



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

DEGREE IN BACHELOR OF SCIENCE IN NURSING AND  
MIDWIFERY

**MAIN EXAMINATION PAPER MAY 2017**

TITLE OF PAPER : INTRODUCTION TO PARASITOLOGY

COURSE CODE : GNS 104

DURATION : 2 HOURS

MARKS : 100

INSTRUCTIONS :

READ THE QUESTIONS & INSTRUCTIONS CAREFULLY

: **QUESTION ONE IS COMPULSORY, THEN ANSWER ANY OTHER THREE QUESTIONS**

: EACH QUESTION **CARRIES 25** MARKS.

: WRITE NEATLY & CLEARLY

: NO PAPER SHOULD BE BROUGHT INTO 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 students must answer this question]**

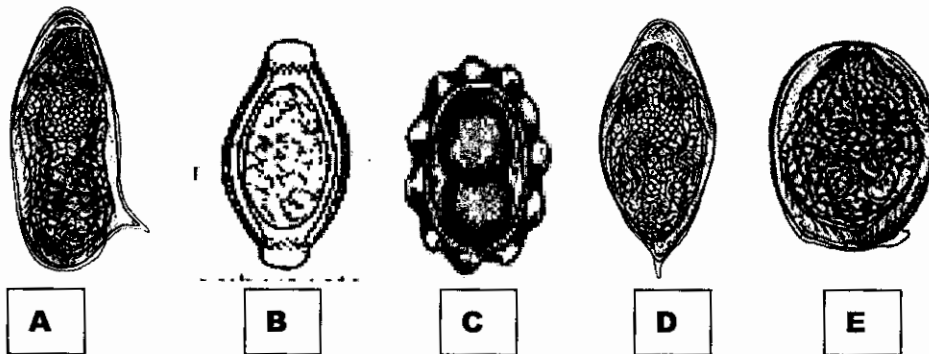
a. **MULTIPLE CHOICE:** Indicate your response to the items in this question by writing down the letter corresponding to your chosen answer. (20)

i. A laboratory technologist analyses stool to determine the parasite infecting a patient with acute diarrhoea. He identifies the following parasite:



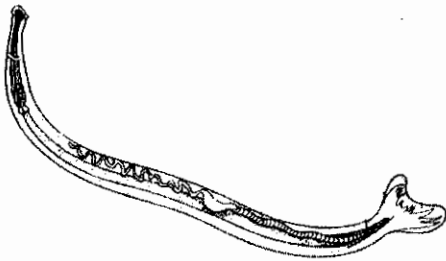
The laboratory technologist is likely to conclude that the patient is infected with:

- A. *Entamoeba histolytica*
  - B. *Giardia lamblia*
  - C. *Balantidium coli*
  - D. *Isospora belli*
  - E. *Toxoplasma gondii*
- ii. Which one of the parasites below may be transmitted to the foetus transplacentally?
- A. *Entamoeba histolytica*
  - B. *Giardia lamblia*
  - C. *Toxoplasma gondii*
  - D. *Ascaris lumbricoides*
  - E. *Necator americanus*
- iii. Which one of the eggs below is likely to be recovered from a patient infected with *Schistosoma haematobium*?



- iv. Which one of the malaria parasites below causes disease in both humans and animals?
- A. *Plasmodium falciparum*
  - B. *Plasmodium knowlesi*
  - C. *Plasmodium ovale*
  - D. *Plasmodium vivax*
  - E. *Plasmodium malariae*

- v. Local transmission of malaria has decreased significantly in the last decade in Swaziland. The measures that have been used by the National Malaria Control Programme to cause the decrease include all of the following except:
- A. Identification of breeding sites of malaria vectors and addition of larvicidal chemicals to destroy young vector stages and reduce mosquito populations
  - B. Treatment of infected with effective antimalarial drugs to remove the source of infection for other susceptible hosts
  - C. Introduction of rapid diagnostic tests and their use to determine infection among all fever cases
  - D. Initiation of a reporting and surveillance programme to identify asymptomatic parasite carriers through reactive case detection
  - E. Conducting indoor residual sprays annually in more than 80% of households in endemic areas of the country
- vi. A community is found to have high prevalence of *Toxoplasma gondii* infections. Which one of the following methods is likely to reduce *Toxoplasma gondii* infections in the community?
- A. Prevention of immunosuppression through reduction of unprotected sexual intercourse and increased access and use of condoms
  - B. Initiation of schemes to construct toilets and deposit all human faecal material to reduce environmental contamination with oocysts
  - C. Promote thorough washing of vegetables, salads and fruits with running water to remove oocysts and prevent their ingestion
  - D. Testing and treatment of women during early pregnancy
  - E. Screening all donated blood for *Toxoplasma gondii* parasites before transfusion to the recipients
- vii. The following parasite was removed from the intestines of an infected 10-year old girl.



- Which one of the statements below is TRUE about the worm?
- A. The worm is likely to lead to malnutrition in the girl due to its size and the amount of nutrients it absorbs
  - B. The worm is likely to cause anaemia in the girl due the amount of blood it absorbs
  - C. The worm is a female hookworm
  - D. The worm migrates to the perianal area of the girl at night or when the girl is resting and cause itchiness

- E. The worm is likely to lead to obstruction of the girl's intestines if repeated infection occurs

viii. Several of the eggs shown below were recovered from the faeces of an infected 7-year old girl.



Which one of the following conditions is the attending healthcare worker likely to assess on the 7-year old girl following recovery of large numbers these eggs.

- A. malnutrition  
B. dehydration  
C. anaemia  
D. hypoalbuminemia  
E. Both C and D
- ix. A 4-year old girl shows symptoms of restlessness at night leading to insomnia and she frequently scratches the peri-anal area. Upon examination of the peri-anal area, the mother of the girl finds that the skin folds contain eczematous skin lesions. Following this discovery,
- A. The girl's faeces should be examined for *Ascaris lumbricoides* eggs  
B. The girl's faeces should be examined for hookworm eggs  
C. The peri-anal skin folds of the girl should be examined in the morning for eggs of *Enterobius vermicularis*  
D. The girl's faeces should be examined for *Trichuristrichiura* eggs  
E. The girl should be examined for malnutrition
- x. Cysticercosis in humans is associated with:
- A. *Echinococcusgranulosus*  
B. *Taenia saginata*  
C. *Dyphylobothriumlatum*  
D. *Taenia solium*  
E. *Trichinella spiralis*
- b. Write **T** (for true) or **F** (for false) to indicate your response to each of the items below: (5)
- i. A paratenic host is one that carries the parasite and provides for its development from one stage to another
- ii. *Trypanosoma rhodesiense* is a multi-cellular flagellate protozoan parasite of the bloodstream
- iii. Five species of Plasmodia cause malaria in humans.
- iv. Rates of infection with schistosomiasis are highest in countries that practice agriculture and among poor communities of the tropics
- v. *Ascaris lumbricoides* infections always result in temporary symptoms in the lungs

[25 marks]

**QUESTION 2**

- a. A community health worker conducts stool examination for all children in community X with a population of 1 400 children to determine the prevalence of amoebic infections and the appearance of symptoms. He establishes the following information and displays it on a table of percentages.

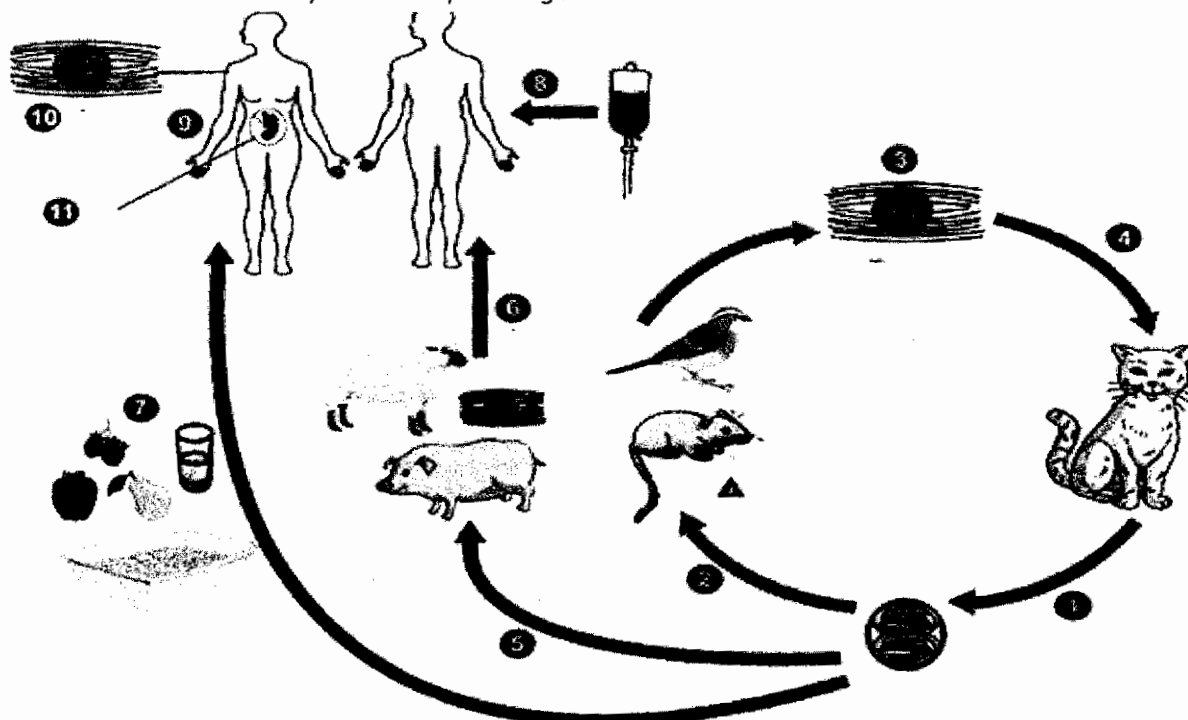
Parasite	Dysenteric with blood and mucus	Non-dysenteric	TOTAL
<i>Entamoeba histolytica</i>	13	71	84
<i>Entamoeba coli</i>	0	596	596
<i>Entamoeba moshkovkii</i>	0	12	12
<i>Endolimax nana</i>	1	31	32
No parasites	1	675	676

- i. Explain how the children are likely to have acquired infection with these parasites. (2)
  - ii. Why do you think some children were dysenteric and some non-dysenteric among those infected with *Entamoeba histolytica*? (2)
  - iii. Which of the two parasites are likely to cause symptomatic disease in the children? (2)
  - iv. Write down TWO pieces of information that the community health worker is likely to deduce from those who were infected with non-pathogenic species. (3)
- b. The health care worker also performed serologic tests among the group of children infected with *Entamoeba histolytica*. He finds that 12% of those with dysenteric disease were positive for antibodies specific to *Entamoeba histolytica* and only 1% was positive among those with non-dysenteric disease. Explain why the cause of the difference among dysenteric and non-dysenteric patients with regard to expression of antibodies specific to *Entamoeba histolytica*. (3)
- c. What complications are likely to occur among children that are immunocompromised due to co-infection with untreated human immunodeficiency virus (HIV)? (3)
- d. Name one drug the community health worker is likely to prescribe to the children with non-dysenteric amoebiasis and one drug she is likely to use to treat the children with dysenteric stool. (2)
- e. What other consideration do you think should be made for those patients with dysentery accompanied by mucus and blood? (2)
- f. Discuss THREE interventions you may use in the community to reduce incidence of amoebic dysentery. (6)

**[25 marks]**

**QUESTION 3**

a. Shown below is the life cycle of *Toxoplasma gondii*.



- i. Describe the routes 6, 7, 8 and 9 through which humans may acquire infection. (8)
  - ii. Explain the process in 4 which describes the route through which cats acquire infection. (2)
  - iii. Describe one way the infection of cats through route 4 may be prevented. (2)
  - iv. Describe how human infections through routes 6, 7, and 8 may be prevented. (6)
- b. What is the essential difference in the life cycles of Coccidian parasites such as *Cryptosporidium parvum*, *Isospora belli* and that of *Toxoplasma gondii*. (2)
  - c. Name the drug usually prescribed to patients with a low CD4 cell count and infection with the Human immunodeficiency virus (HIV) to prevent symptoms of Coccidian parasites occurring. (1)
  - d. Describe TWO important community initiatives you may recommend to reduce incidence of *Cryptosporidium parvum*. (4)

[25 marks]

**QUESTION 4**

- a. Describe a method by which patients commonly acquire infection with malaria parasites. (2)
- b. Health care workers in resource limited settings sometimes have to prepare thin and thick blood smears for onward transmission to the laboratory for staining and reading.
  - i. Why is important to prepare thick smears? (3)
  - ii. Why is it important to prepare thin smears? (2)
  - iii. During preparation of thin and thick smears, the health care worker is cautioned not to squeeze the site too hard. What problems arise when the site is squeezed too hard? (2)

- iv. Following confirmation of an infected patient, explain the reporting process that the health care worker has to follow in Swaziland. (2)
- c. The current policy for the treatment for uncomplicated malaria in Swaziland involves 3 doses of artemether-lumefantrine + a single dose of 0.25mg Primaquine. Explain the importance of the component drugs in the treatment regimen.
  - i. Artemether (6)
  - ii. Lumefantrine (4)
  - iii. Primaquine (2)
- d. Describe a method by which travellers to endemic areas may prevent development of malaria even when they are exposed to infective bites during their stay in the endemic areas. (2)

[25 marks]

**QUESTION 5**

- a. List THREE morphological differences between members of the Class Cestoda and that of the Class Nematoda. (3)
- b. Human infections with helminths occur mainly in two ways. Using suitable examples, explain the two ways. (4)
- c. There is one major difference in the life cycle of schistosomiasis and that of the other flukes. Explain this difference. (3)
- d. The National Bilharzia and Worm Control Programme conducted a national survey in 2015 which revealed that the Lubombo plateau had the highest prevalence of *Schistosoma haematobium*. Suppose you have to lead an investigation to identify the risk factors that are responsible for the high transmission of schistosomiasis on the Lubombo plateau. List the factors you are likely to investigate. (8)
- e. Given that there is high prevalence rates of schistosomiasis in the Lubombo plateau, suppose you have to conduct mass drug administration to reduce the prevalence.
  - i. Name the drug you would use during the mass drug administration. (1)
  - ii. Explain how you think mass drug administration may contribute to reduced incidence of schistosomiasis infections. (2)
- f. Following partial success of biological control methods instituted in some countries in Africa such as Ethiopia, possible use of this method was investigated along the Lomati river in Swaziland.
  - i. Describe the biological method that was investigated along the Lomatiriver in Swaziland. (2)
  - ii. Explain the processes that led to the discovery of this method as being molluscicidal prior to its adoption in countries like Ethiopia. (2)

[25 marks]

**QUESTION 6**

- a. Humans infected with *Trichuris trichiura* result in petechial and sub-epithelial haemorrhages and may cause prolapses of the rectum or anaemia.
- i. What is the cause of the petechial and sub-epithelial haemorrhages? (2)
  - ii. What is the cause of the prolapses of the rectum? (2)
  - iii. What is the cause of anaemia? (4)
- b. List FOUR strategies you may recommend for the control of trichuriasis. (6)
- c. Children infected with *Trichuris trichiura* are commonly also infected with *Ascaris lumbricoides*.
- i. Why do the two worms commonly occur in the same host? (2)
  - ii. Children infected with *Ascaris lumbricoides* sometimes show symptoms that include cough, wheezing and rales, as well as jaundice. Explain the pathogenesis that lead to: cough, wheezing and rales and jaundice (4)
  - iii. What method of diagnosis may be used to confirm co-infection of children with *Trichuris trichiura* and *Ascaris lumbricoides*? (3)
  - iv. Control of high prevalence of trichuriasis and ascariasis in Swaziland involved the mass drug administration strategy. Explain what mass drug administration is and also mention two drugs you may recommend for use during the mass drug administration strategy to control the two infections. (2)

**[25 marks]**