

**UNIVERSITY OF SWAZILAND**  
FACULTY OF HEALTH SCIENCES

**RE-SIT EXAMINATION PAPER – JULY, 2019**

TITLE OF PAPER : VECTOR CONTROL

COURSE CODE : EHS104

TIME : 2 HOURS

MARKS : 100

INSTRUCTIONS :

- ANSWER QUESTION 1 AND ANY THREE OTHER QUESTIONS
- EACH QUESTION CARRIES 25 MARKS
- NO FORM OF PAPER SHOULD BE BROUGHT INTO NOR TAKEN OUT OF THE EXAMINATION ROOM
- BEGIN THE ANSWER TO EACH QUESTION ON A SEPARATE SHEET OF PAPER
- CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPE
- ALL CALCULATIONS/WORK-OUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET

**DO NOT OPEN THE QUESTION PAPER UNTIL PERMISSION TO DO SO IS GRANTED BY THE INVIGILATOR**

**QUESTION 1: COMPULSORY [You should answer this question]**

- a. **MULTIPLE CHOICE:** Indicate your response to the items in this question by writing down the letter corresponding to your chosen answer. (20)
- i. When mosquitoes bite humans, bites results in pain due to material in the saliva of the mosquito. This type of effect on the host s known as:
- A. vesication
  - B. urtication
  - C. sensitisation
  - D. envenomation
  - E. causing allergic reactions
- ii. The compound eye of an insect comprises of independent eyelets known as:
- A. ocelli
  - B. maxillae
  - C. ommatidia
  - D. cerci
  - E. elytra
- iii. Which one of the statements below about male *Anopheles* mosquitoes IS NOT correct?
- A. Male *Anopheles* mosquitoes have more feathery antennae compared to female counterparts
  - B. The ends of the palps of male *Anopheles* mosquitoes are feathery
  - C. The ends of the palps of male *Anopheles* mosquitoes are clubbed
  - D. Male *Anopheles* mosquitoes feed on plant juices and nectar and not on blood of mammals
  - E. The palps of male *Anopheles* mosquitoes are as long as the proboscis
- iv. An entomology student catches the fly shown below from night-biting catches in a house located in a tropical region in Africa.



The technical name of the fly is:

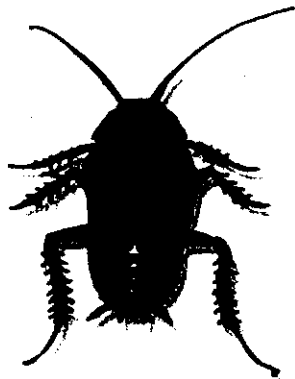
- A. *Simulium damnosum*
- B. *Chrysops silacea*
- C. *Phlebotomus argentipes*
- D. *Glossina palpalis*
- E. *Aedes aegypti*

- v. Which one of the diseases below are transmitted to humans following bites of infected blackflies?
- A. leishmaniasis
  - B. trypanosomiasis
  - C. loiasis
  - D. onchocerciasis
  - E. malaria

- vi. How many nymphal stages occur before development of adults in the life cycle of head lice?
- A. 2
  - B. 3
  - C. 4
  - D. 5
  - E. 6

- vii. Which of the statements below about bedbugs is (are) true?
- A. Adult bedbugs can live for up to 7 months without feeding
  - B. Bedbug infestations are commonly associated with areas of unsanitary conditions
  - C. Bedbug infestations are more likely in concentrated human populations such as refugee camps, hotels, inns and hostels
  - D. Both male and female bedbugs feed on nothing but blood of humans
  - E. All the statements above are true

- viii. The cockroach shown below was identified in a house.



Which one of the following statements is true about the cockroach?

- A. The cockroach is a male oriental cockroach
- B. The cockroach is a female oriental cockroach
- C. The cockroach is a male American cockroach
- D. The cockroach is a female American cockroach
- E. The cockroach is a German cockroach

- ix. Which of the following statements about the pupal stage of development of mosquitoes is NOT true?
- The pupa is a resting, non-feeding development stage
  - The pupa is non-motile
  - The pupa is sensitive to light
  - Development of the mosquito is arrested in the pupa stage when environmental temperature are too low
  - The pupa stage is part of a complete metamorphosis of the mosquito
- x. Which one of the following statements about housefly reproduction is NOT correct?
- Houseflies are monogamous i.e. they mate only once
  - Female houseflies release pheromones that attract members of the opposite sex for copulation
  - Each female housefly can lay up to 8 000 eggs in its lifetime
  - Larvae of houseflies have no eyes or appendages but they do move
  - Eggs of houseflies are laid single
- b. Write **T** (for True) or **F** (for false) against each of the statements below: (5)
- The exoskeleton of arthropods extends to the mouth, alimentary canal and to the anus.
  - Fleas have sponging type of mouthparts
  - Cockroaches occur in almost all areas habited by humans
  - Head lice may transmit deadly diseases between human hosts
  - Both male and female bedbugs are blood-feeders

[25 marks]

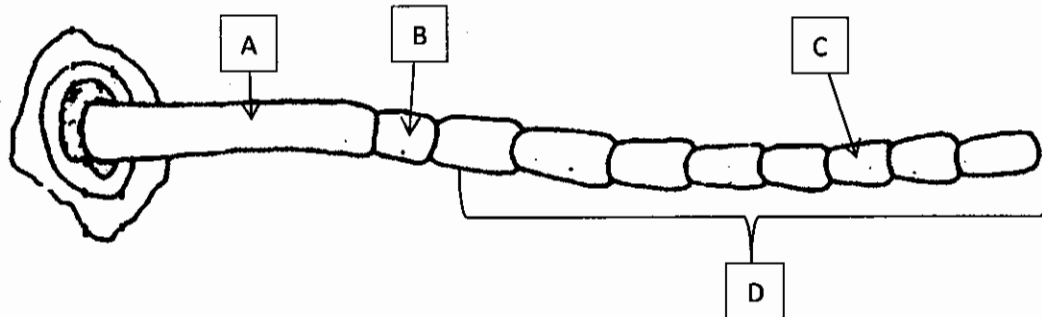
## QUESTION 2

- a. Two groups of tsetsefly, the palpalis and morsitans, transmit trypanosomiasis to humans and other vertebrate hosts in different parts of the African continent.
- Describe the distribution of the two groups of tsetseflies on the African continent. (2)
  - What factors influence the distribution of the two groups of tsetseflies in the areas described in (i) above? (4)
  - Which of the two groups can most effectively be controlled through clearing of bushes next to homesteads? Give reasons for your answer. (3)
  - Tsetsefly control has been attempted through genetic approach. Describe this method and explain the limitations that prevented its application on large-scale field levels. (6)
- b. Tsetseflies and houseflies are commonly differentiated through examination of the antennae. What characteristics are used to differentiate the antennae of tsetseflies from those of houseflies? (4)
- c. Housefly infestations are commonly high in households with diverse types of domestic animals. How do domestic animals influence the occurrence and distribution of houseflies? (3)
- d. What advice would you provide for households that also rear large numbers of domestic animals that would like to prevent high infestation of houseflies? (3)

[25 marks]

**QUESTION 3**

- a. Shown below is the general diagram of the antenna of an insect. Label the parts A – D. (4)

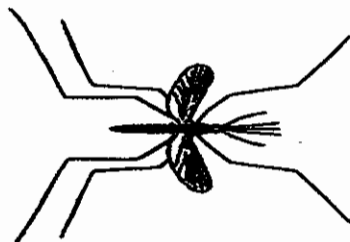


- b. What purpose is served by the antennae of an insect? (3)
- c. Antennae of insects vary greatly although the general parts are all possessed. What type of antennae are possessed by cockroaches? (2)
- d. Explain why cockroaches are undesired pests of households. (10)
- e. Cockroaches infest almost all parts of the world.
- i. Explain why cockroaches infest every part of the world and are not confined to the tropics like houseflies, mosquitoes and others. (2)
  - ii. Describe the different methods by which cockroaches are dispersed all many households in different parts of the world. (4)

[25 marks]

**QUESTION 4**

- a. Mosquitoes are important vectors of deadly diseases of humans including malaria. As a result, their occurrence in communities should be closely monitored and controlled.
- i. List THREE diseases of humans transmitted by mosquitoes other than malaria. (3)
  - ii. What characteristics are used to identify mosquitoes from other flies? (6)
- b. The mosquito shown below is collected from a vehicle in Mbabane.



- i. Is this mosquito capable of transmitting malaria to humans? Give reasons for your answer. (3)
- ii. How do you think the mosquito got into the car? (2)

- iii. What strategies would you suggest to be implemented in order to prevent such mosquitoes reaching Mbabane in vehicles? (2)
- c. Indoor residual spray is the key intervention used to reduce mosquito populations in malaria endemic parts of the country.
- i. Describe the working principle of the indoor residual spray strategy. (3)
- ii. Describe the type of nozzles, surfaces and chemicals used during indoor residual spray in Swaziland. (6)

[25 marks]

### QUESTION 5

- a. Horseflies are robust and troublesome hence have several names used to refer to them. List FOUR common names used to refer to the different species of horseflies. (4)
- b. Describe two morphological characteristics of the wing commonly used to identify horseflies. (4)
- c. Describe briefly the reproductive life cycle stages of the horsefly. (6)
- d. Kerosene was used to facilitate death of large numbers of horseflies in water habitats.
- i. Explain how this strategy killed horseflies. (2)
- ii. Why is this strategy not used currently? (2)
- e. Unlike horseflies, sandflies are much smaller and feed during the night, hence require different strategies for personal protection against bites. Discuss FOUR strategies you may recommend for personal protection against sandfly bites. (7)

[25 marks]

### QUESTION 6

- a. Fleas were responsible for "black death" in the 16<sup>th</sup> century in Europe and their control to this era has remained a global priority.
- i. What disease was known as "black death" and why was it called black death? (3)
- ii. What was the causative agent of black death? (1)
- iii. What species of fleas are responsible for transmitting the causative agent of black death to humans? (1)
- iv. Write down the scientific name of the usual host of the fleas that are vectors of the causative agent of black death. (1)
- b. Briefly describe characteristics that you would use to identify fleas from other arthropods. (7)
- c. Describe briefly the three stages of the typical life cycle of a flea that terminate in the development of the adult stage. (8)
- d. Describe briefly FOUR strategies you would use to prevent or control flea infestations in homesteads that also keep pets such as dogs and cats. (4)

[25 marks]