

Z00518 – APPLIED ENTOMOLOGY AND PEST MANAGEMENT

FINAL TERM MOST IMPORTANT QUESTIONS

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Group Link: <https://chat.whatsapp.com/BjC6W0jZx8o9yaC2lSh1Gu>

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Q-1 What is electrical method for insects?

Electricity devices are available for electrocuting insects. Some are in the form of **electrical window screen** for flies. While others are as **electric light traps** for moths and beetles.

These are so arranged that an insect striking parallel wire of the device completes an electrical circuit and is killed by the shock. A machine for the electrical treatment of insect-infested grain and cereal products has been used successfully for several years, in which the insects are killed when the product is passed through a field of high frequency between two electrodes.

Q-2 What is ploughing?

In entomology, ploughing, also known as "plowing" in American English, refers to the behavior exhibited by certain insect species, particularly among soil-dwelling insects. Ploughing behavior involves the creation of tunnels, burrows, or galleries in the soil, typically for the purpose of creating shelters, finding food, or for reproduction. This behavior can serve various functions depending on the species of insect and their ecological role.

Ploughing insects often use their specialized mouthparts, legs, or other body parts to dig through the soil and create these tunnels. These tunnels can vary in complexity and depth, ranging from simple burrows to intricate galleries. The insects that exhibit ploughing behavior can include various types of beetles, ants, termites, and other soil-dwelling species.

Q-3 Write benefits of insects.

Insects play important roles in ecosystems and provide numerous benefits to humans and the environment. Here are some of the key benefits of insects:

1. **Pollination:** Insects, particularly bees, butterflies, and other pollinators, play a crucial role in pollinating flowers and crops. They transfer pollen between plants, allowing them to reproduce and produce fruits, seeds, and vegetables. It is estimated that insects contribute to the pollination of approximately 75% of global food crops.
2. **Pest control:** Many insects are natural predators or parasitoids of pests that can damage crops and plants. Ladybugs, praying mantises, and certain wasp species, for example, feed on harmful

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insects like aphids, caterpillars, and mites. This natural pest control reduces the need for synthetic pesticides, making it an environmentally friendly approach to managing pests.

3. **Decomposition and nutrient cycling:** Insects play a vital role in breaking down organic matter, such as dead plants and animals. They assist in the process of decomposition, recycling nutrients back into the soil and contributing to the fertility of ecosystems. Without insects, organic waste would accumulate, and nutrient cycling would be impaired.
4. **Food source:** In many cultures around the world, insects are consumed as a source of protein and nutrients. They can be a sustainable and affordable food option, requiring fewer resources than traditional livestock farming. Additionally, some insects, like mealworms and black soldier flies, can be used to convert organic waste into nutritious animal feed.
5. **Research and medicine:** Insects have contributed significantly to scientific research and the development of medical treatments. For example, the fruit fly (*Drosophila melanogaster*) has been extensively studied to understand genetics and developmental processes. Moreover, compounds derived from insects, such as ants and beetles, have been used in traditional medicine and are being investigated for potential therapeutic applications.
6. **Ecological balance:** Insects are a vital part of the food chain and serve as a food source for many other animals, including birds, reptiles, amphibians, and mammals. They help maintain the balance of ecosystems and ensure the survival of various species. Removing insects from the ecosystem could disrupt the food web and have cascading effects on other organisms.

Q-4 Explain artificial control of insects.

Artificial controls of insects refer to various methods and techniques employed by humans to manage or regulate insect populations. These controls can be categorized into several broad categories:

- a. **Chemical control:** The use of insecticides or pesticides to kill or repel insects. This can involve the application of chemical sprays, baits, or systemic treatments to crops, buildings, or other areas affected by insect infestations.
- b. **Biological control:** The utilization of natural enemies or predators to control insect populations. This approach involves introducing or enhancing the presence of beneficial organisms such as predatory insects, parasitic wasps, or pathogenic microorganisms to reduce the population of target pests.
- c. **Cultural control:** The modification of agricultural or environmental practices to minimize insect damage. This may include crop rotation, intercropping, sanitation measures, or the use of physical barriers to prevent insect access.

- d. **Genetic control:** The manipulation of insect genes or genetic material to control populations. This can involve techniques such as the release of sterile insects, genetic modification to render insects infertile, or the use of genetically modified crops resistant to specific insect pests.
- e. **Mechanical control:** The use of physical methods to manage insects. This can include trapping, vacuuming, or physically removing insects or their breeding sites.

Q-5 Write five ways to manage rice ear head.

- 1- The population can be suppressed by killing the bug by using light traps.
- 2- Collection of adult bug using net.
- 3- Destroy weed to remove alternate host.
- 4- Keep on hanging the cattle urine soaked gunny bags or cow dung wrapped cloth in the field to attract the bug.
- 5- Synchronize rice planting to maintain simultaneous crop maturity in the field in an area for equal distribution of bugs in all fields.
- 6- Conserve predator of rice bug like tiger beetle, *Cicindela sexpunctata* by using chemical pesticide judiciously.
- 7- Spray after at least 10 bug per 100 panicles with pesticide like carbaryl (Carbaryl 5% dust@25kg/ha)
- 8- Spray Fenvalerate 20 EC 0.5ml/liter of water

Q-6 What are difference between intelligent cultivation and destructive cultivation?

Intelligent cultivation and use of fertilizers is well as pruning to remove injured or diseased parts will aid in insect control

The **destruction of vegetable trash and weeds**, frequently called **clean culture**, is also an important factor, especially in the control of hibernating insects

Q-7 Explain four types of Larvae.

Larvae of insects can be classified in four types:

- i- Larvae of moths and butterflies are called caterpillars.
- ii- Larvae of beetles are usually called grubs.
- iii- Larvae of flies are called maggots.
- iv- Larvae found in boring wood, of any insect either moth, butterfly or beetles are uniformly called borers.

Q-8 What are different ways to manage fruit borer pest of cotton?

- 1- Clean cultivation and destruction of crop residues (fallen leaves, twigs etc.) before the onset of season.
- 2- Plough deeply to expose the hibernating larvae / pupae.
- 3- Avoid late sowing of the crop. Early sowing helps in early maturity facilitating escape.

- 4- Withholding irrigation water to avoid prolonged late boll production/formation to reduce the buildup of over-wintering population.
- 5- Acid de-linting of cotton seeds.
- 6- Release of egg parasitoids *Trichogramma chilonis* or *E. johnstoni*
- 7- Spray triazophos 40 EC 2.5l/ha and Quinalphos 20% AF in alternation even after 100 DAS.

Q-9 What are attractants? Give examples.

Attractants or sometimes called **attrahents** are materials used to **lure insects** to traps and poisoned baits. The use of geraniol in **Japanese beetle traps**, **sugar sirups** for **ant baits**, and **fermenting sirup solutions** for trapping various moths are good examples.

Q-10 What damages are caused by yellow rice stem borer?

The larval feeding damage may cause death of the central leaf whorl at the vegetative stage, which is known as **dead heart**. Damage at the reproductive stage causes ear devoid of grain, which is known as **white head**.

Q-11 Give three ways to manage cotton aphid – *Aphis gossypii*.

- 1- Seed treatment with imidacloprid 70 WS at 7 g/kg protect the crop upto 8 weeks
- 2- Release predator *Chrysoperla carnea* or *coccinella* sp.
- 3- Monitoring the activities of the adult by setting up yellow sticky traps
- 4- Spray any one of the following insecticides (500 l spray fluid/ha)
- 5- Imidacloprid 200 SL at 100 ml/ha
- 6- Methyl demeton 25 EC 500 ml/ha
- 7- Dimethoate 30 EC 500 ml/ha
- 8- Phosphamidon 40 SL 600 ml/ha

Q-12 How topography affects the distribution of insects' population?

Topography can influence insect population distribution by affecting factors like temperature, moisture, and habitat availability. For instance, slopes and elevation can create microclimates that influence insect preferences for nesting, feeding, and survival.

Q-13 Mention the structure present on head of insect.

Insects have a variety of structures present on their heads that serve different functions. Some of these structures include:

1. **Antennae:** These are sensory organs located on the insect's head. Antennae are used to detect chemical cues, vibrations, and air currents. They play a crucial role in communication, navigation, and finding food.
2. **Compound Eyes:** Insects typically have two large compound eyes on their head. Each compound eye is made up of many individual lenses called ommatidia, which collectively provide a wide field of view and detect motion and light intensity.

3. **Simple Eyes (Ocelli):** Some insects also have simple eyes, called ocelli, positioned between or near the compound eyes. Ocelli detect changes in light intensity and help insects orient themselves to light sources, such as the sun or moon.

4. **Mouthparts:** Insect mouthparts vary widely depending on their diet and feeding habits. Examples of mouthparts include:

Mandibles: Strong, cutting mouthparts used for biting and chewing.

Maxillae and Labium: Structures that assist in manipulating food during feeding.

Proboscis: A long, tube-like mouthpart used for sucking liquids, commonly seen in butterflies and moths.

5. **Clypeus:** This is a plate-like structure located between the insect's antennae and above the mouthparts. It is part of the insect's face and may be involved in protecting the mouthparts.

6. **Labrum:** Also known as the upper lip, the labrum is a movable flap-like structure that covers and protects the insect's mouthparts.

7. **Labial Palps and Maxillary Palps:** These are small sensory structures located near the mouthparts. They assist in manipulating food and can also play a role in tasting and sensing chemical cues.

8. **Genae:** These are lateral areas of the insect's head, often referred to as the "cheeks."

9. **Frons:** The frons is the front part of an insect's head located above the antennae. It can be a distinct, often flattened area.

10. **Vertex:** The vertex is the uppermost part of the insect's head, usually situated between the eyes.

Q-14 What is physical transmission?

Physical transmission in insects refers to the process by which certain pathogens, such as bacteria, viruses, or parasites, are directly transmitted from one organism to another through physical contact or mechanical means involving insects. In this context, insects act as mechanical vectors, carrying the pathogen on their bodies or through their feeding activities.

There are various mechanisms through which physical transmission can occur:

1. **Mechanical Transmission:** Insects may carry pathogens on their body surfaces, mouthparts, or in their feces. When they come into contact with a susceptible host, the pathogens can be transferred. For example, houseflies can pick up pathogens from fecal matter or decaying organic material and subsequently transfer them to food or surfaces that humans come into contact with.

2. **Regurgitation:** Some insects, such as mosquitoes and ticks, regurgitate saliva containing pathogens into the host during feeding. This enables the pathogens to enter the host's bloodstream, potentially causing infection. Mosquitoes are known to transmit diseases like malaria, dengue fever, and Zika virus through this mechanism.
3. **Biting or Piercing:** Insects with piercing mouthparts, such as mosquitoes, fleas, and ticks, can directly introduce pathogens into the host's body through their bites. These insects may harbor pathogens in their salivary glands or gut, which are then injected into the host during feeding.
4. **Fecal Transmission:** Insects like tsetse flies and kissing bugs can transmit pathogens through their feces. They defecate while feeding, and if the feces come into contact with a host's skin or mucous membranes, the pathogens present in the feces can enter the host's body, potentially leading to infection.

Q-15 What is benefit of IPM?

- 1- Protects environment through elimination of unnecessary pesticide applications
- 2- Improves Profitability
- 3- Reduces risk of crop loss by a pest
- 4- Peace of Mind

Q-16 What are characteristics of order Neuroptera?

- 1- Order Neuroptera includes Green Lacewing, Antlion
- 2- **Mouthparts:** adults have hypognathous (directed downward) mouthparts and unique piercing– sucking larval jaws composed of the mandibles (directed downward) plus maxillae
- 3- They possess complete Metamorphosis
- 4- Both are beneficial insects
- 5- Antlions create a sand pit to capture unsuspecting prey

Q-17 Name any ten important orders of insects.

There are sixteen orders of insects:

- | | |
|------------------|--------------------|
| i- Orthoptera | ix- Neuroptera |
| ii- Hemiptera | x- Thysanura |
| iii- Homoptera | xi- Isoptera |
| iv- Coleoptera | xii- Siphonaptera |
| v- Lepidoptera | xiii- Phthiraptera |
| vi- Diptera | xiv- Thysanoptera |
| vii- Hymenoptera | xv- Dermaptera |
| viii- Odonata | xvi- Blattodea |

Q-18 Write methods of artificial control.

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Q-19 Write symptoms of damage of White Grub.

- 1- Both grub and adult cause the damage
- 2- Grub feeds on fine rootlets and then girdles of the main roots .
- 3- Yellowing and wilting of leaves and finally dries out
- 4- Affected canes come off easily when pulled

Q-20 What are commercial products of insects?

There are many commercial products that are synthesized by insects naturally. Some of them are:

- a. Silk by silkworm (*Bombyx mori*), sericulture
- b. Honey by Honey bee (*Apis mellifera*), apiculture
- c. Beeswax
- d. Shell lac by lac insect (*Kiara lacca*), lac culture

Q-21 Write benefits of legislative control of insects.

Legislative control of insects, typically through regulations and laws, offers several benefits:

1. **Public Health:** Legislative measures can help control disease-carrying insects like mosquitoes and ticks, reducing the risk of diseases such as malaria, dengue fever, and Lyme disease.
2. **Agricultural Protection:** Regulations can prevent the spread of harmful insects that damage crops, leading to better agricultural productivity and food security.
3. **Ecosystem Conservation:** Legislative control can prevent the introduction of invasive insect species that can disrupt ecosystems and harm native flora and fauna.
4. **Biodiversity Preservation:** By managing the trade and movement of insects, legislation can contribute to preserving biodiversity by preventing the unintentional introduction of harmful species.
5. **Pollinator Protection:** Regulations can protect pollinators like bees and butterflies, which play a vital role in pollinating crops and maintaining ecosystem balance.
6. **Mitigating Economic Losses:** Insects can cause economic losses through damage to structures and agricultural products. Legislative measures can help minimize these losses.
7. **Research and Monitoring:** Legislative frameworks can support research and monitoring efforts, leading to a better understanding of insect populations and their impacts.
8. **Integrated Pest Management:** Legislation can encourage the use of integrated pest management strategies that emphasize environmentally friendly and sustainable pest control methods.
9. **Public Awareness:** Regulations can raise public awareness about the importance of insect control and promote responsible behavior to prevent insect-related problems.
10. **International Cooperation:** Legislative measures can facilitate international cooperation to control the spread of insects and prevent global pest outbreaks.

Q-22 What factors affect the condition of climate?

Climate, including temperature, moisture, etc. Climate is probably the most important factor affecting the distribution of insects.

I- Temperature: No insect can live and develop at **temperatures** higher or lower than a certain range. The temperature at which development is most rapid is about midway of this range; at other points either higher or lower the development is proportionately slower

II- Moisture: The same statements hold true for air moisture although variation due to moisture differences is usually less marked. The favorable range of either temperature or moisture varies with different insect species, often even during the stages of development.

III- Weather Conditions: It is easy to understand from these facts why some insects are prevented by winter temperatures from living in the northern United States, and why some can live only there. After several favorable winters, an insect pest may become very numerous, and then disappear suddenly when a severe winter occurs.

Q-23 What is repellent? Describe some repellents.

Repellents are those materials used to keep insects away from crops, animals and man. Various **coal-tar** and **pine** products are rather general insect repellents.

Naphthalene is a clothes moth repellent and oil of citronella is a common ingredient of preparations used to keep mosquitoes away from people.

Q-24 Write features of grasshopper.

Grasshoppers are insects belonging to the suborder Caelifera within the order Orthoptera. They are known for their distinctive features and behaviors. Here are some of the key features of grasshoppers:

1. **Body Structure:** Grasshoppers have a relatively elongated body divided into three main segments: the head, thorax, and abdomen.
2. **Antennae:** They have a pair of long antennae that extend from their head. These antennae are important for sensory perception, helping them detect movement, touch, and environmental cues.
3. **Mouthparts:** Grasshoppers have chewing mouthparts, which allow them to consume a variety of plant materials such as leaves, grasses, and flowers.
4. **Hind Legs:** One of the most distinctive features of grasshoppers is their powerful hind legs. These legs are well-developed for jumping, which is their primary mode of movement. The femur of the hind legs is often enlarged and muscular, providing the necessary force for jumping.
5. **Wings:** Grasshoppers usually have two pairs of wings: the front pair is called tegmina, which are leathery and protect the hind wings. The hind wings are membranous and used for flying.
6. **Coloration and Camouflage:** Grasshoppers come in a variety of colors, often adapted to their natural habitat. Some species have cryptic coloration that helps them blend into their surroundings, providing protection from predators.

7. **Sound Production:** Male grasshoppers produce sound by rubbing their wings or legs together in a process called stridulation. This sound is used to communicate with females and establish territory.
8. **Compound Eyes:** Grasshoppers have large compound eyes that provide them with a wide field of vision. These eyes are composed of multiple tiny lenses, allowing them to detect movement and changes in their environment.
9. **Life Cycle:** Grasshoppers undergo incomplete metamorphosis, which means they have three life stages: egg, nymph, and adult. The nymphs resemble miniature versions of the adult grasshoppers but lack fully developed wings and reproductive organs.
10. **Behavior:** Grasshoppers are primarily herbivorous and feed on plant materials. They are known for their jumping ability, which helps them escape from predators. Some grasshopper species are considered agricultural pests due to their ability to cause damage to crops.
11. **Environmental Adaptations:** Grasshoppers are found in a wide range of habitats, including grasslands, forests, and agricultural fields. They have evolved various adaptations to survive in different environments and climates.
12. **Predators and Defense Mechanisms:** Grasshoppers have various predators, including birds, rodents, reptiles, and other insects. They employ defensive tactics such as camouflage, jumping away from danger, and releasing substances that deter predators.

Q-25 Explain role of insects in pollination.

Insects play a vital role in the process of pollination, which is essential for the reproduction of many flowering plants. Pollination is the transfer of pollen from the male reproductive structures (anthers) to the female reproductive structures (stigmas) of flowers, leading to fertilization and the production of seeds. Insects are among the most important pollinators and contribute significantly to global agriculture and ecosystems.

Q-26 Write features of thysanura.

- 1- Order thysanura Silverfish & Firebrat.
- 2- Mouthparts are chewing type.
- 3- They have incomplete Metamorphosis
- 4- They like to lay their eggs in books and wall paper because of the paper and glue Live 3-5 years Most primitive of all insects

Q-27 Write structure of wings in insects.

- 1- The wings are chitinous outgrowths from the body which vary much in size and form in different insects.
- 2- Each consists of two delicate membranes in contact with each other except along certain lines.
- 3- Along these lines each membrane thickens and also rises above the general surface so that if the two membranes could be separated and examined from the inner surface, they would appear uniform except for grooves with thickened sides and bottoms, running here and there.
- 4- When the membranes are brought together again, these grooves combining form hollow rods which, being stronger than the rest of the membrane, serve as its support and hold it stiff.
- 5- These hollow rods are usually called veins or nerves, though they are nothing of the sort.
- 6- The main and largest veins arise at the base of the wing and extend outward, branching as they go, and some branch several times before they reach the wing margin.
- 7- Cross veins also occur, connecting the radiating main veins or their branches.
- 8- Areas of membrane between veins are termed as cells and where entirely surrounded by veins are called closed cells.
- 9- These may be relatively few or many, according to the number of veins and their branches present.
- 10- The arrangement and number of the chief veins and their branches are of importance in identifying insects.
- 11- There is usually a point or tip called the apex, somewhere along the margin of the wing, though frequently the outline is so rounded that the exact apex is uncertain.
- 12- The front margin of the wing from where it joins the body to where the edge begins to turn backward (in an extended wing) is called the costa.

Q-28 Explain types of mouthparts in insects according to position.

There are three types of heads in insects on the basis of location, each of which will be discussed below.

- a. **Pro-gnathous:**
In this type of mouthparts, head is extended longitudinally with body axis. Mouthparts are pointed forward. Examples are Weevils.
- b. **Hypo-gnathous:**
In this type of mouthparts, head is directed perpendicular to longitudinal body axis. Mouthparts are pointed downwards. Examples are grasshoppers and locust.
- c. **Opitho-gnathous:**
In this type of mouthparts, head is bent underneath thorax during rest. Mouthparts are pointed backwards. Aphids are an excellent example.

Q-29 Write economic importance of cotton.

It is chiefly grown for its fiber which is used for manufacturing of clothes for mankind

- 1- **Cotton lint:** It is the most important vegetable fiber and is woven into fabrics either alone or combined with other fibers
- 2- **Fuzz:** It is used in production of mattresses, surgical cotton, photographic film and paper.
- 3- **Cotton seed:** Depending on varieties, it contains 20-25% semi-drying edible oil which is used for cooking.
- 4- **Cotton seed cake:** Seed cakes contain 40% protein and serves as a important concentrated feed for livestock
- 5- **Cotton stem:** The stem can be used as organic manure or fuel.

Q-30 Explain economic threshold with graph.

Economic Threshold:

“Pest Population at which a grower must take action to prevent a pest populations from reaching the economic injury level”

Economic threshold is slightly below the economic injury level and pest populations must be increasing. This graph explains the relationship of the Economic Injury Level to the Economic Threshold. The red arrow may indicate a pesticide application which was applied at the economic threshold and did not allow the pest population to reach the Economic Injury Level

Q-31 Write damage caused by termites.

Symptoms of damage:

- a. They enter through cut ends of setts & feed on the soft tissue.
- b. The tunnel is filled with the soil.
- c. The termites attack setts, shoots, and canes and also stubbles Entire shoot dries up and can be pulled out easily.

Q-32 What is host plant resistance?

Host plant resistance, also known as plant resistance or crop resistance, refers to a plant's ability to withstand or defend itself against attacks from pests, diseases, and pathogens. In other words, it's the plant's inherent ability to resist damage caused by organisms that can negatively impact its health, growth, and productivity.

This resistance can manifest in several ways:

1. **Physical Barriers:** Some plants develop physical structures that make it difficult for pests to feed or establish themselves. This might include tough or hairy leaves, thorns, or other deterrents.
2. **Chemical Defenses:** Many plants produce natural chemicals that deter or harm pests and pathogens. These can include toxins, volatile compounds, and secondary metabolites that interfere with the feeding or reproductive processes of the attacking organisms.

3. **Genetic Resistance:** Some plants have genetic traits that make them less susceptible to specific pests or pathogens. These traits are inherited and can be selected for through breeding. Plant breeding programs often aim to develop cultivars with higher levels of genetic resistance to certain pests and diseases.

4. **Induced Resistance:** Plants can also activate their defense mechanisms in response to an attack. This is known as induced resistance and involves complex signaling pathways that trigger the production of defense compounds.

Q-33 Write features of order Orthopetera.

- 1- This order includes Indian House Crickets, Field Cricket, Short-horned, Grasshoppers, Katydid (Long-horned Grasshoppers)
- 2- Mouthparts are chewing.
- 3- Metamorphosis is incomplete.
- 4- Damage: Chewing leaves, Crop grains
- 5- Over 20,000 species worldwide

Q-33 Define tracheal gills.

Tracheal gills are respiratory structures found in aquatic insects like dragonflies and mayflies, allowing them to extract oxygen from water during their nymph stage.