

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

MAIN EXAMINATION PAPER – MAY, 2015

TITLE OF PAPER : INTRODUCTION TO PARASITOLOGY
COURSE CODE : HSC 104
TIME : 2 HOURS
MARKS : 100

INSTRUCTIONS : ANSWER QUESTION 1 AND ANY THREE QUESTIONS

: EACH QUESTION CARRIES 25 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

This question paper consists of 7 printed pages including this one

QUESTION 1

a. Write the letter corresponding to your chosen answer among those suggested for each item in this question. (20)

i. Which one of the parasites below results in Vitamin B₁₂ deficiency in hosts with heavily infection?

- A. *Entamoeba histolytica*
- B. *Balantidium coli*
- C. *Giardia lamblia*
- D. *Isospora belli*
- E. *Cryptosporidium parvum*

ii. A parasite is recovered from an adult patient is found to have the following characteristics:

- Reproduces by both sexual and asexual methods in different hosts
- Has no apparatus for locomotion or movement

The parasite is likely to be:

- A. *Plasmodium falciparum*
- B. *Toxoplasma gondii*
- C. *Cryptosporidium parvum*
- D. Either *Plasmodium falciparum* or *Toxoplasma gondii*
- E. Either *Plasmodium falciparum* or *Cryptosporidium parvum*

iii. The parasite stages shown below were identified from the blood of an infected human host.



The person is likely to be infected with:

- A. *Plasmodium falciparum*
- B. *Plasmodium ovale*
- C. *Plasmodium vivax*
- D. *Plasmodium malariae*
- E. *Plasmodium knowlesi*

iv. Which one of the statements below about African trypanosomiasis is NOT true?

- A. People with the disease are infected when metacyclic trypomastigote stages of the parasite are injected into the bloodstream
- B. People infected with the disease always show a chancre, lymphadenitis, enlargement of lymph nodes, sensory abnormalities, delayed sensation to stimuli, frequent sleeping and emaciation
- C. Melarsoprol is used to effectively treat all infections involving the CNS.
- D. Elevated IgM levels indicate meningoencephalitic involvement

- E. Insecticide treated nets prevent human-fly contact thereby reducing incidence of disease
- v. Which one of the parasites below is likely to cause blockage of the bile duct leading to their rupture, jaundice and hepatomegaly in heavily infected patients?
- Fasciola hepatica*
 - Plasmodium falciparum*
 - Schistosoma mansoni*
 - Toxoplasma gondii*
 - Trypanosoma rhodesiense*
- vi. The drug of choice for successful treatment of pork tapeworm infections is:
- metronidazole
 - praziquantel
 - mebendazole
 - diethyl carbamazine (DEC)
 - albendazole
- vii. A researcher collects *Bulinus* species of snails from the edges of Lubovane dam in the Lubombo region of Swaziland in order to determine if the snails are infected with helminthes and therefore posing a danger to humans coming in contact with the dam water. Several cercariae similar to the one shown below are identified from the water.



The snails are likely to be infected with:

- Schistosoma haematobium*
- Schistosoma mansoni*
- Fasciola hepatica*
- Fasciolopsis buski*
- Taenia solium*

- vii. A laboratory technologist recovers the parasite below from the stool of an infected 11-year old child.



The child is likely to be suffering from:

- amoebiasis
- enterobiasis
- ascariasis
- trichuriasis
- hookworm infection

- viii. Which of the parasites below may be transmitted from one human host to another through the bite of an infected arthropod?
- Plasmodium vivax*
 - Trypanosoma rhodesiense*
 - Wuchereria bancrofti*
 - Onchocerca volvulus*
 - All of the above

- ix. A team of researchers employed by the National Bilharzia and Worm Control Programme in Swaziland identifies the egg below from the stool of a 13-year old boy.



The team is likely to conclude that the boy is infected with:

- Ascaris lumbricoides*
 - Ancylostoma duodenale*
 - Trichuris trichiura*
 - Taenia solium*
 - Fasciola hepatica*
- x. Infection with *Isospora belli* and *Crptosporidium parvum* in patients with low CD4 cell count results in profuse watery diarrhoea that often leads to death. Which of the statements above is a cause of the diarrhoea?
- Malabsorption of food
 - Destruction of absorptive cells at the tips of villi
 - Failure of water to be re-absorbed from the large intestines due to failure of the formation of an appropriate osmotic gradient between the bloodstream and the bowel contents
 - Increase in the secretion of Cl⁻
 - All of the above
- b. Write **T** (for true) or **F** (for false) as applied to each of the statements below: (5)
- The number of parasitic worms do not multiply inside the body of the human host but parasitic protozoa multiply and their number increase exponentially
 - Trichomonas foetus* may sometimes cause abortion in infected pregnant mothers
 - Nematodes (roundworms) consist of segmented and unsegmented members
 - Hookworms are minute worms that alternate between a parasitic existence and a free-living cycle
 - Microfilariae of *Wuchereria bancrofti*, the filarial that cause elephantiasis in humans, are identifiable by that possess terminal and sub-terminal nuclei.

[25 marks]

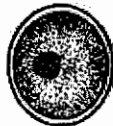
QUESTION 2

- a. What pathogeneses are associated with the symptoms identified below in patients acutely infected by each parasite?
- i. acute diarrhoea associated with giardiasis (3)
 - ii. discharge associated with trichomoniasis (2)
 - iii. amoebic ulcers (3)
- b. Explain how infections with ANY TWO of the three parasites listed in (a) may occur. (4)
- c. Name one drug that may be used to successfully treat acute infection with all three parasites. (1)
- d. Name the drug currently recommended by the World Health Organization for treating chronic amoebiasis. (1)
- e. Amoebiasis often results in extra-intestinal disease.
- i. Name three sites that are primarily involved during extra-intestinal amoebiasis. (3)
 - ii. Explain how *Entamoeba histolytica* trophozoites escape from the intestinal lumen to extra-intestinal tissues. (4)
- f. Discuss TWO community strategies you may initiate to reduce prevalence of both giardiasis and amoebiasis. (4)

[25 marks]**QUESTION 3**

Isospora belli and *Cryptosporidium parvum* are classified under the Subclass Coccidia.

- a. List three characteristics associated with members of the Subclass Coccidia. (3)
- b. Give One reason why *Toxoplasma gondii* is NOT classified under the Subclass Coccidia. (2)
- c. Serology tests to determine IgM titres are commonly used to determine *T. gondii* infection in pregnant mothers. Explain the importance of using IgM antibody titres. (3)
- d. During laboratory diagnosis of an infected human host, the oocyst stage of the parasite shown below was identified from the faeces of the host.



- Name the parasite and give a reason for your decision. (3)
- e. Name the drugs you may recommend to successfully treat each of the following parasitic infections: isosporiasis, cryptosporidiosis and toxoplasmosis. (4)
 - f. Describe TWO community strategies you may use to reduce incidence of Coccidian parasites. (4)
 - g. Describe THREE ways infection with *Toxoplasma gondii* may be prevented by an individual. (6)

[25 marks]

QUESTION 4

- a. The diagnosis of malaria has undergone advancement and improvement in the last decade with the development and introduction of rapid diagnostic tests (RDTs) alongside introduction artemisinin combination therapies (ACTs) for treatment of malaria.
- What improvements have been added by RDTs into microscopic diagnostic procedures for malaria? (4)
 - Discuss briefly the basic method of function and operation of RDTs. (4)
 - Name the ACT recommended for use alongside RDTs in Swaziland's malaria treatment policy. (1)
 - Why has the treatment policy in Swaziland switched from chloroquine to the ACT mentioned in (iii) above? (2)
- b. Malaria control has also resulted in vast reduction reductions in the last decade following the introduction of insecticide treated nets (ITNs) and recently of long lasting insecticide treated bednets (LLINs).
- What characteristics of ITNs have been exploited to facilitate reduction of disease incidence among endemic populations? (4)
 - Recent development on LLINs have reported the inclusion of the chemical piperonyl butoxide during the manufacture of the nets. What advantages has the addition of piperonyl butoxide brought in the ability of the LLINs to reduce malaria incidence? (3)
- c. Efforts to reduce reliance on pesticide use to reduce malaria incidence in some countries such as Benin in West Africa have introduced large-scale production of the malaria biocontrol agent *Romanomeris iyengari*.
- What advantages do biocontrol methods have over wide-scale insecticide use? (4)
 - Describe the method of function of *R. iyengari* in the reduction of malaria incidence among endemic populations. (3)

[25 marks]**QUESTION 5**

- List THREE structural characteristics that distinguish *Fasciola hepatica* from *Ascaris lumbricoides*. (3)
- List TWO structural characteristics that distinguish *Fasciola hepatica* from *Taenia solium*. (2)
- Explain how humans commonly acquire infection with *F. hepatica*. (2)
- Describe briefly the symptoms of acute infection that would lead to suspicion of heavy infection with *F. hepatica* in a patient. (3)
- How can infections with *F. hepatica* confirmed in the laboratory. (3)
- Two domestic animals commonly serve as a reservoir hosts for fascioliasis and are often responsible for outbreaks of disease in humans.
 - Name the TWO animal reservoir hosts. (2)
 - Explain how the animals mentioned in (i) above result in spread of fascioliasis to humans. (6)

- g. What measures would you suggest to a homeowner that rears the domestic animals to reduce human infections with *F. hepatica*? (4)

[25 marks]

QUESTION 6

- a. Enterobiasis affects over 200 million people, mostly children, globally each year.
- Describe the characteristics of families that are prone to enterobiasis infections. (3)
 - Why is enterobiasis more common in children than adults? (2)
 - Infections with enterobiasis commonly result in intense peri-anal and perineal pruritus and itching among infected children with most usually developing eczematous perianal area. Explain what causes the pruritus or itching and the eczematous perianal region among infected children. (3)
 - Literature cites autoinfection mechanisms among infected children. Explain how autoinfection with enterobiasis occurs in children. (4)
 - Describe the method used to confirm infection with enterobiasis in children. (4)
 - Write down a list of FOUR issues you are likely to raise with a family of children infected with enterobiasis to prevent future infections. (4)
- b. Children infected with *E. vermicularis* are also often co-infected with *Trichuris trichiura*.
- Explain how children become infected with *T. trichiura*. (2)
 - Name one drug you may use to treat both enterobiasis and trichuriasis. (1)
 - Describe ONE community strategy you may initiate to reduce trichuriasis in an infested community. (2)

[25 marks]