

Khulna University

School: Life Science Discipline: Agrotechnology Program: MS in Entomology

Year: 1st Term: 1st Examination Year: 2026 Session: 2025-2026

081108 AT 5101: Insect Taxonomy and Morphology

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Draw and label wherever necessary.

Section A

- 1a. How does Carl Linnaeus's Binomial Nomenclature resolve the confusion caused by regional common names in international scientific research? [L2; CLO1] 3
- b. Critically evaluate the impact of removing offensive common names on promoting inclusivity and accessibility within the global scientific community. [L5; CLO1] 3
- c. When did the modern development of Zoological Nomenclature begin? [L1; CLO1] 1
- d. If you were to revise Aristotle's *Enhaima* and *Anehaima* classification using modern biological knowledge, what new criteria would you integrate to reflect evolutionary relationships? [L6; CLO1] 3
- 2a. Formulate a hypothetical scenario where a newly discovered subspecies requires a trinomial name. Explain how you would apply the rules of Typification and Authorship to validate this new taxon. [L6; CLO1] 3
- b. Describe a situation in which two different teams of researchers fail to follow the Principle of Homonymy. Provide a detailed, sequential solution to resolve the conflict using the rules of the principle. [L2; CLO1] 4
- c. 'Biological Classification (BC) is based on several theories'. Critically analyze the utility of these theories in BC. [L5; CLO1] 3
- 3a. Identify the key features of an atlas and a synopsis as tools for taxonomic literature review. [L3; CLO1] 3
- b. Contrast the format and purpose of taxonomic revisions and taxonomic reviews. [L4; CLO1] 2
- c. Evaluate how evolutionary publications have influenced modern theories of biological classification. [L5; CLO1] 3
- d. Compare monotypic and polytypic species concepts and their implications for agricultural pest identification. [L5; CLO1] 2
- 4a. Explain the significance of bibliographical catalogues in tracking the nomenclatural history of a genus. [L2; CLO1] 3
- b. Justify why a 19th-century descriptive catalog is considered part of 'Taxonomic Literature' but may no longer serve as a primary 'Taxonomic Publication' in modern research. [L5; CLO1] 3
- c. Differentiate between phenetic and cladistic theories of biological classification. [L4; CLO1] 2
- d. Critique the statement: 'A taxonomic description is incomplete without the designation of a type specimen.' [L5; CLO1] 2

- balance at earth surface. [L2; CLO2]
- c. 'Energy emission is more in blue light than that of red light' - prove mathematically. [L6; CLO2] 4
- 7a. What are antitranspirants? Outline its role in improving water use efficiency. [L1, L3; CLO4] 3
- b. 'The modern agricultural practices enhance the emission of greenhouse gases' - justify with example. [L5; CLO2] 4
- c. 'Predictability of weather forecasting depends on systematic study of weather parameters'- assess. [L5; CLO5] 3
- 8a. Discuss the light-dependent and light-independent reactions of photosynthesis and their interdependence. [L2; CLO3] 4
- b. Analyze how meteorological data are applied in sowing time, irrigation scheduling and fertilizer management. [L4; CLO5] 3
- c. Construct a relation between photosynthesis and water use efficiency. [L6; CLO3] 3

Khulna University

School: Life Science Discipline: Agrotechnology Program: MS in Entomology

Year: 1st Term: 2nd Examination Year: 2026 Session: 2025-2026

081108 ENT 5103: Insect Pathology and Molecular Mangement

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Draw and label wherever necessary.

Section A

- 1a. Outline insect physiopathology and distinguish between pathogenesis and virulence in the context of microbial invasion. [L2; CLO1] 3
- b. Compare the portals of entry and modes of infection utilized by fungi versus bacteria in an insect host. [L4; CLO1] 3
- c. Analyze the physiological cascades of infection in an insect body when challenged by a spore-forming bacterium versus a non-spore-forming type. [L4; CLO2] 4
- 2a. Differentiate between Polyhedrosis and Granulosis viruses (Baculoviruses) with specific examples of each. [L4; CLO1] 2
- b. Critique the statement: 'Gram-negative bacteria are more successful insect pathogens than Gram-positive bacteria due to their cell wall structure' with their examples. [L5; CLO2] 3
- c. Justify the utility of bacterial spores in surviving environmental stress and their role in causing septicemia within the hemocoel. [L5; CLO1] 2
- d. Evaluate the roles of adjuvants (emulsifiers, UV protectants, and wetting agents) in improving the shelf-life and field efficacy of microbial pesticides. [L5; CLO2] 3
- 3a. Explain the replication and translation cycle of a virus within the host cell, leading to the eventual formation of an insect cadaver. [L2; CLO2] 2
- b. Classify plant viruses based on the Baltimore classification system providing one representative example for each genome type. [L4; CLO1] 3
- c. Formulate a management strategy for a persistent viral invasion in a vegetable field, considering vector control and plant resistance. [L6; CLO2] 3
- d. Contrast Homology-Directed Repair (HDR) and Non-Homologous End Joining (NHEJ) following a Cas9-induced double-strand break. [L4; CLO3] 2
- 4a. Identify two common microbial pesticides (trade names) used in Bangladesh or India and state their target pests and efficiency percentages. [L3; CLO1] 2
- b. 'SNP genotyping technologies plays a crucial role in identifying gene (s) related to pest resistance' – justify. [L5; CLO3] 3
- c. Demonstrate the essential steps in executing Genome-Wide Association Mapping (GWAS) and state two major challenge in its implementation. [L3,2; CLO31] 3
- d. Shortly design a dilution protocol for the formulation of a fungal-based biopesticide. [L3,2; CLO2] 2

Section B

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| 5a. Assess the use of marker-assisted selection (MAS) in improving resistance breeding efficiency. [L5; CLO3] | 3 |
| b. Develop a breeding scheme for the development of a near-isogenic line with BPH resistance gene (s) in the genetic background of 'BRRIdhan28'. [L6; CLO3] | 4 |
| c. Differentiate between RNAi technique and genome editing approaches for ensuring resistance to insect pest. [L4; CLO4] | 3 |
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| 6a. 'Host plant resistance techniques are getting popular in controlling pest' – justify logically. [L5; CLO1] | 2 |
| b. Schemetically represent the development process of genetically engineered pathogen for pest management. [L6; CLO3] | 4 |
| c. 'Pest management using HPR involves the identification, validation, and deployment of resistance (R) genes' – judge with example. [L5; CLO4] | 4 |
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| 7a. Evaluate the impact of secondary metabolites like alkaloids or terpenoids on the fitness and fecundity of generalist vs. specialist pests. [L5; CLO3] | 4 |
| b. Analyze the concept of gene pyramiding in resistance breeding and its advantages in durable pest management. [L4; CLO4] | 3 |
| c. Synthesize your thoughts how genetically modified fungi can be engineered to express insect-specific toxins. [L6; CLO4] | 3 |
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| 8a. Analyze the physiological challenges insects face when feeding on plants expressing high levels of lectins. [L4; CLO3] | 3 |
| b. Evaluate the future prospects of genetically modified crops in sustainable agriculture and food security. [L5; CLO3] | 3 |
| c. Delineate the process of identification and genomic characterization of insect resistance (R) genes. [L5; CLO4] | 4 |

Khulna University

School: Life Science Discipline: Agrotechnology Program: MS in Entomology

Year: 1st Term: 1st Examination Year: 2026 Session: 2025-2026

081108 AT 5105: Insect Ecology and Biocontrol

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Draw and label wherever necessary.

Section A

- 1a. Discuss the adaptive significance of hibernation and aestivation in the survival of insects under adverse environmental conditions. [L2; CLO1] 3
- b. 'Biotic components play a major role in regulating the population dynamics of insects within an agroecosystem' — justify with an example. [L5; CLO1] 3
- c. Explain insect associations and classify the different types of associations found among insects. [L6; CLO2] 4
- 2a. Graphically represent the structure of an agroecosystem and tropic level. [L3; CLO1] 3
- b. Describe the major dispersion patterns found in insect populations and explain their ecological significance. [L2; CLO1] 4
- c. Explain the physiological significance of insect tropism like phototaxis or chemotaxis in host-finding behavior. [L2; CLO2] 3
- 3a. 'Mimicry is an important defensive adaptation in insects' — justify the statement critically. [L5; CLO2] 3
- b. Explain sexual dimorphism in insects with suitable examples and evaluate its ecological significance. [L2; CLO2] 4
- c. Differentiate between genetic polymorphism and phenotypic plasticity in insects. [L4; CLO2] 3
- 4a. 'Unlimited resources lead to exponential growth, whereas limited resources result in logistic growth' — validate the statement logically. [L5; CLO2] 3
- b. Differentiate between the solitary and gregarious phases of locusts as a form of density-dependent polymorphism. [L4; CLO2] 3
- c. What is insect population dynamics? Explain the mathematical basis of exponential population growth in insects. [L2; CLO2] 4

Section B

- 5a. Explain the 'Push-Pull' strategy with examples and design a 'Push-Pull' strategy for a commercial vegetable farm such as tomato or cabbage using specific repellent and attractant plants. [L2,6; CLO3] 3
- b. Critique the statement: 'Semiochemicals are always safer and more effective than conventional insecticides.' [L5; CLO3] 4
- c. Develop a rapid diagnostic chart to identify whether a biological agent is a predator, a koinobiont parasitoid, or an entomopathogen based on field observations. [L6; CLO3] 3
- 6a. Outline the process of Conservation Biocontrol and suggest how shifting planting dates or 3

- spacing acts as a preventative measure. [L2; CLO3]
- b. Contrast barrier crops and hedge crops in terms of their physical and biological roles in preventing pest immigration. [L4; CLO3] 2
 - c. Construct a table comparing Entomopathogenic Bacteria, Fungi, and Viruses with respect to their scientific names, efficacy, and ease of application. [L6; CLO3] 3
 - d. Justify why idiobiont parasitoids are often preferred over koinobionts in certain laboratory mass-rearing programs. [L5; CLO3] 2
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- 7a. Distinguish between Kairomones, Allomones, and Synomones based on which organism (emitter or receiver) benefits from the chemical signal. [L4; CLO3] 3
 - b. State the scientific names of two major botanicals Neem and Pyrethrum and explain their primary mode of action against insects. [L2; CLO3] 3
 - c. Justify the use of *Wolbachia*-based management over traditional chemical sprays in urban environments, highlighting key challenges. [L5; CLO3] 4
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- 8a. Analyze what happens to the progeny when: (i) a *Wolbachia*-infected male mates with an uninfected female, and (ii) both parents are infected. [L4; CLO3] 2
 - b. Define Insect Sterile Technique (IST) and identify two commonly used radioisotopes or radiation types utilized to induce sterility. [L2; CLO3] 3
 - c. Compare the merits and demerits of IST, citing one successful historical event where it eradicated a major pest. [L4; CLO3] 3
 - d. Argue for the roles of sex pheromones versus aggregation pheromones in pest monitoring and mass trapping. [L4; CLO3] 2

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Year: 1st Term: 1st Examination Year: 2026 Session: 2025-2026

081108 AT 5107: Commercial Entomology and Stored Product Pest

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
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Section A

- 1a. Critique the major challenges in public perception regarding the adoption of edible insects as a food source. [L5; CLO1] 3
- b. Examine how the historical use of bees in Ancient Egypt (mummification) shaped the early methods of organized beekeeping. [L4; CLO1] 3
- c. Design a 'Bee-Friendly Farming Model' that minimizes CCD by improving floral diversity and nutrition. [L6; CLO1] 4
- 2a. Analyze the trade-off between monoculture honeybee farming efficiency and the economic losses caused by reduced pollinator biodiversity. [L4; CLO1] 3
- b. Discuss the importance of hamuli in wing coupling and its impact on the flight efficiency and payload-carrying capacity of honeybees while foraging. [L2; CLO1] 3
- c. Evaluating the reliability of 'Crystallization' as a marker for honey purity, considering the effects of excessive heating during processing. [L5; CLO1] 3
- d. What is 'Queen of Textiles'? [L1; CLO1] 1
- 3a. How does sericulture contribute to the achievement of Gender Equality? [L2; CLO1] 2
- b. Delineate how byproduct utilization improves the economic viability of the silk industry. [L2; CLO1] 2
- c. Examine how 'Hybridization' and 'Line Breeding' differ in their genetic objectives for silkworm population improvement. [L4; CLO1] 3
- d. Justify the relative importance of 'Rearing Conditions' versus "Feeding Management" in ensuring the quality and maximum yield of silk in *Bombyx mori*. [L5; CLO1] 3
- 4a. What is stick lac and its usage? [L2; CLO1] 2
- b. How can lac be utilized in different industries? [L2; CLO1] 2
- c. 'Different strains of lac insects may prefer certain host plants' – justify. [L4; CLO1] 3
- d. Based on your knowledge of entomology, how can you profitably harvest lac from host plants? [L2; CLO1] 3

Section B

- 5a. What are the major insect pests affecting stored paddy, flour, and pulses, and how do they differ in their feeding habits? [L1; CLO2] 4
- b. Explain the bio-ecology of *Sitophilus oryzae* (rice weevil) and its role in damaging stored grains. [L2; CLO2] 3
- c. How does moisture content in storage conditions affect pest infestation in grains and pulses? 3

[L2; CLO2]

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| 6a. List three advantages of biological control agents in storage pest management. [L1; CLO2] | 2 |
| b. How do environmental factors influence the population dynamics and infestation potential of stored grain pests? [L2; CLO2] | 4 |
| c. Evaluate the effectiveness of biological control methods in managing stored product pests. [L5; CLO2] | 4 |
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| 7a. Define 'bio-ecology' in the context of stored grain pests. Why is it important in pest management? [L1,2; CLO2] | 3 |
| b. Explain the role of quarantine measures in preventing the spread of stored product pests with examples. [L2; CLO2] | 3 |
| c. Generate an integrated pest management (IPM) strategies for stored grain protection in context of Bangladesh. [L6; CLO2] | 4 |
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| 8a. What are the types of damage caused by insect pests to milled rice and flour in storage conditions, and how does this affect their market quality? [L1,2; CLO2] | 3 |
| b. What are the key features of rodent pest infestation in storage, and how can early detection be achieved? [L1,2; CLO2] | 3 |
| c. Describe the life cycle and feeding behavior of <i>Tribolium castaneum</i> . [L2; CLO2] | 4 |