

UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER – JULY, 2014

TITLE OF PAPER : RODENTS AND VECTOR CONTROL
COURSE CODE : EHM 200
TIME : 2 HOURS
MARKS : 80

INSTRUCTIONS :

- ANSWER QUESTION 1 AND ANY THREE OTHER QUESTIONS**
- EACH QUESTION CARRIES 20 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**

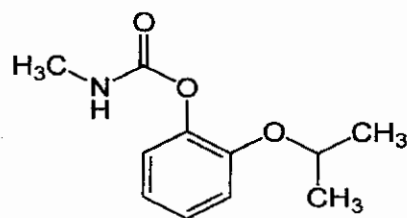
This question paper consists of 6 printed pages including this one

QUESTION 1 MULTIPLE CHOICE

Write the letter that corresponds to your chosen answer among those suggested for each sub-question e.g. xv. D

- i. The posterior pair of wings in the true flies (Diptera) has been replaced by vestigial appendages called:
 - A. hemelytra
 - B. halteres
 - C. apterygota
 - D. ovipositor
 - E. antennae
- ii. Insect antennae are able to detect all of the following except:
 - A. humidity
 - B. odour
 - C. motion
 - D. heat
 - E. sound
- iii. Which one of the following arthropods feed their larvae with 'milk'?
 - A. fleas
 - B. tsetseflies
 - C. houseflies
 - D. mites
 - E. lice
- iv. Which one of the following ticks is likely to be recovered from ears of dogs?
 - A. *Otobius megnini*
 - B. *Argus persicus*
 - C. *Ornithodoros savignyi*
 - D. *Ixodes ricinus*
 - E. *Boophilus anulatus*
- v. Mites are often involved in the transmission of disease to man and other animals. Which one of the following mites is a vector of rickettsial pox?
 - A. *Dermanyssus gallinae*
 - B. *Leptotrombidium akamushi*
 - C. *Allodermanyssus sanguineus*
 - D. *Sarcoptes scabiei*
 - E. *Demodex folliculorum*
- vi. Which one of the following diseases may be transmitted by flies belonging to the family Simuliidae?
 - A. yellow fever
 - B. onchocerciasis
 - C. trypanosomiasis
 - D. murine typhus
 - E. lymphatic filariasis

- vii. Which one of the following mites is an ectoparasite of mice?
 A. *Dermanyssus gallinae*
 B. *Leptotrombidium akamushi*
 C. *Demodex folliculorum*
 D. *Sarcoptes scabiei*
 E. *Allodermanyssus sanguineus*
- viii. A malaria endemic community in the lowveld undertakes an intervention to crush and bury underground all cans that may provide as breeding habitats for mosquitoes as a means to reduce the population of malaria transmitting mosquitoes. The strategy is:
 A. correct, because malaria transmitting mosquitoes breed in cans
 B. incorrect, because malaria transmitting mosquitoes do not breed in cans
 C. correct, because it provides a long term solutions to malaria transmission in a community
 D. incorrect, because the cans become an environmental problem underground
 E. incorrect, because malaria transmitting mosquitoes have many other alternative habitats besides cans in which they can breed
- ix. A field biologist collects a rodent and characterises it as follows:
Tail longer than head + body, large ears and eyes and a pointed snout.
 The rodent is likely to be:
 A. *Rattus norvegicus*
 B. *Rattus rattus*
 C. *Mus musculus*
 D. A young *Rattus rattus* or *Rattus norvegicus*
 E. None of the above
- x. An insecticide is found to have the following structure:



The insecticide is likely to be:

- A. DDT
 B. HCH
 C. parathion
 D. propoxur
 E. dichlovors

[20 marks]

QUESTION 2

Houseflies are among the most important mechanical transmitters of diseases of man.

- a. To what family do houseflies belong? (1)
- b. Describe two ways houseflies may be identified from other flies. (4)
- c. Explain why houseflies are efficient mechanical transmitters of pathogens of human disease. (4)
- d. The antennae of houseflies bear similarities with those of the tsetseflies. Explain how you would differentiate between the antennae of a housefly from those of a tsetsefly. (4)
- e. Houseflies are able to cling onto very smooth surfaces such as window panes in human dwellings. Explain how the housefly achieves this. (3)
- f. Design a housefly control strategy you would recommend to a rural household to maintain a low housefly population and infestation. (4)

[20 marks]

QUESTION 3

Mosquitoes are major transmitters of pathogenic agents of diseases that are very deadly to humans.

- a. Name two diseases that may occur in man as a result of bites from infected mosquitoes. Also name the genus of mosquito involved in the transmission. (4)
- b. Describe the breeding habitats of the genera of mosquitoes mentioned in (a) above. (4)
- c. Mosquito control in Southern Africa has largely benefitted from indoor residual spray with DDT or pyrethroids.
 - i. Explain how indoor residual sprays result in reduction of mosquito populations. (2)
 - ii. Explain why global efforts are now attempting to reduce reliance on DDT. (2)
- d. Describe two methods by which individual persons may prevent themselves from mosquito bites and infection by mosquito-borne diseases. (4)
- e. Explain how mosquito control may be achieved through use of the two biological methods listed below:
 - i. *Bacillus thuringiensis israeli* (2)
 - ii. *Toxorhynchites* mosquitoes (2)

[20 marks]

QUESTION 4

- a. Even though most lice do not transmit disease to man, they remain important public health pests that have to be controlled.
 - i. List three effects lice may have on man other than disease transmission. (3)
 - ii. Explain how you may differentiate between a body louse and a pubic louse. (4)
 - iii. Describe two methods or practices you would recommend that could result in prevention of body louse infestation. (2)
 - iv. Describe two methods or practices you would recommend that could prevent or reduce infestation with pubic lice. (2)

- b. Bedbugs are blood-feeding arthropods that are often structurally confused with head lice.
- To what order do bedbugs belong? (1)
 - Explain how you can differentiate between a head louse and a bedbug. (2)
 - List two methods by which human dwellings acquire bedbug infestation. (2)
 - Describe two methods you would recommend to a household that has a heavy bedbug infestation to remove the nuisance. (4)
- [20 marks]**

QUESTION 5

- a. Cockroaches are common pests of many domestic areas, hence are referred to as "synanthropes".
- Explain the meaning of "synanthrope". (2)
 - Explain how cockroach infestation occurs initially in a domestic residence and further outline the conditions involved in establishment and spread of the infestation. (6)
 - Discuss the life cycle of a cockroach including areas where eggs are laid until an adult cockroach emerges. (4)
- b. A second family of bugs are those of Reduviidae. One species of these bugs are commonly referred to as assassin bugs, kissing bugs or cone-noses. What do these common names mean?
- assassin bugs (1)
 - kissing bugs (1)
 - cone-noses (1)
- c. Name one disease transmitted to man by assassin bugs. (1)
- d. Mention 2 methods you may use to prevent bites from assassin bugs. (2)
- e. Discuss one method you may use to differentiate between a young cockroach and a bedbug. (2)
- [20 marks]**

QUESTION 6

- a. Pesticides may have an acute or systemic effect on a human or animals victim that is poisoned. With regard to pesticide use and effect define:
- acute effect (2)
 - systemic effect (2)
 - LD₅₀ (2)
- b. Explain what you understand by 'insecticide resistance'. (2)
- c. Describe the process that commonly leads to the development of insecticide resistance. (4)
- d. Pyrethrins are the most commonly used insecticides in public health. However, despite their frequent use, reports of resistance against them are not as frequent.
- What is the most potent property of pyrethrins that has led to their preferred wide use? (2)
 - What property of pyrethrins make arthropods not to easily develop resistance against them? (2)

- iii. Despite their wide use, pyrethrins are seldom used alone. Explain why pyrethrins are usually used in combination. (2)
- iv. What effects do pyrethrins have on man following accidental poisoning during application? (2)

[20 marks]