



UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

Department of Environmental Health Science

MAIN EXAMINATION PAPER JANUARY 2020

TITLE OF PAPER : RODENTS AND VERMIN CONTROL
COURSE CODE : EHS 307
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
: ANSWER **QUESTION 1 AND ANY THREE OTHER** QUESTIONS
: EACH QUESTION **CARRIES 25** 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 COMPULSORY – ALL STUDENT MUST ANSWER THIS QUESTION

- a. **MULTIPLE CHOICE:** Indicate your responses to the items this question by writing the letter corresponding to your chosen answer. (20)
- i. Which one of the following statements about dermal or nasopharyngeal myiasis IS NOT true?
 - A. Humans infestations result from over-spillage of heavy animal infestations
 - B. Movement of maggots to the base of the brain can result in meningitis and often death of the host
 - C. Infestation in humans result to furuncular, painful, boil-like lesions, which often become secondarily infected and are extremely painful
 - D. Flies lay eggs in skin or nasopharyngeal tissues of humans
 - E. Commonly invaded sites include healthy tissue about the nose, mouth, ear, and orbit; but wounds or genitalia are sometimes invaded

 - ii. Which one of the snakes below is the world's most venomous?
 - A. Inland taipan
 - B. Rattlesnake
 - C. Malayan-Krait Bungaris
 - D. Tiger snake
 - E. Black mamba

 - iii. 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

 - iv. Which one of the following IS NOT a difference between first and second generation rodenticidal anticoagulants?
 - A. First generation anticoagulants have shorter half-lives than second-generation anticoagulants
 - B. Second generation anticoagulants are far more toxic than first generation anticoagulants
 - C. Second generation anticoagulants are generally applied in higher concentrations compared to first generation anticoagulants
 - D. Second generation anticoagulants are effective against rodents that have become resistant to first generation anticoagulants
 - E. None of the above

 - v. Which one of the following statements IS TRUE about cholecalciferol?
 - A. May be used as a single-dose
 - B. May be used as a multiple-dose

- C. All food intake ceases once rodent consumes a lethal dose
 - D. Bait shyness apparently does not occur
 - E. All the statements are true
- vi. Which one of the statements about DDT IS NOT true?
- A. DDT has a long residual effect
 - B. DDT is banned for public health and agricultural use
 - C. The damaging effects of DDT use during indoor residual spray have not been proved
 - D. Some insects of public health importance including mosquitoes have been reported to show resistance to DDT
 - E. DDT can be taken into the body by ingestion with food, through the skin on contact and through inhalation
- vii. Which one of the statements below DOES NOT describes a health effect of pesticides in humans?
- A. Affect and damage the nervous system
 - B. Damage the liver
 - C. Damage DNA and cause a variety of cancers
 - D. Cause reproductive and endocrine damage
 - E. None of the statements above
- viii. During analysis to determine occurrence of insecticide resistance, several procedures are followed. Which one of the following findings suggest occurrence of resistance?
- A. The chemical dilution rate was not performed correctly
 - B. The sprayer did not apply the chemical at the correct rate
 - C. The chemical used had expired
 - D. Large numbers of insects survived when the WHO cylinder test was conducted
 - E. The spray equipment was faulty
- ix. Which one of the following symptoms IS NOT likely to appear as a short term exposure of farmers and workers to pesticides?
- A. Headache
 - B. Vomiting
 - C. Diarrhoea
 - D. Skin and eye problems
 - E. Dizziness
- x. 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

- b. Write **T** (for true) or **F** (for false) to indicate your responses to each item in this question. (5)
- i. Centipedes cause severe human envenomation that often ends fatally
 - ii. Ingestion of Dipteran genera in food sometimes results in their survival and faecal passage of live maggots causing accidental myiasis.
 - iii. All pesticides are chemicals extracted from plants or synthesized in the laboratory
 - iv. No segment of the population, including unborn babies, is completely protected against exposure to pesticides and the potentially serious health effects
 - v. Propoxur was an insecticide that was immediately recommended for DDT resistant insects
- [25 marks]

QUESTION 2

- a. Black widow spiders are often responsible for human envenomation that results in death if appropriate medical attention and first aid are not provided timeously.
- i. Why is this spider referred to as “the Black widow”? (2)
 - ii. What is the technical name of the black widow spider? (1)
 - iii. What sign characteristic would you use to identify the black widow spider? (2)
 - iv. Describe briefly the life cycle of the Black widow spider. (5)
 - v. Describe the chain of symptoms identified following the bite of the black widow spider. (4)
 - vi. What measures would you undertake to reduce the effect of black widow poisoning on a patient prior to transmission to hospital? (3)
 - vii. List THREE suggestions you would make to reduce spider envenomation in communities. (3)
- b. Scorpions are often the cause of human envenomation and death compared to that due to spiders.
- i. How is scorpion venom introduced to the victim? (3)
 - ii. Why is the scorpion venom more deadly in children than adults? (2)
- [25 marks]

QUESTION 3

- a. Rodent infestation may lead to man acquiring diseases such as salmonellosis, leptospirosis and murine typhus. Explain how each of these three diseases may be transmitted from infected rodents to humans. (9)
- b. All precautions have to be made to prevent entry of rodents into docked ships.
- i. Why should rodent entry into docked ships be prevented? (5)
 - ii. List SIX strategies that may be used to prevent entry of rodents into a docked ship. (6)
- c. Suppose the Captain of the ship places granular brodifacoum 0.005% bait in the luggage area to further control rodents that may enter the docked ship unnoticed.
- i. Would you support this strategy? Give reasons for your answer. (3)
 - ii. How does the brodifacoum control rodents? (2)
- [25 marks]

QUESTION 4

- a. Suppose during the inspection of premises for rodent infestation you identify a dead rat, explain how you may go about determining whether it's *Rattus rattus* or *Rattus norvegicus*?
(10)
- b. Following confirmation of the existence of rodent infestation at a household, an Environmental Health Officer performs a thorough inspection to collect data that will determine the areas his/her control programme will focus on. Discuss the areas of focus the inspection process is likely to involve, also explaining why each area is important.
(15)

[25 marks]

QUESTION 5

- a. What is the difference between broad-spectrum pesticides and narrow spectrum-pesticides?
(2)
- b. After a pesticide has been released into the environment during application, what will eventually happen to the pesticide?
(10)
- c. Explain how each of the following affects pesticide pollution of soil, water or air?
i. Soil temperature (4)
ii. Microbial activity (3)
iii. Treatment surface (3)
- d. A householder sprays a cockroach on the ground for several minutes until the cockroach is wet with insecticide to make sure that it is killed. Is it correct for the householder to spray so much insecticide on the cockroach? Give reasons for your answer. (3)

[25 marks]

QUESTION 6

- a. During indoor residual spray (IRS) of human dwellings to reduce populations of adult mosquitoes DDT (Dichloro diphenyl trichloroethane) and pyrethroids are commonly the insecticides used in many malaria control programmes of developing countries including Swaziland.
i. What is the primary site of action of DDT and pyrethroid insecticides? (4)
ii. Why do IRS programmes use both DDT and pyrethroids in developing countries? (2)
- b. Development of populations of insects have continually created the demand for the development of newer and effective insecticides.
i. Define insecticide resistance. (2)
ii. What are the three main objectives of monitoring of insecticide susceptibility in a vector control programme? (6)
iii. List the SIX factors that are favourable to the development of insecticide resistance. (6)
- c. An entomologist wants to detect insecticide resistance against a mosquito population early and uses the WHO Test Kit to determine the resistance factor. He finds that the LC_{50} of the susceptible mosquito population is 0.032 and that of the resistant mosquito population is 1.056. By calculating

the resistant factor of the insecticide, determine if resistance has occurred in the resistant population. (5)

[25 marks]