

GATE 2026 AG Question Paper with Solutions

Time Allowed :3 Hour	Maximum Marks :100	Total Questions :65
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General Instructions

Please read the following instructions carefully:

1. This question paper is divided into three sections:
 - **General Aptitude (GA):** 10 questions (5 questions \times 1 mark + 5 questions \times 2 marks) for a total of 15 marks.
 - **Environmental Science and Engineering + Engineering Mathematics:**
 - **Part A (Mandatory):** 36 questions (1 questions \times 1 mark + 19 questions \times 2 marks) for a total of 55 marks.
 - **Part B (Section 1):** Candidates can choose either Part B1 (Surveying and Mapping) or Part B2 (Section 2). Each part contains 16 questions (8 questions \times 1 mark + 11 questions \times 2 marks) for a total of 30 marks.
2. The total number of questions is **65**, carrying a maximum of **100 marks**.
3. The duration of the exam is **3 hours**.
4. Marking scheme:
 - For 1-mark MCQs, $\frac{1}{3}$ mark will be deducted for every incorrect response.
 - For 2-mark MCQs, $\frac{2}{3}$ mark will be deducted for every incorrect response.
 - No negative marking for numerical answer type (NAT) questions.
 - No marks will be awarded for unanswered questions.
5. Ensure you attempt questions only from the optional section (Part B1 or Part B2) you have selected.
6. Follow the instructions provided during the exam for submitting your answers.

1. The permanent wilting point of soil corresponds approximately to which soil moisture tension?

- (A) 0.33 bar
- (B) 1 bar
- (C) 10 bars
- (D) 15 bars

Correct Answer: (D) 15 bars

Solution:

Step 1: Understanding permanent wilting point.

The permanent wilting point (PWP) refers to the soil moisture condition at which plants can no longer extract sufficient water from the soil and remain permanently wilted even if placed in a humid environment. At this point, the water is held very tightly by soil particles.

Step 2: Understanding soil moisture tension.

Soil moisture tension represents the force with which water is held in the soil. As the soil becomes drier, the tension increases, making it more difficult for plant roots to absorb water.

Step 3: Relating PWP to soil moisture tension.

Scientifically, the permanent wilting point corresponds to a soil moisture tension of approximately 15 bars (or 1500 kPa). At this tension, plant roots cannot overcome the force holding water in the soil.

Step 4: Analyzing the options.

- (A) 0.33 bar: This represents field capacity, not the wilting point.
- (B) 1 bar: This value is too low and still allows plant water uptake.
- (C) 10 bars: This is close but still below the permanent wilting threshold.
- (D) 15 bars: Correct — this value accurately represents the permanent wilting point.

Step 5: Conclusion.

The permanent wilting point of soil corresponds approximately to a soil moisture tension of **15 bars**.

Quick Tip

Remember: Field capacity is around 0.33 bar, while permanent wilting point is around 15 bars.

2. Which one of the following crops is most sensitive to photoperiod?

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

Correct Answer: (B) Rice

Solution:

Step 1: Understanding photoperiod sensitivity.

Photoperiod sensitivity refers to a plant's response to the length of day and night, especially in relation to flowering. Some crops require specific day lengths to initiate flowering.

Step 2: Classification of crops based on photoperiod.

Crops can be classified as short-day, long-day, or day-neutral plants. Short-day plants flower when the day length is shorter than a critical value.

Step 3: Identifying the photoperiod-sensitive crop.

Rice is a classic short-day plant and shows strong sensitivity to day length. Its flowering is highly influenced by photoperiod, especially in traditional varieties.

Step 4: Analyzing the options.

- (A) **Wheat:** Wheat is a long-day plant but is relatively less sensitive compared to rice.
- (B) **Rice:** Correct — Rice is highly sensitive to photoperiod and flowering depends strongly on day length.
- (C) **Maize:** Maize is mostly day-neutral or weakly photoperiod-sensitive.
- (D) **Barley:** Barley is a long-day plant but less sensitive than rice.

Step 5: Conclusion.

Among the given crops, **rice** is the most sensitive to photoperiod.

Quick Tip

Rice is a short-day crop and is commonly used as an example of photoperiod-sensitive plants.

3. In Mendelian inheritance, the phenotypic ratio of a dihybrid cross is:

- (A) 1 : 2 : 1
- (B) 3 : 1
- (C) 9 : 3 : 3 : 1
- (D) 15 : 1

Correct Answer: (C) 9 : 3 : 3 : 1

Solution:

Step 1: Understanding a dihybrid cross.

A dihybrid cross involves the inheritance of two different traits simultaneously. Mendel studied

such crosses to understand how traits are passed independently from parents to offspring.

Step 2: Applying Mendel's law of independent assortment.

According to the law of independent assortment, alleles of different genes assort independently during gamete formation, provided the genes are located on different chromosomes.

Step 3: Formation of gametes.

In a typical dihybrid cross such as $RrYy \times RrYy$, each parent produces four types of gametes: RY, Ry, rY, and ry.

Step 4: Phenotypic outcomes.

When these gametes combine, they produce four phenotypic classes in the ratio:

9 showing both dominant traits,
3 showing the first dominant and second recessive trait,
3 showing the first recessive and second dominant trait,
1 showing both recessive traits.

Step 5: Conclusion.

Thus, the phenotypic ratio of a dihybrid cross is **9 : 3 : 3 : 1**.

Quick Tip

A 9 : 3 : 3 : 1 ratio is always associated with a Mendelian dihybrid cross showing independent assortment.

4. The duty of water is defined as:

- (A) Volume of water applied per unit area
- (B) Area irrigated by unit discharge flowing continuously during crop period
- (C) Depth of water applied to the field
- (D) Rate of evapotranspiration

Correct Answer: (B) Area irrigated by unit discharge flowing continuously during crop period

Solution:

Step 1: Understanding duty of water.

The duty of water is an important concept in irrigation engineering. It helps in determining how efficiently water is used for irrigation purposes over a specific period.

Step 2: Defining unit discharge.

Unit discharge refers to a fixed quantity of water flowing continuously, usually expressed as one cubic meter per second (cumec).

Step 3: Relation between duty and irrigated area.

Duty of water is defined as the total area that can be irrigated by one unit of discharge flowing continuously during the entire crop growth period.

Step 4: Analyzing the options.

- (A) **Volume of water applied per unit area:** This describes irrigation requirement, not duty.
- (B) **Area irrigated by unit discharge flowing continuously during crop period:** Correct — this is the standard definition of duty of water.
- (C) **Depth of water applied to the field:** This refers to delta of water, not duty.
- (D) **Rate of evapotranspiration:** This is a climatic parameter, not related to duty.

Step 5: Conclusion.

The duty of water is correctly defined as the **area irrigated by unit discharge flowing continuously during the crop period**.

Quick Tip

Duty and delta are inversely related — higher duty means less depth of water required.

5. Which nutrient is most commonly deficient in Indian soils?

- (A) Nitrogen
- (B) Phosphorus
- (C) Potassium
- (D) Calcium

Correct Answer: (A) Nitrogen

Solution:

Step 1: Understanding soil nutrient deficiency.

Soil nutrient deficiency refers to the lack of essential plant nutrients required for normal growth and crop productivity. In Indian agriculture, continuous cropping and intensive farming practices often lead to nutrient depletion.

Step 2: Role of nitrogen in plant growth.

Nitrogen is a primary macronutrient required for the synthesis of proteins, chlorophyll, and enzymes. It plays a major role in vegetative growth and overall crop development.

Step 3: Nitrogen status in Indian soils.

Most Indian soils are low in organic matter, which is the main natural source of nitrogen. Due to high cropping intensity and losses through leaching, volatilization, and denitrification, nitrogen deficiency is widespread.

Step 4: Analyzing the options.

- (A) **Nitrogen:** Correct — Nitrogen is the most commonly deficient nutrient in Indian soils.
- (B) **Phosphorus:** Phosphorus deficiency occurs, but it is less widespread than nitrogen deficiency.
- (C) **Potassium:** Most Indian soils contain adequate potassium reserves.
- (D) **Calcium:** Calcium deficiency is rare in Indian soils.

Step 5: Conclusion.

The nutrient most commonly deficient in Indian soils is **nitrogen**.

Quick Tip

Nitrogen deficiency is common because it is highly mobile in soil and easily lost through leaching.

6. The efficiency of irrigation system is maximum in:

- (A) Surface irrigation
- (B) Sprinkler irrigation
- (C) Drip irrigation
- (D) Furrow irrigation

Correct Answer: (C) Drip irrigation

Solution:

Step 1: Understanding irrigation efficiency.

Irrigation efficiency refers to the percentage of water applied that is actually used by the crop. Higher efficiency means less water loss through evaporation, runoff, or deep percolation.

Step 2: Comparing different irrigation methods.

Different irrigation systems vary in how effectively they deliver water to the plant root zone.

Traditional methods usually involve greater water losses.

Step 3: Characteristics of drip irrigation.

Drip irrigation supplies water directly to the root zone in small, controlled quantities. This minimizes evaporation losses and prevents runoff and deep percolation.

Step 4: Analyzing the options.

- (A) **Surface irrigation:** Low efficiency due to runoff and evaporation losses.
- (B) **Sprinkler irrigation:** Moderate efficiency, but water losses occur due to wind drift and evaporation.
- (C) **Drip irrigation:** Correct — It provides the highest irrigation efficiency.
- (D) **Furrow irrigation:** Similar to surface irrigation with significant water losses.

Step 5: Conclusion.

Among all irrigation methods, **drip irrigation** has the maximum efficiency.

Quick Tip

Drip irrigation can achieve irrigation efficiencies of more than 90%.

7. Which plant hormone is mainly responsible for apical dominance?

- (A) Cytokinin
- (B) Gibberellin
- (C) Abscisic acid
- (D) Auxin

Correct Answer: (D) Auxin

Solution:

Step 1: Understanding apical dominance.

Apical dominance is a phenomenon in plants where the growth of lateral (side) buds is inhibited by the presence of the apical (terminal) bud. This ensures that the plant grows vertically rather than branching excessively.

Step 2: Role of plant hormones.

Plant hormones regulate growth and development. Different hormones control different physiological processes such as cell elongation, dormancy, and branching.

Step 3: Hormone responsible for apical dominance.

Auxin is produced in the apical bud and is transported downward through the stem. High concentrations of auxin suppress the growth of lateral buds, thereby maintaining apical dominance.

Step 4: Analyzing the options.

- (A) **Cytokinin:** Cytokinins promote lateral bud growth and counteract apical dominance.
- (B) **Gibberellin:** Gibberellins mainly promote stem elongation and seed germination.
- (C) **Abscisic acid:** Abscisic acid is associated with dormancy and stress responses.
- (D) **Auxin:** Correct — Auxin inhibits lateral bud growth and maintains apical dominance.

Step 5: Conclusion.

The plant hormone mainly responsible for apical dominance is **auxin**.

Quick Tip

Removal of the apical bud reduces auxin levels and allows lateral buds to grow.