



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

MAIN EXAMINATION PAPER DECEMBER 2017

TITLE OF PAPER	:	RODENTS AND VERMIN CONTROL
COURSE CODE	:	EHS 307
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER <u>QUESTION 1 AND ANY THREE OTHER</u> QUESTIONS
	:	EACH QUESTION <u>CARRIES 25</u> MARKS.
	:	WRITE NEATLY & CLEARLY
	:	NO PAPER SHOULD BE BROUGHT INTO OR OUT OF 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

- a. **MULTIPLE CHOICE:** Write down the letter corresponding to your chosen answer among the options provided for each item in this question.
- i. Which one of the statements below about *Aucleromyia luteola*, the Congo Floor maggots, IS NOT true?
 - A. The parasite is the only blood sucking obligatory parasite of humans
 - B. The parasite only lives on the floor and is not able to climb on elevated sleeping structures such as beds
 - C. Bites from the parasite may result in excessive loss of blood in human victims resulting in anaemia
 - D. The parasite feeds rapidly on sleeping persons for 20 minutes daily
 - E. *Aucleromyia luteola* is thought to also affect domestic pigs

 - ii. Some ants bite and sting to introduce their poison into the body of humans. The venom of the ants:
 - A. causes hypersensitivity among certain people
 - B. causes inflammation, oedema and swelling
 - C. contains a necrotising component
 - D. may cause anaphylactic shock, and respiratory or cardiac impairment
 - E. all of the above

 - iii. Which one of the flies below produces larvae that cause internal ophthalmomyiasis and may lead to blindness among people that are infested?
 - A. *Cochliomyia hominivorax*
 - B. *Oestrus ovis*
 - C. *Dermatobia hominis*
 - D. *Hypoderma lineatum*
 - E. *Codylobia anthropophaga*

 - iv. Synthetic pyrethroids are commonly combined with organophosphates or synergists inside commercial insecticide cans because:
 - A. they are cheap to make and are easy to add into many other active ingredients
 - B. they quickly biodegrade and may do so before they achieve the desired effect
 - C. they quickly develop resistance when used alone
 - D. they lack any insecticidal effect of their own
 - E. they maintain a soluble nature of the organophosphate for ease of dispersion

 - v. Rodent control often requires good storage of refuse. Which one of the following IS NOT a requirement of refuse storage in order to prevent rodent infestation?
 - A. Refuse should always be stored outside the house to prevent rodents entering the house
 - B. Garbage should be drained and wrapped in plastic bags to prevent odours that may attract rodents before placing into a garbage can
 - C. Garbage should be placed in garbage racks above the ground to prevent spillage

- D. Garbage storage cans have to be water-tight
 - E. Garbage storage cans should not have any handles because rodents may use them to climb into the cans
- vi. Which one of the following statements about rodents IS NOT true?
- A. Rodents are the largest group under the class Mammalia
 - B. Rodents use their tails to balance, swim, brace their bodies and protect themselves from cold or the sun
 - C. Some rodents practice coprophagy
 - D. The incisors grow continuously for the life of a rodent
 - E. Rodents have canines that they use to tear hard substances such as meat
- vii. Norbomide is no longer used to control rodents control because:
- A. it is highly toxic and commonly poisons other domestic animals
 - B. it is very bitter and many rodents avoid it
 - C. many rodents have developed resistance against it
 - D. it is expensive to manufacture and households cannot afford the cost
 - E. it accumulates in the rodent body and poisons other animals that prey on the dead rodent
- viii. When applying DDT on the internal surface of walls in human residential areas, the sprayer has to ensure that the concentration of DDT is maintained at:
- A. 1 g/m²
 - B. 2 g/m²
 - C. 0.4 g/m²
 - D. 100 g/m²
 - E. 0.01 g/m²
- ix. Insecticide resistance should be suspected when:
- A. Decreased susceptibility of insects is detected during monitoring
 - B. Complaints are received from local users of insecticides
 - C. Disease transmission rates show an increase
 - D. Vector populations increase in numbers in treated areas and there is evidence of breeding
 - E. All of the above
- x. Which statement is true about chemical control as a pest management method?
- A. Pesticides play a key role in pest management programs and sometimes are the only control method available.
 - B. Pesticides include any material that is applied to plants and the soil but not to water or harvested crops.
 - C. A highly selective pesticide controls a wide variety of pests.
 - D. Systemic pesticides are not absorbed by treated plants or animals
 - E. None of the above

- b. Write **T** (for true) or **F** (for false) to indicate your response to each of the items in this question. (5)
- Larvae of flies involved in myiasis may be deliberately introduced into diabetic wounds to effect healing
 - The venom from the rattlesnake is 15 times more potent than the venom of a spider
 - Rodents sometimes cause a deadly disease known as plague in humans
 - Systemic pesticides penetrate to the inside of a plant through its absorption pathway and can kill pollinators such as bees and butterflies
 - Rainfall is an important factor that influences the risk of pesticide pollution into soil, water and air

QUESTION 2

- a. Other than involvement in the transmission of disease agents to the human host, arthropods may cause disease directly through myiasis.
- Explain what is involved in myiasis. (2)
 - Explain what is meant by furuncular myiasis. (2)
 - Three flies are involved in furuncular myiasis. Name them. (3)
 - Explain the process involved when the three flies mentioned in (iii) above cause myiasis in humans or animals. (6)
 - Suggest the treatment process you may recommend to a victim of furuncular myiasis. (3)
- b. Ocular myiasis may involve external and internal ophthalmomyiasis. Explain the difference between the two. (4)
- c. Flies may cause accidental myiasis in humans.
- Explain the process involved during accidental myiasis. (3)
 - What measures would you suggest to reduce or prevent accidental myiasis in humans. (2)

[25 marks]

QUESTION 3

- a. Scorpions poison 1.2 million people globally each year leading to 3 250 (0.27%) deaths.
- What clinical features are likely to lead you into suspecting that a victim has been poisoned by a scorpion? (2)
 - What measures would you put in place in a community to reduce unnecessary deaths and illness from scorpion poisoning? (3)
- b. "Spiders are venomous but not poisonous".
- Explain the meaning of the statement above about spiders. (2)
 - Describe how the venom of a spider is introduced to the human host and also describe the effects it has once in the body of the host. (3)
 - Name TWO species of spiders that are considered very venomous and dangerous to humans. (2)
 - What feature would you use to identify the species of spiders mentioned in (iii) above? (4)

- v. Emergency treatment delays development of severe symptoms and may prevent death of the victim of spider venom poisoning. What emergency treatment would you suggest for someone who has been poisoned by a venomous spider? (5)
- vi. What pieces of information would you include in a community health talk to advise members on measures to prevent or reduce spider venom poisoning? (4)

[25 marks]

QUESTION 4

A householder recovers the rodent shown below and brings it to your Environmental Health Office to seek assistance with the infestation.



Your office begins the task by identifying the rodent presented.

- a. Why is it important to identify the species of the rodent? (3)
- b. Name the species of the rodent. (1)
- c. What characteristics and how would you use them to identify the species of the rodent? (8)
- d. How do you think this rodent acquired entry into the house? (2)
- e. What measures would you suggest to the householder to prevent future infestation with this rodent? (5)
- f. Zinc phosphide is one of the rodenticides that may be used to reduce infestation with this type of rodent.
 - i. Explain the method of functioning of zinc phosphide. (2)
 - ii. What advantage does zinc phosphide have over other rodenticides during control of rodents indoors? (2)
 - iii. What is the disadvantage to animals that eat the whole rodent? (2)

[25 marks]

QUESTION 5

- a. Explain what you understand by the term "insecticide resistance". (2)
- b. Describe FOUR major factors that contribute to the development of insecticide resistance. (8)
- c. Name the gene commonly involved in mutations that result in the development of resistance to DDT, an insecticide largely used during indoor residual spraying among many malaria endemic countries in Africa. (1)
- d. Insecticide resistance sometimes involves target site insensitivity. Explain how target site insensitivity lead to insecticide resistance. (2)

- e. What is the difference between cross resistance and multiple resistance as applied to insecticide resistance? (4)
- f. Discuss FOUR operational strategies that an Environmental Health Officer may engage to delay development of insecticide resistance. (8)

[25 marks]

QUESTION 6

- a. List FIVE (5) general effects that pesticides may cause in the health of humans. (4)
- b. Explain the difference between bioaccumulation and biomagnification as applied to DDT use. (4)
- c. Explain the difference between LD_{50} and LC_{50} as applied to pesticide use. (4)
- d. Because of the effects of pesticides on the body, pregnant women are strongly advised not to work in fields where agricultural chemicals are sprayed. List THREE (3) recommendations you may suggest to reduce or prevent effects of pesticides on pregnant women. (3)
- e. Exposure to pesticides may result in acute or chronic effects in humans. Explain the difference between acute effect and chronic effect. (4)
- f. Resistant insects may engage several processes in their compartments render the insecticide non-effective in killing them. Mention FOUR (4) such processes. (4)
- g. Carbamates, such as bendiocarb, are frequently used to control household pests such as houseflies. Explain how carbamates are able to effect a lethal effect on insects such as houseflies. (2)

[25 marks]