



UNIVERSITY OF SWAZILAND

Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

RE-SIT EXAMINATION PAPER JULY 2017

- TITLE OF PAPER : INTRODUCTION TO PARASITOLOGY
- COURSE CODE : EHS 107
- 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. The key morphological features used to differentiate *Giardia lamblia* from *Entamoeba histolytica* is that:

- A. *Giardia lamblia* possesses flagella for movement while *Entamoeba histolytica* uses pseudopodia for locomotion
- B. *Giardia lamblia* is a parasite that remains in the gastro-intestinal tract while *Entamoeba histolytica* may invade the intestinal mucosa and enter the bloodstream
- C. *Giardia lamblia* reproduces only by binary fission while *Entamoeba histolytica* reproduces by both sexually and asexually (binary fission)
- D. *Entamoeba histolytica* is transmitted through the ingestion of cysts in faecally contaminated water or food while *Giardia lamblia* is transmitted differently
- E. *Giardia lamblia* causes acute diarrhoea without mucous and blood while *Entamoeba histolytica* causes dysentery with mucous and blood

ii. Which one of the following statements about *Isospora belli* IS NOT true?

- A. *Isospora belli* has no apparatus for locomotion
- B. *Isospora belli* reproduces both by sexual and asexual methods inside enterocytes of infected hosts
- C. *Isospora belli* may cause acute, watery diarrhoea among infected patients
- D. *Isospora belli* symptoms only show in patients with concurrent immunosuppression
- E. *Isospora belli* results in production of only thick-walled oocysts during reproduction

iii. Shown below are nuclei of different amoebae recovered from the faeces of an infected host.



Which of the nuclei is from *Entamoeba histolytica*?

iv. Which one of the following statements describes a method by which *Trichomonas vaginalis* causes symptoms or pathogenesis in infected human hosts?

- A. Release of waste materials that are toxic to the host
- B. production of enzymes that digest or causing lysis of tissue material
- C. physical or mechanical damage of tissue
- D. immunosuppression
- E. inflammatory response at points of attachment to urogenital tract

v. An Environmental Health Officer (EHO) delivers a health talk to a community in order to source participation in preventing breeding of *Anopheles* mosquitoes. Which one of the following interventions is the EHO likely to suggest as a community strategy?

- A. Crushing of cans and artificial containers to prevent *Anopheles* breeding

- B. Draining of ponds, water paddles, slow-moving streams, and swamps
- C. Reduction of water habitats polluted by pesticides applied to kill pests
- D. Slicing of old tyres to prevent water collection inside which *Anopheles* mosquitoes would breed
- E. Conducting indoor residual sprays using DDT or pyrethroids

vi. The parasite shown below was recovered from an infected human host.



From what medium was the parasite likely to have been recovered?

- A. Urine
- B. Blood
- C. Sputum
- D. Faeces
- E. Lymph fluid

vii. The egg stage shown below was recovered from the faeces of a child. Name the species of the parasite that produced the egg.



- A. *Necator americanus*
- B. *Schistosoma japonicum*
- C. *Ascaris lumbricoides*
- D. *Trichuris trichiura*
- E. *Enterobius vermicularis*

viii. The key morphological difference between adults of *Fasciola hepatica* and *Trichuris trichiura* is that:

- A. The body of *Fasciola hepatica* is dorso-ventrally flattened while *Trichuris trichiura* has a cylindrical body
- B. *Fasciola hepatica* has an unsegmented body while the body of *Trichuris trichiura* is segmented
- C. *Fasciola hepatica* has a segmented body while the body of *Trichuris trichiura* is unsegmented
- D. *Fasciola hepatica* have separate sexes (dioecious) while *Trichuris trichiura* have male and female reproductive organs in the same worm (hermaphrodite)
- E. Both A and C

ix. The egg shown below is recovered from a patient.



The attending medical officer is likely to conclude that the patient is infected with:

- A. *Ascaris lumbricoides*
 - B. *Schistosoma haematobium*
 - C. *Schistosoma japonicum*
 - D. *Schistosoma mansoni*
 - E. *Ancylostomaduodenale*
- x. Children are sometimes found with *Taenia solium* adult worm infections, increasing the danger of infection with *Cysticercuscellulosae* larval stages which is more dangerous. Which one of the following statements describes the route of infection of children with *Taenia solium* worms?
- A. Ingestion of cysticerci in raw or partially cooked meat of infected pigs
 - B. Ingestion of cysticerci in raw or partially cooked meat of cattle
 - C. Ingestion of eggs of *Taenia solium* in contaminated water, food or from hands
 - D. Ingestion of metacercariae in raw or undercooked meat of aquatic animals
 - E. Both A and C
- b. **TRUE OR FALSE:** Write **T** (for True) or **F** (for False) against each of the statements below to indicate your response. (5)
- i. All parasitic worms belonging to the Class Trematoda consist of unsegmented bodies.
 - ii. The predominant species of malaria parasite responsible for disease in all endemic countries in the world is *Plasmodium falciparum*.
 - iii. Rapid Diagnostic Tests (RDTs) are used in many facilities to confirm infection with malaria parasites because they are more sensitive than microscopy.
 - iv. *Ascaris lumbricoides* worms are unlikely to increase the number of worms in the intestines of an infected host if exposure is single.
 - v. *Schistosoma mansoni* require two intermediate hosts in their life cycle but *Fasciolopsis buski* require only one

[25 marks]

QUESTION 2

- a. Giardiasis commonly results in sudden onset of watery diarrhoea with no blood or mucous yet patients infected with *Entamoeba histolytica* commonly pass stools containing blood and mucous.
- Why is blood and mucus rare in the faeces of patients of giardiasis yet likely to occur in patients infected with *Entamoeba histolytica*? (2)
 - Describe the pathogenesis that results in acute diarrhoea among children infected with large numbers of *Giardia lamblia*? (5)
 - Explain how children acquire infection with *Giardia lamblia*. (2)
 - Giardiasis is sometimes referred to as "traveller's diarrhoea". Why is the disease called so? (4)
 - Name one drug recommended by the World Health Organisation for the successful treatment of children infected with both giardiasis and amoebic dysentery. (1)
- b. *Entamoeba histolytica* cysts are commonly found in faeces of humans infected with *Giardia lamblia*.
- Explain why the two parasites are commonly found infecting the same host? (3)
 - Explain why trophozoites are likely to be seen in the stool of children infected with *Giardia lamblia* than in the stool of those infected with *Entamoeba histolytica*. (2)
 - Discuss three key strategies that the department of Environmental Health may initiate at a community with high incidence of giardiasis and amoebic dysentery to reduce incidence of both diseases. (6)

[25 marks]

QUESTION 3

The parasites shown below were identified by microscopy inside the red blood cells of a woman in the third trimester of pregnancy by a laboratory technologist working at Good Shepherd Hospital.



- i ii iii iv
- Name the stages marked i to iv. (4)
 - What parasite species may have infected the patient? Give a reason for your answer. (2)
 - Why was it important for the attending medical officer to establish that the patient was in the third trimester of pregnancy? (3)

- d. Give THREE reasons why this species of malaria parasite is more deadly than other species. (6)
- e. The attending medical officer prescribes quinine and a single dose of 0.25mg by weight of Primaquine.
- i. Briefly explain why the medical officer prescribed quinine and not artemether-lumefantrine to the woman? (2)
 - ii. What is the purpose of including 0.25mg Primaquine in the treatment regimen? (2)
- f. The medical officer issues the pregnant woman with an insecticide treated net and advices that she sleeps under the net with the child in order to enhance protection from repeated infection with malaria. How does the insecticide treated net protect the child from malaria? (4)
- g. Pregnant women are not protected with sulphadoxine-pyremethamine in Swaziland. Why pregnant women are not protected using intermittent prophylaxis with sulphadoxine-pyrimethamine as soon as it was discovered that they are pregnant in Swaziland? (2)

[25 marks]

QUESTION 4

- a. The Subclass Coccidia consist of organisms that lack any apparatus of movement. Explain why *Toxoplasma gondii* is sometimes not classified with this group despite that *T. gondii* also has no apparatus for locomotion. (2)
- b. Explain why *T. gondii* is often not classified in the same Class as Plasmodia despite that both parasites lack apparatus for locomotion. (2)
- c. *Toxoplasma gondii* parasites exist in two stages inside the body of infected human hosts. Name the two stages and the condition of the hosts in which each stage occurs. (4)
- d. Explain why it is more important to prevent toxoplasmosis infection in pregnant women than in non-pregnant women. (3)
- e. List FOUR ways by which humans acquire infection with *Toxoplasma gondii*. (6)
- f. Two drugs are used to successfully treat humans infected with toxoplasmosis. Name the drugs. (2)
- g. Describe THREE interventions you may initiate to reduce infections and symptomatic toxoplasmosis in a community. (6)

[25 marks]

QUESTION 5

- a. Mention three differences between members of the Subphyla Platyhelminthes and Nematelminthes. (6)

- b. Write down one second intermediate host on which the metacercariae of the following trematodes encyst:
- i. *Fasciolopsis buski* (1)
 - ii. *Clonorchis sinensis* (1)
 - iii. *Fasciolopsis buski* (1)
 - iv. *Paragonimus westermanni* (1)
- c. Name one drug that is commonly used to successfully treat all the trematodes. (1)
- d. i. Explain spurious fascioliasis. (2)
- ii. Explain how spurious fascioliasis affect diagnosis and also mention how the problem may be avoided. (2)
- e. Patients that are heavily infected with *Fasciola hepatica* sometimes show up with jaundice. Explain the cause of jaundice. (2)
- f. Patients infected with *Paragonimus westermanni* often show symptoms that include chronic or sometimes paroxysmal cough and haemoptysis. Explain the pathogenesis responsible for these symptoms. (4)
- g. Discuss two methods that may be used to prevent or reduce incidence of fascioliasis at a community that is endemic for the disease. (4)

[25 marks]

QUESTION 6

- a. Give FOUR characteristics of the members of the Class Nematoda that distinguish them from other members of the Sub-Kingdom Metazoa. (4)
- b. Discuss the typical composition of the reproductive system of members of the Class Nematoda, showing clear contrasting features with other members of other Metazoan parasites. (4)
- c. A typical nematode, *Ascaris lumbricoides*, is a common parasite of children in tropical and sub-tropical areas of rural sub-Saharan Africa.
 - i. Explain why *Ascaris lumbricoides* infections are more common in children than adults? (4)
 - ii. Explain why *Ascaris lumbricoides* is common in tropical and sub-tropical climates as opposed to temperate climates? (2)
 - iii. Give TWO reasons why *Ascaris lumbricoides* is more common in rural areas in sub-Saharan Africa. (4)
- d. Explain what causes tropical pulmonary pneumonia (Löffler's syndrome) and cyanosis (blueness of skin) among children infected with *Ascaris lumbricoides*. (3)
- e. High prevalence rates of *Ascaris lumbricoides* among children may be reduced through mass treatment or chemotherapy. Explain how mass treatment is effective in reducing prevalence of infection among children. (4)

[25 marks]