

**RAJARATA UNIVERSITY OF SRI LANKA  
FACULTY OF APPLIED SCIENCES**

**Bachelor of Science in Applied Biology  
First Year – Semester II Examination – January/February 2023**

**ZOO 1203 – GENERAL ENTOMOLOGY**

**Time: Two (02) hours**

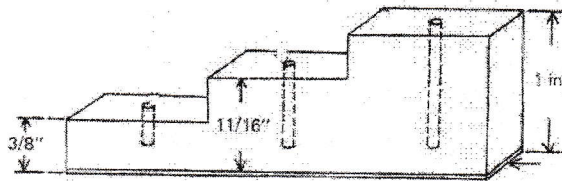
**Answer the compulsory question and TWO (02) of the optional questions.**

**Compulsory Question:** [Approximate time allocation is **ONE (01)** hour]

**1. Answer ALL questions. Underline the most suitable answer using a pen. No marks will be given for multiple responses. (200 marks)**

- a) Which is the compound found in the exocuticle but not in the endocuticle?
  - i. Chitin
  - ii. Protein
  - iii. Quinine
  - iv. Lipid
- b) Select the incorrect combination.
  - i. Aristate – three short segments, the last one is bristle-like – Housefly
  - ii. Bipectinate – comb structure – Male moths
  - iii. Serrate – segments are triangular and one side is like a saw – Click beetle
  - iv. Moniliform – segments are oval or like beads – Termites
- c) Which of the following insects is capable of transmitting a pathogenic virus to the plant sap?
  - i. Red ant
  - ii. Click beetle
  - iii. Leafhopper
  - iv. Butterfly
- d) Reason for abundance of insects in the world is:
  - i. high reproductive potential
  - ii. small size
  - iii. exoskeleton
  - iv. all of the above
- e) Select the correct statement about holometabolous insects.
  - i. Immature have special tracheal gills for respiration.
  - ii. The young resemble the adults except in size and sexual structures.
  - iii. Undergo dramatic changes in ecology, physiology, and morphology.
  - iv. Holometabolism is primarily controlled by the ecdysone hormone.
- f) Select the order that does not have the ability to detect ultrasound.
  - i. Coleoptera
  - ii. Hemiptera
  - iii. Orthoptera
  - iv. Mantodea

- g) Select the correct statement regarding the following apparatus.



- i. Use to regulate the heights of specimens and labels.
  - ii. Use to regulate the spacing of the specimen and the label.
  - iii. This spread board is not essential to preserve insect specimens.
  - iv. None of the above statements is correct.
- h) Primary hormone needed for the metamorphosis process is:
- i. juvenile hormones
  - ii. neuropeptide hormones
  - iii. ecdysone
  - iv. prothoracicotrophic hormone (PTTH)
- j) Which of the following statement is incorrect with regard to the sensory reception of insects?
- i. Many insects have well-developed vision, olfaction, and hearing.
  - ii. Sensilla are developed from epidermal cells and provide proprioceptive cues to insects.
  - iii. Ocelli are having a single corneal lens and are found in many insects as the only photoreceptor.
  - iv. Tympanum vibrations are detected by three chordotonal organs: subgenual, intermediate, and crista acustica.
- k) Which one of the following is the correct matching pair?
- i. Eruciform – Lady beetle
  - ii. Campodeiform – June beetle
  - iii. Scarabaeiform – Moths and butterfly
  - iv. Vermiform – House fly
- l) In a male insect, which structure would lie below/ventral to the anus?
- i. Epiproct
  - ii. Paraproct
  - iii. Aedeagus
  - iv. Furca
- m) Select the incorrect statement about the insect excretory system.
- i. Most of the nitrogen is taken up in the form of urine.
  - ii. Malpighian tubules collect waste from the blood.
  - iii. There are 2 – 200 malpighian tubules in an insect as an outgrowth of the alimentary canal.
  - iv. Amino acids, various ions, and water are absorbed from the excretory system.
- n) Which structure is unicellular?
- i. Spine
  - ii. Seta
  - iii. Gland
  - iv. Pile
- o) Which of the following traps can be used to collect ground insects?
- i. Aspirators
  - ii. Berlese funnel
  - iii. Beating tray
  - iv. Winkler bags

- p) What is the order that contains the following features?
- Forewing narrower than the hind wing
  - Hind wing membranous and held folded fan-like under the forewing at rest
  - Large compound eyes
  - Hind leg enlarged and modified for jumping
- Odonata
  - Phasmida
  - Orthoptera
  - Coleoptera
- q) Which of the following statement is true?
- Freezing in a household freezer can be practiced for many insects as a dry preservation technique.
  - The safest and most readily available liquid-killing agent is ethyl acetate.
  - Removal of the gut content of insects before mounting should be practiced with all the insects.
  - Aphids and scale insects are usually preserved in ethyl alcohol.
- r) Insect coloration is due to
- the effect of various structural configurations on the light.
  - structural modification in conjunction with a layer of pigment.
  - various pigments in the cuticle, scales, epidermal cells, fat body, etc.
  - all of the above-mentioned reasons.
- s) Select the correct sequence of events.
- Epidermal cells become active due to the hormone ecdysone
  - Sclerotization takes place
  - Apolysis takes place
  - Exocuticle and epicuticle are shed
  - Space called "exuvial space" is formed and the cuticle deposit
- B, A, C, D, E
  - A, B, C, D, E
  - B, C, D, E, A
  - A, C, E, D, B
- t) Which of these is not a function of cerci?
- Tactile
  - Holding the mate
  - Olfactory
  - Gustatory
- u) Which of these statements regarding the insect nervous system is incorrect?
- Central nervous system is composed of supraesophageal ganglion and ventral nerve cord.
  - Protocerebraum innervates with the antennae.
  - There is a ganglion in each thoracic segment and one in each abdominal segment.
  - Acetylcholine is the chemical transmitter and enzyme acetylcholinesterase is also present.
- v) Which one of these is not a respiratory organ found in insects?
- Gills
  - Siphon
  - Plastron
  - Book lung



- w) The major components of the cuticle are
- |                            |                            |
|----------------------------|----------------------------|
| i. chitin and protein.     | iii. chitin and lipid.     |
| ii. wax and carbohydrates. | iv. fat and carbohydrates. |
- x) Identification feature of order Hemiptera is the presence of
- |                            |                       |
|----------------------------|-----------------------|
| i. a triangular scutellum. | iii. elytra.          |
| ii. Membranous forewings   | iv. all of the above. |
- y) Select the correct statement.
- |   |
|---|
| i. Auxillary hearts are connected with the ventral blood vessel of insects.   |
| ii. Insect respiratory system and circulatory system together engage with oxygen and carbon dioxide transportation. |
| iii. Red blood cells of insects are familiar in function to the vertebrate red blood cells.                         |
| iv. Having a tracheal system enables insects to be energy efficient.  |
- z) An insect usually becomes active each day at dusk. If kept in the dark all day, it will still become active around sunset even though it cannot see the sun. This behavior is an example of
- |                             |                            |
|-----------------------------|----------------------------|
| i. a circadian rhythm.      | iii. diurnal behavior.     |
| ii. transverse orientation. | iv. exogenous entrainment. |

**Optional Questions:** [Approximate time allocation is **ONE (01) hour**].

**Answer any TWO (02) questions.**

2. Discuss the adaptations shown by insects to have different feeding modes with suitable examples. **(100 marks)**
  
3. a) While walking near a water body, you spotted an insect on a plant leaf with the following features: (i) long slender abdomen, (ii) large conspicuous compound eyes, (iii) veined, transparent wings with stigma near the tip of the wings, and (iv) wings outstretched at rest.
  - i. Identify the Sub-class and Order of this insect. **(10 marks)**
  - ii. What is the type of life cycle of this insect? **(10 marks)**
  - iii. Describe the life cycle stages of this insect. **(45 marks)**
  
- b) Above described insect is mainly spotted during the day time. Explain briefly the periodic behavior of insects that connects them with the nature of sun and moon. **(15 marks)**
  
- c) Discuss the reproductive strategies seen in the insect world giving suitable examples. **(20 marks)**
  
4. Write short notes on the following.
  - a) Respiratory system of a typical insects **(35 marks)**
  - b) Structure of insect integument **(35 marks)**
  - c) Insect colouration **(30 marks)**

**--END--**