CUET-UG Agriculture Sample Paper-11

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. In a dihybrid cross exhibiting incomplete dominance along with independent assortment, what will be the phenotypic ratio observed in the F_2 generation?

(A) 9:3:3:1

(B) 1:2:1:2:4:2:1:2:1

(C) 3:1

(D) 9:7

Q2. Linkage between genes is most likely to be broken during which of the following processes?

(A) Mutation

(B) Crossing over during prophase I

(C) Independent assortment

(D) DNA replication

Q3. A test cross of a heterozygous organism exhibiting complete linkage will produce which type of offspring?

(A) 1:1 ratio

(B) 3:1 ratio

(C) Only parental types

(D) Only recombinant types

Q4. During DNA replication, which enzyme is responsible for removing RNA primers from the newly synthesized strand?

(A) DNA ligase

(B) DNA polymerase I

(C) Helicase

(D) Primase

Q5. Which plant breeding method is most suitable for maintaining genetic purity in self-pollinated crops over successive generations?

(A) Mass selection

(B) Pure line selection

(C) Hybridization

(D) Mutation breeding

Q6. Somaclonal variation is commonly observed in plants regenerated through which of the following techniques?

(A) Seed propagation

(B) Tissue culture

(C) Vegetative propagation

(D) Hybrid vigor

Q7. Enzymes increase the rate of biochemical reactions primarily by affecting which of the following?

(A) Increasing activation energy

(B) Decreasing activation energy

(C) Increasing substrate concentration

(D) Changing equilibrium constant

Q8. Deficiency of which vitamin in plants is most closely associated with reduced growth and sterility?

(A) Thiamine

(B) Riboflavin

(C) Niacin

(D) Ascorbic acid

Q9. Which microorganism is primarily responsible for biological nitrogen fixation in leguminous crops?

(A) Nitrosomonas

(B) Nitrobacter

(C) Rhizobium

(D) Pseudomonas

Q10. The optimum temperature range for the growth of most agricultural crops generally lies within which of the following limits?

(A) 0–10°C

(B) 10–20°C

(C) 20–30°C

(D) 30–45°C

Q11. Relative humidity is best defined as the ratio of which of the following quantities?

(A) Actual vapor pressure to saturation vapor pressure

(B) Actual vapor pressure to total pressure

(C) Saturation vapor pressure to atmospheric pressure

(D) Total pressure to vapor pressure

Q12. Which of the following climatic factors has the greatest influence on the rate of evapotranspiration in crops?

(A) Soil color

(B) Wind speed

(C) Soil microorganisms

(D) Crop variety

Q13. Recombinant DNA technology fundamentally involves which of the following processes?

(A) Transcription

(B) Translation

(C) Gene cloning

(D) Mutation

Q14. Which enzyme is specifically used in the polymerase chain reaction (PCR) technique to amplify DNA?

(A) DNA polymerase III

(B) Taq polymerase

(C) RNA polymerase

(D) DNA ligase

Q15. Which of the following Indian cattle breeds is well known for its ability to withstand drought conditions?

(A) Jersey

(B) Holstein Friesian

(C) Sahiwal

(D) Brown Swiss

Q16. Ranikhet disease is a highly contagious viral disease that primarily affects which type of livestock?

(A) Cattle

(B) Poultry

(C) Sheep

(D) Goats

Q17. The causative agent of Foot and Mouth Disease (FMD) in livestock belongs to which category?

(A) Bacteria

(B) Virus

(C) Fungus

(D) Protozoa

Q18. A balanced ration for livestock is defined as a diet that provides which of the following?

(A) Only carbohydrates

(B) Only proteins

(C) All nutrients in correct proportions

(D) Only vitamins

Q19. Artificial insemination in livestock management is primarily used for which purpose?

(A) Increasing disease transmission

(B) Improving genetic quality

(C) Reducing milk yield

(D) Increasing mortality

Q20. Colostrum, the first milk produced after parturition, is especially rich in which of the following components?

(A) Carbohydrates

(B) Fats

(C) Antibodies

(D) Minerals

Q21. Coccidiosis in poultry is caused by organisms belonging to which group?

(A) Virus

(B) Bacteria

(C) Protozoa

(D) Fungus

Q22. The primary objective of providing proper housing to livestock is to ensure which of the following?

(A) Decoration

(B) Protection from weather and predators

(C) Increasing workload

(D) Reducing feeding requirements

Q23. Pasteurization of milk is mainly carried out to achieve which of the following objectives?

(A) Increase fat content

(B) Kill pathogenic microorganisms

(C) Remove lactose

(D) Increase vitamin content

Q24. Which of the following nutrients is most essential for sustaining high levels of milk production in dairy animals?

(A) Fiber

(B) Protein

(C) Water

(D) All of these

Q25. Exotic breeds of cattle are generally introduced into a region mainly for which purpose?

(A) Disease resistance

(B) High milk yield

(C) Draught power

(D) Local adaptation

Q26. Rinderpest is a highly contagious disease that primarily affects which category of livestock animals?

(A) Poultry

(B) Cattle

(C) Fish

(D) Goats

Q27. Silage is prepared by preserving green fodder through which of the following processes?

(A) Drying under sunlight

(B) Fermentation under anaerobic conditions

(C) Burning and storage

(D) Freezing at low temperature

Q28. Soil having a pH value below 7 is generally classified under which category?

(A) Alkaline soil

(B) Neutral soil

(C) Acidic soil

(D) Saline soil

Q29. Deficiency of nitrogen in plants is most commonly indicated by which of the following symptoms?

(A) Yellowing of leaves (chlorosis)

(B) Purple coloration of leaves

(C) Excessive flowering

(D) Thickening of stems

Q30. Which method of irrigation is considered most efficient in terms of water conservation and precise application?

(A) Flood irrigation

(B) Furrow irrigation

(C) Drip irrigation

(D) Basin irrigation

Q31. Field capacity of soil refers to the amount of water retained in the soil after which of the following processes?

(A) Evaporation

(B) Drainage of excess water

(C) Rainfall

(D) Irrigation

Q32. Urea is widely used in agriculture as a fertilizer primarily because it is a rich source of which nutrient?

(A) Phosphorus

(B) Potassium

(C) Nitrogen

(D) Calcium

Q33. Integrated Weed Management (IWM) involves the use of which of the following approaches?

(A) Only chemical control methods

(B) Only mechanical control methods

(C) Combination of cultural, mechanical, and chemical methods

(D) No weed control practices

Q34. Rice is predominantly grown as which type of seasonal crop in India?

(A) Rabi crop

(B) Kharif crop

(C) Zaid crop

(D) Perennial crop

Q35. Wheat cultivation requires which of the following climatic conditions for optimal growth?

(A) High temperature throughout the year

(B) Cool growing season with moderate rainfall

(C) Heavy rainfall and waterlogging

(D) Extremely dry conditions

Q36. Millets are considered highly suitable for cultivation in arid regions mainly due to which characteristic?

(A) High water requirement

(B) Drought tolerance

(C) Low nutritional value

(D) Short growing period only

Q37. Sugarcane is commonly propagated through which of the following methods?

(A) Seeds

(B) Stem cuttings

(C) Root division

(D) Leaf cuttings

Q38. Organic farming systems avoid the use of which of the following inputs?

(A) Compost

(B) Green manure

(C) Synthetic fertilizers

(D) Crop rotation

Q39. Precision farming techniques primarily rely on which of the following technologies for efficient crop management?

(A) Traditional tools

(B) Satellite imaging and sensors

(C) Manual labor only

(D) Random field observation

Q40. Soil texture is determined based on which of the following properties of soil particles?

(A) Color

(B) Particle size distribution

(C) Chemical composition

(D) Nutrient content

Q41. Agricultural drainage systems are primarily designed to achieve which objective?

(A) Increase soil salinity

(B) Remove excess water from soil

(C) Add nutrients to soil

(D) Increase rainfall absorption

Q42. Deficiency of potassium in plants typically results in which visible symptom?

(A) Weak stems

(B) General chlorosis

(C) Necrosis at leaf margins

(D) Excessive vegetative growth

Q43. Minimum tillage practices in agriculture are mainly adopted to achieve which of the following goals?

(A) Increase soil erosion

(B) Reduce soil disturbance

(C) Increase labor requirement

(D) Destroy crop residues

Q44. Crop rotation contributes to sustainable agriculture primarily by influencing which factor?

(A) Increasing pest population

(B) Improving soil fertility

(C) Increasing soil erosion

(D) Promoting weed growth

Q45. Which of the following is an example of a biofertilizer used in agriculture?

(A) Urea

(B) Rhizobium

(C) DAP

(D) MOP

Q46. Mango plants are most commonly propagated using which vegetative method to maintain desirable traits?

(A) Seeds

(B) Grafting

(C) Cutting

(D) Layering

Q47. Citrus crops generally grow best in soils with which of the following pH characteristics?

(A) Highly alkaline

(B) Slightly acidic to neutral

(C) Strongly acidic

(D) Highly saline

Q48. Potato cultivation is primarily carried out using which planting material?

(A) True seeds

(B) Tubers

(C) Roots

(D) Leaves

Q49. The preservation of jams and jellies largely depends on which key factor?

(A) Low sugar concentration

(B) High sugar concentration

(C) High protein content

(D) Low acidity

Q50. Budding, as used in horticultural practices, is classified under which type of plant propagation?

(A) Sexual propagation

(B) Asexual propagation

(C) Seed formation

(D) Pollination

Detailed Solutions

Q1.

Solution

Concept: Mendelian genetics, specifically a dihybrid cross involving two genes that both exhibit incomplete dominance and assort independently.

Solution: In incomplete dominance, the heterozygous phenotype is an intermediate blend of the two homozygous phenotypes. A monohybrid cross (e.g., Rr x Rr) for a gene with incomplete dominance yields a phenotypic ratio of 1:2:1 (e.g., 1 Red : 2 Pink : 1 White), which is identical to its genotypic ratio (1 RR : 2 Rr : 1 rr).

A dihybrid cross examines the inheritance of two different genes. The principle of independent assortment states that the alleles for these two genes segregate independently. Therefore, we can find the combined phenotypic ratio by multiplying the individual monohybrid ratios.

Since both genes in this cross exhibit incomplete dominance, the F 2 2
phenotypic ratio for each gene is 1:2:1. The dihybrid ratio is the product of these two ratios:
(1:2:1) × (1:2:1)
This is expanded as:
1 × (1:2:1) -> 1:2:1
2 × (1:2:1) -> 2:4:2
1 × (1:2:1) -> 1:2:1
Combining these gives the final phenotypic ratio of 1:2:1:2:4:2:1:2:1. This represents nine distinct phenotypes because each of the nine possible genotypes produces a unique phenotype.
Final Answer : "1:2:1:2:4:2:1:2:1"

Answer: (B)

Q2.

Solution

Concept: Genetic linkage and the mechanism of recombination.

Solution: Genetic linkage is the tendency of genes that are located physically close to each other on the same chromosome to be inherited together. This is an exception to Mendel's Law of Independent Assortment. However, this linkage is not always absolute. The process that breaks this linkage is crossing over.

Crossing over is the physical exchange of genetic segments between non-sister chromatids of a pair of homologous chromosomes. This event occurs during the pachytene stage of prophase I of meiosis. By swapping segments, crossing over creates new combinations of alleles on the chromosomes, resulting in recombinant gametes. These recombinant gametes carry different combinations of alleles than the parental chromosomes, thus breaking the linkage between the genes. The further apart two genes are on a chromosome, the more likely it is that a crossover event will occur between them.

Final Answer : "Crossing over during prophase I"

Answer: (B)

Q3.

Solution

Concept: Test cross analysis with completely linked genes.

Solution: A test cross involves crossing an individual with an unknown genotype (in this case, a heterozygote, e.g., AB/ab) with a homozygous recessive individual (ab/ab). Complete linkage means that the two genes are so close together on the chromosome that no crossing over occurs between them.

In the heterozygous parent (AB/ab), because of complete linkage, the alleles A and B are always inherited together, and the alleles a and b are always inherited together. Therefore, this parent can only produce two types of gametes: the parental gametes (AB) and (ab). No recombinant gametes (Ab or aB) are formed.

The homozygous recessive parent (ab/ab) can only produce one type of gamete: (ab).

The possible offspring are produced by the fusion of these gametes:

Gamete (AB) from heterozygote + Gamete (ab) from recessive parent $\rightarrow$ Offspring (AB/ab)

Gamete (ab) from heterozygote + Gamete (ab) from recessive parent $\rightarrow$ Offspring (ab/ab)

Both of these offspring genotypes are parental types, meaning they have the same combination of alleles as the original parents in the cross. Therefore, a test cross with complete linkage produces only parental-type offspring.

Final Answer : "Only parental types"

Answer: (C)

Q4.

Solution

Concept: The roles of key enzymes in the process of DNA replication.

Solution: During DNA replication, the enzyme Primase synthesizes short RNA primers to provide a starting point (a free 3'-OH group) for DNA polymerase to begin synthesizing the new DNA strand. This is necessary because DNA polymerases can only add nucleotides to an existing strand. On the lagging strand, which is synthesized discontinuously in Okazaki fragments, many such primers are required.

After the DNA segments are synthesized, these RNA primers must be removed and replaced with DNA. This crucial role is performed by DNA polymerase I. It has a unique 5'→3' exonuclease activity that allows it to remove the RNA primer nucleotides one by one from the 5' end of the fragment ahead of it. As it removes the RNA, its 5'→3' polymerase activity simultaneously fills the gap with the correct DNA nucleotides. Finally, DNA ligase seals the nick between the newly synthesized DNA and the preceding fragment.

Final Answer : "DNA polymerase I"

Answer: (B)

Q5.

Solution

Concept: Plant breeding methods for improving and maintaining crop varieties, particularly in self-pollinated species.

Solution: Pure line selection is a plant breeding method used for the improvement of self-pollinated crops. A pure line is a population of plants that are all progeny of a single, self-fertilized homozygous individual. Consequently, all individuals within a pure line are genetically identical and homozygous.

The method involves selecting a large number of superior-looking individual plants from a mixed population. The seeds from each selected plant are harvested separately and grown in individual rows (progeny rows) in the next generation. After rigorous evaluation over several seasons, the progeny of the single best-performing plant is selected, multiplied, and released as a new variety. Because this variety originated from a single homozygous plant and is maintained through self-pollination, it exhibits a very high degree of genetic uniformity and purity. This is the most effective method for maintaining genetic purity in self-pollinating crops.

Final Answer : "Pure line selection"

Answer: (B)

Q6.

Solution

Concept: Sources of genetic variation in plants, specifically those arising from in vitro culture techniques.

Solution: Somaclonal variation is the genetic and phenotypic variation that arises among plants regenerated from in vitro tissue culture. Plants derived from a single parent explant are expected to be identical clones. However, the stress associated with the tissue culture process—such as wounding, exposure to unnatural levels of plant growth regulators, and the nutrient medium—can induce genetic and epigenetic changes. These changes can include point mutations, chromosomal rearrangements (deletions, duplications), changes in chromosome number (polyploidy, aneuploidy), and alterations in DNA methylation patterns. This phenomenon is a hallmark of plant regeneration via tissue culture and is distinct from the predictable variation from sexual reproduction (seed propagation) or the high fidelity of conventional vegetative propagation.

Final Answer : "Tissue culture"

Answer: (B)

Q7.

Solution

Concept: The fundamental mechanism of enzyme catalysis in biochemical reactions.

Solution: Enzymes are biological catalysts that dramatically increase the rate of biochemical reactions. They achieve this by lowering the activation energy (Ea) of the reaction. The activation energy is the energy barrier that must be overcome for reactants (substrates) to be converted into products.

An enzyme binds to its specific substrate at the active site, forming an enzyme-substrate complex. This binding orients the substrate molecules optimally and stabilizes the high-energy transition state of the reaction. By providing an alternative reaction pathway with a lower energy transition state, the enzyme effectively reduces the activation energy barrier. This allows a much larger proportion of reactant molecules to have sufficient energy to react, thus speeding up the reaction rate. Enzymes do not change the overall energy difference between reactants and products (G) or the final equilibrium point of the reaction.

Final Answer : "Decreasing activation energy"

Answer: (B)

Q8.

Solution

Concept: The roles of essential vitamins in plant metabolism and development.

Solution: Thiamine (Vitamin B1) is a vital vitamin that plants synthesize and use as a coenzyme. Its active form, thiamine pyrophosphate (TPP), is an essential cofactor for several key enzymes involved in central carbohydrate metabolism. These enzymes include the pyruvate dehydrogenase complex (which links glycolysis to the Krebs cycle) and α ketoglutarate dehydrogenase (a key enzyme in the Krebs cycle). These metabolic pathways are fundamental for cellular respiration, energy (ATP) production, and the synthesis of essential organic molecules.

A deficiency in thiamine severely impairs these critical metabolic processes. The resulting energy deficit and lack of metabolic intermediates lead directly to a significant reduction in overall plant growth, particularly root development. Furthermore, the metabolic disruption can interfere with the development of reproductive organs, leading to sterility.

Final Answer : "Thiamine"

Answer: (A)

Q9.

Solution

Concept: Symbiotic relationships and the process of biological nitrogen fixation in agriculture.

Solution: Biological nitrogen fixation is the conversion of atmospheric nitrogen gas (N 2 2), which is largely inert, into ammonia (NH 3 3), a form that plants can readily use. In leguminous crops (such as soybeans, peas, alfalfa, and clover), this process is performed by symbiotic bacteria. The genus Rhizobium is the primary group of bacteria responsible for this symbiotic relationship.

Rhizobium bacteria infect the roots of legume plants and stimulate the formation of specialized structures called root nodules. Within the protected, low-oxygen environment of these nodules, the bacteria use an enzyme called nitrogenase to fix atmospheric nitrogen. In this mutualistic relationship, the plant supplies the bacteria with carbohydrates for energy, and in return, the bacteria provide the plant with a continuous supply of fixed nitrogen, reducing the need for external nitrogen fertilizers. Nitrosomonas and Nitrobacter are involved in nitrification (converting ammonia to nitrate), not nitrogen fixation.

Final Answer : "Rhizobium"

Answer: (C)

Q10.

Solution

Concept: The effect of cardinal temperatures on the growth and productivity of agricultural crops.

Solution: Temperature is a critical environmental factor that governs the rate of all metabolic processes in plants, including photosynthesis, respiration, and nutrient uptake. For every crop, there are three cardinal temperatures: a minimum below which growth ceases, an optimum at which growth is maximal, and a maximum above which growth stops and damage may occur.

While the specific optimum temperature varies depending on the crop species (e.g., cool-season vs. warm-season crops), the general range that supports vigorous growth for the majority of important agricultural crops is between 20°C and 30°C. Within this range, the rate of photosynthesis is typically high, and while respiration also increases, the net accumulation of biomass (growth) is maximized. Temperatures below this range significantly slow down metabolism, while temperatures above it can cause heat stress, increase water loss, and lead to a decline in net photosynthetic rate.

Final Answer : "20–30°C"

Answer: (C)

Q11.

Solution

Concept: Definition and formula for Relative Humidity (RH).

Solution: Relative humidity is a crucial measure in meteorology and agriculture that indicates how saturated the air is with water vapor. It is expressed as a percentage. The formal definition is the ratio of the amount of water vapor currently present in the air to the maximum amount of water vapor the air could possibly hold at that same temperature. These quantities are measured by their partial pressures.

Actual vapor pressure is the partial pressure exerted by the water vapor present in the air.

Saturation vapor pressure is the maximum partial pressure of water vapor that can exist at a given temperature before condensation occurs.

Thus, Relative Humidity (%) = (Actual Vapor Pressure / Saturation Vapor Pressure) × 100.

Option (A) correctly states this ratio. The other options represent incorrect relationships between atmospheric pressures.

Final Answer : "Actual vapor pressure to saturation vapor pressure"

Answer: (A)

Q12.

Solution

Concept: Climatic factors influencing the rate of evapotranspiration.

Solution: Evapotranspiration (ET) is the combined process of water evaporating from soil and other surfaces and water transpiring from plants. Several climatic factors drive this process, including solar radiation, air temperature, humidity, and wind speed. Among the given options, wind speed has a significant influence. Wind removes the layer of moist air (the boundary layer) from the leaf's surface. This action increases the vapor pressure gradient between the leaf's interior and the surrounding air, which accelerates the rate of transpiration. While soil color can affect soil temperature and evaporation, and crop variety determines physiological characteristics, wind speed is a direct and major climatic driver of ET.

Final Answer : "Wind speed"

Answer: (B)

Q13.

Solution

Concept: The core process of recombinant DNA technology.

Solution: Recombinant DNA technology, also known as genetic engineering, involves the manipulation of an organism's genes. The most fundamental process within this technology is gene cloning. This involves several key steps: isolating a specific gene of interest, inserting it into a small, self-replicating DNA molecule called a vector (such as a plasmid), and then introducing this recombinant vector into a host organism (like a bacterium). As the host cell divides, it makes numerous copies of the vector, and thus, numerous copies—or clones—of the inserted gene. Transcription and translation are processes of gene expression that occur after a gene is in place, and mutation is a change in a gene, but gene cloning is the foundational technique for creating and propagating recombinant DNA.

Final Answer : "Gene cloning"

Answer: (C)

Q14.

Solution

Concept: The specific enzyme required for the Polymerase Chain Reaction (PCR).

Solution: The Polymerase Chain Reaction (PCR) is a technique used to make millions of copies of a specific DNA segment. The process involves cycles of repeated heating and cooling. A critical step, DNA denaturation, requires heating the sample to about 95°C to separate the DNA strands. This high temperature would destroy most enzymes. Therefore, PCR relies on a special heat-stable (thermostable) DNA polymerase. The most commonly used enzyme is Taq polymerase, isolated from the thermophilic bacterium Thermus aquaticus, which thrives in hot springs. This enzyme's ability to withstand high temperatures allows for the automation of the entire PCR process. DNA polymerase III is not thermostable, RNA polymerase synthesizes RNA, and DNA ligase joins DNA fragments.

Final Answer : "Taq polymerase"

Answer: (B)

Q15.

Solution

Concept: Adaptability of indigenous Indian cattle breeds.

Solution: Indian cattle are broadly classified into indigenous (Zebu) and exotic breeds. Indigenous breeds like the Sahiwal are well-adapted to the subcontinent's harsh tropical and subtropical climates. The Sahiwal, originating from the Punjab region, is particularly noted for its high heat tolerance and ability to survive and produce milk during periods of drought and on low-quality forage. This hardiness is a characteristic of Zebu cattle (Bos indicus). In contrast, Jersey, Holstein Friesian, and Brown Swiss are exotic (Bos taurus) breeds from Europe. While they are high-yielding milk producers, they are not well-adapted to drought conditions and are susceptible to heat stress.

Final Answer : "Sahiwal"

Answer: (C)

Q16.

Solution

Concept: Host specificity of Ranikhet disease (Newcastle Disease).

Solution: Ranikhet disease, also known globally as Newcastle Disease, is a highly infectious and devastating viral ailment. The disease is caused by the avian paramyxovirus type 1 (APMV-1). Its primary hosts are birds, and it is particularly virulent in domestic poultry, including chickens, turkeys, and other fowl. The virus can cause severe respiratory distress, neurological signs (like twisting of the neck), and high mortality rates, leading to significant economic losses for the poultry industry. It does not naturally infect or cause disease in mammalian livestock such as cattle, sheep, or goats.

Final Answer : "Poultry"

Answer: (B)

Q17.

Solution

Concept: The classification of the pathogen causing Foot and Mouth Disease (FMD).

Solution: Foot and Mouth Disease (FMD) is an extremely contagious disease that affects cloven-hoofed animals, including cattle, pigs, sheep, and goats. The causative agent of FMD is a pathogen belonging to the Aphthovirus genus within the family Picornaviridae. Aphthoviruses are a type of RNA virus. The disease is characterized by fever and the formation of vesicles (blisters) on the mouth, tongue, and feet of affected animals. Due to its viral nature, it spreads rapidly, making it a major concern for international trade in livestock and animal products. It is not caused by bacteria, fungi, or protozoa.

Final Answer : "Virus"

Answer: (B)

Q18.

Solution

Concept: The definition of a balanced ration in the context of animal nutrition.

Solution: In animal husbandry, a 'ration' refers to the total amount of feed an animal receives in a 24-hour period. A 'balanced ration' is specifically formulated to provide all the essential nutrients in the correct quantities and proportions needed by the animal for its specific physiological state. This includes meeting the requirements for maintenance (basic body functions), growth, production (e.g., milk, eggs, wool), and reproduction. These nutrients include energy (from carbohydrates and fats), proteins, minerals, vitamins, and water. A diet consisting of only one nutrient class would be severely imbalanced and would lead to deficiencies and health problems.

Final Answer : "All nutrients in correct proportions"

Answer: (C)

Q19.

Solution

Concept: The primary application and benefit of Artificial Insemination (AI) in livestock.

Solution: Artificial insemination (AI) is a sophisticated breeding technology where semen is collected from a male and manually introduced into the reproductive tract of a female. The foremost advantage and primary reason for its widespread use is genetic improvement. AI allows for the extensive use of semen from a few genetically superior sires (males) with desirable traits (like high milk yield or rapid growth). This allows a single superior male to sire thousands of offspring, rapidly disseminating his desirable genes throughout a population and improving the overall genetic quality of the herd. AI also helps control venereal diseases, increases safety for handlers and animals, and is more cost-effective than keeping multiple bulls.

Final Answer : "Improving genetic quality"

Answer: (B)

Q20.

Solution

Concept: The unique and vital composition of colostrum.

Solution: Colostrum is the first form of milk produced by mammals immediately following parturition (giving birth). It is a dense, nutrient-rich fluid that is crucial for the newborn's survival. Its most vital and distinctive component is a very high concentration of antibodies, specifically immunoglobulins (Ig). Newborns of many species, including calves and lambs, are born with an immature immune system and cannot produce their own antibodies effectively. They acquire passive immunity by absorbing these maternal antibodies from the colostrum directly into their bloodstream through the intestinal wall. This protection is critical for fending off infections during the first few weeks of life. While colostrum is also rich in proteins, fats, and vitamins, its antibody content is its most important feature.

Final Answer : "Antibodies"

Answer: (C)

Q21.

Solution

Concept: The etiological agent responsible for Coccidiosis.

Solution: Coccidiosis is a parasitic disease that affects the intestinal tract of various animals, causing significant economic losses, particularly in the poultry industry. The disease is caused by microscopic, single-celled organisms known as protozoa. In poultry, the causative agents belong to several species within the protozoan genus Eimeria. These parasites invade and destroy the epithelial cells of the intestinal lining, leading to symptoms like diarrhea, poor nutrient absorption, weight loss, and in severe cases, death. The disease is host-specific, meaning the Eimeria species that infect chickens do not infect other animals like cattle.

Final Answer : "Protozoa"

Answer: (C)

Q22.

Solution

Concept: The fundamental purpose of providing housing for livestock.

Solution: The primary objective of housing livestock is to promote their health, welfare, and productivity by providing a safe and comfortable environment. This fundamentally involves shielding them from environmental stressors. This includes protection from adverse weather conditions such as extreme heat, cold, rain, snow, and strong winds. It also serves to protect the animals, especially the young and vulnerable, from predators. By minimizing stress from exposure and predation, proper housing helps prevent diseases, improves feed efficiency, and allows animals to achieve their full genetic potential for growth and production.

Final Answer : "Protection from weather and predators"

Answer: (B)

Q23.

Solution

Concept: The main goal of the milk pasteurization process.

Solution: Pasteurization is a heat-treatment process applied to milk and other beverages to ensure their safety for consumption. The primary and most crucial objective of pasteurization is to eliminate or reduce to a safe level any pathogenic (disease-causing) microorganisms that may be present in raw milk. This includes harmful bacteria like Listeria monocytogenes, Campylobacter jejuni, Salmonella, and Escherichia coli O157:H7, which can cause serious illnesses. A secondary benefit is that the process also kills many spoilage organisms, which extends the shelf life of the milk. The process has minimal effect on the nutritional value and does not aim to alter fat or lactose content.

Final Answer : "Kill pathogenic microorganisms"

Answer: (B)

Q24.

Solution

Concept: The key nutritional requirements for lactation in dairy animals.

Solution: Sustaining high levels of milk production places enormous metabolic demands on a dairy animal, requiring a diet rich in several key nutrients. All of the listed options are critically essential.

- **Water:** Milk is approximately 87% water. A high-producing cow needs to drink vast quantities of water daily just to replace the volume lost in milk. It is often considered the most limiting nutrient.
- **Protein:** Milk contains a significant amount of high-quality protein (casein and whey). The animal must consume enough dietary protein to synthesize these milk proteins.
- **Fiber:** For ruminants like dairy cows, fiber is essential for maintaining a healthy rumen environment. Fermentation of fiber by rumen microbes produces volatile fatty acids, which are the cow's primary source of energy for all bodily functions, including the energy-intensive process of synthesizing milk fat and lactose.

A deficiency in any one of these nutrients will severely limit milk production. Therefore, all are essential.

Final Answer : "All of these"

Answer: (D)

Q25.

Solution

Concept: The primary reason for importing and using exotic cattle breeds.

Solution: Exotic cattle breeds are those that are not native to a particular region. Breeds such as Holstein Friesian (from the Netherlands/Germany) and Jersey (from Jersey Island, UK) have been developed and intensively selected for generations in temperate climates, specifically for a very high milk production capacity. The primary purpose of introducing these breeds into countries like India is to leverage this high genetic potential for milk yield. This is often done through crossbreeding programs with local, indigenous breeds. The goal is to create a new animal that combines the high milk yield of the exotic breed with the hardiness, disease resistance, and local adaptation of the indigenous breed.

Final Answer : "High milk yield"

Answer: (B)

Q26.

Solution

Concept: Host specificity of the Rinderpest virus.

Solution: Rinderpest, also known as cattle plague, was a highly contagious and fatal viral disease. It was caused by a morbillivirus, closely related to the viruses causing measles in humans and canine distemper in dogs. The disease primarily affected cloven-hoofed animals, with cattle and domestic buffalo being the most susceptible and severely impacted. It caused high fever, mucosal erosions, and severe diarrhea, leading to devastating epidemics with mortality rates approaching 100% in naive populations. Thanks to a global vaccination campaign led by the FAO, the disease was officially declared eradicated in 2011. While it could affect goats, its primary and most devastating impact was on cattle.

Final Answer : "Cattle"

Answer: (B)

Q27.

Solution

Concept: The process of making silage for fodder preservation.

Solution: Silage is a method of preserving high-moisture green fodder for livestock feed, especially during periods when fresh fodder is scarce. The process involves harvesting the crop (like maize, sorghum, or grasses) at an optimal stage, chopping it into small pieces, and tightly packing it into an airtight structure called a silo. The exclusion of air creates anaerobic (oxygen-free) conditions. In this environment, naturally occurring lactic acid bacteria ferment the soluble carbohydrates (sugars) in the fodder, producing lactic acid. This acid lowers the pH of the material, which inhibits the growth of spoilage microorganisms and preserves the fodder's nutritional value. This is in contrast to hay-making, which preserves fodder by drying it under the sun.

Final Answer : "Fermentation under anaerobic conditions"

Answer: (B)

Q28.

Solution

Concept: The pH scale and its application to soil classification.

Solution: The pH scale is a logarithmic scale used to specify the acidity or basicity (alkalinity) of an aqueous solution. The scale typically ranges from 0 to 14. A pH of 7 is considered neutral. A pH value less than 7 indicates acidity, while a pH value greater than 7 indicates alkalinity. In the context of soil science, soil pH is a master variable that affects nutrient availability, microbial activity, and plant growth. Soil having a pH value below 7 is therefore classified as acidic soil.
Final Answer : "Acidic soil"

Answer: (C)

Q29.

Solution

Concept: Visual symptoms of nitrogen deficiency in plants.

Solution: Nitrogen (N) is a primary macronutrient essential for plant growth and is a core component of chlorophyll, the molecule responsible for photosynthesis and the green color of leaves. When nitrogen is deficient, the plant cannot synthesize enough chlorophyll. Since nitrogen is a mobile nutrient within the plant, the plant will move the available nitrogen from older, lower leaves to support new growth in the upper leaves. This translocation results in the older leaves becoming nitrogen-starved, leading to a loss of chlorophyll (chlorosis) and causing them to turn a uniform pale green or yellow. This symptom typically appears on the lower leaves first.
Final Answer : "Yellowing of leaves (chlorosis)"

Answer: (A)

Q30.

Solution

Concept: Water use efficiency of different irrigation methods.

Solution: Different irrigation methods vary significantly in their water application efficiency. Surface irrigation methods like flood, furrow, and basin irrigation involve spreading water over the soil surface. They often result in substantial water loss due to evaporation from the large wetted surface area and deep percolation or runoff of excess water. In contrast, drip irrigation is a micro-irrigation technique that delivers water slowly and directly to the plant's root zone through a network of pipes and emitters. By minimizing evaporation and runoff, and applying water precisely where it is needed, drip irrigation achieves the highest water use efficiency, often exceeding 90
Final Answer : "Drip irrigation"

Answer: (C)

Q31.

Solution

Concept: Definition of Field Capacity in soil science.

Solution: Field capacity is a key concept in soil water dynamics. After a soil profile is thoroughly wetted by heavy rainfall or irrigation, it becomes saturated. Following this, the force of gravity will pull the excess water (known as gravitational water) downwards out of the root zone. After this downward drainage has substantially ceased (typically after 24 to 48 hours), the amount of water retained in the soil is referred to as the field capacity. At this point, the soil's micropores are filled with water, and the macropores are filled with air. This represents the upper limit of water that is readily available to plants.

Final Answer : "Drainage of excess water"

Answer: (B)

Q32.

Solution

Concept: The primary nutrient supplied by urea fertilizer.

Solution: Urea, with the chemical formula CO(NH2)2, is the most widely used solid nitrogen fertilizer globally. Its popularity stems from its very high nitrogen content, which is typically 46% by weight (often represented as 46-0-0 in the N-P-K fertilizer rating system). When applied to soil, the enzyme urease (present in soil microorganisms) breaks down urea into ammonia, which is then converted to ammonium and nitrate forms that can be readily taken up by plant roots. It is used to supply nitrogen, an essential nutrient for vegetative growth and protein synthesis in plants.

Final Answer : "Nitrogen"

Answer: (C)

Q33.

Solution

Concept: Principles of Integrated Weed Management (IWM).

Solution: Integrated Weed Management (IWM) is a comprehensive approach to controlling weed populations in an economically and environmentally sustainable way. The core principle of IWM is to not rely on a single control method, particularly chemical herbicides. Instead, it integrates multiple tactics in a coordinated strategy. This includes:

- **Cultural Methods:** Crop rotation, planting competitive crop varieties, adjusting planting dates.
- **Mechanical Methods:** Tillage, hoeing, hand-pulling, mowing.
- **Biological Methods:** Using insects or pathogens that attack specific weeds.
- **Chemical Methods:** The judicious and targeted use of herbicides as part of the overall strategy, not as the sole solution.

By combining these methods, IWM aims to manage weeds effectively over the long term while minimizing negative impacts.

Final Answer : "Combination of cultural, mechanical, and chemical methods"

Answer: (C)

Q34.

Solution

Concept: Major cropping seasons in India.

Solution: India has three main cropping seasons: Kharif, Rabi, and Zaid. The Kharif season is aligned with the southwest monsoon, typically from June to October. Crops grown during this period, known as Kharif crops, require warm, wet conditions and a significant amount of water. Rice is the quintessential Kharif crop in India because its cultivation, especially via the traditional transplanting method, is heavily dependent on the monsoon rains. Rabi crops (e.g., wheat) are sown in winter (October-December) and harvested in spring. Zaid is a short season between Rabi and Kharif for crops like cucumber and watermelon.

Final Answer : "Kharif crop"

Answer: (B)

Q35.

Solution

Concept: Agro-climatic requirements for wheat cultivation.

Solution: Wheat is the primary Rabi (winter) cereal crop in India. Its successful cultivation requires specific climatic conditions. For germination and early vegetative growth, wheat needs a cool and moist climate, with optimal temperatures ranging from 10°C to 20°C. During the later stages of grain filling and ripening, it requires a long period of bright sunshine and warm, dry weather. High temperatures throughout the year, heavy rainfall, and waterlogged conditions are detrimental to the crop's growth and can lead to diseases and reduced yield. Therefore, a cool growing season with moderate rainfall is ideal.

Final Answer : "Cool growing season with moderate rainfall"

Answer: (B)

Q36.

Solution

Concept: Adaptability of millets to adverse environmental conditions.

Solution: Millets (a group including sorghum, pearl millet, finger millet, etc.) are often referred to as "climate-smart" or "miracle" grains. Their most outstanding characteristic is their exceptional resilience to harsh environments, particularly drought. They have a high water-use efficiency and a well-developed root system, allowing them to grow and produce a yield in arid and semi-arid regions with low and erratic rainfall where other major cereals like rice and wheat would fail. This drought tolerance makes them a crucial crop for food security in dryland farming systems. They are also highly nutritious, contrary to option (C).

Final Answer : "Drought tolerance"

Answer: (B)

Q37.

Solution

Concept: Method of propagation in sugarcane.

Solution: Sugarcane is propagated commercially through vegetative means rather than by sexual reproduction using seeds. The method used is planting sections of the mature cane stalk. These sections are known as 'setts' or 'stem cuttings'. Each sett typically has two or three nodes, and each node possesses a bud (or 'eye'). When the setts are planted horizontally in the soil, these buds germinate and sprout, giving rise to new plants that are genetically identical clones of the parent plant. This method ensures uniformity and is much faster and more reliable for commercial cultivation than growing from seed.

Final Answer : "Stem cuttings"

Answer: (B)

Q38.

Solution

Concept: Core principles and prohibitions in organic farming.

Solution: Organic farming is an agricultural system focused on sustainability, ecological balance, and biodiversity. A fundamental principle of organic farming is to work in harmony with natural systems. This entails the complete avoidance of synthetically produced inputs. Therefore, organic systems strictly prohibit the use of synthetic fertilizers (like urea, superphosphate), synthetic pesticides (insecticides, fungicides, herbicides), and genetically modified organisms (GMOs). Instead, fertility is maintained using natural inputs and practices such as applying compost and farmyard manure, growing green manure crops, and implementing crop rotation.

Final Answer : "Synthetic fertilizers"

Answer: (C)

Q39.

Solution

Concept: The technological foundation of precision farming.

Solution: Precision farming (or precision agriculture) is a modern farm management concept that uses information technology to observe, measure, and respond to variability within and between fields. The goal is to optimize inputs like water, fertilizer, and pesticides, thereby increasing efficiency and reducing environmental impact. This approach is heavily reliant on advanced technologies. Key tools include the Global Positioning System (GPS) for accurate location data, remote sensing technologies like satellite imaging and drones to monitor crop health, and various ground-based sensors to measure soil moisture, nutrient levels, and other variables. This data is then used to make precise management decisions.

Final Answer : "Satellite imaging and sensors"

Answer: (B)

Q40.

Solution

Concept: Definition of soil texture.

Solution: Soil texture is one of the most fundamental physical properties of soil. It is defined by the relative proportions of the three primary mineral particles, classified by their size: sand (2.0 - 0.05 mm), silt (0.05 - 0.002 mm), and clay (< 0.002 mm). The percentage of sand, silt, and clay in a soil sample determines its textural class (e.g., sandy loam, clay, silt loam), which is often visualized using a soil textural triangle. This particle size distribution is critical as it influences soil properties like water retention, drainage, aeration, and nutrient holding capacity. Soil color and chemical composition are different properties.

Final Answer : "Particle size distribution"

Answer: (B)

Q41.

Solution

Concept: The purpose and function of agricultural drainage.

Solution: The primary objective of installing an agricultural drainage system is to manage the soil water content by removing excess water from the plant root zone. When soil becomes saturated, or waterlogged, after heavy rain or irrigation, the pore spaces that normally hold air are filled with water. This condition, called anaerobiosis, is harmful to the roots of most crops as they require oxygen for respiration. A drainage system, which can be surface ditches or subsurface pipes (tiles), facilitates the removal of this gravitational water, thereby improving soil aeration, allowing for timely fieldwork, and creating a healthier environment for root growth and overall crop productivity.

Final Answer : "Remove excess water from soil"

Answer: (B)

Q42.

Solution

Concept: Potassium deficiency symptoms in plants.

Solution: Potassium (K) is an essential mobile nutrient for plants, crucial for enzyme activation, water regulation, and overall plant health. When deficient, it is translocated from older to younger tissues. This results in characteristic symptoms appearing first on lower, older leaves. The most typical visible symptom is chlorosis (yellowing) along the margins and tips of these leaves, which subsequently develops into necrosis (browning or scorching) of the tissue in the same areas. Weak stems are also a symptom, but necrosis at the leaf margins is the most distinctive visual cue.

Final Answer : "Necrosis at leaf margins"

Answer: (C)

Q43.

Solution

Concept: Principles of conservation tillage in agriculture.

Solution: Minimum tillage is a soil conservation practice designed to limit the mechanical manipulation of the soil. The primary goal is to reduce soil disturbance as much as possible. This approach helps to preserve the soil's natural structure, increase organic matter, reduce soil erosion from wind and water, conserve soil moisture, and decrease fuel and labor costs compared to conventional tillage. It contrasts with practices that increase erosion, labor, or destroy beneficial crop residues.

Final Answer : "Reduce soil disturbance"

Answer: (B)

Q44.

Solution

Concept: Benefits of crop rotation in sustainable agriculture.

Solution: Crop rotation is a fundamental practice in sustainable agriculture involving growing different crops in a sequence on the same land. Its primary contribution is to improve and maintain soil fertility. This is achieved in several ways: including nitrogen-fixing legumes (like beans or alfalfa) in the rotation adds nitrogen to the soil; different crops have different nutrient requirements and root structures, preventing the depletion of specific nutrients and improving soil structure. Crop rotation also helps break the life cycles of crop-specific pests, diseases, and weeds.

Final Answer : "Improving soil fertility"

Answer: (B)

Q45.

Solution

Concept: Definition and examples of biofertilizers.

Solution: Biofertilizers are substances containing living microorganisms that, when applied to soil or plants, promote growth by increasing the supply of essential nutrients. Rhizobium is a genus of soil bacteria that infects the roots of leguminous plants to form root nodules, where it fixes atmospheric nitrogen into a form the plant can use. This makes it a classic example of a biofertilizer. In contrast, Urea, DAP (Diammonium Phosphate), and MOP (Muriate of Potash) are synthetically produced chemical fertilizers.

Final Answer : "Rhizobium"

Answer: (B)

Q46.

Solution

Concept: Vegetative propagation is a method of asexual reproduction in plants where new plants are produced from vegetative parts such as stem, root, or leaves. It ensures genetic uniformity (clonal propagation) and preservation of desirable horticultural traits.

Solution: Mango is a highly heterozygous plant, meaning that plants grown from seeds show wide genetic variation. As a result:

- Seed-grown mango plants may differ in fruit size, taste, yield, and quality.
- The juvenile phase is longer, delaying fruiting.

To overcome these issues, vegetative propagation is preferred, especially grafting.

In grafting:

- A **scion** (shoot portion from a superior variety) is joined with a **rootstock** (plant with strong root system).
- The vascular tissues unite and grow as a single plant.
- The resulting plant retains the desirable traits of the scion such as fruit quality and productivity.
- It also results in early bearing compared to seed propagation.

Other methods like cutting and layering are generally ineffective in mango due to poor root formation and low success rate.

Final Answer : Grafting

Answer: (B)

Q47.

Solution

Concept: Soil pH is a critical factor influencing nutrient availability, microbial activity, and overall plant growth.

Solution: Citrus crops such as orange, lemon, and lime require optimal soil conditions for efficient nutrient uptake. The ideal soil pH range for citrus cultivation is slightly acidic to neutral (approximately 5.5–7.5).

- In **slightly acidic soils**, essential nutrients like nitrogen, phosphorus, potassium, and micronutrients (iron, zinc) are readily available.
- In **highly alkaline soils**, micronutrients become unavailable, leading to deficiencies such as chlorosis.
- In **strongly acidic soils**, toxic elements like aluminum may become soluble, harming plant roots.
- **Saline soils** interfere with water absorption due to osmotic imbalance.

Thus, slightly acidic to neutral soils provide the best environment for healthy citrus growth and fruit production.

Final Answer : Slightly acidic to neutral

Answer: (B)

Q48.

Solution

Concept: Vegetative propagation through modified underground stems.

Solution: Potato is propagated using tubers, which are modified underground stems rich in stored food.

- Tubers possess **"eyes"** (axillary buds) capable of sprouting into new plants.
- Each eye can develop into a shoot system under suitable conditions.
- This method ensures rapid multiplication and uniform crop production.
- It maintains genetic consistency, which is essential for commercial farming.

Propagation through true seeds is not preferred because:

- It leads to genetic variation.
- It produces non-uniform crops with varying yield and quality.

Hence, tubers are the standard planting material in potato cultivation.
Final Answer : Tubers

Answer: (B)

Q49.

Solution

Concept: Food preservation through osmotic pressure and inhibition of microbial growth.

Solution: Jams and jellies are preserved primarily due to their high sugar concentration.

- High sugar content creates a **hypertonic environment**.
- This leads to **osmotic dehydration** of microbial cells (plasmolysis).
- Microorganisms lose water and cannot grow or reproduce.
- Sugar also reduces **water activity (a_w)**, making conditions unsuitable for spoilage organisms.

Additionally:

- Acidity (from fruit acids) supports preservation.
- Proper sealing prevents contamination.

Low sugar concentration would fail to inhibit microbial growth, leading to spoilage.
Final Answer : High sugar concentration

Answer: (B)

Q50.

Solution

Concept: Classification of plant propagation methods.

Solution: Budding is a type of vegetative (asexual) propagation in which a single bud from a desired plant is inserted into the stem of another plant (rootstock).

- It does not involve fusion of gametes or seed formation.
- The new plant produced is genetically identical to the parent plant (clone).
- It is widely used in horticulture for fruit trees and ornamental plants.
- It allows combination of desirable traits such as disease resistance (rootstock) and high-quality yield (bud/scion).

Since it bypasses sexual reproduction and produces clones, budding is classified under asexual propagation.
Final Answer : Asexual propagation

Answer: (B)

Answer Key

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