



RAFFLES
UNIVERSITY

TEACHING PLAN: Fundamentals of Entomology

Name of Faculty- Dr. Awaneesh Kumar

SCHOOL: (SOAS) SCHOOL OF AGRICULTURAL SCIENCES		ACADEMIC SESSION: 2024 – 2025		FOR STUDENTS’ BATCH: 2023-2027 (Sem. 2 nd)		
1	Course No.	AET-T-101/AET-P-101				
2	Course Title	Fundamentals of Entomology				
3	Credits	3+1				
4	Learning Hours		Contact Hours	72		
			Assessment	9		
			Guided Study	9		
			Total hours	90		
5	Course Objective	1. To impart knowledge to the students on morphology and physiology of Insects. 2. To impart knowledge on classification and identification of insects based on their morphology				
6	Course Outcomes	1. To be able to identify morphological characteristics, feeding habit and habitat of agriculturally important insect-pest. 2. To be able to apply concepts and analytical approaches in evolutionary biology, genetics and other areas of insect biology of the student's choice. 3. To be able to categorize insects based on basic ecological, behavioural, morphological, physiological, or developmental attributes. 4. To be able to examine insects deeply within a biological level of analysis and make strategies for successful pest management strategy. 5. To be able to understand about different families and orders of class Insecta which cause economic losses for human beings.				
7	Outline syllabus:					
7.01	Subject Code	Unit	Introduction	Page Numbers	Lect ures	
7.02	AET-T-101	Unit I (History of Insects and Insect Morphol ogy, Anatomy & Physiolo gy)	1. History of Entomology in India.	9-12	1	
			2. Major points related to dominance of Insecta in Animal kingdom.	13-14	1	
			3. Classification of phylum Arthropoda up to classes. Relationship of class Insecta with other classes of Arthropoda.	137-144	1	
			4. Morphology: Structure and functions of insect cuticle and msolting.	51-53	1	
			5. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus.	16-46	3	
			6. Structure of male and female genital organ.		2	
			7. Metamorphosis and diapause in insects. Types of larvae and pupae.		1	
			8. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects.	55-121	5	
			9. Types of reproduction in insects.	116-121	1	
			10. Major sensory organs like simple and compound eyes, chemoreceptor.		1	
		Unit II (Insect Ecology)	1. Insect Ecology: Introduction, Environment and its components.	91-106	1	
			2. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents.		1	
			3. Effect of biotic factors – food competition, natural and environmental resistance.	199-205	1	

		Unit III (Pest and IPM)	1. Categories of pests.	220-258	1
			2. Concept of IPM, Practices, scope and limitations of IPM.	206-219	2
		Unit IV (Insect Taxonomy)	3. Classification of insecticides, toxicity of insecticides and formulations of insecticides.		2
			4. Chemical control- importance, hazards and limitations.		3
		Unit IV (Insect Taxonomy)	5. Recent methods of pest control, repellents, anti feed ants, hormones, attractants, and gamma radiation.		2
			6. Insecticides Act 1968- Important provisions.	145-195	1
		Unit IV (Insect Taxonomy)	7. Application techniques of spray fluids.		1
			8. Symptoms of poisoning, first aid and antidotes.		1
		Unit IV (Insect Taxonomy)	1. Systematic: Taxonomy –importance, history and development and binomial nomenclature.	133-136	2
			2. Definitions of Biotype, Sub-species, Species, Genus, Family and Order.		1
		Unit IV (Insect Taxonomy)	3. Classification of class Insecta upto Orders, basic groups of present-day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigoniidae, Gryllidae, Gryllotalpidae;	141-144	2
			4. Dictyoptera: Mantidae, Blattidae; Odonata;		1
		Unit IV (Insect Taxonomy)	5. Isoptera: Termitidae;		1
			6. Thysanoptera: Thripidae;		1
		Unit IV (Insect Taxonomy)	7. Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae;		2
			8. Neuroptera: Chrysopidae;		1
		Unit IV (Insect Taxonomy)	9. Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae;	145-199	3
			10. Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae;		2
		Unit IV (Insect Taxonomy)	11. Hymenoptera: Tenthredinid, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcidoidea;		2
			12. Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.		2
8	Course Evaluation				
8.1	CA: 10%				
8.1.1	Attendance	5 %			
8.1.2	Homework	2 Assignments, 5%			
8.1.3	Quizzes	-			
8.1.4	Projects	-			
8.1.5	Presentation	-			
8.1.6	Any other	Practical Examination- 15%			
8.2	MTE	30%			
8.3	End-term examination: 50%				
9	Text Books & References				
9.1	Text book	1. Text Book of Entomology, By J S Jagannath, AIB Saliha Publications, Tamil Nadu, India ISBN: 978-81-950231-4-1			
9.2	References	1. Basic Entomology, By Sunil Kumar Yadav, New Vishal Publications, 2017 2. Handbook of Entomology, By Dr. T V Prasad, 4 th Edition, New Vishal Publications 3. Fundamentals of Agricultural Entomology, By P K Sehgal, Kalyani Publications 2017			
9.3	Video References	1. 2.			

Outcome no. → Syllabus topic↓	1	2	3	4	5
Paper Code.Unit I (1)	✓				
Paper Code. Unit I (2)	✓	✓	✓	✓	✓
Paper Code. Unit I (3)	✓				
Paper Code.Unit II (1)	✓	✓	✓	✓	✓
Paper Code. Unit II(2)	✓		✓	✓	✓
Paper Code. Unit II(3)	✓	✓			
Paper Code.Unit III (1)	✓	✓	✓	✓	✓
Paper Code.Unit III (2)	✓				
Paper Code.Unit IV (1)	✓		✓	✓	✓
Paper Code.Unit IV (2)	✓	✓			
Paper Code.Unit IV (3)	✓		✓	✓	✓
Paper Code.Unit IV (4)	✓	✓			
Paper Code.Unit IV (5)	✓	✓			
Paper Code.Unit IV (6)	✓				
Paper Code.Unit IV (7)	✓		✓	✓	✓

QUESTION BANK

UNIT I Objective Questions

1. The study of form and structure of insects are called_____?

- A. Insect morphology
- B. Insect physiology
- C. Insect Ecology
- D. No of above

2. Which structure would lie below the anus In a male insect?

- A. Epiproct
- C. Aedeagus
- B. Paraproct
- D. Furca

3. The compound which found in the exocuticle but not in the endocuticle?

- A. Chitin
- C. Protein
- B. Quinone
- D. Wax

4. To which body segment are the elytra attached?

- A. Mesothorax
- C. Prothorax
- B. First abdominal
- D. Metathorax

5. The shell of an insect's egg is called the:

- A. Serosa
- C. Chorion
- B. Amnion
- D. Periplasm

Definitions

1. Insect Digestive,
2. Insect Head

3. Insect Thorax
4. Insect Abdomen
5. Insect Legs

Short Notes

1. Structure and modifications of insect antennae
2. Insect Nervous
3. Insect Circulatory
4. Insect Excretory
5. Insect Respiratory

Descriptive Questions

1. Express history of Entomology in India.
2. Describe major points related to dominance of Insecta in Animal kingdom.
3. Articulate the classification of phylum Arthropoda upto classes.
4. Tell us about the relationship of class Insecta with other classes of Arthropoda.
5. Put across the structure and functions of insect cuticle.

UNIT II

Objective Questions

1. What is the function of the micropyle in an insect's egg?

- A. Water balance
- C. Respiration
- B. Nutrition
- D. Sperm entrance

2. Which mouthparts lie between the labrum and the maxillae?

- A. Hypopharynx
- C. Labium
- B. Mandibles
- D. Palps

3. A line of weakness between adjacent sclerites that breaks during molting is called a(n):

- A. Apodeme
- C. Ecdysial suture
- B. Apophysis
- D. Epistomal suture

4. Chitin is most abundant in which part of the exoskeleton?

- A. Epicuticle
- C. Cuticulin layer
- B. Procuticle
- D. Epidermis

5. The lateral sclerotized region of insect body is called_____?

- A. Pleuron
- B. Tergum
- C. Sternum
- D. None of the above

Definitions

1. Abiotic factors
2. Biotic factors

3. Insect Ecology
4. Food chain
5. Food web

Short Notes

1. Effect of temperature on insect population.
2. Effect of moisture on insect population.
3. Effect of humidity on insect population.
4. Effect of rainfall on insect population.
5. Effect of light, atmospheric pressure and air currents on insect population.

Descriptive Questions

6. Express importance of ecology in Entomology.
7. Describe major component of ecology.
8. Articulate the environmental resistance.
9. Tell us about effect of food competition on insect population.
10. Difference between food web and food chain.

UNIT III

Objective Questions

1. Which of the following statements is true about Entomology?

- (a) The study of Birds
- (b) The study of Insects
- (c) The study of Microbes
- (d) The study of Parasitic worms

Sol: (b) The study of Insects.

2. Which of the following are the main characteristic features of an Insect?

- (a) Pair of antennae
- (b) Three pairs of legs
- (c) Pair of wings
- (d) All of the above

Sol: (b) Three pairs of legs.

3. Which of the following is called the resting and inactive stage in the insect life cycle?

- (a) The Egg stage
- (b) The Larva stage
- (c) The pupa stage
- (d) The Adult stage

Sol: (c) The pupa stage.

4. Which of the following is not a natural predator of BPH?

- (a) Bugs
- (b) Red ants
- (c) Spiders
- (d) All of the above

Sol: (b) Red ants.

5. Insects, which feed on one type of food, are called _____.

- (a) Polyphagous
- (b) Monophagous
- (c) Entomophagy
- (d) None of the above

Sol: (b) Monophagous.

Definitions

1. Hormones
2. Attractants,
3. IPM
4. Insecticides Act 1968

5. Antidotes

Short Notes

6. Describe the application techniques of spray fluids.
7. Tell us about the categories of pests.
8. Difference between major pest and minor pest.
9. What are the concepts of IPM.
10. Importance of chemical control insect management.

Descriptive Questions

1. Express hazards and limitations of chemical control.
2. Role of repellents and antifeedant in methods of pest control.
3. Articulate the classification of insecticides in detail.
4. Tell us about classification of insecticides,.
5. Describe the common symptoms of poisoning and how you will manage first aid.

UNIT IV

Objective Questions

1. Which of the following statements is true for Entomophagy?

- (a) Refers to eating birds
- (b) Refers to eating insects
- (c) Refers to eating fishes
- (d) None of the above

Sol: (b) Refers to eating insects.

2. The total number of abdominal legs in the larval stage of the mustard sawfly is ____.

- (a) 2 pairs
- (b) 4 pairs
- (c) 6 pairs
- (d) 8 pairs

Sol: (d) 8 pairs.

3. Which of the following statements is true about the holometabolous insects?

- (a) These insects undergo complete metamorphosis
- (b) These insects undergo incomplete metamorphosis
- (c) Both A and B
- (d) None of the above

Sol: (a) These insects undergo complete metamorphosis.

4. Aphid, small, sap-sucking insects are examples of ____.

- (a) Oviparous
- (b) Viviparous
- (c) Paedogenesis
- (d) Parthenogenesis

Sol: (b) Viviparous.

5. Which of the following structures is not the part of the insects head capsule?

- (a) Vertex
- (b) Antennae
- (c) Pronotum
- (d) Tentorium

Sol: (c) Pronotum.

Definitions

1. Taxonomy

2. Biotype
3. Order
4. Species
5. Genus

Short Notes

1. Describe about the Orthoptera.
2. Tell us about the Dictyoptera.
3. Difference between weevil and beetle.
4. Difference between moth and butterfly.
5. Economic importance of isopteran.

Descriptive Questions

1. Express the key characteristics of order Lepidopteron.
2. State the key characteristics of order Coleoptera.
3. Articulate the key characteristics of order Hymenoptera.
4. Tell us about key characteristics of order Diptera.
5. Describe the common characteristics of order Hemiptera.