

CUET UG Agriculture Sample Paper - 1

Duration: 1 Hour

Maximum Marks: 250

Instructions

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

Q1. A population of a cross-pollinated crop is in Hardy-Weinberg equilibrium. If the frequency of the dominant allele (A) for drought resistance is 0.7, what is the frequency of the heterozygous genotype in the population?

- (A) 0.49
- (B) 0.09
- (C) 0.42
- (D) 0.21

Q2. In molecular biology, the 'Wobble Hypothesis' proposed by Crick explains why:

- (A) One amino acid can be coded by more than one codon
- (B) Multiple ribosomes can attach to a single mRNA
- (C) The third base of a codon can undergo non-standard pairing with the anticodon
- (D) DNA polymerase can skip incorrect bases during replication

Q3. A soil has a bulk density of 1.3 g/cm^3 and a particle density of 2.6 g/cm^3 . Calculate the percentage of total porosity of this soil sample.

- (A) 25%
- (B) 50%



(C) 33%

(D) 66%

Q4. Which of the following breeding methods is most suitable for the development of 'Multilines' to provide stable resistance against various races of a pathogen?

(A) Pure line selection

(B) Backcross method

(C) Bulk method

(D) Pedigree method

Q5. The 'Apoplastic' movement of water in plants is restricted at the endodermis by the presence of:

(A) Plasmodesmata

(B) Casparian strips

(C) Pericycle

(D) Xylem vessels

Q6. In the context of Livestock diseases, 'Anthrax' is characterized by sudden death and discharge of tarry, non-clotting blood from natural orifices. The causative agent is:

(A) *Pasteurella multocida*

(B) *Bacillus anthracis*

(C) *Clostridium chauvoei*

(D) *Brucella abortus*

Q7. Which specific enzyme is inhibited by the majority of organophosphate insecticides, leading to the accumulation of a neurotransmitter in pests?

(A) DNA Polymerase



- (B) Acetylcholinesterase
- (C) Nitrogenase
- (D) Amylase

Q8. The 'Short-day' plants (SDPs) flower only when:

- (A) The day length is more than the critical photoperiod
- (B) The day length is less than the critical photoperiod
- (C) The night length is less than the critical dark period
- (D) Photoperiod does not matter

Q9. Identify the correct match regarding the indigenous cattle breed and its primary utility:

- (A) Sahiwal : Best Draft breed
- (B) Amritmahal : Best Milch breed
- (C) Hallikar : Excellent Draft breed
- (D) Gir : Dual purpose breed

Q10. In a Sugarcane field, the removal of lower dry and green leaves to improve aeration and reduce pest incidence is known as:

- (A) Propping
- (B) Detrashing
- (C) Earthing up
- (D) Wrapping

Q11. Which of the following types of soil water is held between 0.33 bar and 31 bar tension and is partially available to plants?

- (A) Gravitational water



- (B) Hygroscopic water
- (C) Capillary water
- (D) Combined water

Q12. The phenomenon of 'Synapsis' and formation of the 'Synaptonemal complex' occurs during which stage of Prophase I?

- (A) Leptotene
- (B) Zygotene
- (C) Pachytene
- (D) Diplotene

Q13. According to NPK recommendations, if a crop requires a ratio of 4 : 2 : 1 and the Nitrogen dose is 120 kg/ha, what is the required dose of P_2O_5 ?

- (A) 30 kg/ha
- (B) 60 kg/ha
- (C) 40 kg/ha
- (D) 120 kg/ha

Q14. Which propagation method is commercially followed for 'Litchi' to ensure early fruiting and true-to-type plants?

- (A) T-budding
- (B) Air layering (Gootee)
- (C) Inarching
- (D) Tongue grafting

Q15. The concentration of CO_2 in the soil air is generally:

- (A) Higher than the atmospheric air



- (B) Lower than the atmospheric air
- (C) Equal to the atmospheric air
- (D) Zero

Q16. Which of the following is a 'Total Root Parasite' weed affecting crops like Tobacco and Brinjal?

- (A) Cuscuta
- (B) Loranthus
- (C) Orobanche
- (D) Striga

Q17. The 'Fat' content in the milk of a buffalo is highest in which of the following breeds?

- (A) Murrah
- (B) Nili-Ravi
- (C) Bhadawari
- (D) Surti

Q18. In plant tissue culture, the mass of disorganized undifferentiated cells is termed as:

- (A) Explant
- (B) Callus
- (C) Somaclone
- (D) Protoplast

Q19. The conversion of Nitrite (NO_2^-) to Nitrate (NO_3^-) in the soil is mediated by:

- (A) Nitrosomonas



- (B) Nitrobacter
- (C) Rhizobium
- (D) Azotobacter

Q20. What is the 'Seed Index' of a crop?

- (A) Weight of 100 seeds
- (B) Weight of 1000 seeds
- (C) Number of seeds in 1 kg
- (D) Percentage of pure seeds

Q21. The 'Relative Humidity' is measured using which instrument?

- (A) Anemometer
- (B) Psychrometer
- (C) Lysimeter
- (D) Tensiometer

Q22. Which of the following fruit crops is highly susceptible to 'Bronze' or 'Pink' disease caused by Boron deficiency?

- (A) Mango
- (B) Citrus
- (C) Guava
- (D) Apple

Q23. The 'Pre-heating' of milk before condensation in the manufacturing of milk powder is done to:

- (A) Increase the fat content
- (B) Kill all thermophilic bacteria



- (C) Inactivate enzymes and improve stability
- (D) Change the color of milk

Q24. The 'Aneuploidy' condition ($2n - 1$) is technically known as:

- (A) Monosomy
- (B) Nullisomy
- (C) Trisomy
- (D) Tetrasomy

Q25. In 'Organic Farming', which of the following is strictly prohibited?

- (A) Green manuring
- (B) Use of Bio-fertilizers
- (C) Use of Synthetic Nitrogenous fertilizers
- (D) Crop rotation

Q26. The 'Rice-Wheat' cropping system is most dominant in which agro-climatic zone of India?

- (A) Coastal Plains
- (B) Indo-Gangetic Plains
- (C) Himalayan Region
- (D) Southern Plateau

Q27. The 'Tensiometer' works effectively in which type of soils?

- (A) Heavy Clay soils
- (B) Sandy soils
- (C) Saline soils
- (D) Peat soils



Q28. Which of the following is a non-reducing sugar found in high concentrations in Sugarcane juice?

- (A) Glucose
- (B) Fructose
- (C) Sucrose
- (D) Maltose

Q29. The 'Lactose' or milk sugar is a disaccharide made up of:

- (A) Glucose + Glucose
- (B) Glucose + Fructose
- (C) Glucose + Galactose
- (D) Fructose + Galactose

Q30. 'Black Heart' of potato is a physiological disorder caused by:

- (A) Nitrogen deficiency
- (B) High temperature during storage
- (C) Lack of O_2 in storage
- (D) Copper toxicity

Q31. Which part of the ruminant stomach is known as the 'True Stomach'?

- (A) Rumen
- (B) Reticulum
- (C) Omasum
- (D) Abomasum

Q32. The 'Graft union' fails if there is a lack of:



- (A) Xylem continuity
- (B) Phloem continuity
- (C) Cambial contact
- (D) Epidermal fusion

Q33. Which of the following is a 'Water-soluble' vitamin that must be supplemented in poultry feed?

- (A) Vitamin A
- (B) Vitamin D
- (C) Vitamin B-complex
- (D) Vitamin K

Q34. The 'Dapog' method of nursery raising is associated with which crop?

- (A) Wheat
- (B) Rice
- (C) Bajra
- (D) Maize

Q35. The hormone responsible for 'Milk Let-down' in dairy cows is:

- (A) Prolactin
- (B) Oxytocin
- (C) Estrogen
- (D) Progesterone

Q36. Which of the following soil orders is characterized by the presence of 'Expanding' type clay minerals and deep cracks during summer?

- (A) Alfisols



- (B) Entisols
- (C) Vertisols
- (D) Aridisols

Q37. The 'Central Dogma' of molecular biology states the flow of genetic information as:

- (A) RNA → DNA → Protein
- (B) DNA → RNA → Protein
- (C) Protein → RNA → DNA
- (D) DNA → Protein → RNA

Q38. In mango, 'Alternate Bearing' can be partially managed by the application of:

- (A) GA_3
- (B) Paclobutrazol (Cultar)
- (C) IAA
- (D) Ethylene

Q39. The 'Kjeldahl method' is used to determine which component in a soil or plant sample?

- (A) Phosphorus
- (B) Potassium
- (C) Total Nitrogen
- (D) Organic Carbon

Q40. The 'Yellow Vein Mosaic' (YVM) is a devastating viral disease of:

- (A) Tomato
- (B) Okra (Bhindi)



- (C) Chilli
- (D) Potato

Q41. Which among the following is a 'C4' plant?

- (A) Rice
- (B) Wheat
- (C) Maize
- (D) Soybean

Q42. The 'Specific Heat' of water is:

- (A) 0.5 cal/g/°C
- (B) 1.0 cal/g/°C
- (C) 2.0 cal/g/°C
- (D) 0.1 cal/g/°C

Q43. In DNA, the two strands are held together by:

- (A) Covalent bonds
- (B) Ionic bonds
- (C) Hydrogen bonds
- (D) Phosphodiester bonds

Q44. 'Gully erosion' is an advanced stage of:

- (A) Splash erosion
- (B) Sheet erosion
- (C) Rill erosion
- (D) Wind erosion



- Q45.** The acidity in 'Jellies' is essential for:
- (A) Increasing the weight
 - (B) Improving the color
 - (C) Pectin gelation and flavor
 - (D) Preventing sugar crystallization
- Q46.** Which breed of poultry is known as the 'Indian Game' and used for cock-fighting?
- (A) Kadaknath
 - (B) Aseel
 - (C) Chittagong
 - (D) Busra
- Q47.** The 'Panchayat Raj' system was first introduced in India in:
- (A) 1950
 - (B) 1959
 - (C) 1965
 - (D) 1972
- Q48.** The nutrient element involved in the 'Opening and Closing' of stomata is:
- (A) Nitrogen
 - (B) Phosphorus
 - (C) Potassium
 - (D) Calcium
- Q49.** The 'Standardization' of milk involves:
- (A) Adding water to milk



- (B) Adjusting Fat and SNF to a desired level
- (C) Removing all cream
- (D) Boiling the milk

Q50. Which type of rainfall is common in the equatorial regions?

- (A) Cyclonic
- (B) Orographic
- (C) Convectional
- (D) Frontal



Detailed Solutions

Q1.

Solution

Concept:

The Hardy-Weinberg principle states that in a large, random-mating population, allele and genotype frequencies remain constant. The equation used is:

$$p^2 + 2pq + q^2 = 1$$

where p is the frequency of the dominant allele and q is the frequency of the recessive allele.

Solution:

1. Given the frequency of the dominant allele (p) = 0.7. 2. Since $p + q = 1$, the frequency of the recessive allele (q) = $1 - 0.7 = 0.3$. 3. The frequency of the heterozygous genotype (Aa) is represented by the term $2pq$ in the equation. 4. Calculation:

$$2pq = 2 \times 0.7 \times 0.3$$

$$2pq = 2 \times 0.21 = 0.42$$

5. Therefore, the frequency of the heterozygous genotype is 0.42.

Final Answer: The frequency of the heterozygous genotype is 0.42.

Answer: (C)

Q2.

Solution

Concept:

The genetic code is degenerate, meaning multiple codons can code for the same amino acid. This efficiency is partly explained by the **Wobble Hypothesis**.

Solution:

1. According to this hypothesis, the pairing between the first two bases of the mRNA codon and the last two bases of the tRNA anticodon is very strict. 2. However, the pairing at the **third position** of the codon (the "wobble" position) is flexible. 3. This allows a single tRNA to recognize more than one codon. For example, the base Uracil (U) in the wobble position of the anticodon can pair with Adenine (A) or Guanine (G) in the codon. 4. This mechanism reduces the number of different tRNAs required for protein synthesis.

Final Answer: The hypothesis explains non-standard pairing at the third base of a codon.

Answer: (C)



Q3.

Solution**Concept:**

Soil porosity refers to the volume of the soil that is occupied by air and water. It is inversely related to bulk density and is calculated using the relationship between Bulk Density (BD) and Particle Density (PD).

Solution:

1. The formula for Percentage Porosity (P) is:

$$P = \left(1 - \frac{BD}{PD}\right) \times 100$$

2. Given $BD = 1.3 \text{ g/cm}^3$ and $PD = 2.6 \text{ g/cm}^3$. 3. Substitute the values into the formula:

$$P = \left(1 - \frac{1.3}{2.6}\right) \times 100$$

$$P = (1 - 0.5) \times 100$$

$$P = 0.5 \times 100 = 50\%$$

4. This means 50% of the soil volume consists of pore spaces.

Final Answer: The total porosity is 50%.

Answer: (B)

Q4.

Solution**Concept:**

A **Multiline** variety consists of a mixture of several "Isogenic Lines" (lines that are genetically identical except for one specific gene, usually for disease resistance).

Solution:

1. To create isogenic lines, breeders take a high-yielding variety (the recurrent parent) and cross it with various donor parents that carry different resistance genes. 2. The **Backcross method** is the standard technique used to transfer these specific monogenic traits (resistance genes) into the recurrent parent. 3. Once multiple lines (each with a different resistance gene) are developed, they are mixed together to form a Multiline variety. 4. If a pathogen race evolves to overcome one gene, the other lines in the mixture remain resistant, preventing an epidemic.

Final Answer: The Backcross method is used to develop Multilines.

Answer: (B)



Q5.

Solution**Concept:**

Water moves through the root in three ways: Apoplastic (through cell walls), Symplastic (through cytoplasm/plasmodesmata), and Transcellular.

Solution:

1. The **Apoplastic pathway** is a fast route as it moves through the non-living spaces (cell walls and intercellular spaces). 2. However, when water reaches the **Endodermis**, it encounters the **Casparian strips**. 3. These strips are made of **Suberin**, a waxy, water-impermeable substance. 4. The Casparian strip blocks the apoplastic flow, forcing the water to enter the living cytoplasm (Symplast) to cross the endodermis. 5. This acts as a biological filter for the plant's vascular system.

Final Answer: Apoplastic movement is restricted by Casparian strips.

Answer: (B)

Q6.

Solution**Concept:**

Anthrax is a peracute to acute, febrile, infectious disease of all warm-blooded animals, including humans (zoonotic). In livestock, it is known for its sudden onset and characteristic post-mortem findings.

Solution:

1. Anthrax is caused by **Bacillus anthracis**, a Gram-positive, spore-forming, rod-shaped bacterium. 2. A key diagnostic feature is the failure of the blood to clot and its dark, tarry appearance due to the toxin's effect on the vascular system. 3. The bacteria form highly resilient spores when exposed to oxygen, which can survive in the soil for decades. 4. Because of this, it is strictly advised **not to perform a post-mortem** on suspected anthrax carcasses to prevent environmental contamination. 5. *Pasteurella* causes Haemorrhagic Septicaemia, and *Clostridium chauvoei* causes Black Quarter.

Final Answer: The causative agent is Bacillus anthracis.

Answer: (B)



Q7.

Solution**Concept:**

Organophosphates (OPs) are a class of insecticides that act as neurotoxins. Their primary mode of action is the disruption of nerve impulse transmission.

Solution:

1. In a healthy nervous system, the neurotransmitter **Acetylcholine** sends signals across synapses. After the signal is sent, the enzyme **Acetylcholinesterase (AChE)** breaks it down to "reset" the nerve. 2. Organophosphates bind to the active site of Acetylcholinesterase, inhibiting its function. 3. This leads to a massive accumulation of Acetylcholine at the nerve endings. 4. The result is continuous, over-stimulation of the nervous system, leading to tremors, paralysis, and eventually death of the insect.

Final Answer: The enzyme inhibited is Acetylcholinesterase.

Answer: (B)

Q8.

Solution**Concept:**

Photoperiodism is the physiological reaction of organisms to the length of night or day. Short-day plants (SDPs) typically flower in late summer, autumn, or winter.

Solution:

1. For every plant species, there is a **Critical Photoperiod** (a specific duration of light). 2. **Short-day plants** require a photoperiod that is **less than** this critical value. 3. Scientific research has shown that SDPs are actually sensitive to the **length of the dark period** (uninterrupted night). They require a dark period longer than a critical length. 4. If the continuous dark period is interrupted by even a flash of light, flowering is inhibited. 5. Common examples include Rice, Soybeans, and Chrysanthemums.

Final Answer: SDPs flower when the day length is less than the critical photoperiod.

Answer: (B)



Q9.

Solution**Concept:**

Indian cattle breeds are classified into Milch (milk), Draft (work), and Dual-purpose breeds based on their performance and utility.

Solution:

1. **Sahiwal** is considered the best indigenous **milch** breed (not draft). 2. **Amritmahal** is a famous **draft** breed from Karnataka, known for its stamina and power. 3. **Hallikar** is another premier **draft** breed from Karnataka, widely recognized for its excellent working capacity in the fields. 4. **Gir** is primarily a milch breed known for high fat content, though sometimes considered dual-purpose in specific regions; however, Hallikar's classification as a "Draft breed" is a more definitive standard match.

Final Answer: Hallikar is an excellent Draft breed.

Answer: (C)

Q10.

Solution**Concept:**

Sugarcane cultivation involves several specialized intercultural operations to ensure high cane and sugar yields.

Solution:

1. **Detrashing** is the process of removing the older, dry, and lower green leaves from the sugarcane stalk. 2. This is usually done around 5–6 months after planting. 3. Benefits include: * Improved air circulation and light penetration. * Reduction in the population of pests like mealybugs and scale insects. * Making the process of **Wrapping** and **Propping** (supporting the cane) easier. 4. *Earthing up* involves mounding soil around the base, and *Propping* is tying canes to prevent lodging.

Final Answer: The removal of leaves is known as Detrashing.

Answer: (B)



Q11.

Solution**Concept:**

Soil water is categorized based on the physical force (tension) with which it is held by soil particles. This tension determines whether the water can be extracted by plant roots.

Solution:

1. **Gravitational water** is held at less than 0.33 bar and drains away quickly due to gravity.
2. **Capillary water** is held between 0.33 bar (Field Capacity) and 31 bar (Hygroscopic Coefficient).
3. Capillary water is further divided: **Available water**: Held between 0.33 bar and 15 bar (Wilting Point). **Unavailable/Partially available**: Held between 15 bar and 31 bar.
4. Although the most "available" water stops at 15 bar, the entire range of water held by surface tension in micropores up to 31 bar is technically classified as capillary water.
5. **Hygroscopic water** (> 31 bar) is held so tightly that it is completely unavailable to plants.

Final Answer: Capillary water is held between 0.33 and 31 bar.

Answer: (C)

Q12.

Solution**Concept:**

Meiosis I is characterized by a long and complex Prophase I, which is divided into five substages: Leptotene, Zygotene, Pachytene, Diplotene, and Diakinesis.

Solution:

1. In **Leptotene**, chromosomes become visible as thin threads.
2. In **Zygotene**, homologous chromosomes start pairing up, a process called **Synapsis**.
3. This pairing is stabilized by a protein structure called the **Synaptonemal complex**.
4. In **Pachytene**, crossing over occurs between non-sister chromatids.
5. In **Diplotene**, the synaptonemal complex dissolves, and chiasmata become visible.

Final Answer: Synapsis occurs during the Zygotene stage.

Answer: (B)



Q13.

Solution**Concept:**

NPK recommendations are expressed as a ratio ($N : P : K$). To find the dose of an individual nutrient, we use the proportion of that nutrient relative to the known nutrient.

Solution:

1. The given ratio is $N : P : K = 4 : 2 : 1$. 2. The recommended dose for Nitrogen (N) is 120 kg/ha. 3. From the ratio, we can see that the amount of Phosphorus (P_2O_5) is half the amount of Nitrogen because 2 is half of 4. 4. Mathematically:

$$\text{Dose of } P_2O_5 = \frac{\text{Ratio of } P}{\text{Ratio of } N} \times \text{Dose of } N$$

$$\text{Dose of } P_2O_5 = \frac{2}{4} \times 120 = 0.5 \times 120 = 60 \text{ kg/ha}$$

5. Similarly, Potassium (K_2O) would be 30 kg/ha.

Final Answer: The required dose of P_2O_5 is 60 kg/ha.

Answer: (B)

Q14.

Solution**Concept:**

Vegetative propagation is essential for fruit trees to maintain genetic purity and reduce the juvenile (non-fruiting) period. Different fruits have specific successful methods.

Solution:

1. **Litchi** (*Litchi chinensis*) is commercially propagated by **Air Layering**, also known as **Gootee**. 2. A ring of bark is removed from a healthy branch, treated with rooting hormones, and covered with moist moss and polythene. 3. Once roots develop, the branch is cut and planted. 4. While grafting is common in Mango and budding in Citrus, Air layering remains the standard for Litchi in India due to high success rates.

Final Answer: Air layering (Gootee) is the commercial method for Litchi.

Answer: (B)



Q15.

Solution**Concept:**

Soil air composition differs from atmospheric air due to the biological activities occurring within the soil matrix, primarily root respiration and microbial decomposition.

Solution:

1. Roots and soil microbes consume Oxygen (O_2) and release Carbon Dioxide (CO_2) during respiration. 2. Because the diffusion of gases between the soil and the atmosphere is limited by soil pores and moisture, CO_2 tends to accumulate. 3. Atmospheric air contains approximately 0.03% to 0.04% CO_2 . 4. Soil air generally contains **10 to 100 times more CO_2 ** than atmospheric air, often ranging from 0.3% to higher levels in waterlogged or high-organic-matter soils. 5. Conversely, O_2 levels are lower in soil air than in the atmosphere.

Final Answer: The concentration of CO_2 is higher in soil air than in atmospheric air.

Answer: (A)

Q16.

Solution**Concept:**

Parasitic weeds are classified based on where they attach to the host (stem or root) and whether they are completely dependent (holoparasites) or partially dependent (hemiparasites) on the host for nutrients.

Solution:

1. **Orobanche** (commonly known as Broomrape) is a **Total Root Parasite**. 2. It lacks chlorophyll and attaches its haustoria to the roots of host plants like Tobacco, Brinjal, Tomato, and Mustard. 3. It draws all its nourishment, including water and carbohydrates, from the host root system. 4. *Cuscuta* is a total stem parasite, *Loranthus* is a partial stem parasite, and *Striga* is a partial root parasite.

Final Answer: Orobanche is a Total Root Parasite.

Answer: (C)



Q17.

Solution**Concept:**

Different buffalo breeds are adapted for either high milk volume or high milk quality (fat percentage).

Solution:

1. **Murrah** is the most popular milch breed, providing high volume but moderate fat (around 7%). 2. **Bhadawari** is an indigenous breed from the Agra/Etawah region of India. 3. It is famous specifically for the high fat content in its milk, which often ranges from 8% to 13%. 4. This makes it a preferred breed for Ghee production, even though its total milk yield is lower than the Murrah.

Final Answer: The Bhadawari breed has the highest milk fat content.

Answer: (C)

Q18.

Solution**Concept:**

In *in vitro* cultures, when an explant (plant tissue) is placed on a nutrient medium containing specific ratios of auxin and cytokinin, the cells begin to divide rapidly without forming specific structures.

Solution:

1. This mass of dividing, undifferentiated cells is called **Callus**. 2. From the callus, "Organogenesis" can be induced (forming roots or shoots) or "Somatic Embryogenesis" can occur. 3. An *Explant* is the starting tissue, a *Somaclone* is a plant derived from tissue culture, and a *Protoplast* is a cell with the cell wall removed.

Final Answer: The mass of undifferentiated cells is termed as Callus.

Answer: (B)



Q19.

Solution**Concept:**

Nitrification is the biological oxidation of ammonia to nitrate. It occurs in two distinct steps, each facilitated by specific genera of chemoautotrophic bacteria.

Solution:

1. **Step 1:** $NH_4^+ \rightarrow NO_2^-$ (Ammonia to Nitrite) is performed by *Nitrosomonas*. 2. **Step 2:** $NO_2^- \rightarrow NO_3^-$ (Nitrite to Nitrate) is performed by *Nitrobacter*. 3. This conversion is crucial because nitrate is the most mobile and readily available form of nitrogen for the majority of agricultural crops. 4. *Azotobacter* and *Rhizobium* are nitrogen-fixing bacteria, not nitrifying bacteria.

Final Answer: Nitrobacter converts Nitrite to Nitrate.

Answer: (B)

Q20.

Solution**Concept:**

Seed weight is a critical parameter for determining seed quality and sowing rates. Two terms are commonly used: Test Weight and Seed Index.

Solution:

1. **Test Weight:** The weight of 1000 seeds. This is used for small-seeded crops like Rice and Wheat. 2. **Seed Index:** The weight of 100 seeds. This is used for large-seeded crops like Bold Maize, Gram, and Groundnut. 3. Using 100 seeds for larger grains provides a more practical and accurate representation of the seed lot's quality.

Final Answer: Seed Index is the weight of 100 seeds.

Answer: (A)

Q21.

Solution**Concept:**

Humidity represents the amount of water vapor in the air. Relative Humidity (RH) is the ratio of the actual amount of water vapor present to the maximum amount the air could hold at that temperature, expressed as a percentage.

Solution:

1. An **Anemometer** measures wind speed. 2. A **Psychrometer** (a type of Hygrometer) consists of two thermometers: a dry bulb and a wet bulb. The difference in their readings is used to calculate **Relative Humidity**. 3. A **Lysimeter** measures Evapotranspiration. 4. A **Tensiometer** measures soil moisture tension.

Final Answer: Relative Humidity is measured using a Psychrometer.

Answer: (B)



Q22.

Solution**Concept:**

Boron is a micro-nutrient essential for cell wall synthesis, sugar translocation, and pollen germination. Its deficiency leads to the breakdown of internal tissues and skin discoloration.

Solution:

1. In **Guava**, Boron deficiency manifests as the browning or "bronzing" of leaves and the development of pinkish or brownish spots on the fruit. 2. In **Mango**, it causes "Internal Necrosis" or fruit cracking. 3. However, the term "Bronze" or "Pink" disease (often specifically referring to the leaf and fruit discoloration) is a hallmark of Boron deficiency in **Guava**.

Final Answer: Guava is highly susceptible to this Boron deficiency symptom.

Answer: (C)

Q23.

Solution**Concept:**

In the production of milk powder, pre-heating (or forewarming) is a critical step before the milk enters the evaporator.

Solution:

1. Pre-heating milk (usually to temperatures between 72°C and 95°C) serves multiple purposes. 2. The most critical technical reason is to **inactivate enzymes** (like lipase) and **increase the heat stability** of the milk proteins (caseins and whey proteins). 3. This ensures that the concentrated milk does not coagulate during the drying process and results in a final powder with better shelf-life and solubility.

Final Answer: Pre-heating is done to inactivate enzymes and improve stability.

Answer: (C)

Q24.

Solution**Concept:**

Aneuploidy involves the loss or gain of one or more individual chromosomes from the diploid set ($2n$), rather than an entire set (polyploidy).

Solution:

1. **Monosomy ($2n - 1$):** Loss of a single chromosome. 2. **Nullisomy ($2n - 2$):** Loss of a pair of homologous chromosomes. 3. **Trisomy ($2n + 1$):** Gain of one extra chromosome (e.g., Down Syndrome in humans). 4. **Tetrasomy ($2n + 2$):** Gain of an extra pair of homologous chromosomes.

Final Answer: The condition ($2n - 1$) is technically known as Monosomy.

Answer: (A)



Q25.

Solution**Concept:**

Organic farming is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions.

Solution:

1. Organic farming promotes natural inputs like green manure, compost, and bio-fertilizers. 2. A fundamental rule of organic certification (e.g., NPOP in India) is the **total prohibition of synthetic chemical inputs**. 3. Therefore, the use of **Synthetic Nitrogenous fertilizers** (like Urea or Ammonium Nitrate) is strictly prohibited. 4. Crop rotation and green manuring are actually mandatory or highly encouraged practices in this system.

Final Answer: Synthetic Nitrogenous fertilizers are strictly prohibited.

Answer: (C)

Q26.

Solution**Concept:**

A cropping system refers to the cropping patterns used on a farm and their interaction with farm resources, other farm enterprises, and available technology.

Solution:

1. The **Rice-Wheat** cropping system is one of the largest agricultural production systems in the world. 2. In India, it covers approximately 10.5 million hectares. 3. It is the backbone of India's food security and is most dominant in the **Indo-Gangetic Plains (IGP)**, spanning Punjab, Haryana, Uttar Pradesh, Bihar, and West Bengal. 4. This system became prevalent after the Green Revolution due to the availability of high-yielding varieties and assured irrigation in these plains.

Final Answer: The system is most dominant in the Indo-Gangetic Plains.

Answer: (B)



Q27.

Solution**Concept:**

A tensiometer measures the "Matric Suction" or tension with which water is held by soil particles. It consists of a water-filled tube with a porous ceramic cup at the tip.

Solution:

1. Tensiometers are most accurate at low suction ranges (from 0 to 0.85 bar). 2. In **Sandy soils**, a large portion of the available water is held at low tensions. Therefore, the tensiometer can accurately reflect the moisture status. 3. In **Heavy Clay soils**, water is held at much higher tensions (often exceeding 1 bar even when still available to plants), which exceeds the operating range of the tensiometer (causing air to enter the cup, known as "breaking the vacuum").

Final Answer: Tensiometers work most effectively in Sandy soils.

Answer: (B)

Q28.

Solution**Concept:**

Sugars are classified as reducing or non-reducing based on their ability to act as a reducing agent, which depends on the presence of a free aldehyde or ketone group.

Solution:

1. Glucose and Fructose are monosaccharides and are reducing sugars. 2. **Sucrose** (Cane Sugar) is a disaccharide formed by glucose and fructose. 3. In sucrose, the glycosidic bond is formed between the reducing ends of both monomers, leaving no free reducing group. 4. Therefore, **Sucrose** is a **non-reducing sugar**. It is the primary transport and storage carbohydrate in Sugarcane.

Final Answer: Sucrose is a non-reducing sugar found in Sugarcane.

Answer: (C)

Q29.

Solution**Concept:**

Lactose is known as "Milk Sugar." It is a disaccharide that is less sweet than sucrose and is unique to mammalian milk.

Solution:

1. Disaccharides are formed by the dehydration synthesis of two monosaccharides. 2. **Lactose** is composed of one molecule of **D-glucose** and one molecule of **D-galactose**. 3. They are linked by a $\beta(1 \rightarrow 4)$ glycosidic bond. 4. For comparison: Maltose is Glucose + Glucose, and Sucrose is Glucose + Fructose.

Final Answer: Lactose is made up of Glucose and Galactose.

Answer: (C)



Q30.

Solution**Concept:**

Physiological disorders are distinct from diseases as they are caused by environmental stress, oxygen levels, or nutrient imbalances during growth or storage.

Solution:

1. **Black Heart** of potato is a common storage disorder. 2. It occurs when the inner tissues of the potato tuber do not receive enough oxygen for respiration. 3. This is typically caused by **poor ventilation** (lack of O_2) combined with high temperatures in storage or transport. 4. The lack of oxygen leads to the death (necrosis) of internal cells, which then turn black due to the oxidation of phenols.

Final Answer: Black Heart is caused by a lack of O_2 in storage.

Answer: (C)

Q31.

Solution

Concept: Ruminant animals (like cows, buffaloes, and goats) have a complex four-compartment stomach designed to digest high-fiber plant material. Only one of these compartments functions similarly to a monogastric (human) stomach.

Solution: 1. The **Rumen** is the large fermentation vat where microbes break down cellulose. 2. The **Reticulum** (honeycomb) acts as a filter and assists in rumination. 3. The **Omasum** (many-plies) is responsible for water and nutrient absorption. 4. The **Abomasum** is known as the **"True Stomach"** because it is the only compartment that secretes gastric juices (hydrochloric acid and digestive enzymes) to break down proteins chemically.

Final Answer: The Abomasum is known as the true stomach.

Answer: (D)

Q32.

Solution

Concept: Grafting is the joining of two separate plant parts (scion and rootstock) so they grow as one. The biological success of this union depends on the continuous flow of nutrients and water.

Solution: 1. For a graft to "take," the **Cambium** layers (the thin layer of meristematic cells between the bark and wood) of both the scion and the rootstock must be in close contact. 2. The cambium cells divide to form a "callus bridge" that eventually differentiates into new vascular tissues. 3. Without proper **Cambial contact**, the vascular tissues (xylem and phloem) cannot align, leading to the failure of the graft union.

Final Answer: The graft union fails if there is a lack of Cambial contact.

Answer: (C)



Q33.

Solution

Concept: Vitamins are organic compounds required in small amounts. They are classified based on their solubility. In poultry, diet formulation must account for vitamins that are not stored in high quantities.

Solution: 1. Vitamins A, D, E, and K are **Fat-soluble** and can be stored in the body's fatty tissues. 2. **Vitamin B-complex** and **Vitamin C** are **Water-soluble**. 3. Because water-soluble vitamins are not stored extensively and are excreted in the urine/droppings, they must be supplied constantly in the poultry feed to prevent deficiency diseases like curled toe paralysis (B2 deficiency).

Final Answer: Vitamin B-complex is a water-soluble vitamin.

Answer: (C)

Q34.

Solution

Concept: Rice nursery techniques vary based on water availability and time. The **Dapog method** was introduced to India from the Philippines (IRRI).

Solution: 1. The Dapog method involves raising seedlings without soil on a firm surface (like concrete, plastic sheets, or banana leaves). 2. Seedlings are ready for transplanting very quickly (within **11–14 days**). 3. This method is highly efficient for **Rice** cultivation when there is a shortage of land for a conventional nursery or when a quick crop turnaround is needed.

Final Answer: The Dapog method is associated with Rice.

Answer: (B)

Q35.

Solution

Concept: Milk let-down is a reflex action triggered by stimuli such as the calf sucking, washing the udder, or the sight of a milker. This reflex involves the endocrine system.

Solution: 1. The stimulus sends a signal to the brain, specifically the posterior pituitary gland. 2. The gland releases the hormone **Oxytocin** into the bloodstream. 3. Oxytocin causes the myoepithelial cells surrounding the alveoli (milk-producing sacs) in the udder to contract, squeezing the milk into the ducts. 4. Prolactin, conversely, is responsible for the **production** of milk, not the immediate **let-down**.

Final Answer: Oxytocin is the hormone responsible for milk let-down.

Answer: (B)



Q36.

Solution

Concept: Soil taxonomy classifies soils into "Orders" based on their dominant properties. **Vertisols** are unique mineral soils that contain a high percentage of swelling clay.

Solution: 1. Vertisols are characterized by a high content of **montmorillonite** (expanding type) clay. 2. These soils exhibit significant volume changes with moisture content. They swell when wet and shrink when dry. 3. During dry periods (summer), the shrinking creates **deep, wide vertical cracks**. 4. These soils are often called "Black Cotton Soils" in India and are predominant in the Deccan Plateau (Maharashtra, Madhya Pradesh, etc.).

Final Answer: Vertisols are characterized by expanding clays and deep cracks.

Answer: (C)

Q37.

Solution

Concept: The **Central Dogma** is a framework for understanding the transfer of sequence information between information-carrying biopolymers.

Solution: 1. Genetic information is stored in the **DNA**. 2. **Transcription:** Information is transferred from DNA to Messenger RNA (**mRNA**). 3. **Translation:** The mRNA sequence is then decoded by ribosomes to build a chain of amino acids, forming a **Protein**. 4. While "Reverse Transcription" (RNA to DNA) exists in some viruses, the standard flow in almost all biological systems is DNA → RNA → Protein.

Final Answer: The Central Dogma flow is DNA → RNA → Protein.

Answer: (B)

Q38.

Solution

Concept: Alternate bearing is a phenomenon in fruit trees (especially Mango) where a heavy crop ("On" year) is followed by a very poor crop or no crop ("Off" year).

Solution: 1. This is largely controlled by the balance of carbohydrates and hormones in the tree. 2. **Paclobutrazol** (commercially known as **Cultar**) is a growth retardant that inhibits gibberellin synthesis. 3. When applied to the soil at the base of a mango tree, it restricts vegetative growth and encourages the tree to produce flower buds even during an "Off" year. 4. This helps in regularizing the bearing and increasing yield consistency.

Final Answer: Alternate bearing is managed by the application of Paclobutrazol.

Answer: (B)



Q39.

Solution

Concept: Analytical chemistry in agriculture requires standardized methods to measure soil and plant health. Protein and nitrogen content are fundamental indicators.

Solution: 1. The **Kjeldahl method** is the worldwide standard for the determination of **Total Nitrogen** content. 2. It involves three main steps: **Digestion** (with sulfuric acid), **Distillation** (releasing ammonia), and **Titration**. 3. Since proteins contain a relatively constant percentage of nitrogen (typically 16%), this method is also used to calculate "Crude Protein" by multiplying the nitrogen value by a factor (usually 6.25).

Final Answer: The Kjeldahl method is used to determine Total Nitrogen.

Answer: (C)

Q40.

Solution

Concept: Yellow Vein Mosaic (YVM) is a major constraint in the cultivation of warm-season vegetables, often transmitted by the whitefly (*Bemisia tabaci*).

Solution: 1. **Okra** (*Abelmoschus esculentus*), also known as Bhindi, is extremely vulnerable to **Yellow Vein Mosaic Virus**. 2. The disease is characterized by the clearing and yellowing of the veins, eventually leading to completely yellowed leaves and small, hard, yellowish fruits. 3. Managing this disease usually involves breeding resistant varieties (like 'Parbhani Kranti') and controlling the whitefly vector.

Final Answer: YVM is a devastating viral disease of Okra.

Answer: (B)

Q41.

Solution

Concept: Plants are classified into C3, C4, and CAM based on their initial carbon fixation product. C4 plants have a specialized leaf anatomy (**Kranz anatomy**) that makes them highly efficient in tropical environments.

Solution: 1. **C3 plants** (Rice, Wheat, Soybean) fix CO_2 into a 3-carbon compound (3-PGA) and suffer from photorespiration in hot weather. 2. **C4 plants** (Maize, Sugarcane, Sorghum, Pearl Millet) fix CO_2 into a 4-carbon compound (Oxaloacetate). 3. This pathway allows C4 plants to maintain high photosynthetic rates under high temperatures and low CO_2 concentrations, making **Maize** a classic C4 example.

Final Answer: Maize is a C4 plant.

Answer: (C)



Q42.

Solution

Concept: Specific heat is the amount of heat energy required to raise the temperature of 1 gram of a substance by 1°C.

Solution: 1. Water has an exceptionally high specific heat compared to other common liquids and soil minerals. 2. The specific heat of water is exactly **1.0 cal/g/°C**. 3. This high value is the reason why large bodies of water (and moisture in the soil) act as a temperature buffer, cooling down and warming up much slower than the surrounding air.

Final Answer: The specific heat of water is 1.0 cal/g/°C.

Answer: (B)

Q43.

Solution

Concept: The DNA double helix is composed of two antiparallel strands. The stability of this structure relies on specific chemical bonds.

Solution: 1. The "backbone" of each individual strand is held by **phosphodiester bonds** (covalent). 2. The two strands are connected to each other across the center by **Hydrogen bonds** between complementary nitrogenous bases. 3. Adenine and Thymine share **2 hydrogen bonds**, while Guanine and Cytosine share **3 hydrogen bonds**.

Final Answer: The two strands are held together by Hydrogen bonds.

Answer: (C)

Q44.

Solution

Concept: Water erosion occurs in a predictable sequence as the energy and volume of runoff increase.

Solution: 1. **Splash erosion:** Raindrops hit bare soil. 2. **Sheet erosion:** A uniform thin layer of soil is removed. 3. **Rill erosion:** Small, well-defined channels (rills) are formed. 4. **Gully erosion:** When rills are neglected, they enlarge into deep, wide channels called gullies that cannot be removed by ordinary tillage.

Final Answer: Gully erosion is an advanced stage of Rill erosion.

Answer: (C)



Q45.

Solution

Concept: The formation of a fruit jelly is a chemical "balancing act" between pectin, sugar, and acid.

Solution: 1. Pectin molecules are normally negatively charged and repel each other. 2. The **Acid** (lowering pH to about 3.0–3.5) neutralizes these charges, allowing the pectin chains to bond. 3. This is essential for the **gelation** (setting) of the jelly and also provides the characteristic tart flavor and acts as a preservative.

Final Answer: Acidity is essential for Pectin gelation and flavor.

Answer: (C)

Q46.

Solution

Concept: The **Aseel** is the most famous indigenous breed of poultry in India, particularly in Andhra Pradesh and Uttar Pradesh.

Solution: 1. Aseel is known for its high stamina, majestic gait, and aggressive nature. 2. It is traditionally used for **cock-fighting** and is known as the "Indian Game" bird. 3. While it has excellent meat quality, its egg-laying capacity is very low.

Final Answer: Aseel is the breed known for cock-fighting.

Answer: (B)

Q47.

Solution

Concept: The Panchayat Raj system is the three-tier system of local self-government in India.

Solution: 1. Based on the Balwant Rai Mehta Committee recommendation, the system was first inaugurated. 2. It was introduced on **October 2, 1959**, in Nagaur district, Rajasthan, by Prime Minister Jawaharlal Nehru.

Final Answer: The system was first introduced in 1959.

Answer: (B)



Q48.

Solution

Concept: Stomatal movement is regulated by the turgor pressure of the guard cells.

Solution: 1. **Potassium (K^+)** ions are actively pumped into the guard cells. 2. This lowers the water potential, causing water to enter the cells (osmosis), making them turgid and opening the stoma. 3. When K^+ ions leave, the cells become flaccid and the stoma closes.

Final Answer: Potassium is the element involved in stomatal movement.

Answer: (C)

Q49.

Solution

Concept: Standardization is a legal and technical process in dairy plants to ensure consumers get milk of a consistent quality.

Solution: 1. Natural milk varies in fat content based on the animal and season. 2. **Standardization** involves the **adjustment of Fat and Solids-not-fat (SNF)** to meet specific legal requirements (e.g., 4.5% fat and 8.5% SNF for "Standardized Milk").

Final Answer: Standardization involves adjusting Fat and SNF levels.

Answer: (B)

Q50.

Solution

Concept: Rainfall is classified based on the mechanism that causes the air to rise and cool.

Solution: 1. In equatorial regions, high solar radiation causes the air to heat up and rise vertically. 2. This creates **Convictional** currents. As the air rises, it cools adiabatically, leading to heavy, afternoon showers almost daily.

Final Answer: Convictional rainfall is common in equatorial regions.

Answer: (C)



Answer Key

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

