



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

**MAIN EXAMINATION PAPER DECEMBER 2017**

- TITLE OF PAPER : INTRODUCTION TO PARASITOLOGY
- COURSE CODE : EHS 107
- 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.

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DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

**QUESTION 1**

- a. Write the letter corresponding to your chosen answer to indicate your response in this question.
- i. A laboratory technologist identifies a protozoan parasite while doing routine urinalysis of a patient. The parasite has one nucleus, 5 flagella and an exostyle. The parasite is likely to be:
- A. *Balantidium coli*
  - B. *Giardia lamblia*
  - C. *Entamoeba histolytica*
  - D. *Entamoeba coli*
  - E. *Trichomonas vaginalis*
- ii. The following parasite was recovered from an infected host.



Which one of the following hosts and areas is likely to be the source from which the parasite was recovered?

- A. The parasite was recovered from the bloodstream of an infected human host
  - B. The parasite was recovered from the midgut of an infected tsetsefly vector
  - C. The parasite was recovered from the salivary glands of an infected tsetsefly vector
  - D. The parasite was recovered from the tissues of an infected human host
  - E. The parasite was recovered from the
- iii. A Mozambican national staying in Swaziland visits his home in Inhambane, a region highly endemic with malaria and has to attend a night vigil during the funeral of one of his relatives. Which of the methods below would be best for use to prevent infection with malaria parasites even if the Mozambican receives infective bites of mosquitoes during the night vigil?
- A. Sleeping under an insecticide treated bednet
  - B. Taking prophylactic tablets prior to travel, while in Mozambique and for 4 weeks following return
  - C. Making sure that he remains in a room that has screens covering every window and other openings
  - D. Smearing his skin with insect repellent lotions such as "Peaceful Sleep".
  - E. All of the above
- iv. The World Health Organisation recommends use of artemisinin-based combination therapies (ACTs) to treat uncomplicated malaria following parasitological confirmation of infection. Which of the following reasons IS NOT an advantage of using ACTs compared to monotherapies such as chloroquine that was used before?
- A. The artemisinin component of ACTs is fast in destroying asexual stages resulting in relief of symptoms in the patient

- B. ACTs kill mature gametocytes thus preventing transmission of parasites to the mosquito vector and to other human hosts
  - C. ACTs consist of two partner drugs with different modes of action which delays the development of parasites resistant to both drugs
  - D. The artemisinin kills immature gametocytes and reduce transmission of parasites to the mosquito vector
  - E. ACTs are easily obtainable through a Private-Public Partnerships process
- v. A laboratory technologist performs routine stool analysis and identifies the following stage of a parasite.



The parasite is likely to be:

- A. *Giardia lamblia* cyst
  - B. *Entamoeba histolytica* cyst
  - C. *Balantidium coli* cyst
  - D. *Trichomonas vaginalis* trophozoite
  - E. *Entamoeba coli* cyst
- vi. Which of the parasitic infections below result in severe disease among people with concurrent HIV infection and a low CD4 cell count?
- A. giardiasis
  - B. trichomoniasis
  - C. amoebiasis
  - D. cryptosporidiosis
  - E. all of the above
- vii. An adult man of 49 years reports to a health facility with complaints of watery diarrhoea and weight loss. Upon stool examination, the parasite stage below is identified.



What conclusions can be made about the man's infection?

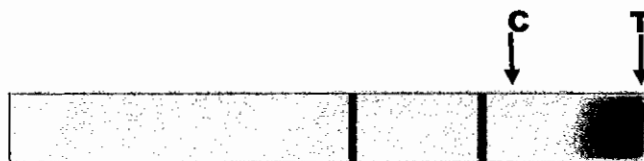
- A. The man is likely to be infected with both HIV and isosporiasis
- B. The man is likely to be infected with both HIV and toxoplasmosis
- C. The man could have a low CD4 cell count and is infected with cryptosporidiosis
- D. The man is likely to have a normal CD4 cell count and might be infected with cryptosporidiosis
- E. The man is likely to have a normal CD4 cell count and might be infected by both HIV and isosporiasis

- viii. A laboratory technologist performs routine analysis of a stool sample of a patient who shows up at the health facility with complaints of severely, acute and watery diarrhoea accompanied by vomiting. He identifies the following egg stage of a helminthic parasite:



Which one of the statements below is the laboratory technologist likely to make following identification of this egg stage.

- A. The diarrhoea and vomiting is caused by the adult worms producing these eggs
  - B. The patient is infected by *Ascaris lumbricoides* but is not the cause of the diarrhoea and vomiting
  - C. The patient is infected by *Enterobius vermicularis* but it is not the cause of the diarrhoea and vomiting
  - D. The patient is infected by *Trichuris trichiura* and it is the cause of the diarrhoea and vomiting
  - E. The patient is infected with *Balantidium coli* which is the cause of the diarrhoea and vomiting
- ix. The rapid diagnostic result shown below was obtained by a nurse from a patient suspected to be infected with malaria following exposure to mosquito bites while visiting a friend in Big Bend, in the Lowveld of Swaziland.



Which one of the following conclusions is the nurse likely to make from this result?

- A. The patient is not infected
  - B. The patient has multiple infections with different species of malaria
  - C. The test is invalid
  - D. The patient is infected with *Plasmodium falciparum*
  - E. The patient is infected with a non-falciparum species
- x. The stage of hookworm that commonly infects man is the:
- A. egg
  - B. cyst
  - C. *filiform* larva
  - D. *rhabditiform* larva
  - E. cercaria

- b. Write T (for true) or F (for false) against each of the statements below.
- i. During diagnosis of protozoan parasites, cyst stages require concentration because of their small size while trophozoites are larger, easier to see and normally do not require concentration.
  - ii. People living in highly endemic malaria regions develop some degree of protection to malaria parasites but lose this immunity when transmission decreases.
  - iii. Both *Taenia solium* and *Ascaris lumbricoides* have bodies that are long and segmented.
  - iv. Merozoites are stages resultant in development of *Isospora belli*, *Cryptosporidium parvum*, *Toxoplasma gondii* and Plasmodia parasites
  - v. Both *Fasciola hepatica* and *Fasciolopsis buski* infections may be acquired through the ingestion of eggs in watercress

## QUESTION 2

- a. Parasites do not produce the same degree of damage to the hosts. List **FOUR** factors that determine the degree of damage a parasite may elicit on its host. (4)
- b. Describe the pathogenesis caused by the following parasites to result in the symptoms shown against each.
  - i. *Giardia lamblia* – acute diarrhoea (3)
  - ii. *Entamoeba histolytica*– abscesses (3)
  - iii. *Plasmodium falciparum* – anaemia (3)
  - iv. *Plasmodium falciparum* – cerebral anaemia (3)
  - v. *Ancylostoma duodenale* - anaemia (3)
- c. During diagnosis of parasitic infections, xenodiagnosis or serologic tests are used.
  - i. Explain the process involved during xenodiagnosis. (2)
  - ii. What is the disadvantage of xenodiagnosis as a tool to determine infection of parasites? (2)
  - iii. What limitations do healthcare workers face during the use of serologic tests to confirm infection with parasitic infections during field studies? (2)

[25 marks]

## QUESTION 3

- a. During microscopic diagnosis of malaria infected patients, both thick and thin blood smears are often prepared for staining and reading. Thin smears are used to identify the infecting species while thick smears are merely used to determine the presence of parasites inside infected red blood cells.
  - i. Explain why thin smears are not good for determining the presence of parasites inside red blood cells? (2)
  - ii. Explain why thick smears are not suitable for determining the infecting malaria parasite species? (2)
- b. Swaziland is one of the countries aiming to eliminate malaria within the next 3 years. Therefore, confirmation of a single case is reportable and mandates the initiation of a surveillance process to prevent spread of parasites introduced from endemic countries.

Describe TWO surveillance processes that the National Malaria Control Programme conducts following laboratory confirmation of a malaria infected patient.

(4)

- c. The World Health Organisation recommends use of artemisinin-based combination therapies (ACTs) for treating malaria and a single dose of 0.25mg of Primaquine among countries aiming to eliminate malaria.
- i. What is the importance of using ACTs to treat patients in low transmission areas aiming to eliminate malaria? (4)
  - ii. Name the ACT described in the current treatment policy in Swaziland. (2)
  - iii. What is the importance of including the Primaquine in the treatment of patients? (2)
- d. In addition to the initiatives above, Swaziland promotes the uptake of chemoprophylaxis among residents visiting malaria endemic areas to prevent re-introduction of parasites in areas where parasites have already been eliminated.
- i. Name TWO drugs that are recommended in Swaziland for provision of prophylaxis among individuals intending to travel to malaria endemic countries? (2)
  - ii. What advantages is provided by having the two drugs for chemoprophylaxis instead of having just one? (2)
- e. Following achievement of malaria elimination in Swaziland, efforts to maintain low vector populations will still be important. Describe THREE activities the country may conduct to maintain low mosquito vector populations in the country. (5)

[25 marks]

#### QUESTION 4

- a. Some helminthes are haemaphroditic while others have dioecious life cycles. Explain the difference between hermaphroditic and dioecious life cycles. (2)
- b. Examine each of the helminth parasites listed below and state which ones are hermaphroditic and which ones are dioecious. (5)
- i. *Schistosoma mansoni*
  - ii. *Necator americanus*
  - iii. *Fasciola hepatica*
  - iv. *Taenia saginata*
  - v. *Enterobius vermicularis*
- c. Digenean trematodes have life cycles that involve two intermediate hosts.
- i. Describe briefly the general life cycle of Digenean parasites. (3)
  - ii. Name two intermediate hosts in which Digenean life cycles occur. (2)
  - iii. Discuss TWO major differences between the life cycles of other Digeneans and the Schistosomes. (4)
  - iv. Name one drug commonly used to treat all infections with Digenean parasites. (1)
- d. Control of Digenean parasites may be partly achieved by instituting measures with long term positive results. Discuss community measures you may include in your strategy to reduce incidence of Digenean infections with long term results. (8)

[25 marks]

**QUESTION 5**

- a. Name the sites in the body of man where adults of the following worm infections are likely to reside. (5)
- Schistosoma mansoni*
  - Trichuris trichiura*
  - Enterobius vermicularis*
  - Ascaris lumbricoides*
  - Necator americanus*
- b. Untreated infection with *Trichuris trichiura* results to iron deficiency anaemia and rectal prolapse and appendicitis.
- What causes iron deficiency anaemia in *T. trichiura* infection. (2)
  - Explain the cause of rectal prolapse. (2)
  - What is the cause of appendicitis? (2)
- c. Children infected with *Enterobius vermicularis* results in perianal pruritus and eczematous skin lesions.
- What causes perianal pruritus? (2)
  - What causes eczematous skin lesions? (2)
  - List two ways a child may acquire infection with enterobiasis. (2)
  - Describe the method employed in the laboratory to confirm infection with *Enterobius vermicularis*. (3)
  - List FIVE measures you would suggest to reduce infection with *Enterobius vermicularis* in a family of several children. (5)

**[25 marks]****QUESTION 6**

- a. A survey conducted among school-going children in Swaziland in July 2015 showed that the prevalence rate of *Ascaris lumbricoides* was 4.44%.
- Explain how you think these children acquired infection with *Ascaris lumbricoides*. (2)
  - Briefly describe the method that was used to confirm infection among the children and to estimate the degree of infection. (3)
  - The country conducted mass drug administration to eliminate ascariasis among the children. What limitations are likely to retard elimination of ascariasis through this method? (2)
  - What drug do you think was administered to the children during the mass drug administration? (1)
  - Suggest THREE other interventions that may be implemented at community level in order to accelerate efforts to eliminate ascariasis. (6)
- b. Mass drug administration interventions also included administration of drugs to eliminate schistosomiasis which was found to be high among school-going children in Swaziland.
- Describe briefly what symptoms suggest that the children are infected with *Schistosoma haematobium*. (2)
  - What drug do you think was administered to the children to eliminate schistosomiasis during the mass drug administration exercise? (1)

- iii. Describe FOUR factors that you think might have contributed to high schistosomiasis prevalence among the children.

(8)

**[25 marks]**