

UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER – JULY, 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 SH

This question paper consists of 7 printed pages including this one

QUESTION 1**a. MULTIPLE CHOICE**

Indicate your response to items in this question by writing down the letter corresponding to your chosen answer among the possible options provided. (20)

- i. Some insects cast their old skin or cuticle and grow a new one in a process called molting. The period between moults is called a(n):
 - A. exuvia
 - B. stadium
 - C. aestivation
 - D. hibernation
 - E. diapause

- ii. A lateral, flexible, non-chitinous plate of openings in the abdomen of an insect is called the:
 - A. pleuron
 - B. tergum
 - C. sternum
 - D. proctodeum
 - E. stomodeum

- iii. Which one of the insects below has siphoning type of mouthparts that are adapted for imbibing fluid or liquid materials during feeding?
 - A. mosquito
 - B. housefly
 - C. tsetsefly
 - D. flea
 - E. bedbug

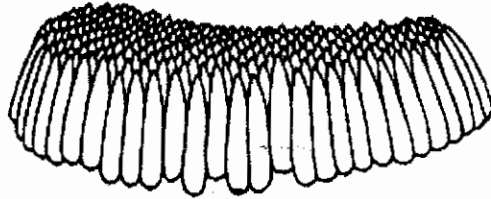
- iv. An entomologist collects ticks of medical importance and finds one that has the following characteristics:
Long palpi, no eyes, no festoons, iornatescutum; and the anal groove is found to surround the anus anteriorly
The tick is likely to be:
 - A. *Ixodesricinus*
 - B. *Rhipicephalusappendiculatus*
 - C. *Dermacentorvariabilis*
 - D. *Amblyommahebraeum*
 - E. *Ornithodorosmoubata*

- v. Which of the insects below has antennae shaped like the one on the diagram below:



- A. housefly
 - B. tsetsefly
 - C. flea
 - D. mosquito
 - E. bedbug
- vi. One of the arthropods below develops a cocoon that is sticky and collects debris from local surrounding in order to camouflage while also surviving harsh environmental conditions. Which arthropod is it?
- A. louse
 - B. flea
 - C. cockroach
 - D. tick
 - E. mosquito

- vii. The eggs below were recovered from a mosquito breeding place.



The eggs are likely to be those of:

- A. *Anopheles gambiae*
 - B. *Culex pipiens pipiens*
 - C. *Aedes albopictus*
 - D. *Haemagogus* spp.
 - E. *Aedes aegypti*
- viii. An Environmental Health Officer examines the rodent below which was recovered from a trap.



The rodent is likely to be:

- A. *Musmusculus*
 - B. *Rattusrattus*
 - C. *Rattusnorvegicus*
 - D. Either *Rattusrattus* or *Rattusnorvegicus*
 - E. Either *Rattusrattus* or *Musmusculus*
- ix. One of the insecticides below is banned for outdoor use because of its persistence in the environment. Which one is it?
- A. Permethrin
 - B. Diazinon
 - C. DDT
 - D. Hexachlorohexane (HCH)
 - E. Malathion
- x. A spray personnel employed by the Swaziland national Malaria Control Programme performs an indoor residual spray exercise. The distance he has to maintain between the spray nozzle and the wall he sprays:
- A. should always be 45cm
 - B. should always more than 45 cm
 - C. should always be less than 45cm
 - D. may vary between 45 and 90cm
 - E. varies between 45cm and 2metres
- b. Write **T** (true) or **F** (false) for each of the statements below: (5)
- i. A rapidly running insect is likely to have long and slender legs.
 - ii. A single eyespot of the simple eye of an insect is called an ommatidium
 - iii. The antennae of the housefly is said to be plumose.
 - iv. A cockroach blood does not use haemoglobin to carry oxygen.
 - v. Warfarin prevents clotting of blood in rodents following ingestion and injury resulting to their death

[25 marks]

QUESTION 2

- a. Lice belong to the order Siphunculata which comprise sucking lice of humans and biting lice of birds. However, only body lice *Pediculus humanus humanus* are involved in disease transmission yet it remains important to control head, body and pubic lice.
 - i. Why is it important to control species of lice that are not involved in transmission of human disease? (2)
 - ii. What is "pthiriasis" and how does it occur? (3)
 - iii. Name TWO diseases transmitted to humans by the body louse. (2)
 - iv. What predisposing factors commonly lead to infestation with body lice? (2)
 - v. Describe TWO structural differences commonly used to differentiate head lice from pubic lice. (4)
- b. Fleas belong to the Class Insecta but considerable differences exist between them and members of the Insecta Class belonging to the Order Diptera.
 - i. To what Order do fleas belong? (1)
 - ii. What differences exist between members of this order (fleas) and those of the Order Diptera? (4)
- c. Describe briefly the reproductive life cycle of the flea from egg-laying until adult fleas emerge. (5)
- d. Fleas are commonly pests of pet animals such as dogs and cats and human infestations usually result following infestation of dogs and cats. (2)

[25 marks]

QUESTION 3

- a. An entomologist employed by the National Malaria Control Programme in Swaziland conducts a survey at Siphofaneni near the Great Usuthu river to identify *Anopheles* larvae and egg stages.
 - i. Describe the habitats he has to examine for *Anopheles* larvae breeding. (3)
 - ii. Describe two structural characteristics the entomologist is likely to use to differentiate Anopheline from Culicine larvae. (4)
 - iii. How can the entomologist differentiate *Anopheles* eggs from those of *Aedes* and those of *Culex* mosquitoes? (4)
- b. The entomologist decides to apply methods targeted at larval and adult stages to reduce *Anopheles* mosquito populations at Siphofaneni.
 - i. Name TWO diseases other than malaria, that adult mosquitoes may transmit to humans. (2)
 - ii. Describe measures the entomologist may use at Siphofaneni to reduce mosquito breeding. (4)
 - iii. Describe TWO measures the entomologist may use at Siphofaneni to reduce populations of adult mosquitoes. (4)
- c. The entomologist also decides to advise the community of Siphofaneni on measures they may employ to prevent mosquito bites. Discuss TWO methods the entomologist

is likely to promote among members of the Siphofaneni community to protect themselves against mosquito bites. (4)

[25 marks]

QUESTION 4

- a. Pubic lice (*Pthirus pubis*) are not involved in the transmission of human disease but infestation still has to be controlled.
 - i. Give TWO ways *Pthirus pubis* infestation may occur in a human host. (2)
 - ii. Give TWO reasons why *Pthirus pubis* infestation of humans should be controlled. (2)
 - iii. How can you go about confirming infestation with *Pthirus pubis* in a 16-year old boy if you suspect he is infested. (2)
 - iv. Discuss a programme you may design to help a 16-year old boy remove infestation with *Pthirus pubis* including health education messages you would impact to him in order to prevent future infestation with these lice. (5)
- b. Bedbugs are not biological vectors of human disease but are mechanical vectors.
 - i. Explain the meaning that "bedbugs are not biological vectors of any human disease but are mechanical vectors". (4)
 - ii. Other than for reasons of disease transmission, why should bedbug infestation be controlled or prevented? (4)
 - iii. Design a programme you may use to remove bedbug infestation in a household including a strategy you may use to prevent future infestation. (6)

[25 marks]

QUESTION 5

- a. Rodent infestation inside buildings and ships should be prevented at all times.
 - i. Give TWO reasons why rodent infestation in buildings should be prevented. (4)
 - ii. Give TWO reasons why rodent infestation in ships should be prevented (make sure the reasons given here are different from those given in (i) above). (4)
 - iii. List THREE signs that may be used to confirm rodent infestation in a building. (3)
 - iv. List THREE ways rodent introduction into buildings may be prevented. (3)
 - v. List THREE ways rodent introduction into ships may be prevented. (3)
- b. Rodent control commonly involves use of rodenticides such as Zinc phosphide or chlorphacinone.
 - i. Explain how Zinc phosphide causes rodenticidal effects. (3)
 - ii. Explain how chlorphacinone causes rodenticidal effects. (3)
 - iii. Which of the two rodenticide would you choose to use to control rodents in a building? Explain your choice of rodenticide. (2)

[25 marks]

QUESTION 6

- a. Define the following terms as they apply to pesticide use in public health:
 - i. Systemic effect (2)
 - ii. Acute effect (2)
 - iii. Pesticide resistance (2)
 - iv. LC₅₀ (2)
- b. Pesticide poisoning often has teratogenic effects on humans and also have a dose-response effect.
 - i. What type of pesticides are said to be 'teratogenic'? (2)
 - ii. What is meant by the assertion that pesticides have a 'dose-response' effect? (2)
- c. Care has to be taken during application of insecticides in the environment to prevent contamination of water, soil and air.
 - i. Explain how contamination of water, soil and air may occur during application of insecticides to control outdoor pests. (7)
 - ii. Discuss two activities in air and one in the soil that reduces pesticide accumulation and toxicity. (6)

[25 marks]