

UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

SPECIAL EXAMINATION PAPER – JULY 2016

TITLE OF PAPER : VECTOR CONTROL

COURSE CODE : EHS 104

TIME : 2 HOURS

MARKS : 100

INSTRUCTIONS : ANSWER **QUESTION 1** AND **ANY OTHER THREE**
QUESTIONS

: EACH QUESTION CARRIES 25 MARKS

: NO FORM OF ANY PAPER SHOULD BE BROUGHT INTO
NOR TAKEN OUT OF THE EXAMINATION ROOM WITHOUT
THE PERMISSION OF THE CHIEF INVIGILATOR

: BEGIN THE ANSWER TO EACH QUESTION ON A
SEPARATE PAGE

: CALCULATORS MAY BE USED BUT THEY MUST BE THE
SILENT TYPE

: ALL CALCULATIONS AND WORKING MUST
SUBMITTED WITH YOUR ANSWER SHEET

DO NOT OPEN THE QUESTION PAPER UNTIL PERMISSION IS GIVEN TO DO SO BY THE INVIGILATOR

QUESTION 1 COMPULSORY : ALL STUDENTS MUST ANSWER THIS QUESTION

- a. **MULTIPLE CHOICE:** Write down the letter corresponding to your chosen response among the choices listed for each question. (20)

- i. The spiracles of insects are located in the:
- A. sternum
 - B. pleurum
 - C. notum
 - D. metathorac
 - E. proctodeum
- ii. Which of the following parts of an insect digestive system is (are) non-chitinized:
- A. foregut or stomodaeum
 - B. midgut or mesenteron
 - C. hindgut or proctodaeum
 - D. All of the above
 - E. None of the above
- iii. A student of entomology collects an arthropod and removes the antennae for further scrutiny and characterization under the microscope. He draws the following structure from what he sees.



The student is likely to conclude that the antennae of the arthropod are:

- A. capitate
 - B. moniliform
 - C. filiform
 - D. geniculate
 - E. plumose
- iv. A young boy excises the head of a bee and returns after 3 days to find that the legs on the abdomen are still moving. He thinks that the abdomen of the bee is still alive yet he recalls that after the head of a chicken is cut, the body dies and becomes motionless in a few seconds. The most appropriate reason for the motion observed on the legs of the abdomen of the bee and not on the body of the chicken is that:
- A. the bee does not have a brain yet the chicken has a brain
 - B. the brain does not serve as an important coordinating centre in the bee yet it does in the chicken
 - C. the bee does not have blood yet the chicken has blood
 - D. the bee has hormones that facilitate motion of the legs which the chicken does not have
 - E. the brain of the bee is on the abdomen and not on the head like in the chicken

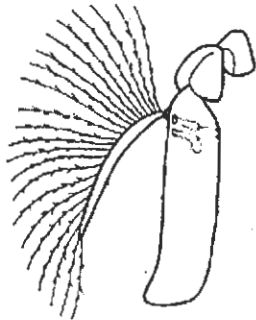
- v. The parts of the housefly that help it stick onto smooth surfaces such as window panes and prevent falling are known as the:
- emelytra
 - tarsi
 - tarsomeres
 - arolia
 - halteres

- vi. The arthropod shown below is likely to cause disease in humans through:



- sensitisation
 - urtication
 - tissue invasion
 - vesication
 - defence secretions
- vii. The blackfly, *Simulium damnosum*, is a vector of:
- African trypanosomiasis
 - American trypanosomiasis
 - onchocerciasis
 - malaria
 - schistosomiasis
- viii. Which one of the following characteristics describe a female *Anopheles* mosquito?
- Palps as long as the proboscis, palps clubbed at the tips
 - Palps shorter than the proboscis, palps feathery
 - Palps as long as the proboscis, palps feathery
 - Palps as long as the proboscis, antennae feathery
 - Palps as long as the proboscis, antennae sparse

- ix. The antennae shown below are for a:



- housefly
- blackfly
- mosquito
- tsetsefly
- cockroach

- x. Which of the following statements about the pupal stage of development of mosquitoes is NOT true?

- A. The pupa is a resting, non-feeding development stage
 - B. The pupa is non-motile
 - C. The pupa is sensitive to light
 - D. Development of the mosquito is arrested in the pupa stage when environmental temperature are too low
 - E. The pupa stage is part of a complete metamorphosis of the mosquito
- b. Write **T** (for true) or **F** (for false) on each of the statements below: (5)
- i. Ametabolous development describes development of insects with incomplete metamorphosis
 - ii. The Culicidae family include mosquitoes that have wings that develop from outside the body
 - iii. All members of the Class Arachnida have eyes
 - iv. Members of the Glossinidae family are larviparous
 - v. Diapause that enables insects to resist heat or drought is known as aestivation

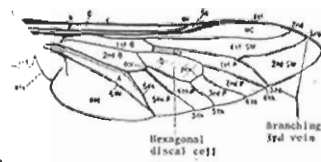
[25 marks]

QUESTION 2

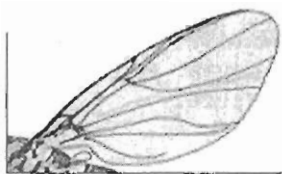
- a. The two largest divisions of the Arthropoda phylum comprise the Insecta and Arachnida classes. List FOUR major differences between the two classes of the Arthropoda phylum. (4)
- b. The following are wings of FOUR Dipteran flies. Study the wings and write down the flies to which each one belongs. (4)



i.



ii.



iii.



iv.

(4)

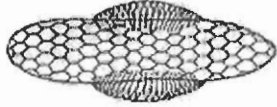
- c. List THREE sites where houseflies commonly lay eggs during breeding. (3)
- d. Entomologists must be able to identify the housefly at different stages and breeding areas in order to know where to target control measures. Describe the structural appearance of the larval stage of the housefly: (a drawing may be used if it enhances clarity of your description) (6)
- e. Butcheries and food stores have to maintain low fly populations at all times. Discuss TWO measures butcheries and food stores may use to control fly populations inside such establishments. (4)

[25 marks]



QUESTION 3

- a. Mosquitoes are important vectors of many diseases of man including malaria.
- i. Other than malaria, name two other diseases of transmitted through the bite of mosquitoes. (2)
 - ii. Describe the biting times for Anopheles mosquitoes, the vectors of malaria parasites. (2)
- b. An entomologist employed by the National Malaria Control Programme collects water from an area non-endemic for malaria to determine the potentiality of malaria transmission and identifies the eggs shown below floating on the water.



- i. Are these eggs from mosquitoes associated with malaria transmission? Give reasons for your answer. (3)
 - ii. Describe the type of habitat from which the entomologist is likely to have collected these eggs. (3)
 - iii. Suppose the entomologist is not sure of the species of mosquito shown above and cultures the eggs until they hatch into larvae. Describe TWO characteristic of the larvae he may use to confirm the species of the mosquito. (4)
 - iv. Suppose the entomologist decides to derive further evidence and allows the larvae to develop into adults. What characteristics of the adult mosquitoes is the entomologist likely to use to determine whether they are Anopheles or not? (4)
- c. Following confirmation of mosquito breeding in the habitats the entomologist has examined. He decides to initiate measures to reduce breeding irrespective of the species of mosquito vectors he has confirmed. Discuss control measures the entomologist is likely to consider for the control of mosquito breeding in the sites. (7)

[25 marks]**QUESTION 4**

- a. Name the family under which human lice are classified. (1)
- b. Three species of lice cause infestation in humans.
 - i. Name the three species. (3)
 - ii. Which of the species is involved in disease transmission among infested human hosts?(1)
 - iii. Explain TWO major structural differences that exist between a head louse and a pubic louse. (4)
- c. Is it necessary to control infestation of humans and animals with non-disease transmitting louse species. Give reasons (6)
- d. In order to confirm louse infestation, inspection of breeding sites have to be conducted. Where and how is investigation for live breeding conducted to confirm infestation? (3)
- e. Discuss initiatives that may be engaged by a household to prevent louse infestation and spread, particularly among children. (3)
- f. Pubic lice commonly affect adults compared to children. How do adults acquire infestation with pubic lice and how can this infestation be prevented? (4)

[25 marks]

QUESTION 5

- a. Cockroaches are common indoor pests all over the world in kitchens and bathrooms and as such are referred to as 'synanthropes'.
- Explain why cockroaches are said to be 'synanthropes' ? (2)
 - Explain cockroaches commonly infest kitchens and bathrooms. (3)
 - List THREE precautions you may recommend to households in order to prevent cockroaches infestation of kitchens and bathrooms. (3)
- b. Bedbugs have caused major human problems around world, both in tropical and temperate areas.
- Explain why bedbugs infestations occur all over the world. (2)
 - Name TWO species of bedbug that commonly infest human dwellings (2)
 - Morphologically, bedbugs often resemble body lice. Describe one method one may use to identify bedbugs from body lice (2)
 - Explain why bedbug infestation must be prevented despite that they are not commonly involved in disease transmission. (5)
 - Discuss TWO methods you may recommend to prevent household infestation from bedbugs. (6)

[25 marks]

QUESTION 6

- a. Snails belong to the Class Gastropoda which are classified into two order.
- Name the two orders snails are classified under. (2)
 - Snails belong to the Phylum Mollusca which are so classified based on two major characteristics. Explain the two characteristics. (4)
 - All snails of medical importance breed in water habitats that contain several plants. Explain the importance of freshwater water plants in breeding habitats of snails. (4)
- b. Vast use of environmental modifications to control snail have been attempted with success in many parts of the People's Republic of China. Discuss how environmental management methods may be used to prevent snail breeding. (4)
- c. Biological control of snails has been attempted but none of the methods has been applied on a wider scale.
- Discuss THREE methods of the biological control of snails that have proved successful experimentally. (6)
 - What challenges have been met by snail control programmes to prevent wide scale application of biological control methods? (2)
 - A method of snail control through the use of a plant species has been applied successfully in parts of Africa including Ethiopia. Name the plant used in snail control and explain the factors that led to its discovery as a molluscicide. (3)

[25 marks]