

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER – JULY, 2013

TITLE OF PAPER : RODENTS AND VECTOR CONTROL

COURSE CODE : EHM 200

TIME : 2 HOURS

MARKS : 100

INSTRUCTIONS : ANSWER **QUESTION 1 AND ANY FOUR**
QUESTIONS

: 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

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

: ALL CALCULATIONS/WORK-OUT DETAILS
SHOULD BE SUBMITTED WITH YOUR ANSWER
SHEET

QUESTION 1 MULTIPLE CHOICE [ALL STUDENTS MUST ANSWER THIS QUESTION]

Indicate your response to the items in this question by writing down the letter corresponding to your chosen answer among those provided for each sub-question.

- i. How does *biological transmission* differ from *mechanical transmission* by a vector?
 - A. In biological transmission, the agent undergoes a development cycle in the vector before it can be transmitted to another host
 - B. In biological transmission, the agent does not undergo a development cycle in the vector before it can be transmitted to another host
 - C. In biological transmission, another species of arthropod facilitates transmission
 - D. In biological transmission, there is no reservoir host
 - E. In biological transmission, two or more pathogens are always transmitted at the same time by the vector

- ii. What is *entomophobia*?
 - A. Fear of spiders
 - B. Fear of mites
 - C. An imagined skin infestation by arthropods
 - D. An imagined internal infestation by arthropods
 - E. Fear of insects

- iii. Insects may take the form of a temporary cessation of development, or temporary cessation of activity, or both. Cessation of development as a result of heat or development of extremely dry conditions is called
 - A. hibernation
 - B. diapause
 - C. metamorphosis
 - D. aestivation
 - E. moulting

- iv. An example of an arthropod that produce allergic reactions from the host through metabolic by-products is a(n)
 - A. *Anopheles* mosquito
 - B. *Sarcoptes scabiei*
 - C. *Tunga penetrans*
 - D. Bee
 - E. Saddleback caterpillar

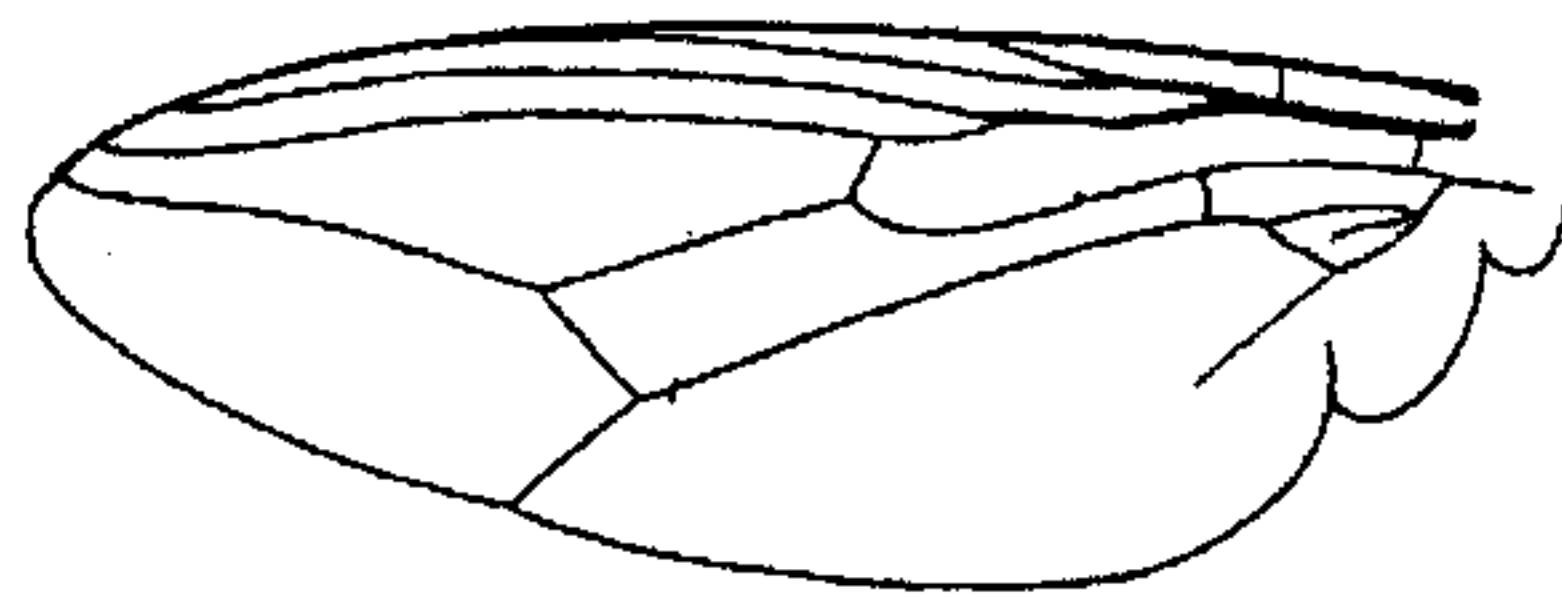
- v. Which insects are included in the order Blattaria?
 - A. Cockroaches
 - B. Lice
 - C. True flies
 - D. Fleas
 - E. Mosquitoes

- vi. The structure of antenna shown below is said to be



- A. moniliform
- B. clavate
- C. filiform
- D. plumose
- E. pectinate

- vii. Shown below is the wing of an arthropod. The arthropod wing shown is that of



- A. *Phlebotomus papatasi*
- B. *Simulium damnosum*
- C. *Musca domestica*
- D. *Glossina morsitans*
- E. *Tabanus latipes*

- viii. Which of these groups of arthropods transmit the causative agents of Rocky Mountain Spotted fever and Babesiosis?

- A. Kissing bugs (conenoses)
- B. Deer flies
- C. Mosquitoes
- D. Ticks
- E. Tsetseflies

- ix. Class Insecta has how many body regions?

- A. 6
- B. 4
- C. 3
- D. 2
- E. 8

- x. What is an *anticoagulant*?

- A. A factor that prevents blood from clotting
- B. A local pain killer
- C. A parasitic fly
- D. A factor that dilates blood vessels
- E. A factor that promotes healing after an insect bite

[20 marks]

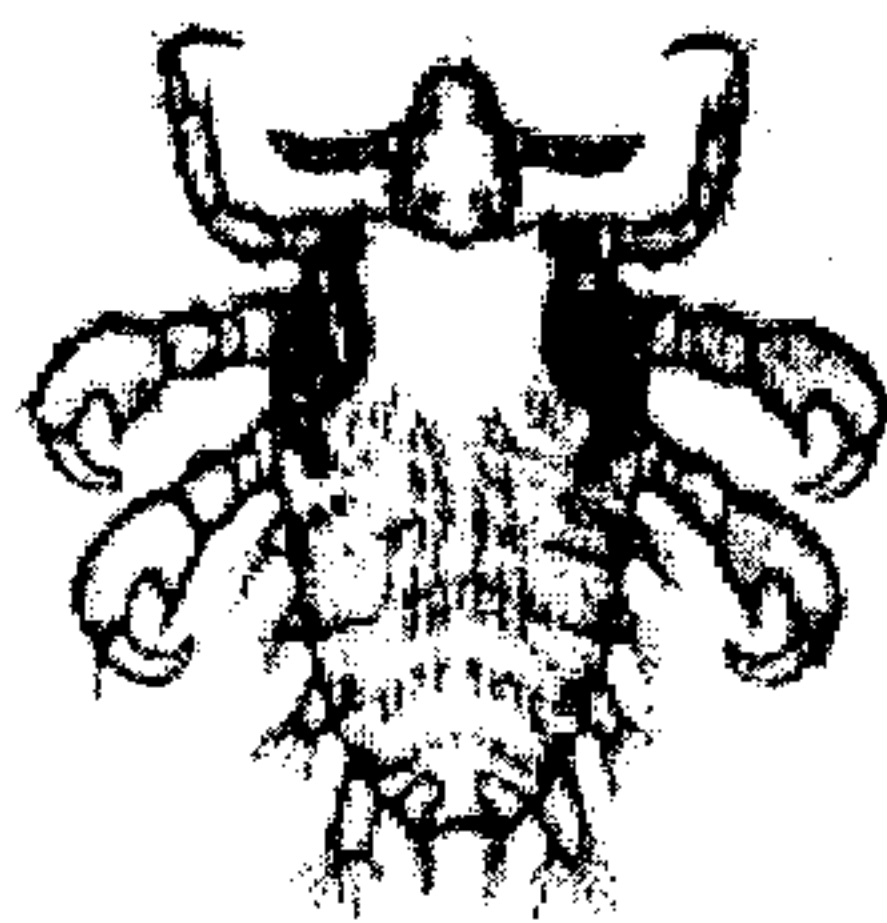
QUESTION 2

- a. Examine each of the statements below and write **T** (for True) and **F** (for false) as you deem applies to the information stated: (5)
- Halters are vestigial appendages that are an evolutionary replacement of the posterior pair of wings in the true flies (Diptera).
 - The mesenteron of insects is chitinized and functions to digest and absorb food.
 - Arachnida (such as spiders) have malpighian tubules that open into the anterior end of the proctodaeum
 - The nymphs and adults of insects with incomplete metamorphosis live in entirely different habitats.
 - Zinc phosphide is an example of an anticoagulant rodenticide.
- b. Give one example of an arthropod with the following mouthparts: (1)
- Sponging (1)
 - Piercing-sucking (1)
 - Chewing-lapping (1)
- c. What is the function of the following parts of the housefly: (2)
- Pulvilli? (2)
 - Antennae (2)
 - Halteres (2)
- d. Explain how you may differentiate between the wing of a housefly from that of tsetsefly. (2)
- e. Explain how you may differentiate between the antenna of tsetsefly from that of a housefly. (4)

[20 marks]

QUESTION 3

- a. The louse shown below is recovered from the body of a heavily infested young 15-year old boy.



- Name the species of the louse. (1)
- How does this species differ from other species that may infest humans? (4)
- Where in the body of the boy is the louse likely to have been recovered? List two areas. (2)
- Describe a method that could have been utilised by the laboratory technician to recover this louse. (3)
- What could have led to this infestation being describe as 'heavy'? (2)

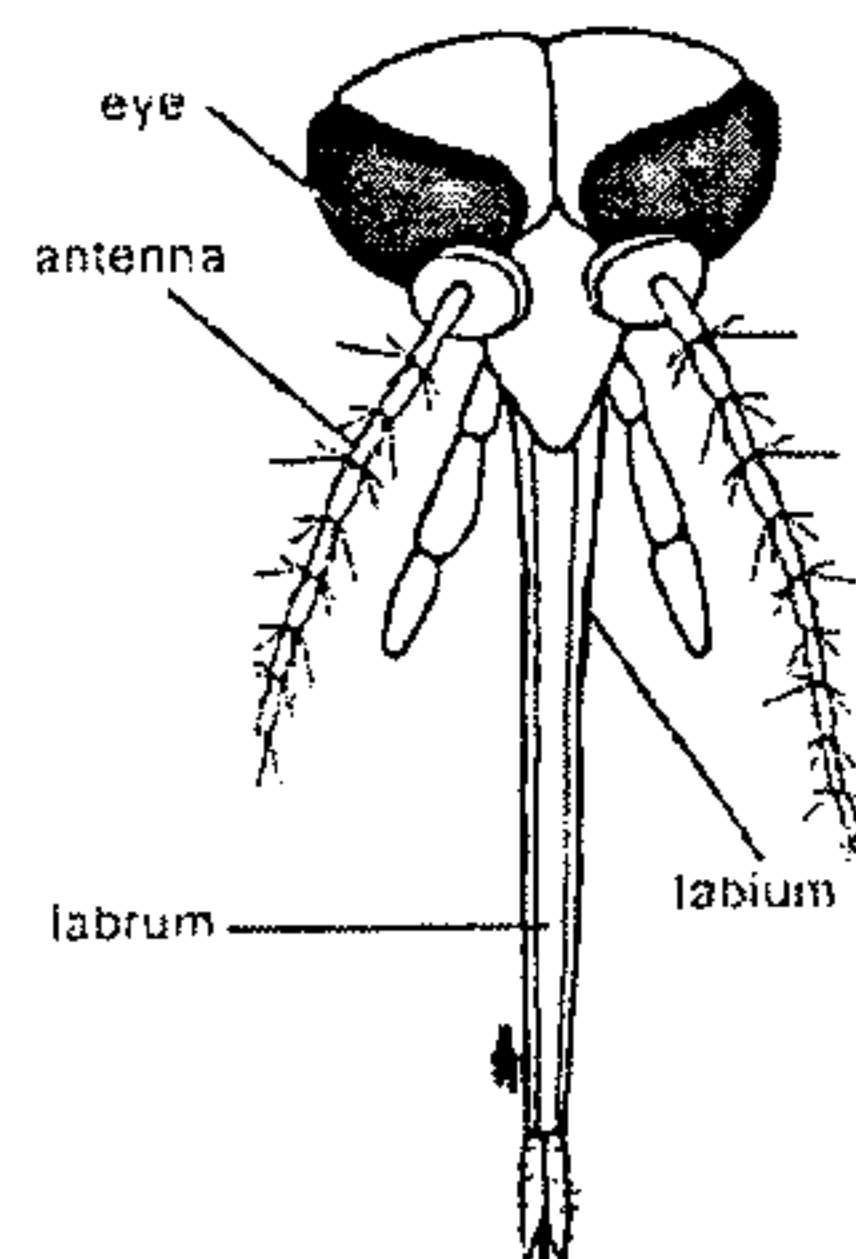
- vi. Describe two methods by which boy is likely to have acquired the infestation? (2)
- vii. What advice would you give this boy to prevent infestation with this louse in the future. (3)
- b. Young body lice are said to be similar to bedbugs in appearance. Describe one characteristic you may use to differentiate between a young bedbug and a body louse. (2)

[20 marks]

QUESTION 4

- a. Mosquitoes are classified under class Insecta, subclass Pterygota, Order Diptera and Suborder Nematocera.
 - i. Write down three differences between the mosquito (class Insecta) and the spider (class Arachnida). (3)
 - ii. Explain why mosquitoes are classified under the subclass Pterygota. (2)
 - iii. What does 'Diptera' mean? (2)
 - iv. State three reasons why mosquitoes are placed under suborder Nematocera. (3)

- b. A student entomologist collects a mosquito and looks at the mouthparts using a microscope. He draws the following diagram from what he sees.



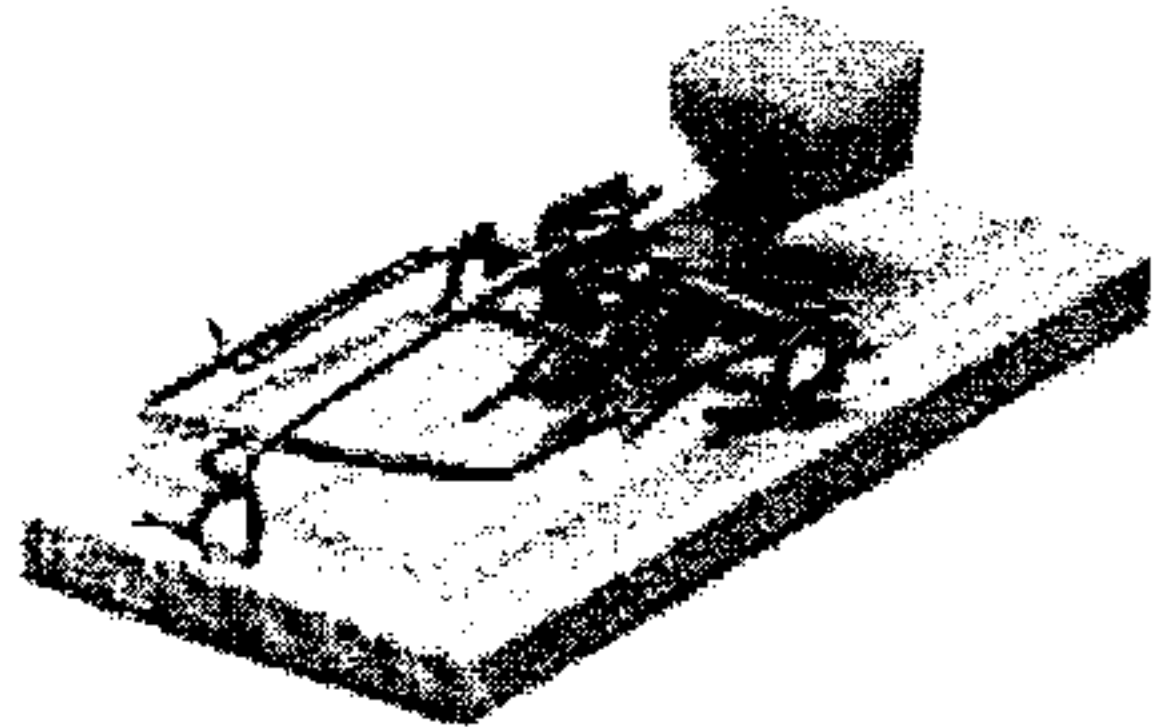
Using the diagram, answer the following questions:

- i. Is this a male or female mosquito? Explain your answer. (3)
 - ii. Is the mosquito Anopheline or Culicine? Explain your answer. (3)
- b. Indoor residual spraying (IRS) is an effective mosquito control method that has been adopted by many malaria control programmes in Africa including Swaziland.
 - i. Besides dichlorodiphenyltetracyclohexane (DDT), name one chemical that may be used during IRS in the control of mosquitoes. (1)
 - ii. What should be the distance between the spray nozzle and the wall during an IRS activity? (1)
 - iii. What problems would arise from a distance that is larger than that stated in (ii) above? (2)

[20 marks]

QUESTION 5

- a. List FIVE reasons why it is important to prevent rodent infestation in a house. (5)
- b. If a rodent infestation is suspected in a house, describe four methods you may use to confirm the infestation. (8)
- c. One of the methods used to control rodents in an infested house is shown below:

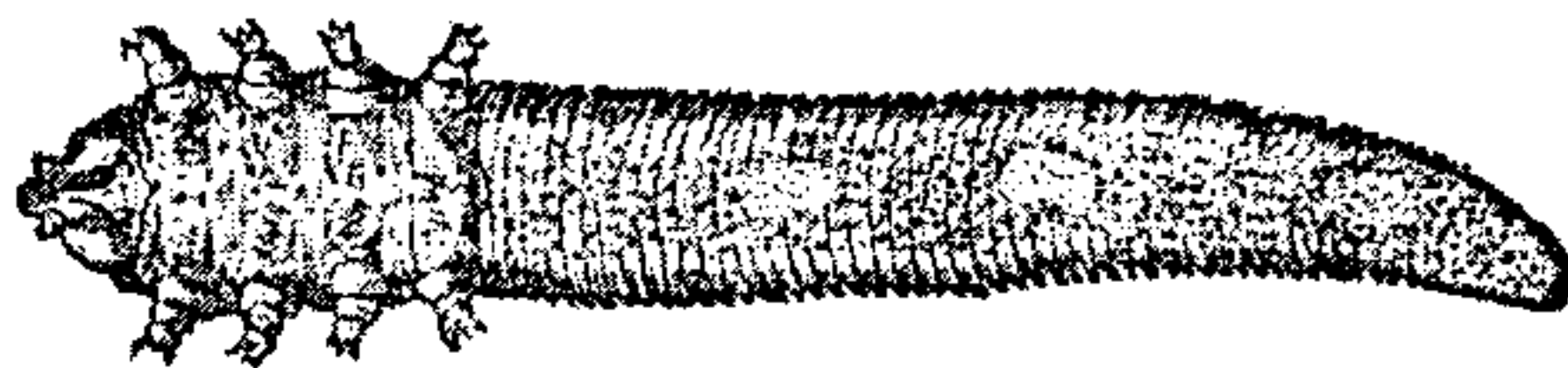


- i. Name the method shown above. (1)
- ii. Explain briefly how this method works. (4)
- iii. List two disadvantages of using this method for rodent control in the house. (2)

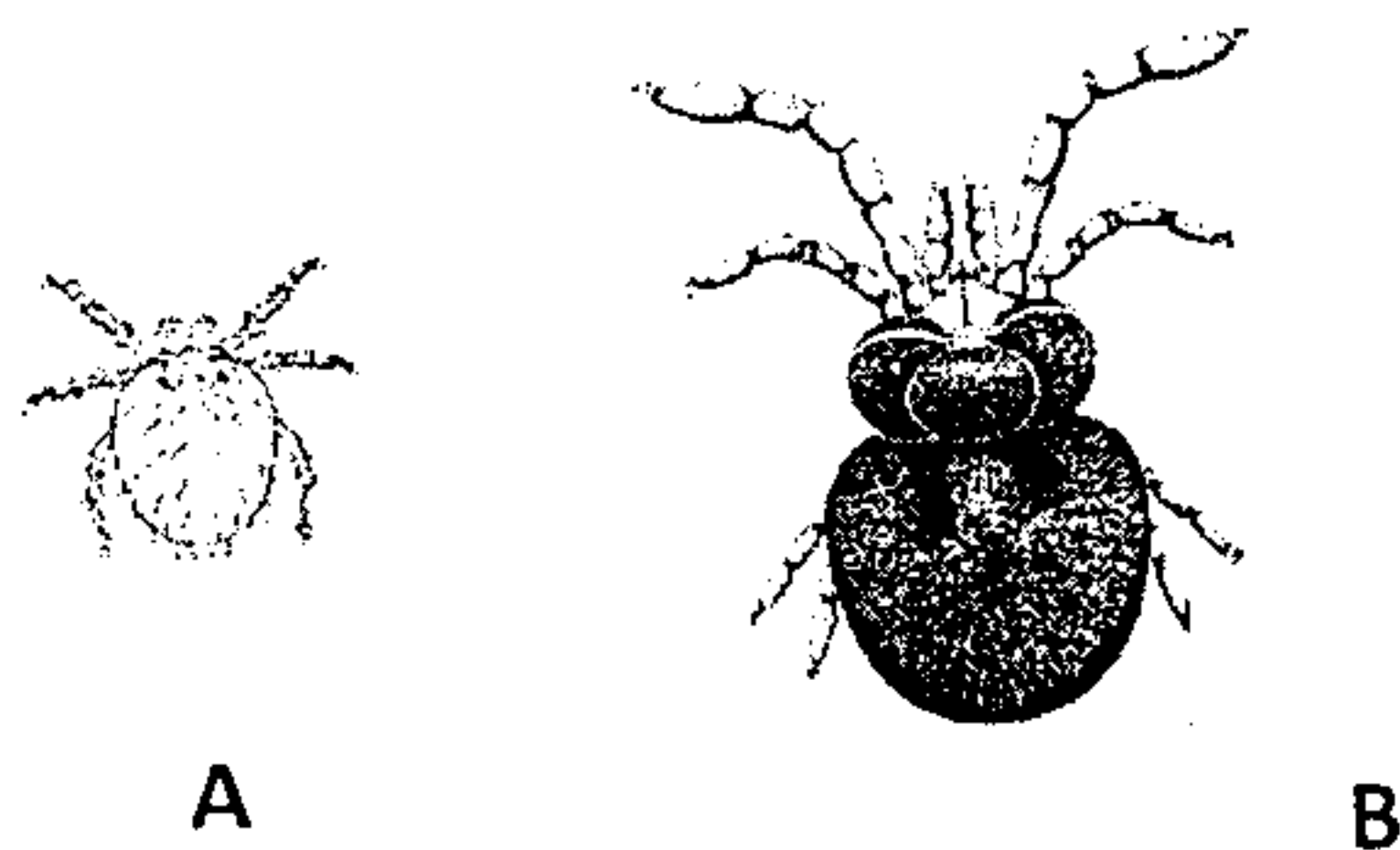
[20 marks]

QUESTION 6

- a. A laboratory technician recovers the following mite from an infested man.



- i. Name the species of the mite. (1)
 - ii. What is the common used to refer to this mite? (1)
 - iii. Where in the body of man is the mite likely to have been recovered? Mention three areas. (3)
 - iv. Explain briefly the method the laboratory technician is likely to have used to recover the mite. (2)
 - v. If untreated, what is likely to happen to the man infested with this mite? (2)
- b. Another diagnosis in the same laboratory recovers the stages of mite (A and B) shown below from a different man.



- i. What species of mite is the man infested with? (1)
- ii. Name the stages (A and B) shown in the diagrams and explain how you decided the stages. (4)
- iii. Name the pathogen that may be transmitted by this mite to man and the disease the pathogen may cause. (2)
- iv. How is the man likely to have acquired this species of mite? (2)
- v. What advice would you give this man to avoid infestation with this mite? (2)

[20 marks]

QUESTION 7

Insecticides remain the mainstay of many tropical disease control programmes and insecticide resistance can have a major impact in the ability of programmes to control these diseases.

- a. Define insecticide resistance. (2)
- b. List three factors that influence the development of insecticide resistance. (3)
- c. List three objectives for monitoring insecticide susceptibility in vector control programmes. (3)
- d. Describe a method you may use to monitor vector susceptibility and detect resistance in an integrated vector management programme. (6)
- e. Suppose a World Health Organisation insecticide susceptibility test kit is used and the following results are obtained. How would you interpret the result?
 - i. 95% mortality (1)
 - ii. <80% mortality (1)
- f. Discuss two strategies you may use to manage or prevent development of insecticide resistance during vector control practice. (4)

[20 marks]