

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION PAPER – MAY, 2011

TITLE OF PAPER : RODENTS AND VERMIN CONTROL
COURSE CODE : EHS 215
TIME : 2 HOURS
MARKS : 100

INSTRUCTIONS : ANSWER QUESTION 1 AND FOUR OTHERS
: QUESTION 1 IS COMPULSORY
: EACH QUESTION IS 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
: ALL CALCULATIONS/WORK OUT DETAILS
SHOULD BE SUBMITTED WITH YOUR
ANSWER SHEET

QUESTION 1 : MULTIPLE CHOICE

Write down the letter corresponding to your chosen answer to indicate your response to each sub-question e.g. xv. E

- i. Grocer's Cupra itch is caused by mould mites in people who handle:
 - A. flower balls
 - B. cheese
 - C. dried fruits
 - D. wheat
 - E. vanilla pods

- ii. Trombicula akamushi mites are commonly found:
 - A. in partially cultivated land that becomes inundated by spring and early summer floods
 - B. in ecologically disturbed vegetation
 - C. in fowl houses
 - D. in houses infested with the house mouse, *Mus musculus*
 - E. Both A and B

- iii. The eggs of Argus persicus ticks during breeding are laid in
 - A. growing vegetation
 - B. cracks and crevices of fowl houses
 - C. in the ears of dogs
 - D. on hair follicles of humans
 - E. on dust or dirt in the soil

- iv. Rodents belong to the class:
 - A. Rodentia
 - B. Mammalia
 - C. Chordata
 - D. Insecta
 - E. Arachnida

- v. Which one of the following is not a key sign of infestation of rodents in a house?
 - A. Gnawings
 - B. Smears
 - C. Droppings
 - D. Unexplained domestic fires
 - E. Holes and nests

- vi. Fumigants enter the insect's body during application through
 - A. being swallowed and absorbed through the gut;
 - B. penetration of the cuticle;
 - C. being vaporised and then entering the respiratory system through spiracles.
 - D. All of the above
 - E. Both B and C

- vii. Which one of the following statements about the toxic effects of pesticides and/or insecticides is NOT true?
- A. Pesticides that have a high toxicity but are readily metabolised and/or eliminated result to an *acute* or *short-term exposure* type of hazard
 - B. Some pesticides have a lower acute toxicity but have a tendency to accumulate in the body
 - C. Other insecticides are rapidly eliminated but induce persistent biological effects
 - D. Acute, toxic effects of pesticides are not readily recognisable
 - E. A dose-effect relationship is defined for most pesticides
- viii. Sinistral coiling, as applied to snail morphology, applies to which genus of snail?
- A. Biomphalaria
 - B. Bulinus
 - C. Lymnaea
 - D. Oncomelania
 - E. Parafossarulus
- ix. Which one of the following is NOT true about anticoagulant rodenticides?
- A. They are slow to act
 - B. The antidote for anticoagulants is Vitamin K₁
 - C. Anticoagulants do not require any bait when setting up
 - D. Continuous use of the same anticoagulants may lead to rodents developing resistance to the toxicant
 - E. Anticoagulants have the same effect in all warm-blooded animals
- x. Which one of the following pesticides has a knock-down effect on insects?
- A. Organophosphates
 - B. Carbamates
 - C. Chlorinated hydrocarbons
 - D. Pyrethrines
 - E. Larvicidal petroleum oils

QUESTION 2

- a. Given below is a table of diseases transmitted by mites to man. Complete the table by writing the appropriate word in the missing spaces e.g. viii. *Argus persicus* (4)

Disease	Mite	Pathogen transmitted
Fowl pox	<i>Dermanyssus gallinae</i>	
Rickettsial pox	(i)	<i>Rickettsia akari</i>
Scrub typhus	<i>Leptotrombidium mites</i>	(ii)
(iii)	Gamasid mites	<i>Coxiella burnetti</i>
Fowl spirochaetosis	<i>Argus persicus</i> ticks and <i>Dermanyssus gallinae</i>	(iv)

- b. A 7-year old girl is diagnosed with scabies after complaining severe itching in many parts of her body.
- What is the causative agent for scabies? (1)
 - How did the disease get the name "scabies"? (2)
 - Explain how the girl could have acquired the infection. (2)
 - Explain what causes the intense itching on the skin of the girl. (3)
 - Mention 4 areas in the body of the girl where the itch might be concentrated. (4)
 - Explain what prescription and advice the doctor is likely to give to the young girl. (4)

[20 marks]

QUESTION 3

- a. Ticks are classified in the class Arachnida and not to the class Insecta like mosquitoes. Give three reasons why mosquitoes are not classified under the Insecta class. (3)
- b. Name one domestic animal that is commonly infected by the following ticks besides man.
- Argus persicus* (1)
 - Ornithodoros moubata* (1)
 - Otobius megnini* (1)
- c. Given below is an anatomical comparison between *Ixodes pilosus* and *Dermacentor variabilis*. Complete the table by writing down the description used to differentiate between the two ticks in each box. The last one is done as an example. (6)

Characteristic	<i>Ixodes pilosus</i>	<i>Dermacentor variabilis</i>
Anal groove	(i)	(ii)
Scutum	(iii)	(iv)
Festoons	(v)	(v)
Eyes	Absent	Present

- d. Ticks are commonly parasites of cattle and monitoring and control of infestation on cattle goes a long way to prevent infestation of humans.
- i. Describe one method each by which sampling to determine the level of infestation of ticks on cattle and on grass where cattle graze may be done. (2)
 - ii. Discuss one method used by farmers on Swazi nation land (SNL) and one used by those on title deed land (TDL) to prevent tick infestation on their herd of cattle. (6)

[20 marks]

QUESTION 4

- a. Lindane or γ -HCH is a commonly used insecticide in many control interventions.
- i. Explain the effect of γ -HCH on insects that bring about control of infestations. (3)
 - ii. Which one has a higher toxicity to insects, DDT or γ -HCH? (1)
 - iii. Explain how γ -HCH affects insects when sprayed onto surfaces such as soft wood or brick and dried mud. (3)
 - iv. For how long does γ -HCH remain active in killing insects when sprayed on a surface? (2)
- b. Dieldrin is often used as a rodent poison.
- i. Explain how dieldrin enters the body of a rodent to cause poisoning. (3)
 - ii. Describe two ways in which dieldrin sprayed on walls may cause death to insects infesting the sprayed room. (4)
 - iii. Parathion is an organophosphate also used in the control of adult flies in cattle barns and outdoor areas. Explain why parathion is only used outdoors and not indoors like dieldrin? (2)
 - iv. Mention two formulations in which parathion is normally used. (2)

[20 marks]

QUESTION 5

- a. Write down the genus of snail responsible for transmitting each of the following diseases:
- i. schistosomiasis mansoni (1)
 - ii. schistosomiasis haematobium (1)
 - iii. schistosomiasis japonicum (1)
 - iv. fascioliasis (1)
- b. Snails prefer habitats such as ponds and streams to large lakes and rivers that contain water plants. What purposes do water plants serve in the life of the snail? (4)
- c. Discuss chemical control of snails, including the names and formulations of chemicals used, in stagnant and in flowing water. (6)
- d. Given that the water velocity of an irrigation canal with a depth of 2.2 metres and a width of 8 m is 0.8 m/s.
- i. Calculate the water volume to be treated per second. (3)
 - ii. Calculate the total amount of 70% molluscicide wettable powder (in grams) at 1g/l needed to efficiently molluscicide the canal. (3)

[20 marks]

QUESTION 6

- a. Anticoagulants are among the most commonly used rodenticides in many rodent control programmes.
- i. Explain how anticoagulants cause death in rodents. (3)
 - ii. Why is the slow action of most anticoagulants an advantage in rodent control programmes? (4)
 - iii. Earlier anticoagulants were referred to as first-generation anticoagulants. Why was it necessary to establish second generation anticoagulants. (2)
- b. Two rodenticides, Brodifocoum and Diphenacoum, are available for your use in the control of domestic rodents.
- i. Which of the two is an anticoagulant and which one is a non-anticoagulant? (2)
 - ii. Which of the two rodenticides would you choose to use in your house and why? (3)
 - iii. How does the non-anticoagulant kill the rodents? (2)
- c. Besides using rodenticides to control rodents, live traps may be used instead or as an additional form of control. Explain one major disadvantage and one advantage of using live traps to control rodents. (4)

[20 marks]

QUESTION 7

- a. With respect to pesticide application and use, define the following:
- i. Local effect (2)
 - ii. LC_{50} (2)
 - iii. hazard (1)
- b. Pesticides are among the most widely used chemicals in the world, and also among the most dangerous to human health. Discuss THREE adverse effects of pesticides in humans. (6)
- c. Discuss the pesticide cycle and use it to explain how water, air and the soil become polluted following pesticide application or contamination. (You may use a drawing if you think it will enhance your description of the processes involved) (9)

[20 marks]