

CBSE Class 10 Agriculture Question Paper 2026 with Solutions

Time Allowed :2 Hour	Maximum Marks :50	Total Questions :21
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. Please read the instructions carefully.
2. This question paper consists of 21 questions in two Sections : Section A and Section B.
3. Section A has Objective type questions, whereas Section B contains Subjective type questions.
4. Out of the given $(5 + 16) = 21$ questions, a candidate has to answer $(5 + 10) = 15$ questions in the allotted (maximum) time of 2 hours.
5. All questions of a particular section must be attempted in the correct order.
6. Section A : Objective Type Questions (24 marks) :
 - (a) This section has 5 questions.
 - (b) There is no negative marking.
 - (c) Do as per the instructions given.
 - (d) Marks allotted are mentioned against each question/part.
7. Section B : Subjective Type Questions (26 marks) :
 - (a) This section has 16 questions.
 - (b) A candidate has to do 10 questions.
 - (c) Do as per the instructions given.
 - (d) Marks allotted are mentioned against each question/part.

1.i. Which of the following is NOT a type of motivation?

- (A) Internal
- (B) Intermediate
- (C) External
- (D) Extensive

Correct Answer: (B) Intermediate

Solution:

Step 1: Understanding the Question

The question asks to identify which of the given terms is not a recognized category or type of motivation in psychology and management.

Step 2: Key Formulas and Approach

The two primary and universally accepted types of motivation are:

- **Internal (or Intrinsic) Motivation:** The drive to do something comes from within. It is based on personal interest, enjoyment, or the satisfaction derived from the task itself.
- **External (or Extrinsic) Motivation:** The drive to do something comes from outside forces. It is based on receiving a reward (like money or praise) or avoiding a punishment.

Step 3: Detailed Explanation

Let's analyze each option based on this classification:

- **(A) Internal:** This is a standard type of motivation, synonymous with intrinsic motivation.
- **(B) Intermediate:** This term is not used in motivation theory. There is no recognized "intermediate" category of motivation.
- **(C) External:** This is a standard type of motivation, synonymous with extrinsic motivation.
- **(D) Extensive:** This term is not a standard type of motivation. However, it is sometimes used incorrectly in place of extrinsic. Between 'Intermediate' and 'Extensive', 'Intermediate' is more definitively not a type of motivation.

Step 4: Final Answer

Based on the standard classification, 'Intermediate' is not a type of motivation.

💡 Quick Tip

Remember the two main types of motivation: Intrinsic (Internal) and Extrinsic (External). Any option other than these is likely incorrect.

ii. Which of the following is not a form of written communication?

- (A) Circulars
- (B) Reports

- (C) Discussion
- (D) SMS

Correct Answer: (C) Discussion

Solution:

Step 1: Understanding the Question

The question asks to identify the option that does not belong to the category of written communication. Written communication involves conveying a message through written words or symbols.

Step 2: Detailed Explanation

Let's classify each option:

- **(A) Circulars:** These are documents printed or written on paper (or in digital text format) and distributed to a group. This is a form of **written communication**.
- **(B) Reports:** These are formal documents that present information in a structured, written format. This is a form of **written communication**.
- **(C) Discussion:** This involves a conversation where two or more people exchange ideas by speaking and listening to each other. This is a form of **oral (or verbal) communication**.
- **(D) SMS (Short Message Service):** This involves sending text-based messages via mobile phones. This is a form of **written communication**.

Step 3: Final Answer

A 'Discussion' is an oral exchange and therefore is not a form of written communication.

💡 Quick Tip

To identify written communication, ask: "Does this involve text on a surface (paper, screen, etc.)?" If yes, it's written. If it involves speaking and listening, it's oral communication.

iii. Enlist different problems related to Sustainable Development.

Solution:

Step 1: Understanding the Question

The question asks to list the major challenges or obstacles that hinder the achievement of Sustainable Development. Sustainable Development aims to balance economic, social, and environmental needs.

Step 2: Detailed Explanation

The major problems and challenges related to achieving Sustainable Development are:

1. **Poverty and Inequality:** Widespread poverty forces people to over-exploit natural resources for immediate survival, while economic inequality leads to social instability and unequal access to resources.
2. **Rapid Population Growth:** A growing population increases the demand for food, water, energy, and land, putting immense pressure on the environment and natural resources.
3. **Environmental Degradation:** This includes deforestation, soil erosion, air and water pollution, and loss of biodiversity. A degraded environment cannot support long-term economic or social well-being.
4. **Climate Change:** Global warming, caused by greenhouse gas emissions, leads to extreme weather events, rising sea levels, and ecosystem disruption, threatening all three pillars of sustainability.
5. **Unsustainable Consumption and Production:** The "use and throw" culture in developed nations leads to excessive resource depletion and waste generation.
6. **Lack of Political Will and Poor Governance:** Ineffective policies, corruption, and a lack of commitment from governments can prevent the implementation of sustainable practices.
7. **Inadequate Education and Awareness:** A lack of public awareness about the importance of sustainability makes it difficult to bring about necessary behavioral changes.
8. **Conflicts and Wars:** Conflicts destroy social and physical infrastructure and divert resources away from development goals.

Step 3: Final Answer

The key problems are poverty, population growth, environmental degradation, climate change, unsustainable consumption, poor governance, lack of awareness, and conflict.

💡 Quick Tip

Remember the three pillars of Sustainable Development: Environment, Economy, and Society. Problems can be categorized under these three heads for better understanding.

iv. **Entrepreneurs can create jobs in the market (True or False).**

Correct Answer: True

Solution:

Step 1: Understanding the Question

The question asks to determine the validity of the statement that entrepreneurs are a source of job creation.

Step 2: Detailed Explanation

The statement is **True**. Entrepreneurs play a fundamental role in job creation through several mechanisms:

- **Starting New Ventures:** When an entrepreneur starts a new business, they create jobs for themselves and are often the first employer. As the business grows, it needs more employees to manage operations, sales, marketing, and administration.
- **Economic Growth:** By creating new products and services, entrepreneurs stimulate economic activity. This growth creates a ripple effect, leading to job creation in other related industries (e.g., suppliers, distributors).
- **Innovation:** Entrepreneurs often introduce new technologies and business models, creating entirely new industries and job roles that did not exist before.

Small and Medium Enterprises (SMEs), which are predominantly started by entrepreneurs, are the largest employers in most economies worldwide.

Step 3: Final Answer

The statement is True. Job creation is one of the most significant contributions of entrepreneurship to an economy.

💡 Quick Tip

Entrepreneurs are often called "job creators" because every new business venture generates employment opportunities directly and indirectly.

v. Which of the following functions is not performed with a mouse?

- (A) Turn on
- (B) Hover
- (C) Right click
- (D) Drag and drop

Correct Answer: (A) Turn on

Solution:

Step 1: Understanding the Question

The question asks to identify which action from the list cannot be accomplished using a standard computer mouse.

Step 2: Detailed Explanation

Let's analyze the functions of a computer mouse and evaluate the options:

- **(B) Hover:** This is a basic mouse function. It means to move the mouse pointer over an icon or link without clicking it.
- **(C) Right click:** This is a standard mouse function. Pressing the right mouse button typically opens a context-sensitive menu.
- **(D) Drag and drop:** This is a common mouse function used to move files or objects on the screen by holding down the left mouse button, moving the mouse, and then releasing the button.
- **(A) Turn on:** This function is performed by pressing the physical **power button** on the computer's casing (CPU or laptop body). A mouse is an input device that functions only after the computer's operating system has loaded. It cannot initiate the power-on sequence.

Step 3: Final Answer

'Turning on' a computer is a hardware function initiated by the power button, not by the mouse.

 Quick Tip

Remember: A mouse is an input device for interaction after the computer is already powered on. Power functions (turn on/off, restart) are performed using buttons on the computer itself.

vi. Which of the following function is not a way to protect data?

- (A) Password
- (B) Antivirus and firewall
- (C) Secure sites
- (D) Trojan horse

Correct Answer: (D) Trojan horse

Solution:

Step 1: Understanding the Question

The question asks to identify which of the options is a threat to data security, rather than a method for protecting data.

Step 2: Detailed Explanation

Let's differentiate between protective measures and threats:

- **(A) Password:** This is a **protective measure**. It is a form of authentication used to control access to systems and data.
- **(B) Antivirus and firewall:** These are **protective measures**. Antivirus software detects and removes malicious software, while a firewall prevents unauthorized network access.
- **(C) Secure sites:** Using secure websites (HTTPS) is a **protective measure**. It encrypts the data transmitted between your browser and the website, preventing eavesdropping.
- **(D) Trojan horse:** This is a **threat**, not a protective measure. A Trojan horse is a type of malware that disguises itself as a legitimate program to trick users into installing it. Once inside a system, it can steal, corrupt, or destroy data.

Step 3: Final Answer

A Trojan horse is a malicious program designed to harm a system, making it the correct answer as it is not a way to protect data.

 Quick Tip

Always differentiate between security tools (passwords, firewalls) and security threats (viruses, trojans, malware). The question asks for something that is NOT a way to protect data, which points directly to a threat.

2.i. Which is a 'Kharif' crop?

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

Correct Answer: (A) Maize

Solution:

Step 1: Understanding the Question

The question asks to identify a Kharif crop from the given options. Kharif crops are monsoon crops, sown at the beginning of the rainy season.

Step 2: Key Formulas and Approach

Crop seasons in India:

- **Kharif:** Sown in June-July, harvested in September-October. Examples: Rice, Maize, Cotton, Jowar, Bajra.
- **Rabi:** Sown in October-December, harvested in March-April. Examples: Wheat, Barley, Gram, Mustard.

Step 3: Detailed Explanation

Let's classify the options:

- **(A) Maize:** This is a classic **Kharif** crop, requiring the warmth and water of the monsoon season.
- **(B) Wheat:** This is the most important **Rabi** crop, grown in the cool winter season.
- **(C) Barley:** This is also a **Rabi** crop, grown alongside wheat.
- **(D) Mustard:** This is a major **Rabi** oilseed crop.

Step 4: Final Answer

Maize is the only Kharif crop listed.

💡 Quick Tip

To remember: Kharif = Monsoon crops (June-October) e.g., Rice, Maize, Cotton. Rabi = Winter crops (October-March) e.g., Wheat, Barley, Mustard, Gram.

ii. _____ is a rabi cereal crop.

- (A) Paddy
- (B) Maize
- (C) Wheat
- (D) Gram

Correct Answer: (C) Wheat

Solution:

Step 1: Understanding the Question

The question asks to identify a crop that meets two conditions: it must be a 'Rabi' crop (sown in winter) and it must be a 'cereal' (a grain-producing grass).

Step 2: Detailed Explanation

Let's evaluate each option against the two conditions:

- **(A) Paddy (Rice):** This is a cereal, but it is a Kharif crop, not a Rabi crop.
- **(B) Maize:** This is a cereal, but it is primarily a Kharif crop.
- **(C) Wheat:** This is a **Rabi** crop and it is a major **cereal**. It fits both conditions.
- **(D) Gram (Chickpea):** This is a Rabi crop, but it is a **pulse** (legume), not a cereal.

Step 3: Final Answer

Wheat is the only option that is correctly identified as a Rabi cereal crop.

💡 Quick Tip

Cereals = Grains like wheat, rice, maize. Pulses = Legumes like gram, pea, arhar.
Don't confuse the two categories.

iii. Marigold is propagated by

- (A) Tubers
- (B) Corms
- (C) Bulbs
- (D) Seeds

Correct Answer: (D) Seeds

Solution:

Step 1: Understanding the Question

The question asks for the primary method of propagation (reproduction) for the marigold flower.

Step 2: Detailed Explanation

Propagation methods can be sexual (via seeds) or vegetative (via parts of the parent plant like tubers, bulbs, etc.).

- **Marigold** is an annual plant, meaning it completes its life cycle—from germination to producing seeds—within one year, and then dies. The primary and most common method for growing annuals like marigolds is through **seeds**.
- **Tubers** (e.g., Potato), **Corms** (e.g., Gladiolus), and **Bulbs** (e.g., Onion, Tulip) are all forms of vegetative propagation used for other types of plants, not for marigolds.

Step 3: Final Answer

Marigold is propagated by seeds.

 Quick Tip

Annual flowers like marigold, zinnia, and sunflower are usually propagated by seeds. Perennials are often propagated by vegetative methods like bulbs, corms, or tubers.

iv. Powder mildew disease is caused by -----

- (A) Bacteria
- (B) Fungus
- (C) Virus
- (D) Nematodes

Correct Answer: (B) Fungus

Solution:

Step 1: Understanding the Question

The question asks to identify the type of pathogen that causes the plant disease known as powdery mildew.

Step 2: Detailed Explanation

Powdery mildew is one of the most common and easily recognizable plant diseases.

- **Symptom:** It appears as white or grayish powdery spots on the leaves and stems of plants.
- **Causative Agent:** This characteristic powdery growth is the mycelium and spores of a specific group of **fungi** (from the order Erysiphales). It is a classic example of a fungal disease.
- Other pathogens cause different symptoms: **Bacteria** often cause wet rots or leaf spots; **Viruses** cause mosaic patterns or stunting; **Nematodes** are worms that typically damage roots.

Step 3: Final Answer

Powdery mildew disease is caused by a fungus.

 Quick Tip

Remember: "Powdery" growth on plants = Fungal disease. Bacteria cause spots with water-soaked appearance, viruses cause mosaic patterns, and nematodes affect roots.

v. Highest lactose is found in

- (A) Human milk
- (B) Cow milk
- (C) Buffalo milk
- (D) Camel milk

Correct Answer: (A) Human milk

Solution:

Step 1: Understanding the Question

The question asks to identify which type of milk from the given options contains the highest percentage of lactose (milk sugar).

Step 2: Detailed Explanation

The composition of milk varies significantly across different mammalian species. Lactose is the primary carbohydrate in milk.

A comparison of typical lactose content:

- **Human milk:** Contains about **7.0%** lactose. This high sugar content provides the necessary energy for the rapid brain development of human infants.
- **Cow milk:** Contains about 4.8% lactose.
- **Buffalo milk:** Contains about 4.9% lactose.
- **Camel milk:** Contains about 4.4% lactose.

Comparing these values, human milk clearly has the highest concentration of lactose.

Step 3: Final Answer

The highest lactose content is found in human milk.

Quick Tip

Remember: Lactose content varies by species. Human milk has the highest lactose, while marine mammals like seals have very low or no lactose.

vi. Protein content in soybean is -----

- (A) 30%
- (B) 40-45%
- (C) 60%
- (D) 55%

Correct Answer: (B) 40-45%

Solution:

Step 1: Understanding the Question

The question asks for the approximate percentage of protein found in soybeans.

Step 2: Detailed Explanation

Soybean is a legume that is exceptionally rich in protein, making it a staple in many vegetarian and vegan diets, as well as a key ingredient in animal feed.

- The protein content of whole, dry soybeans typically ranges from **38% to 45%**. This is significantly higher than most other beans and legumes.
- The option **(B) 40-45%** accurately represents this scientifically established range.
- Other options are incorrect: 30% is too low, while 55% and 60% are too high for unprocessed soybeans (such high concentrations are only found in processed soy protein isolates).

Step 3: Final Answer

The protein content in soybean is in the range of 40-45%.

💡 Quick Tip

Soybean = King of plant proteins (40-45%). Compare with other legumes: Gram (20-25%), Pea (20-25%), Lentil (25-28%).

3. List different methods of communication.

Solution:

Step 1: Understanding the Question

The question asks to list the various methods or channels through which communication (the exchange of information) can take place.

Step 2: Detailed Explanation

Communication can be classified based on the medium used and the level of formality. The different methods are:

1. **Verbal Communication:** This involves the use of spoken words to convey a message. It is a direct and quick form of communication.
 - **Examples:** Face-to-face conversations, meetings, interviews, telephone calls, speeches, and video conferences.
2. **Non-Verbal Communication:** This is the process of communicating without words, through body language. It often accompanies verbal communication.

- **Examples:** Facial expressions, gestures, posture, eye contact, and tone of voice.
3. **Written Communication:** This involves conveying messages through written text or symbols. It provides a permanent record.
- **Examples:** Letters, emails, reports, memos, SMS, notices, and manuals.
4. **Visual Communication:** This method uses visual aids like images, signs, and symbols to convey information quickly and effectively.
- **Examples:** Graphs, charts, maps, posters, presentations, and traffic signals.

Step 3: Final Answer

The main methods of communication are Verbal, Non-Verbal, Written, and Visual.

💡 Quick Tip

Remember: Communication methods can be categorized as verbal/non-verbal, formal/informal, written/oral, and digital/traditional. Each method has its own advantages and appropriate contexts.

4. What is stress? Enlist few simple stress management techniques.

Solution:

Part 1: What is Stress?

Step 1: Understanding the Question

This part requires a clear definition of stress.

Step 2: Detailed Explanation

Stress is the body's natural response to any demand or pressure placed upon it. It is a feeling of emotional or physical tension that can come from any event or thought that makes you feel frustrated, angry, or nervous. In short bursts, stress can be positive (eustress), such as when it helps you avoid danger or meet a deadline. However, when stress lasts for a long time (chronic stress), it can harm your health.

Part 2: Simple Stress Management Techniques

Step 1: Understanding the Question

This part asks for a list of simple, practical techniques to manage or reduce stress.

Step 2: Detailed Explanation

Here are a few simple and effective stress management techniques:

1. **Deep Breathing:** Inhale slowly through your nose, hold for a few seconds, and exhale slowly through your mouth. This simple act can calm your nervous system.
2. **Regular Physical Activity:** Engage in activities like walking, jogging, or yoga. Exercise releases endorphins, which are natural mood-lifters.
3. **Time Management:** Organize your tasks by making a to-do list and prioritizing them. This can reduce the feeling of being overwhelmed.
4. **Get Enough Sleep:** Aim for 7-8 hours of quality sleep per night. Lack of sleep can increase stress levels.
5. **Talk to Someone:** Share your feelings with a trusted friend, family member, or a professional counselor. Talking about your problems can provide relief and new perspectives.
6. **Take Regular Breaks:** Step away from a stressful situation for a few minutes. Listen to music, stretch, or do something you enjoy to relax your mind.

Step 3: Final Answer

Stress is the body's reaction to pressure. Simple techniques to manage it include deep breathing, regular exercise, effective time management, adequate sleep, talking to someone, and taking regular breaks.

💡 Quick Tip

Remember: Stress is inevitable but manageable. Simple techniques like deep breathing, exercise, meditation, and proper time management can significantly reduce stress levels and improve overall well-being.

5. Enlist plan for monthly maintenance of computer.

Solution:

Step 1: Understanding the Question

The question asks for a list of tasks that should be performed on a monthly basis to keep a computer running smoothly, securely, and efficiently.

Step 2: Detailed Explanation

A good monthly computer maintenance plan should cover both software and physical aspects. Here is a checklist:

1. **Backup Important Data:** Perform a full backup of your important files (documents, photos, etc.) to an external hard drive or a cloud storage service. This is the most critical step to prevent data loss.
2. **Update Software:** Check for and install updates for your operating system (like Windows or macOS), as well as for your antivirus software and other key applications (like your web browser). Updates often include crucial security patches.
3. **Run a Full Antivirus Scan:** Run a deep or full scan of your entire system with your antivirus software to detect and remove any malware, viruses, or spyware that might have been missed by real-time protection.
4. **Clean Up Your Hard Drive:** Use a disk cleanup utility to remove temporary files, system junk, and other unnecessary files that clutter your drive and slow down the system. Also, empty the Recycle Bin.
5. **Organize Files:** Take some time to delete files you no longer need and organize the rest into logical folders. This makes it easier to find what you're looking for and keeps your desktop clean.
6. **Physical Cleaning:** Power down the computer and clean it physically. Use a soft cloth to wipe the monitor, and use compressed air to blow dust out of the keyboard, mouse, and ventilation ports of the CPU or laptop.

Step 3: Final Answer

A monthly computer maintenance plan includes backing up data, updating software, running a full virus scan, cleaning up the hard drive, organizing files, and physically cleaning the hardware.

Quick Tip

Remember: Regular monthly maintenance prevents major computer problems. A systematic approach to cleaning, updating, scanning, and backing up ensures your computer runs smoothly and securely.

6. What are the qualities a successful entrepreneur should have?

Solution:

Step 1: Understanding the Question

The question asks to list the key characteristics, traits, and skills that are commonly found in

successful entrepreneurs.

Step 2: Detailed Explanation

While there is no single formula for success, successful entrepreneurs typically possess a combination of the following qualities:

1. **Passion:** A deep passion for their work and vision. This passion provides the motivation to work long hours and overcome obstacles.
2. **Vision:** The ability to see opportunities where others don't and to have a clear idea of what they want to achieve in the future.
3. **Resilience and Perseverance:** The ability to face failures, learn from them, and persist without giving up. Entrepreneurship is filled with setbacks, and resilience is key to survival.
4. **Risk-Taking Ability:** A willingness to take calculated risks. They are not reckless gamblers but are willing to venture into uncertain territories for potential high rewards.
5. **Creativity and Innovation:** The ability to think outside the box, come up with new ideas, and find innovative solutions to problems.
6. **Strong Leadership Skills:** The ability to inspire and lead a team, communicate the vision effectively, and delegate tasks.
7. **Decisiveness:** The ability to make quick and firm decisions, even with incomplete information.
8. **Adaptability:** The flexibility to change course when faced with new market trends, technologies, or challenges.

Step 3: Final Answer

The essential qualities of a successful entrepreneur include passion, vision, resilience, a calculated risk-taking appetite, creativity, leadership, decisiveness, and adaptability.

Quick Tip

Remember: Successful entrepreneurs combine passion with practical skills. While some qualities like risk-taking and innovation are innate, others like financial management and communication can be developed through learning and experience.

7. Enlist different problems related to Sustainable Development.

Solution:

Step 1: Understanding the Question

This question is a repetition of Q3. It asks to list the major challenges or obstacles that hinder the achievement of Sustainable Development. Sustainable Development aims to balance economic, social, and environmental needs.

Step 2: Detailed Explanation

The major problems and challenges related to achieving Sustainable Development are:

1. **Environmental Degradation:** This includes pollution (air, water, soil), deforestation, desertification, and the loss of biodiversity.
2. **Climate Change:** The warming of the planet due to greenhouse gas emissions, leading to more frequent and intense natural disasters.
3. **Resource Depletion:** The over-extraction and rapid consumption of non-renewable resources like fossil fuels and minerals, and the unsustainable use of renewable resources like water and forests.
4. **Poverty and Inequality:** High levels of poverty and wide gaps between the rich and poor make it difficult to achieve social sustainability and can lead to over-exploitation of the environment for survival.
5. **Rapid Population Growth:** A growing population puts increased pressure on all natural resources and public services.
6. **Unsustainable Consumption Patterns:** Particularly in developed countries, high levels of consumption lead to excessive waste and resource use.
7. **Lack of Political Will and Poor Governance:** Without strong government policies, regulations, and enforcement, sustainable practices are often not adopted.

Step 3: Final Answer

The key problems are environmental degradation, climate change, resource depletion, poverty, population growth, unsustainable consumption, and lack of political will.

💡 Quick Tip

Remember: Sustainable development faces interconnected environmental, economic, social, political, and technological challenges. Solving these requires integrated approaches, global cooperation, and commitment from all stakeholders.

8. List the major pests and diseases of rice and discuss shoot borer's damage and management.

Solution:

Part 1: Major Pests and Diseases of Rice

Step 1: Understanding the Question

This part asks for a list of the most common pests (insects) and diseases that affect the rice crop.

Step 2: Detailed Explanation

Major Pests of Rice:

- **Stem Borer (Shoot Borer):** Yellow stem borer is the most common.
- **Leaf Folder:** Larvae fold the leaves and feed from inside.
- **Brown Plant Hopper (BPH):** Sucks sap from the base of the plant, causing "hopper burn".
- **Gundhi Bug (Earhead Bug):** Sucks the milky sap from developing grains, causing them to be chaffy.
- **Gall Midge:** Maggots feed inside the tillers, causing a silvery shoot called "onion leaf".

Major Diseases of Rice:

- **Blast:** A fungal disease causing spindle-shaped spots on leaves and neck rot.
- **Bacterial Leaf Blight (BLB):** A bacterial disease causing yellowing and drying of leaves from the tip downwards.
- **Sheath Blight:** A fungal disease causing lesions on the leaf sheath near the water line.

- **Tungro Virus:** A viral disease transmitted by green leafhoppers, causing stunting and yellowing of plants.

Part 2: Shoot Borer's Damage and Management

Step 1: Understanding the Question

This part requires a detailed discussion of the damage caused by the rice shoot borer (stem borer) and how to manage it.

Step 2: Detailed Explanation

Damage Caused by Shoot Borer:

The larva of the stem borer moth bores into the rice stem to feed. The damage symptoms differ based on the crop stage:

- **At the Vegetative Stage (before flowering):** The larva cuts the central shoot from inside, causing it to dry up. This is known as a **"dead heart"**.
- **At the Reproductive Stage (after flowering):** The larva cuts the stalk of the panicle (the flowering head). This prevents grain formation, and the entire panicle turns white and empty. This is known as a **"white earhead"**.

Management of Shoot Borer:

An Integrated Pest Management (IPM) approach is recommended:

1. **Cultural Methods:** Use resistant varieties, plow the field after harvest to destroy stubble containing larvae, and collect and destroy egg masses.
2. **Biological Methods:** Encourage natural enemies like spiders and dragonflies. Release egg parasitoids like *Trichogramma japonicum*.
3. **Mechanical Methods:** Use pheromone traps to monitor and mass-trap the male moths.
4. **Chemical Methods:** Apply insecticides like cartap hydrochloride or fipronil granules in the nursery or main field only when the pest population crosses the Economic Threshold Level (ETL).

Step 3: Final Answer

Major pests of rice include stem borer and BPH, while major diseases include blast and BLB. The rice shoot borer causes "dead hearts" and "white earheads". Its management involves an integrated approach using cultural, biological, and chemical methods.

💡 Quick Tip

Remember: Rice shoot borer causes deadhearts in vegetative stage and whiteheads in reproductive stage. Integrated management combining resistant varieties, cultural practices, biological control, and need-based chemical application is most effective.

9. Discuss in detail life cycle of Lac insect.

Solution:

Step 1: Understanding the Question

The question asks for a detailed description of the complete life cycle of the Lac insect (*Kerria lacca*).

Step 2: Detailed Explanation

The life cycle of the lac insect is complex and involves distinct stages. It is completed in about six months and there are typically two generations per year.

1. **Egg:** The female lac insect lays around 200-500 eggs inside a resinous cell (the lac encrustation) that she secretes around herself. The eggs are oval and reddish.
2. **Nymph (Crawler Stage):** The eggs hatch inside the cell, and tiny, red-colored nymphs emerge. This is called the 'crawler' stage. This is the **only mobile stage** in the insect's life. The crawlers move out in a large swarm to find a suitable spot on the tender shoots of the host tree (like Palas, Ber, Kusum).
3. **Settlement and Metamorphosis:** Once a crawler finds a suitable spot, it inserts its proboscis (sucking mouthpart) into the plant tissue to suck sap. It then becomes stationary for the rest of its life. It starts secreting the protective lac resin around its body. Both male and female nymphs undergo metamorphosis, but their development paths diverge.
4. **Adult Stage:**
 - **Adult Female:** The female loses her legs and antennae and becomes a blob-like creature inside her resin cell. Her primary function is to feed on sap, grow, and secrete large amounts of lac. After mating, she lays eggs and dies.
 - **Adult Male:** The male develops into a tiny, winged insect. He emerges from his cell, mates with several females, and dies within a few days as he does not have mouthparts to feed.
5. **Mating and Egg-Laying:** After mating, the female develops rapidly, becomes sac-like, and fills with eggs. The eggs hatch, and a new generation of crawlers emerges, starting

the cycle anew.

Step 3: Final Answer

The life cycle of the lac insect consists of the egg, nymph (crawler), and adult stages. The mobile crawler stage is crucial for dispersal. After settling, the insect secretes lac resin. The female becomes a stationary sac for reproduction, while the winged male lives only to mate. This cycle repeats twice a year, producing two crops of lac.

💡 Quick Tip

Remember: Lac insect life cycle includes egg, crawler (mobile stage), settled nymph, and adult stages. Only crawlers are mobile; males are winged but short-lived. The insect completes 2 generations per year depending on the strain (rangeeni or kusmi).

10. Discuss cultivation of apple under the following heads: Soil and climate, major varieties, propagation and rootstock and major diseases and their management.

Solution:

Step 1: Understanding the Question

The question asks for a comprehensive overview of apple cultivation, structured under four specific headings.

Step 2: Detailed Explanation

1. Soil and Climate

- **Climate:** Apple is a temperate fruit crop. It requires a cold climate with a distinct winter period. It needs a specific number of "chilling hours" (around 1000-1500 hours below 7°C) during winter for proper flowering. The ideal growing temperature is between 21-24°C. It is grown at high altitudes (1500-2700 m) in the Himalayan region of India.
- **Soil:** Apples thrive in deep, well-drained, loamy soils that are rich in organic matter. The soil pH should be slightly acidic to neutral (5.5 - 6.5). Water-logged soils are completely unsuitable as they cause root rot.

2. Major Varieties

- The most popular group of varieties grown in India belongs to the 'Delicious' group.

- **Royal Delicious:** The most widely grown variety, known for its conical shape and red stripes.
- **Red Delicious:** A popular commercial variety with a sweet taste.
- **Golden Delicious:** A yellow-skinned variety, used both for eating fresh and for pollination.
- Other important varieties include Rich-a-Red, Red Gold, and traditional ones like Ambri in Kashmir.

3. Propagation and Rootstock

- **Propagation:** Apples are commercially propagated by vegetative methods like **shield budding** or **tongue grafting** onto a rootstock. This ensures that the new plant has the same characteristics as the parent tree.
- **Rootstock:** The choice of rootstock is crucial as it determines the size, vigour, and disease resistance of the tree. Seedling rootstocks are common, but clonal rootstocks from the **Malling (M)** and **Malling-Merton (MM)** series (e.g., M9 - dwarfing, MM106 - semi-dwarfing) are now preferred for high-density planting.

4. Major Diseases and their Management

- **Apple Scab (Fungal):** This is the most serious disease, causing black, scabby spots on leaves and fruits. **Management:** Spraying fungicides (like Mancozeb) at different stages of bud development and removing fallen leaves to reduce infection.
- **Powdery Mildew (Fungal):** Appears as a white powdery coating on leaves and shoots. **Management:** Pruning infected parts and spraying with sulfur-based fungicides.
- **Collar Rot (Fungal):** Affects the base of the trunk, causing the bark to rot. **Management:** Ensuring good soil drainage and using resistant rootstocks.

Step 3: Final Answer

Apple cultivation requires a temperate climate with chilling winters and well-drained loamy soil. Major varieties include the Delicious group. Propagation is done by grafting or budding onto suitable rootstocks (like MM106). Key diseases like Apple Scab and Powdery Mildew are managed through fungicide sprays and good orchard sanitation.

💡 Quick Tip

Remember: Apple cultivation requires temperate climate with adequate winter chilling, well-drained loamy soils (pH 5.5-6.5), and careful selection of varieties and rootstocks. Major diseases like apple scab and powdery mildew require integrated management through resistant varieties, cultural practices, and timely fungicide applications.

11. Discuss any four characteristics of a good quality seed.

Solution:

Step 1: Understanding the Question

The question asks to discuss four key attributes or features that define a "good quality seed." Good quality seed is fundamental for achieving high agricultural yield and healthy crop stand.

Step 2: Detailed Explanation

Here are four essential characteristics of a good quality seed:

1. **High Genetic Purity:** This means the seed is 'true to type,' and all the seeds in a lot belong to the variety stated on the label. High genetic purity ensures that the resulting plants will have the desirable characteristics of that variety, such as high yield potential, specific grain quality, or disease resistance. It should be free from seeds of other varieties.
2. **High Physical Purity:** The seed lot should be free from any foreign material. This includes inert matter (like dirt, stones, and chaff), weed seeds, and seeds of other crops. High physical purity ensures that the farmer is sowing only the desired crop seed and not introducing weeds or other crops into the field.
3. **High Germination Percentage and Vigour:** The seed must have a high capacity to germinate and produce healthy seedlings. A high germination percentage (e.g., above 85-90%) ensures a uniform and adequate plant population in the field. Seed vigour refers to the seed's ability to germinate and grow well even under stressful field conditions.
4. **Freedom from Pests and Diseases:** A good quality seed must be healthy and free from seed-borne diseases (caused by fungi, bacteria, viruses) and insect pests. Sowing infected seeds can lead to a widespread outbreak of disease or pest infestation in the field, causing significant crop loss.

Step 3: Final Answer

Four critical characteristics of a good quality seed are high genetic purity, high physical purity, high germination percentage and vigour, and being free from pests and diseases.

💡 Quick Tip

Remember: Good quality seed must have genetic purity, physical purity, high germination percentage, and high vigor. These characteristics ensure uniform crop establishment, optimal yield, and resistance to stresses. Always purchase certified seeds from reliable sources.

12. What is pollination? Discuss mechanism favoring self and cross-pollination in crop plants.

Solution:

Part 1: What is Pollination?

Step 1: Understanding the Question

This part asks for the definition of pollination.

Step 2: Detailed Explanation

Pollination is a fundamental process in the reproduction of flowering plants. It is defined as the transfer of pollen grains from the anther (the male part of a flower) to the stigma (the female part of a flower). This transfer is essential for fertilization to occur, which leads to the development of seeds and fruits.

Part 2: Mechanisms Favoring Self and Cross-Pollination

Step 1: Understanding the Question

This part requires a discussion of the adaptations or mechanisms that plants have evolved to promote either self-pollination or cross-pollination.

Step 2: Detailed Explanation

Mechanisms Favoring Self-Pollination (Autogamy):

- **Bisexuality (Hermaphroditism):** The presence of both male (stamen) and female (pistil) parts in the same flower, which is a prerequisite for self-pollination. (e.g., Wheat, Rice).
- **Homogamy:** The anthers and stigma of a flower mature at the same time, ensuring that pollination can occur.
- **Cleistogamy:** The flowers never open, forcing self-pollination to occur within the closed bud. This is a surefire mechanism for selfing. (e.g., Groundnut).

Mechanisms Favoring Cross-Pollination (Allogamy):

- **Unisexuality (Dicliny):** The flowers are either male or female. If male and female flowers are on different plants (**dioecy**, e.g., Papaya), cross-pollination is mandatory. If they are on the same plant (**monoecy**, e.g., Maize), it still encourages cross-pollination.
- **Dichogamy:** The anthers and stigma mature at different times. If anthers mature first (**protandry**, e.g., Sunflower), or if the stigma matures first (**protogyny**, e.g., Bajra), it prevents self-pollination.
- **Self-Incompatibility:** A genetic mechanism where the pollen from a flower is unable to fertilize the ovules of the same flower. The stigma chemically rejects its own pollen. (e.g., Mustard, Apple).

Step 3: Final Answer

Pollination is the transfer of pollen from anther to stigma. Mechanisms favoring self-pollination include bisexuality and cleistogamy. Mechanisms favoring cross-pollination include unisexuality, dichogamy, and self-incompatibility.

💡 Quick Tip

Remember: Self-pollination mechanisms include bisexuality, cleistogamy, homogamy while cross-pollination mechanisms include dichogamy, self-incompatibility, unisexuality, and herkogamy. Plants evolve these adaptations based on their reproductive strategy and environmental conditions.

13. Write two major diseases of pulses.

Solution:

Step 1: Understanding the Question

The question asks to name two of the most significant and common diseases that affect pulse crops (like gram, pea, lentil, pigeonpea).

Step 2: Detailed Explanation

Here are two major diseases of pulse crops:

1. Wilt:

- **Causative Agent:** It is a soil-borne fungal disease, most commonly caused by species of *Fusarium* (e.g., *Fusarium oxysporum* in chickpea).
- **Symptoms:** The fungus infects the roots and blocks the plant's water-conducting tissues (xylem). This leads to the characteristic symptoms of yellowing of leaves,

drooping, and eventually the sudden wilting and death of the entire plant. It is a major problem in chickpea and pigeonpea.

2. Yellow Mosaic Virus (YMV):

- **Causative Agent:** It is a viral disease, caused by the Mungbean Yellow Mosaic Virus.
- **Symptoms:** The disease appears as scattered, bright yellow patches on the leaves. These patches expand, and eventually, the entire leaf may turn yellow. The affected plants are stunted and produce fewer flowers and pods. The virus is transmitted by an insect vector, the whitefly. It is a major disease in mungbean and urdbean.

Step 3: Final Answer

Two major diseases of pulses are Wilt (caused by *Fusarium* fungus) and Yellow Mosaic Virus (transmitted by whiteflies).

💡 Quick Tip

Remember: Wilt (*Fusarium*) and Powdery Mildew are two major diseases affecting pulse crops. Wilt causes vascular blockage leading to plant death, while powdery mildew appears as white powdery growth on leaves and stems.

14. Define the male sterility and self-incompatibility.

Solution:

Step 1: Understanding the Question

The question asks for clear definitions of two important concepts in plant breeding: male sterility and self-incompatibility.

Step 2: Detailed Explanation

1. Male Sterility

Definition: Male sterility is a condition in a plant where it is unable to produce functional or viable pollen grains. The female reproductive parts (pistil) of the plant remain fertile and can be pollinated by pollen from another plant.

- **Purpose:** It is a very useful tool in plant breeding for producing hybrid seeds. By using a male-sterile female parent, breeders can ensure cross-pollination without the need for manual removal of anthers (emasculation), which is a tedious process.

2. Self-Incompatibility

Definition: Self-incompatibility is a genetic mechanism in plants that prevents self-fertilization.

It allows the pistil of a flower to recognize and reject its own pollen or pollen from a genetically similar plant.

- **Purpose:** It is a natural mechanism to enforce cross-pollination and promote genetic diversity. This helps in avoiding inbreeding depression and maintaining the vigour of the species.

Step 3: Final Answer

Male Sterility is the inability of a plant to produce functional pollen, while its female parts remain fertile. **Self-Incompatibility** is a genetic mechanism that prevents a fertile plant from being fertilized by its own pollen.

💡 Quick Tip

Remember: Male sterility is the failure to produce functional pollen (used in hybrid seed production). Self-incompatibility is a genetic mechanism that prevents self-fertilization by rejecting self-pollen (promotes cross-pollination).

15. Write two high yielding varieties and two Basmati varieties of rice.

Solution:

Step 1: Understanding the Question

The question asks to name two specific varieties from each of two distinct categories of rice: high-yielding varieties (HYVs) and Basmati varieties.

Step 2: Detailed Explanation

Two High-Yielding Varieties (HYVs) of Rice:

These varieties were central to the Green Revolution and are known for their high productivity.

1. **IR-8:** Often called the "miracle rice," this was one of the first semi-dwarf HYVs developed at the International Rice Research Institute (IRRI). It has very high yield potential but its grain quality is coarse.
2. **Jaya:** A popular HYV developed in India, which even out-yielded IR-8. It is also a semi-dwarf, high-yielding variety widely cultivated across the country.

Two Basmati Varieties of Rice:

These varieties are famous for their distinct aroma, long slender grains, and excellent cooking quality.

1. **Basmati-370:** A traditional, tall-growing Basmati variety from the Punjab region, known for its exceptional aroma and grain quality, although its yield is low.
2. **Pusa Basmati-1121:** A modern, evolved Basmati variety renowned for having the world's longest cooked rice grain. It has excellent aroma and cooking qualities combined with a higher yield than traditional Basmati varieties.

Step 3: Final Answer

High-Yielding Varieties: IR-8, Jaya.

Basmati Varieties: Basmati-370, Pusa Basmati-1121.

💡 Quick Tip

Remember: High-yielding varieties like IR-8 and Jaya focus on production (semi-dwarf, non-lodging). Basmati varieties like Pusa Basmati-1 and Basmati-370 focus on grain quality (aroma, elongation) with Pusa Basmati-1 combining high yield with Basmati quality.

16. What are important species of honeybees in India?

Solution:

Step 1: Understanding the Question

The question asks to list the major species of honeybees that are found in India, which are important for honey production and pollination.

Step 2: Detailed Explanation

There are four main species of honeybees found in India:

1. The Indian Hive Bee (*Apis cerana indica*):

- This is an indigenous species that can be domesticated. It builds multiple parallel combs in enclosed spaces like tree hollows or man-made hives. It is a good pollinator but is prone to swarming and has a moderate honey yield (about 6-8 kg per colony per year).

2. The European Bee or Italian Bee (*Apis mellifera*):

- This is an exotic species introduced to India for commercial beekeeping. It is preferred by beekeepers because it is docile, has a low swarming tendency, and produces a very high yield of honey (about 25-40 kg per colony per year).

3. The Rock Bee (*Apis dorsata*):

- This is a wild, giant honeybee that cannot be domesticated. It builds a single, large comb in open spaces, often on high tree branches or cliffs. It is very aggressive but produces a large amount of honey, which is collected by "honey hunters".

4. The Little Bee (*Apis florea*):

- This is another wild species, the smallest of the honeybees. It builds a single, small comb in bushes and shrubs. It produces very little honey but is an important pollinator.

Step 3: Final Answer

The important species of honeybees in India are the Indian Hive Bee (*Apis cerana indica*), the European Bee (*Apis mellifera*), the Rock Bee (*Apis dorsata*), and the Little Bee (*Apis florea*).

💡 Quick Tip

Remember: India has four main honeybee species - *Apis cerana* (domesticated indigenous), *Apis mellifera* (domesticated exotic high-yielder), *Apis dorsata* (wild giant), and *Apis florea* (wild dwarf). Each has distinct characteristics and importance.

17. Enlist different steps of ice-cream making.

Solution:

Step 1: Understanding the Question

The question asks for a list of the sequential steps involved in the commercial production of ice cream.

Step 2: Detailed Explanation

The process of making ice cream involves a series of carefully controlled steps to ensure a smooth texture, good flavour, and safety.

1. **Blending of Ingredients:** The first step is to select and blend the ingredients (milk, cream, sugar, stabilizers, emulsifiers) to create the "ice cream mix."
2. **Pasteurization:** The mix is heated (e.g., to 71°C for 30 minutes) to kill any harmful bacteria and to help dissolve the ingredients properly. This makes the product safe to eat.
3. **Homogenization:** The hot mix is passed through a homogenizer under high pressure. This breaks down the fat globules into smaller particles, resulting in a smoother texture

and preventing the cream from separating.

4. **Ageing:** The mix is cooled and allowed to age in a refrigerated tank for at least 4 hours. During ageing, the fat solidifies and the stabilizers swell, which improves the whipping quality and texture of the final product.
5. **Freezing:** The aged mix is then put into a freezer. Here, it is rapidly frozen while being churned or whipped. This process incorporates air (called "overrun") and prevents the formation of large ice crystals, making the ice cream light and smooth. Flavourings are usually added at this stage.
6. **Packaging and Hardening:** The semi-frozen ice cream is packaged into containers and then quickly transferred to a "hardening room" or blast freezer at a very low temperature (around -30°C to -40°C). This final, rapid freezing solidifies the ice cream and stabilizes its structure.

Step 3: Final Answer

The steps of ice cream making are: Blending, Pasteurization, Homogenization, Ageing, Freezing, and Hardening.

💡 Quick Tip

Remember: Key steps in ice-cream making are: Mixing → Pasteurization → Homogenization → Cooling/Aging → Freezing → Hardening → Storage. Each step is crucial for proper texture, flavor, and quality.

18. Name two exotic breeds of cow.

Solution:

Step 1: Understanding the Question

The question asks to name two breeds of cattle that are not native to India (i.e., they have been imported from other countries), primarily for their dairy characteristics.

Step 2: Detailed Explanation

Here are two of the most well-known exotic dairy cattle breeds found in India:

1. Holstein-Friesian (HF):

- **Origin:** The Netherlands.

- **Characteristics:** This breed is easily recognizable by its distinct black-and-white (or sometimes red-and-white) coat. It is the world's highest milk-producing dairy animal. However, its milk has a lower fat content compared to other breeds, and it is less tolerant of hot and humid climates.

2. Jersey:

- **Origin:** The Island of Jersey, UK.
- **Characteristics:** This is a smaller dairy breed, typically light brown in colour. It is known for producing milk with a very high butterfat content. Jerseys are more heat-tolerant than HF cattle and adapt well to a variety of climates, making them very popular for crossbreeding in India.

Step 3: Final Answer

Two important exotic breeds of cow are Holstein-Friesian and Jersey.

Quick Tip

Remember: Holstein Friesian is the highest milk producer (black-white spotted), Jersey is smaller with higher fat content (light brown). Both are extensively used in India for crossbreeding with indigenous cattle to improve milk production.