



# UNIVERSITY OF SWAZILAND

Faculty of Health Sciences  
Department of Environmental Health Science

## MAIN EXAMINATION PAPER MAY 2016

TITLE OF PAPER	:	INTRODUCTION TO PARASITOLOGY
COURSE CODE	:	GNS 104
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER <u>QUESTION 1 AND ANY THREE OTHER</u> QUESTIONS
	:	EACH QUESTION <u>CARRIES 25</u> 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 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. Which of the parasites below cause severe disease or death in infected hosts through dehydration?
- Giardia lamblia* and *Plasmodium falciparum*
  - Giardia lamblia* and *Cryptosporidium parvum*
  - Necator americanus* and *Balantidium coli*
  - Trichuris trichiura* and *Entamoeba histolytica*
  - Entamoeba histolytica* and *Toxoplasma gondii*
- ii. A parasite is recovered from a host and then cultured in the laboratory to determine its reproductive cycle. The parasite is found to reproduce by both sexual and asexual methods. The parasite is likely to fall under the:
- Subphylum Sarcodina
  - Subphylum Ciliophora
  - Subphylum Mastigophora
  - Subphylum Sporozoa
  - More information is required to determine the subphylum to which the parasite falls
- iii. Shown below are the nuclei of amoebae that may be found in the bodies of man. Which one is from a pathogenic species?



A



B



C



D



E

- iv. Which one of the following *Plasmodium* life cycle stages must be ingested by a female *Anopheles* mosquito for the *Plasmodium* life cycle to continue in the mosquito?
- merozoites
  - schizonts
  - sporozoites
  - male and female gametocytes
  - trophozoites
- v. Which of the malaria parasites below results in malignant tertian malaria among infected humans?
- Plasmodium malariae*
  - Plasmodium vivax*

- C. *Plasmodium vivax* and *Plasmodium ovale*
- D. *Plasmodium falciparum*
- E. *Plasmodium knowlesi*

vi. Which of the statements about the parasite stages shown below is (are) true?



- A. The parasite stages are obligate intracellular stages of the enterocytes of a cat
  - B. The parasite stages were recovered from newly excreted faeces of a cat
  - C. The parasite stages were recovered from the tissues of an infected but immunocompetent human host
  - D. The parasite stages were recovered from the faeces of a cat voided a week earlier
  - E. The parasite stages are likely to have been recovered from the bloodstream of a recently infected human host
- vii. The parasites shown below were recovered from an infected boy. Which of the statements below about the parasites is (are) true?



- A. The parasites lay eggs in the capillaries of the urinary bladder
  - B. The parasites are commonly acquired through ingestion of metacercariae encysted in undercooked or raw meat
  - C. The parasites cause liver cirrhosis and enlargement among infected human hosts
  - D. Humans infected with these parasites produce blood in urine
  - E. These parasites are not endemic in Swaziland but occur in many countries in South East Asia
- viii. *Ascaris lumbricoides* is a nematode. Which one of the following characteristics is not associated with *A. lumbricoides*?
- A. The body of *A. lumbricoides* is unsegmented
  - B. *A. lumbricoides* possesses an alimentary canal and a body cavity
  - C. *A. lumbricoides* multiplies in the body of infected human hosts to result in large numbers of worms that cause malnutrition
  - D. *A. lumbricoides* males possess two copulatory organs known as spicules

- E. Adult *A. lumbricoides* remain in the small intestines and never escape to reside and produce eggs in other organs
- ix. The infective stage of *Ancylostoma duodenale* is the:
- egg
  - trophozoite
  - sporozoite
  - metacercaria
  - filariform larva
- x. Infection with *Faciola hepatica* commonly occurs through:
- ingestion of metacercariae encysted in the watercress
  - penetration of skin by cercariae when humans come in direct contact with infested water
  - ingestion of metacercariae encysted in undercooked freshwater crabs or crayfish
  - ingestion of eggs in contaminated water or food
  - ingestion of metacercariae encysted in undercooked fish
- b. Write **T** (for true) or **F** (for false) on each of the statements below: (5)
- A facultative parasite is an organism that can be parasitic but does not have to live as a parasite all the time.
  - Giardia lamblia* and *Trichomonas vaginalis* trophozoites have undulating membranes on their bodies hence their classification under the same subphylum Masigophora.
  - Only *Isospora belli*, *Cryptosporidium parvum* and *Toxoplasma gondii* produce severe symptoms among AIDS patients
  - Plasmodium knowlesi* is morphologically similar to *P. malariae*
  - Infection with helminthes occurs through ingestion of eggs or larvae or through penetration of the skin of human hosts by larval stages

[25 marks]

**QUESTION 2**

- a. *Giardia lamblia* exist in two stages. Name the two stages. (2)
- b. *Giardia lamblia* is a protozoan parasite. Protozoan parasites multiply in the bodies of their hosts resulting in an exponential increase in numbers that cause severe, acute diarrhoea among infected hosts.
- Describe the method by which people become infected with giardiasis. (2)
  - What method of reproduction is responsible for increase in trophozoites of *Giardia lamblia*? (1)
  - Describe the pathogenesis responsible for the severe diarrhoea in individuals infected with *Giardia lamblia*. (4)
  - Discuss THREE community initiatives you are likely to recommend to reduce incidence of giardiasis. (6)
- c. *Entamoeba histolytica* sometimes causes symptoms similar to those caused by *Giardia lamblia* in infected hosts.

- i. What characteristics of the symptoms caused by *Entamoeba histolytica* would be useful in differentiating them from those of giardiasis? (2)
- ii. What method of diagnosis may be used to confirm infection with *Entamoeba histolytica*? (3)
- iii. Describe the method by which *Entamoeba histolytica* parasites cause diseases in infected hosts. (4)
- iv. Name one recommended by the World Health Organisation for the treatment of uncomplicated amoebiasis. (1)

[25 marks]

### QUESTION 3

- a. Multiplication of malaria parasites occurs at two types of cells in the human body. Name the two types of cells. (2)
- b. Sexual reproduction of malaria parasites occurs in the definitive host.
  - i. Name the definitive host in which sexual reproduction of malaria parasites occurs. (1)
  - ii. Describe the process of sexual reproduction of malaria parasites. (3)
- c. Malaria treatment policies of many national malaria control programmes have relied on chloroquine for many years until recently.
  - i. Why has the treatment policy for malaria infections been changed from chloroquine? (2)
  - ii. Name two antimalarial drugs currently recommended by the World Health Organisation for the treatment of uncomplicated malaria. (2)
  - iii. What advantages does the use of the antimalarial drugs mentioned in (ii) above have for the treatment of uncomplicated malaria? (6)
  - iv. Why are rapid diagnostic tests (RDTs) recommended alongside the use of the antimalarial drugs listed in (ii) above? (4)
- d. Malaria control often engage long-lasting efforts aimed at reducing mosquito vector populations. Discuss THREE methods that may be adopted by malaria control programmes to reduce or prevent breeding of mosquito vectors. (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 Digean 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. A one-year old child comes to a health facility with complaints of skin rash, hepatomegaly, retinochoroiditis, pneumonitis, jaundice, convulsions, hydrocephalus, intracranial calcifications and mental retardation, some of which were observed from birth.
  - i. Describe a preliminary serologic test that would suggest the infecting parasite. (2)
  - ii. What laboratory procedure would you suggest to confirm the infecting species. (3)
  - iii. List THREE possible ways by which the child may have acquired the infection. (6)
  - iv. Name the drug(s) you would suggest for successful treatment of this child. (2)
  - v. Besides treating the infecting species, what other health condition would you suggest be established in order to adequately and effectively treat the child. (2)
  - vi. What measures would you suggest to the parents of the child to prevent other children acquiring infection with this parasite in the future. (4)
- b. A pregnant woman is found infected with *Trichomonas vaginalis*. Further laboratory investigations confirm that the foetus is infected with the Human Immunodeficiency Virus (HIV).
  - i. What symptoms may appear in the newborn, suggest that the foetus is female, to suggest infection with the parasite? (2)
  - ii. What effect would co-infection with HIV have on the child? (2)
  - iii. Discuss a management strategy you would suggest for the newborn who is found infected with both *Trichomonas vaginalis* and HIV? (2)

[25 marks]

**QUESTION 6**

- a. Hookworm infections are more common in the Lowveld of Swaziland than in the Highveld. What circumstances are responsible for this difference? (2)
- b. Explain how a laboratory technologist may differentiate the following parasites using structural characteristics:
  - i. *Ancylostoma duodenale* and *Necator americanus* adult worms (2)
  - ii. Rhabditiform larva of Hooworm from that of *Strongyloides stercoralis* (2)
- c. Describe TWO ways humans may acquire infection with hookworm parasites. (2)
- d. Hookworm symptoms involve pulmonary stage symptoms and anaemia. Describe the symptoms associated with pulmonary involvement and explain the cause of pulmonary symptoms and anaemia.

- i. Pulmonary symptoms (4)
- ii. Anaemia (4)
- e. Explain a method that may be used to confirm infection with hookworm in the laboratory. (2)
- f. Name one drug commonly used to successfully treat hookworm infections in humans. (1)
- g. Describe THREE methods you would recommend to a community for prevention of human infections. (6)

**[25 marks]**