



**UNIVERSITY OF SWAZILAND**  
Faculty of Health Sciences  
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

**MAIN EXAMINATION PAPER MAY 2018**

- TITLE OF PAPER : VECTOR CONTROL
- COURSE CODE : EHS 104
- DURATION : 2 HOURS
- MARKS : 100
- INSTRUCTIONS :
- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
  - : **QUESTION ONE IS COMPULSORY, THEN ANSWER ANY OTHER THREE QUESTIONS**
  - : EACH QUESTION **CARRIES 25** MARKS.
  - : WRITE NEATLY & CLEARLY
  - : NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
  - : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

**QUESTION 1 MULTIPLE CHOICE [COMPULSORY]**

- a) Indicate your response to this question by writing the letter corresponding to your chosen answer among those given.
- i. The part of the leg most important in achieving a great jump of an insect is the:
- A. tibia
  - B. trochanter
  - C. tarsus
  - D. femur
  - E. arolium
- ii. Which of the insects below is equipped with sponging mouthparts?
- A. Tsetseflies
  - B. Houseflies
  - C. Mosquitoes
  - D. Bees
  - E. Wasps
- iii. Which of the statements below about insect is NOT true?
- A. The legs of insects that dig into soil or wood are usually long and narrow.
  - B. Aquatic insects have legs modified and adapted for swimming
  - C. A rapid running insect usually has long and slender legs
  - D. The pulvilli are structures that offer greater purchase against smooth objects or surfaces
  - E. The sucking lice and some biting lice have only a single claw on the tarsus
- iv. The part of a flying insect modified to achieve greater balance during flight is the:
- A. wing
  - B. elytra
  - C. cercus
  - D. haltere
  - E. sensilla
- v. Which one of the parts of an insect listed below is responsible for production of digestive enzymes?
- A. Salivary glands
  - B. Proventriculus
  - C. Malpighian tubules
  - D. Gizzard
  - E. Gastric caeca

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- vi. The development of an insect through the egg-larva-pupa-adult is an example of development:
- A. without metamorphosis or ametabolous
  - B. through gradual metamorphosis or paurometabolous
  - C. through incomplete metamorphosis or hemimetabolous
  - D. through complete metamorphosis or holometabolous
  - E. None of the above
- vii. The flea responsible for transmission of plague from rodents to humans is
- A. *Xenopsyllacheopsis*
  - B. *Yersinisperstis*
  - C. *Ctenocephalidescati*
  - D. *Tungapenetrans*
  - E. *Pulexirritans*
- viii. Which one of the following IS NOT a part of the mouthparts of an insect?
- A. Pleurum
  - B. Labium
  - C. Labrum
  - D. Mandible
  - E. Maxilla
- ix. The copulatory organ used by male insects to inject spermatozoa into the body of females is known as a (n):
- A. Ejaculatory duct
  - B. aedeagus
  - C. spermatheca
  - D. seminal vesicle
  - E. ovipositor
- x. The antennae of horseflies is said to be:
- A. moniliform
  - B. filiform
  - C. aristate
  - D. lamellate
  - E. capitulate

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b) **TRUE OR FALSE:** Write T (for true) or F (for false) to indicate your responses to each of the items below: **(5)**

- i. All Dipteran insects have one pair of wings
- ii. Anopheles mosquitoes sometimes are found breeding in tyres and cans
- iii. Female *Blattella germanica* (german cockroaches) drop their eggs before they hatch
- iv. Individuals with high infestation of pubic lice risk transmission of important diseases transmitted during blood-feeding of the lice
- v. A single eyelet of the compound eye of an insect is referred to as an ommatidium

[25 marks]

### QUESTION 2

- a. Name the order and family to which the human louse, *Pediculus humanus humanus* belong. **(2)**
- b. The respiratory system of the louse involves external structures called spiracles and paratergal plates.
  - i. Discuss briefly the internal arrangement of the respiratory system of the louse beyond the spiracles. **(4)**
  - ii. Explain the importance of the paratergal plates in the respiratory process of the louse. **(3)**
- c. Other than disease transmission, mention 3 other effects of louse infestation on their host (human or animals). **(3)**
- d. *Pediculus humanus humanus* is the only species of louse involved in disease transmission to humans. Diseases transmitted include epidemic (louse-borne) typhus, epidemic relapsing fever, and trench fever.
  - i. For each of the diseases mentioned above, name the pathogen involved. **(4)**
  - ii. Explain the process by which humans acquire epidemic (louse-borne) typhus from the louse vector. **(3)**
- e. Discuss briefly one method by which infestation with the following louse species may be prevented.
  - i. *Phthirus pubis* **(3)**
  - ii. *Pediculus humanus humanus* **(3)**

[25 marks]

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### QUESTION 3

- a. Name the family to which tsetseflies belong. (2)
- b. Explain briefly the distribution of the different forms of sleeping sickness in Africa. (4)
- c. Explain how you may differentiate the adults of tsetsefly and housefly using the following body parts:
- i. the wing (2)
  - ii. the antennae (2)
  - iii. the thorax (2)
  - iv. abdomen (2)
- d. One method suggested for control of tsetsefly is bush clearing.
- i. Would bush clearing achieve better results for *G. morsitans* than for *G. palpalis* control. Explain your answer. (5)
  - ii. Mention 3 reasons why bush clearing is not used commonly to control tsetsefly populations even in endemic areas. (6)

[25 marks]

### QUESTION 4

- a. Blackflies are involved in the transmission of important diseases of humans and they cause severe problems among farmers of various domestic animals such as cattle and horses.
- i. What is another common name used to refer to blackflies? (1)
  - ii. Name one disease transmitted to humans by blackflies. (1)
  - iii. Describe the breeding habitats preferred by blackflies. (2)
  - iv. Explain why these habitats are favourable for blackflies. (2)
  - v. Explain how you can use the wing to differentiate blackflies from another small type of flies called sandflies. (2)
- b. Discuss the life cycle of the blackfly under the following headings:
- i. Larval stages (7)
  - ii. Pupa stage (4)
- c. Describe THREE strategies employed in the control of blackflies in 13 West African countries to reduce incidence of disease in the populations. (6)

[25 marks]

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### QUESTION 5

- a. Mosquito distribution in Swaziland varies with changing altitude e.g. Anopheles mosquitoes are mainly confined to the Lowveld while Culicines are abundant in the Middleveld and Highveld.
- i. Name the sub-Order to which mosquitoes are classified. (1)
  - ii. Discuss two reasons why *Anopheles* mosquito breeding mainly occurs in the Lowveld. (4)
  - iii. Discuss why Culicine mosquitoes breed mainly in the Highveld and Middleveld where Anopheles breeding is very low. (4)
- b. Explain how you differentiate Anopheline from Culicine mosquitoes using:
- i. Adult resting position (4)
  - ii. Larvae resting position (2)
  - iii. Length of palps in females (2)
  - iv. Male palps (2)
- c. Discuss the following methods of mosquito control used by the National Malaria Programme in Swaziland.
- i. Insecticide treated bednets (ITNs) (3)
  - ii. Indoor residual spraying (3)

**[25 marks]**