, can emerge safely.

Final Answer: Pendimethalin is applied as a Pre-emergence spray.

Answer: (B)

Q21.

Solution

Concept:

Crop growth is divided into several phenological stages, and each stage has a specific requirement for water. The most sensitive stage to moisture stress is called the "Critical Stage." If irrigation is delayed at this stage, the yield loss is maximum and irreversible.

Solution:

1. For Wheat, the most critical stage for irrigation is the **Crown Root Initiation (CRI)** stage. 2. This stage occurs approximately 21 days after sowing (DAS). 3. At this point, the primary roots (seminal roots) are being replaced by the permanent root system (crown roots) just below the soil surface. 4. If the soil is dry during CRI, the crown roots fail to develop properly, leading to poor tillering and a significant reduction in the number of spikes per plant. 5. In a situation where a farmer has only one irrigation available for wheat, it must be applied at this specific stage.

Final Answer: The critical stage for irrigation in Wheat at 21 DAS is Crown Root Initiation (CRI).

Answer: (B)

Q22.

Solution

Concept:

Biofortification is the process of increasing the nutritional value of food crops through genetic engineering or selective breeding. Golden Rice is a famous example of a genetically modified (GM) crop designed to address a specific nutritional deficiency.

Solution:

1. Traditional rice varieties do not contain any Vitamin A in the endosperm (the edible part). 2. Many populations in developing countries rely on rice as a staple, leading to widespread Vitamin A deficiency (VAD), which can cause blindness and immune system failure. 3. Scientists inserted genes from the daffodil plant and a bacterium into the rice genome. 4. These genes complete the biosynthetic pathway for **Beta-carotene**, which is the precursor of Vitamin A. 5. The presence of beta-carotene gives the rice grains a distinct yellow or "golden" color, hence the name Golden Rice.

Final Answer: Golden Rice provides a high content of Beta-carotene (Pro-vitamin A).

Answer: (C)

Q23.

Solution

Concept:

Green manuring is an agro-ecological practice where specific plants are grown and plowed back into the soil while still green. This improves soil organic matter, nitrogen content, and physical structure.

Solution:

1. The most common crops used for green manuring are legumes, as they have the ability to fix atmospheric nitrogen through root nodules. 2. **Dhaincha (Sesbania aculeata)** is the most widely used green manure crop in India, especially for rice cultivation. 3. It is preferred because it grows very quickly, produces a large amount of succulent biomass, and can tolerate a wide range of soil conditions, including waterlogging and salinity. 4. Other common green manure crops include Sunnhemp and Cluster bean. 5. When incorporated, Dhaincha can add about $60 - 80$ kg of nitrogen per hectare to the soil.

Final Answer: Dhaincha (Sesbania) is the most common green manure crop.

Answer: (B)

Q24.

Solution

Concept:

Precision Agriculture uses information technology and remote sensing to ensure that crops and soil receive exactly what they need for optimum health and productivity. The Normalized Difference Vegetation Index (NDVI) is a key tool in this process.

Solution:

1. NDVI is a remote sensing index calculated from the light reflected by plants. 2. Healthy green vegetation absorbs most of the visible light (red) and reflects a large portion of near-infrared (NIR) light. 3. The formula for NDVI is: $(NIR - Red)/(NIR + Red)$. 4. High NDVI values indicate dense, **healthy green biomass**, while low values indicate stressed, sparse, or dead vegetation. 5. In precision farming, NDVI maps allow farmers to identify specific areas of a field that are underperforming due to nutrient deficiency, pests, or water stress without visiting every spot manually.

Final Answer: NDVI is used to assess plant health and biomass.

Answer: (B)

Q25.

Solution

Concept:

Mango (Mangifera indica) is the national fruit of India, and different varieties face different physiological or pathological challenges. Alphonso is a premium variety known for its excellent flavor and export value.

Solution:

1. **Spongy Tissue** is a serious non-infectious, physiological disorder specifically associated with the Alphonso mango. 2. In this condition, the pulp of the ripe fruit develops a yellowish, sour, and "spongy" patch with an off-flavor, making it unmarketable. 3. It is caused by internal heat (convective heat) from the soil surface that reaches the fruit when it is still on the tree or during storage. 4. This heat causes the inactivation of certain enzymes, leading to the breakdown of tissue. 5. Other disorders mentioned, like "Black Tip," are caused by smoke from brick kilns, while "Alternate Bearing" is a characteristic of varieties like Dashehari.

Final Answer: Alphonso is highly susceptible to the Spongy Tissue disorder.

Answer: (C)

Q26.

Solution

Concept:

Plant propagation is the process of creating new plants. In commercial agriculture, vegetative (asexual) propagation is often preferred over seeds to ensure that the offspring are genetically identical to the parent (clones), which maintains fruit quality and yield consistency.

Solution:

1. Banana (*Musa paradisiaca*) is a monocotyledonous herb that produces an underground stem called a rhizome. 2. From this rhizome, lateral shoots emerge which are known as "Suckers." 3. There are two types of suckers: "Water Suckers" (broad leaves, weak) and **"Sword Suckers"** (narrow, sword-like leaves and a strong, heavy rhizome base). 4. For commercial cultivation, Sword Suckers are the preferred planting material because they are more vigorous, have a stronger root system, and result in earlier fruiting compared to water suckers. 5. In modern commercial farming, "Tissue Culture" (micropropagation) is also becoming the standard, but among traditional vegetative methods, sword suckers are the primary choice.

Final Answer: The commercial propagation method for Banana is Sword Suckers.

Answer: (B)

Q27.

Solution

Concept:

Food preservation involves using physical or chemical methods to prevent spoilage. Chemical preservatives work by inhibiting the growth of microorganisms or interfering with their metabolic processes. Sodium Benzoate is one of the most widely used preservatives in acidic foods.

Solution:

1. Sodium Benzoate is the sodium salt of benzoic acid. It is most effective when the pH of the food is low (acidic), typically between 2.5 and 4.0. 2. Once added to acidic fruit juice, it converts into undissociated benzoic acid, which can penetrate the cell membranes of microorganisms. 3. It specifically targets and inhibits the growth of **yeasts and molds**, which are the primary spoilage agents in high-acid fruit products. 4. While it has some antibacterial properties, its primary strength in horticulture processing is against yeast fermentation and fungal growth. 5. In India, the maximum permissible limit for sodium benzoate in fruit juices is 600 ppm.

Final Answer: Sodium Benzoate is used primarily because it is effective against Yeasts.

Answer: (B)

Q28.

Solution

Concept:

Total Soluble Solids (TSS) is a measure of the dissolved solids in a liquid, primarily consisting of sugars. In food processing, TSS is measured using a Refractometer in degrees Brix (°B). Each fruit product has a specific legal minimum TSS requirement to be labeled as such.

Solution:

1. Tomato Ketchup is a product prepared from tomato juice or pulp with the addition of salt, sugar, vinegar, and spices. 2. According to the Food Safety and Standards (FSS) regulations in India, for a product to be called **Tomato Ketchup**, it must have a minimum **TSS of 25%**. 3. For comparison: - Tomato Puree must have a minimum TSS of 9%. - Tomato Paste must have a minimum TSS of 25%. - Fruit Jams must have a minimum TSS of 68%. 4. The high TSS in ketchup helps in preservation and provides the characteristic thick consistency.

Final Answer: Ketchup must contain a minimum TSS of 25%.

Answer: (B)

Q29.

Solution

Concept:

Fruits are classified into two categories based on their ripening behavior: Climacteric and Non-climacteric. Climacteric fruits show a sudden burst of respiration and ethylene production during the ripening process, allowing them to ripen even after being harvested.

Solution:

1. **Sapota (Chiku)** is a classic example of a climacteric fruit. It is harvested when it is physiologically mature but still hard; it then undergoes ripening and softening during transport and storage. 2. In contrast, Non-climacteric fruits do not show a respiratory burst and must remain on the tree to reach full eating quality. 3. Examples of non-climacteric fruits include **Citrus, Grapes, and Pomegranate**. If you harvest these fruits while they are sour, they will not become sweeter after harvest. 4. Knowing this classification is vital for post-harvest handling and determining the right time for the market.

Final Answer: Sapota is a climacteric fruit that continues to ripen after harvest.

Answer: (C)

Q30.

Solution

Concept:

Plant hormones (Phytohormones) are chemical messengers that regulate various aspects of plant growth and development. One specific hormone is known as the "Ripening Hormone" because of its role in the final stages of fruit development.

Solution:

1. **Ethylene** (C_2H_4) is a gaseous plant hormone. 2. It triggers a cascade of physiological changes in fruits, including the breakdown of chlorophyll (color change), the conversion of starch to sugar (sweetening), and the softening of cell walls. 3. Ethylene is often applied artificially (in the form of Ethephon or Ethrel) in ripening chambers to ensure uniform ripening of fruits like Bananas and Mangoes. 4. Other hormones have different primary roles: - Auxins: Cell elongation and apical dominance. - Gibberellins: Stem elongation and seed germination. - Abscisic Acid (ABA): Stress response and dormancy.

Final Answer: Ethylene is the hormone responsible for fruit ripening.

Answer: (C)

Q31.

Solution

Concept:

In animal husbandry, specific terminology is used to describe livestock based on their age, sex, and reproductive status. This helps in precise management and record-keeping on a farm.

Solution:

1. A **Gilt** is a term specifically used in swine (pig) management. 2. It refers to a young female pig that has reached sexual maturity but has not yet given birth to her first litter (farrowed). 3. Once a gilt farrowed, she is then referred to as a "Sow." 4. For comparison: - A castrated male pig is called a "Barrow." - A mature female sheep is called a "Ewe." - An adult male goat is called a "Buck" or "Billy." 5. Identifying gilts is important for selection in breeding programs to ensure high-quality replacements for the herd.

Final Answer: A Gilt is a young female pig that has not yet farrowed.

Answer: (A)

Q32.

Solution

Concept:

Bloat, also known as Tympany, is a common digestive disorder in ruminants (cattle, sheep, goats). It is an emergency condition that can lead to sudden death if not treated quickly.

Solution:

1. Ruminants produce large amounts of gas (carbon dioxide and methane) during the normal fermentation of feed in the rumen. 2. Normally, this gas is expelled through belching (eructation). 3. **Bloat** occurs when this gas is trapped in the rumen, either as free gas or as a stable foam mixed with the rumen contents. 4. This usually happens when animals graze on lush, young legumes (like Lucerne or Berseem) which are high in saponins that promote foaming. 5. The accumulation of gas causes the rumen to distend, putting pressure on the diaphragm and lungs, eventually leading to asphyxiation.

Final Answer: Bloat is primarily caused by the accumulation of gas in the rumen.

Answer: (B)

Q33.

Solution

Concept:

Ranikhet disease (also known as Newcastle Disease) is a highly contagious and fatal viral disease of poultry. Vaccination is the only effective way to prevent outbreaks in a flock.

Solution:

1. In the poultry industry, vaccination starts as early as possible. 2. For 1-day-old chicks (hatchlings), a mild strain of the virus is used to provide early immunity without causing the disease. 3. The **F1 strain** (or the similar **Lasota strain**) is the standard vaccine used for this purpose. It is usually administered via intraocular (eye) or intranasal (nose) drops. 4. The R2B strain is a stronger "booster" dose given to older birds (usually at 8–12 weeks). 5. HVT (Herpesvirus of Turkeys) is used specifically to vaccinate against Marek's disease, not Ranikhet.

Final Answer: The vaccine used for 1-day old chicks is the F1 / Lasota strain.

Answer: (A)

Q34.

Solution

Concept:

Essential plant nutrients are classified as macro or micro. Magnesium (Mg) is a secondary macronutrient that plays a fundamental structural and functional role in plants.

Solution:

1. **Magnesium** is the central core atom of the **Chlorophyll** molecule, similar to how iron is the center of hemoglobin in humans. Without magnesium, the plant cannot capture solar energy for photosynthesis. 2. Magnesium is a "mobile" element within the plant. When a deficiency occurs, the plant moves magnesium from older leaves to the younger, growing parts. 3. This leads to the characteristic symptom of **interveinal chlorosis** (veins remain green while the tissue between them turns yellow) specifically in the **older leaves**. 4. Iron deficiency also causes interveinal chlorosis, but it appears first on young leaves because iron is immobile.

Final Answer: Magnesium is a constituent of chlorophyll and its deficiency causes interveinal chlorosis in older leaves.

Answer: (B)

Q35.

Solution

Concept:

The Nitrogen Cycle in the soil involves several microbial transformations that convert nitrogen from one form to another. Ammonification is the stage that bridges organic matter and inorganic nutrients.

Solution:

1. Most nitrogen in the soil is tied up in organic forms (proteins, amino acids from dead plants and animals). 2. Plants cannot absorb these large organic molecules; they prefer inorganic forms like Ammonium (NH_4^+) or Nitrate (NO_3^-). 3. **Ammonification** is the process where soil bacteria and fungi break down organic nitrogenous compounds and release nitrogen in the form of **Ammonia** (NH_3) or Ammonium. 4. This is the first step of mineralization. 5. Subsequent steps include "Nitrification" (converting ammonia to nitrate), which is performed by bacteria like *Nitrosomonas* and *Nitrobacter*.

Final Answer: The conversion of organic nitrogen to ammonia is called Ammonification.

Answer: (C)

Q36.

Solution

Concept:

Soil fertility and crop health are often limited by the availability of essential micronutrients. Zinc (Zn) is a critical micronutrient required for the synthesis of auxins (growth hormones) and the activation of various enzymes.

Solution:

1. The **'Khaira' disease** is a very famous nutritional disorder of Rice, first identified in the Tarai region of India by Dr. Y.L. Nene. 2. It is caused by a **deficiency of Zinc** in the soil. 3. Symptoms usually appear in the nursery or shortly after transplanting. The younger leaves show chlorosis at the base, while older leaves develop characteristic rusty-brown (bronzed) spots or streaks. 4. The growth of the plant is severely stunted, and tillering is restricted. 5. This condition is easily managed by the foliar application of Zinc Sulphate mixed with lime or by applying zinc fertilizers to the soil before sowing.

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

Answer: (C)

Q37.

Solution

Concept:

Rainfall (Precipitation) is classified based on the mechanism that causes the moist air to rise, cool, and condense. The three main types are Convectional, Cyclonic, and Orographic.

Solution:

1. **Orographic rainfall** (also known as Relief Rainfall) occurs when a mass of moist air is physically forced to move upward by a topographic barrier, such as a mountain range. 2. As the air rises on the "windward side" of the mountain, it cools adiabatically, leading to condensation and heavy precipitation. 3. Once the air crosses the peak and descends on the other side (the "leeward side"), it becomes warmer and drier, creating a "Rain Shadow" region with very little rainfall. 4. This type of rainfall is responsible for the heavy rains in the Western Ghats and the Himalayas in India.

Final Answer: Rainfall caused by air rising over a topographic barrier is called Orographic rainfall.

Answer: (C)

Q38.

Solution

Concept:

Insect pests cause damage to crops in different ways depending on their feeding habits. The Yellow Stem Borer (*Scirpophaga incertulas*) is one of the most destructive pests of rice in India.

Solution:

1. The larvae (caterpillars) of the stem borer hatch and bore into the central part of the rice stem. 2. They feed on the internal tissues, effectively cutting off the supply of water and nutrients to the upper parts of the plant. 3. If the attack occurs during the **vegetative stage**, the central leaf whorl dries up and dies, a symptom known as **"Dead Heart."** 4. If the attack occurs during the **reproductive stage** (after flowering), the entire panicle turns white and contains no grains, a symptom known as **"White Ear."** 5. These symptoms are diagnostic for stem borer infestation.

Final Answer: Dead Heart and White Ear symptoms are caused by the Yellow Stem Borer.

Answer: (B)

Q39.

Solution

Concept:

Calculating the cost of nutrients in fertilizers is essential for economic farm management. This requires knowing the total weight of the fertilizer, the percentage of the nutrient it contains, and its market price.

Solution:

1. **Calculate the amount of Nitrogen in one bag:** A 50 kg bag of Urea contains 46% Nitrogen. Amount of $N = 50 \text{ kg} \times 0.46 = 23 \text{ kg}$ of Nitrogen. 2. **Determine the total cost of the bag:** The cost is given as 266.50. 3. **Calculate the cost per kg of Nitrogen:** Cost per kg of N = Total Cost/Total kg of N Cost per kg of $N = 266.50/23 = 11.586...$ 4. Rounding to two decimal places, we get 11.58. 5. This calculation helps farmers compare different fertilizers (like Urea vs. Ammonium Sulphate) to see which provides nitrogen at a cheaper rate.

Final Answer: The cost per kg of Nitrogen in Urea is 11.58.

Answer: (B)

Q40.

Solution

Concept:

Sugar acts as a preservative when used in high concentrations (generally above 65%). This method is the scientific basis for making jams, jellies, and marmalades.

Solution:

1. High sugar concentration creates a condition of high osmotic pressure. 2. When microorganisms (bacteria or yeast) come into contact with the high-sugar environment, water is drawn out of the microbial cells through the process of **osmosis**. 3. This dehydration of the microbial cells, known as **plasmolysis**, prevents them from growing, reproducing, or causing spoilage. 4. This specific method of using sugar to preserve food is often referred to as **Osmotic Dehydration** or preservation by high osmotic pressure. 5. It is a physical-chemical method that ensures fruit products remain shelf-stable for long periods without refrigeration.

Final Answer: The method using high sugar concentrations to inhibit growth is Osmotic Dehydration.

Answer: (B)

Q41.

Solution

Concept:

In genetics, a cross is named based on the purpose it serves and the nature of the parents involved. A testcross is a specific tool used to determine the zygosity (genotype) of an individual expressing a dominant phenotype.

Solution:

1. An F_1 hybrid (e.g., Tt) expresses the dominant phenotype but carries a recessive allele. 2. To "test" its genetic makeup, it is crossed with a parent that is **homozygous recessive** (tt) for the same trait. 3. This is called a **testcross** because the phenotypic ratio of the offspring directly reveals the genotype of the F_1 parent. 4. If the F_1 is heterozygous (Tt), the offspring will show a 1:1 ratio of dominant to recessive phenotypes. 5. While every testcross is technically a backcross (crossing with a parent), not every backcross is a testcross. A backcross could also involve the dominant parent.

Final Answer: A cross between an F_1 and its homozygous recessive parent is a testcross.

Answer: (B)

Q42.

Solution

Concept:

The 'Central Dogma' is the fundamental framework of molecular biology, first proposed by Francis Crick in 1958. It explains how the static information stored in DNA is transformed into functional units (proteins).

Solution:

1. The flow of information starts with **DNA**, which can replicate itself. 2. Information is then transferred from DNA to **RNA** (specifically mRNA) through a process called **Transcription**. 3. Finally, the information in the RNA sequence is used to build a sequence of amino acids to form a **Protein** through a process called **Translation**. 4. Therefore, the sequence is: **DNA $\rightarrow$ RNA $\rightarrow$ Protein**. 5. Note: "Reverse Transcription" (RNA to DNA) is an exception found in some viruses, but the standard central dogma follows the linear path mentioned above.

Final Answer: The Central Dogma describes the flow as DNA $\rightarrow$ RNA $\rightarrow$ Protein.

Answer: (B)

Q43.

Solution

Concept:

Enzymes are biological catalysts, usually proteins, that speed up chemical reactions in living organisms without being consumed in the process. They work by creating a favorable environment for the reaction to occur.

Solution:

1. For a chemical reaction to begin, the reactants must reach a specific energy threshold called the **Activation Energy** (E_a). 2. Without an enzyme, this threshold might be so high that the reaction happens very slowly or not at all at body temperature. 3. Enzymes work by binding to the substrates and stabilizing the transition state, which significantly **lowers the activation energy** required. 4. This allows the reaction to proceed much faster. 5. Crucially, enzymes do not change the total free energy (ΔG) of the products or reactants, nor do they change the equilibrium constant of the reaction.

Final Answer: Enzymes speed up reactions by lowering the Activation Energy.

Answer: (B)

Q44.

Solution

Concept:

The soil environment is not uniform. The area influenced by living plant roots is a unique micro-ecosystem with distinct chemical, physical, and biological properties compared to the "bulk soil" further away.

Solution:

1. The **Rhizosphere** is defined as the narrow zone of soil **immediately surrounding the plant roots**. 2. In this region, plants secrete "exudates" (sugars, organic acids, and amino acids) from their roots. 3. These exudates serve as a rich food source for microorganisms, leading to a much higher microbial population (often 10 to 100 times higher) in the rhizosphere than in the bulk soil. 4. This zone is critical for nutrient cycling, plant-microbe signaling, and protecting the plant from soil-borne pathogens. 5. The term was first coined by Lorenz Hiltner in 1904.

Final Answer: The Rhizosphere is the soil region immediately surrounding plant roots.

Answer: (B)

Q45.

Solution

Concept:

Indigenous cattle breeds of India (Zebu cattle) are often named after their region of origin. The Gir is one of the most important milk-producing (dairy) breeds of India.

Solution:

1. The Gir breed takes its name from the **Gir forest** and surrounding districts (Amreli, Bhavnagar, Junagadh). 2. These regions are located in the state of **Gujarat**. 3. Gir cattle are easily identified by their prominent convex forehead (domed head) and long, pendulous, leaf-like ears. 4. They are world-renowned for their high milk yield and tolerance to heat and tropical diseases. 5. In fact, Gir cattle were exported to Brazil many years ago, where they were further developed into the high-yielding "Gyr" breed.

Final Answer: The Gir breed of cattle is mainly found in Gujarat.

Answer: (B)

Q46.

Solution

Concept:

Artificial Insemination (AI) is the technique of depositing semen into the female reproductive tract by mechanical means rather than natural mating. The success of AI depends heavily on the "Correct Site of Deposition," which varies slightly between species but follows a standard protocol in cattle.

Solution:

1. In the "Recto-vaginal method" commonly used for cows, the technician passes the AI gun through the vagina and carefully navigates through the rings of the cervix. 2. The optimal site for semen deposition is the **Body of the Uterus**, just past the internal opening (internal os) of the cervix. 3. Depositing semen here allows the sperm to travel equally into both uterine horns toward the fallopian tubes, where fertilization occurs. 4. If semen is deposited in the vagina or too shallow in the cervix, the conception rate drops significantly due to physical barriers and the acidic environment. 5. In contrast, in sheep and goats, the cervix is much more difficult to penetrate, and deposition is often limited to the cervix.

Final Answer: In cows, the site of semen deposition is the Body of the Uterus.

Answer: (C)

Q47.

Solution

Concept:

Nitrogen-fixing bacteria are categorized based on their relationship with the host plant. Symbiotic bacteria (like *Rhizobium*) require a host plant and form nodules, while non-symbiotic (free-living) bacteria fix nitrogen independently in the soil.

Solution:

1. **Azotobacter** is a classic example of a free-living, aerobic, non-symbiotic nitrogen-fixing bacterium. 2. It lives in the soil and fixes atmospheric nitrogen without forming any specialized structures or needing a host plant. It is particularly common in neutral to alkaline soils. 3. *Rhizobium* and *Bradyrhizobium* are symbiotic and only fix nitrogen when inside the root nodules of legumes. 4. *Frankia* is a symbiotic actinomycete that forms nodules in non-leguminous plants like Casuarina. 5. Azotobacter biofertilizers are used for non-leguminous crops like Wheat, Maize, and Mustard to improve soil nitrogen status.

Final Answer: Azotobacter is a non-symbiotic nitrogen-fixing bacterium.

Answer: (B)

Q48.

Solution

Concept:

Puddling is a critical land preparation operation specifically for lowland (wetland) rice. It involves churning the soil in standing water using a tractor-mounted puddler or a country plow.

Solution:

1. The primary objective of puddling is to destroy the soil structure and create an impervious layer (a "plow pan") just below the surface. 2. This layer **reduces the deep percolation** (downward movement) of water. 3. By minimizing percolation, puddling helps maintain standing water in the field, which is essential for rice growth and helps suppress the germination of terrestrial weeds. 4. While it does help in incorporating organic matter and easing transplanting, the hydrological benefit of water conservation in the root zone is the most vital functional reason for this practice.

Final Answer: Puddling is done primarily to reduce deep percolation of water.

Answer: (B)

Q49.

Solution

Concept:

Coccidiosis is a common and economically devastating parasitic disease in poultry, caused by protozoa of the genus *Eimeria*. It affects the intestinal tract, causing bloody diarrhea, poor growth, and high mortality.

Solution:

1. Coccidiosis is managed through strict sanitation and the use of specific chemical agents. 2. These agents are called **Coccidiostats** (which inhibit the parasite's growth) or Coccidiocides (which kill the parasite). 3. In commercial poultry farming, coccidiostats (like Monensin or Amprolium) are routinely added to the **poultry feed** as a preventive measure throughout the bird's growth period. 4. Since the parasite's life cycle involves oocysts shed in the litter, maintaining dry litter is also a critical part of management. 5. Antibiotics are used for bacterial infections, and antifungal sprays are for molds; neither is effective against the protozoan cause of Coccidiosis.

Final Answer: Coccidiosis is managed using Coccidiostats in feed.

Answer: (B)

Q50.

Solution

Concept:

Horticulture is the branch of agriculture that deals with the garden cultivation of plants. It is further subdivided into specialized fields based on the type of crop being studied.

Solution:

1. **Olericulture** is the specific branch of horticulture that deals with the production, storage, processing, and marketing of **Vegetables**. 2. For comparison: - **Pomology** deals with the study of Fruits. - **Floriculture** deals with the study of Flowers and ornamental plants. - **Arboriculture** deals with individual trees and shrubs. 3. The term comes from the Latin word 'Oleris' (potherb/vegetable) and 'cultura' (cultivation).

Final Answer: Olericulture deals with the study of Vegetables.

Answer: (C)

Answer Key

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