

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

MAIN EXAMINATION PAPER – DECEMBER, 2015

TITLE OF PAPER : RODENTS AND VECTOR CONTROL
COURSE CODE : EHM 200
TIME : 2 HOURS
MARKS : 100

INSTRUCTIONS : ANSWER QUESTION 1 AND ANY THREE 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

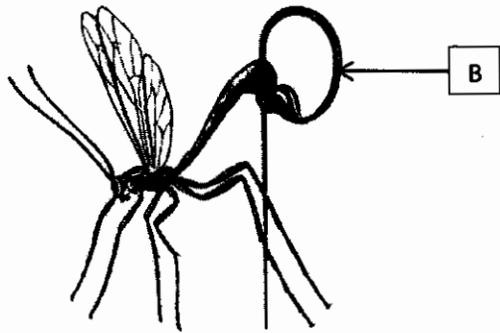
This question paper consists of 7 printed pages including this one

QUESTION 1 COMPULSORY : ALL STUDENTS MUST ANSWER THIS QUESTION

a. **MULTIPLE CHOICE:** Write down the letter corresponding to your chosen response among the choices listed for each question. (20)

- i. The best description of the mouthparts of the housefly is that they are:
 - A. siphoning
 - B. chewing-lapping
 - C. rasping-sucking
 - D. piercing-sucking
 - E. sponging

- ii. An arthropod is found having the part marked B on the diagram below:



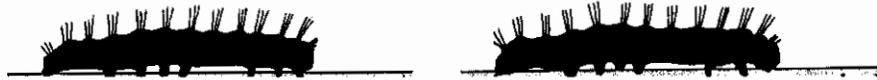
What is the likely function of the part?

- A. Reproduction
 - B. Stinging
 - C. Oviposition
 - D. Sensory
 - E. Balancing during flight
-
- iii. Which of the parts of an insect below is responsible for collecting and removing metabolic wastes from the body of an insect?
 - A. gastric caeca
 - B. malpighian tubules
 - C. spiracles
 - D. the crop
 - E. the proventriculus

- iv. An entomology student collects an arthropod for identification in the laboratory. He removes the antenna and places it on a microscope. He identifies the following image:



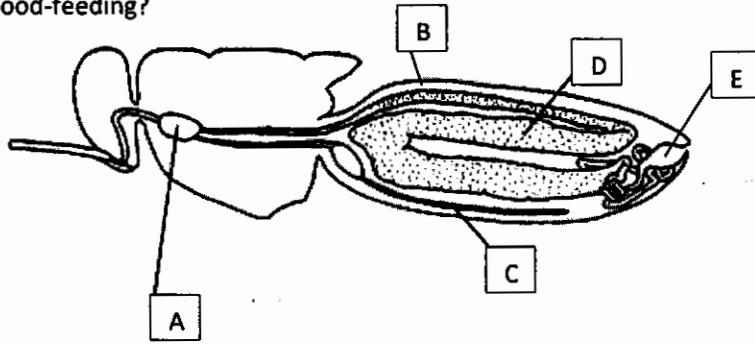
- The student is likely to conclude that the arthropod is a:
- A. mosquito
 - B. tsetsefly
 - C. cockroach
 - D. housefly
 - E. flea
- v. Some female arthropods may release unfertilised eggs that go on and bear viable offspring. This process of reproduction is called:
- A. oviparity
 - B. larviparity
 - C. pathogenesis
 - D. viviparity
 - E. ovoviviparity
- vi. The following arthropod sometimes causes an effect on the skin of man.



The effect caused by this arthropod is called:

- A. sensitisation
- B. vesication
- C. urtication
- D. envenomation
- E. an allergic reaction

- vii. A tsetsefly, *Glossina pallidipes*, feeds on the blood of a cow. Into which parts of the sites marked A to E on the diagram below is the blood stored immediately following blood-feeding?



- viii. The housefly, *Musca domestica*, lays eggs in all of the following except in:

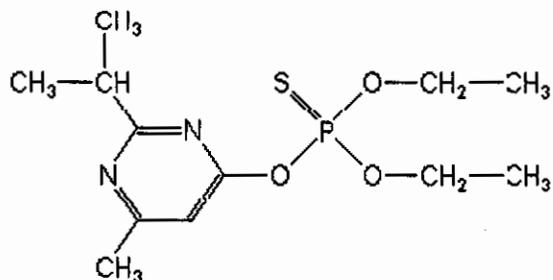
- the soil below the ground
- decomposing organic material
- human faeces
- horse manure
- on foodstuff

- ix. The eggs shown in the diagram below are likely to be those of:



- Aedes aegypti*
- Anopheles stephensi*
- Culex quinquefasciatus*
- Anopheles gambiae*
- Anopheles arabiensis*

- x. The molecular structure of an insecticide is determined and found as follows:



The insecticide is likely to be:

- an organophosphate called diazinon
- a carbamate called propoxur
- a chlorinated hydrocarbon called-dichloro diphenyl-trichloroethane
- a naturally occurring pyrethrins
- a synthetic pyrethroid

- b. Write **T** (for true) or **F** (for false) on each of the statements below: (5)
- The non-chitinous part of the abdomen of an insect that comprises of spiracles is known as the sternum.
 - The antennae of insects may be used to sense motion, odour, sound and humidity
 - Cockroaches are omnivorous or eat about anything but they prefer sugary foods
 - Some insecticides are vaporised into the atmosphere where they get dissolved in rainwater and return to pollute the ground
 - Head louse infestation can easily be diagnosed by visual inspection alone.

QUESTION 2

- a. The common housefly, *Musca domestica*, is said to be an efficient mechanical vector of many pathogens responsible for human disease.
- To what order does the housefly belong? (1)
 - What characteristic(s) qualify the housefly for classification in the order mentioned in (i) above. (2)
 - Describe TWO methods by which the housefly transmits pathogens of disease to humans. (4)
- b. Describe THREE by which the housefly manages to cling onto smooth surfaces like window panes without falling. (6)
- c. An Environmental Health Officer (EHO) wants to assist a household control the population of houseflies in its compound. He reviews literature on breeding habitats of the housefly prior to initiating control measures.
- Why is it important to know the breeding habitats of the housefly before initiating control measures? (6)
 - The EHO reads that houseflies primarily prefer breeding in horse or animal manure. What measures is the EHO likely to recommend to reduce the housefly population based on this piece of information? (6)

[25 marks]

QUESTION 3

- a. An entomologist employed by the National Malaria Control Programme visits the area next to the Great Usuthu River at Siphofaneni with the aim of determining if there is active *Anopheles* mosquito breeding.
- Describe the potential areas the entomologist is likely to investigate to confirm breeding of *Anopheles* mosquitoes. (3)
 - What precaution should the entomologist take when approaching potential breeding in order to improve the likelihood of confirming active breeding? Give reasons for your answer. (4)
 - What characteristic is the entomologist likely to use at the breeding site to ensure that the larvae he sees are Anopheline and not Culicine? (2)
 - The entomologist collects the larvae for further characterisation under the microscope in the laboratory. Describe TWO features he is likely to use to confirm that they are *Anopheles* larvae. (4)

- v. Discuss TWO measures the entomologist may initiate on the breeding site in order to reduce the population of adult mosquitoes in the area. (4)
- b. Lice are common parasites among low-income populations.
 - i. To what order do lice belong? (1)
 - ii. Why do louse-infestations predominate among low-income populations? (2)
 - iii. How can head louse infestation be prevented among humans living in low-income populations? (5)

[25 marks]

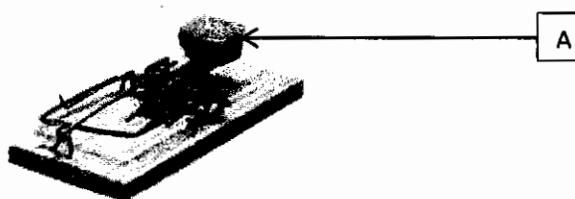
QUESTION 4

- a. Three species of cockroaches are said to be synanthropes that are often mechanical transmitters of several diseases.
 - i. What is meant by the word "synantrope"? (2)
 - ii. Why are cockroaches synanthropes? (4)
 - iii. Name the three species of cockroaches that are synanthropes. (3)
 - iv. Describe the habitat where each of the three synanthrope species of cockroaches listed above. (3)
 - v. Discuss briefly the arrangement of the nervous system of a cockroach. (4)
 - vi. Describe briefly TWO pieces of advice you are likely to include in a health talk you would give to members of a household that complains of cockroach infestation every year. (4)
- b. Bedbugs are household pests that are very difficult to remove once infestation has been introduced.
 - i. Describe ONE way bedbugs may be introduced in a household. (2)
 - ii. What management initiatives should be introduced in households to remove bedbug infestation once it has been introduced. (3)

[25 marks]

QUESTION 5

- a. Rodent populations should be kept low in communities and among households.
 - i. Discuss THREE reasons why communities and households should always strive to maintain low rodent populations besides the possibility of transmitting disease to humans. (6)
 - ii. List THREE methods rodents may be introduced into a household. (2)
- b. Rodent infestation may be controlled through the use of rodenticides.
 - i. Explain the mode of operation of zinc phosphide and a second generation rodenticide, brodifacoum (4)
 - iii. Rodent infestation of ships is also a problem. Discuss THREE methods that could be used to prevent infestation of ships with rodents. (5)
- c. Lethal traps, such the snap trap shown below are often used to catch rodents in houses.



- i. What is the item marked A on the diagram of the snap trap and what purpose does it serve? Discuss the mode of action of these traps (2)
- ii. Discuss the mode of action of the snap trap shown above. (2)
- iii. List TWO disadvantages of using a snap trap like this one. (4)

[25 marks]

QUESTION 6

- a. Pesticides are among the mostly used chemicals in the world but are also among the most dangerous to human health.
 - i. List three ways pesticides commonly enter the body of man to result in poisoning. (3)
 - ii. Explain the difference between a pesticide with an acute effect and one with a chronic effect? (2)
 - iii. Explain the difference between a chemical with a local effect and one with a systemic effect? (4)
- b. During the application or use of pesticides, the soil, water and air may be polluted. Explain how each of the following affect the degree of pollution likely to occur.
 - i. Drainage (4)
 - ii. The characteristics of the pesticide (6)
- c. Deltamethrin is applied at a dosage of 0.05% water dispersible powder on a mud and thatch surface to kill mosquitoes.
 - i. For how long does deltamethrin remain effective on the wall surface? (2)
 - ii. What is the advantage of the mud wall surface in enhancing the insecticidal effect of the deltamthrin? (2)
 - iii. What happens to the deltamethrin beyond the period of effectiveness on the wall? (2)

[25 marks]