UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

MAIN EXAMINATION PAPER – DECEMBER, 2012

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

INSTRUCTIONS	:	ANSWER **QUESTION 1** AND **ANY FOUR** QUESTIONS
	:	EACH QUESTION IS 20 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
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	:	ALL CALCULATIONS/WORK-OUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET

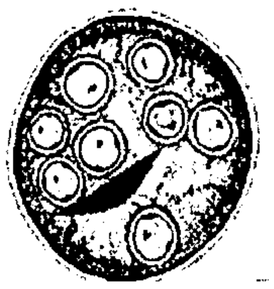
QUESTION 1: COMPULSORY [All students MUST answer this question]

Indicate your response to this question by writing the letter corresponding to your chosen answer among those provided for each sub-question.

i. A protozoan parasite is recovered from a patient. Its life cycle is studied and it is found that it reproduces asexually and not by sexual methods. Which one of the protozoan parasites below is the parasite likely to be?
   A. *Plasmodium falciparum*
   B. *Entamoeba histolytica*
   C. *Isospora belli*
   D. *Toxoplasma gondii*
   E. *Cryptosporidium parvum*

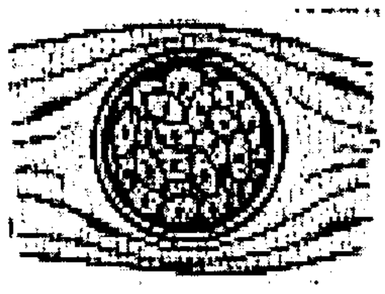
ii. Which of the parasites below have monoxenous life cycles?
   A. *Trichomonas vaginalis* and *Ascaris lumbricoides*
   B. *Plasmodium falciparum* and *Toxoplasma gondii*
   C. *Trypanosoma rhodesiense* and *Plasmodium falciparum*
   D. *Taenia solium* and *Taenia saginata*
   E. *Necator americanus and Isospora belli*

iii. A laboratory technologist examines the stool of a patient who has dysentery and sees the parasitic egg shown below:



The laboratory technologist is likely to conclude that:
   A. this parasite is responsible for the dysentery
   B. the patient is likely to be infected with another similar parasite responsible for the dysentery
   C. the patient does not have a serious illness
   D. the patient may be infected with *Balantidium coli*
   E. the patient does not need treatment

iv. The diagram below is recovered from the cross-sectional tissue of an infected patient. The parasite is likely to:



   A. belong to the subphylum Mastigophora
   B. belong to the subphylum Sarcodina

C. be transmitted through ingestion
D. be transmitted through the bite of an arthropod vector
E. to belong to Subclass Haemosporina that have no apparatus of movement

v. The drug of choice for treating luminal (non-invasive) amoebiasis is
A. metronidazole
B. mebendazole
C. paromomycin
D. praziquantel
E. tetracycline

vi. A patient reports that he had lymph node enlargement in the lower posterior cervical triangle only. The doctor suspects that he may be suffering from trypanosomiasis. Which of the following statements is (are) true about the patient and the illness.
A. The patient is not likely to be suffering from trypanosomiasis
B. The patient could be suffering from West African trypanosomiasis
C. The patient could be suffering from East African trypanosomiasis
D. The patient may have been bitten by *Glossina morsitans* and transmitted *Trypanosoma gambiense* which did not show a trypanosome chancre
E. Both B and D

vii. Which of the following parasites is likely to cause opportunistic disease in immunosuppressed individuals?
A. *Entamoeba histolytica*
B. *Cryptosporidium parvum*
C. *Trichomonas vaginalis*
D. *Plasmodium falciparum*
E. *Trypanosoma rhodesiense*

viii. The current treatment policy for uncomplicated malaria in Swaziland is
A. artemether-lumefantrine,
B. mefloquine
C. chloroquine
D. sulphadoxine/pyrimethamine.
E. quinine

ix. Worms are recovered from the faeces of an infected child and found to have the following characteristics: Unsegmented, have separated sexes, is dorso-ventrally flattened, have no body cavity. The worm is likely to be:
A. a nematode
B. a tapeworm
C. *Fasciola hepatica*
D. *Ascaris lumbricoides*
E. *Schistosoma mansoni*

x. The intermediate hosts of *Paragonimus westermani* are
A. crabs or crayfish

B. watercress
C. freshwater fish
D. water chestnut
E. water caltrop

[20 marks]

QUESTION 2

A traveller reports to a hospital with symptoms suspected to be either giardiasis or amoebic dysentery.

a. By using the symptoms only, how can you eliminate either of the diseases above to be responsible for the infection? (3)
b. Explain how you can make a definite diagnosis of the infecting species in the traveller. (3)
c. Describe how the traveller may have acquired infection with the parasite causing the symptoms. (3)
d. What drug would you recommend to successfully treat the traveller if he was found to be infected with:
   i. giardiasis (1)
   ii. amoebic dysentery (1)
e. The doctor explains to the traveller complications that could have resulted from failure to seek treatment.
   i. What complications are likely to have occurred if the traveller was infected with giardiasis. (2)
   ii. List two extra-intestinal sites that are likely to be affected if the patient had complications associated with amoebic dysentery. (2)
   iii. Describe two ways by which the parasite could have escaped the intestinal lumen to extraintestinal tissue. (2)
f. List three community measures that may reduce prevalence of both giardiasis and amoebic dysentery if successfully implemented. (3)

[20 marks]

QUESTION 3

A Swazi couple visits Bilene, located north of Maputo in a malaria endemic part of Mozambique. After two weeks, the man suffers from symptoms that the doctor suspects for malaria.

a. What symptoms would make the doctor suspect malaria infection in the man? (3)
b. The woman partner was also contacted and examined but found not to be infected. She claims to have taken 'necessary precautions' prior to leaving for Mozambique to prevention infection with the deadly disease.
   i. What 'necessary precautions' could the woman have taken prior to departure to prevent infection? (3)
   ii. What precautions could have been taken by the couple while in Bilene to prevent mosquito bites? (3)

c. Explain briefly the process, other than using rapid diagnostic tests, the laboratory technologists is likely to have followed in order to confirm that the man was indeed infected. (5)
d. What malaria species is likely to have infected the man? Give reasons. (3)
e. As the couple is from Swaziland, name the drug the doctor is likely to prescribed for successful treatment of the man. (1)
f. Why is it a problem for the country's malaria control efforts for the man not to have taken the 'necessary precautions' taken by his counterpart? (2)

[20 marks]

QUESTION 4

A twenty-six year old woman complains of remittent diarrhoea that ranges from mild to profuse diarrhoea, accompanied by abdominal cramps, anorexia, nausea and vomiting. She claims the symptoms had lasted for more than a month and in the process to have lost a considerable amount of weight. The doctor orders an HIV test and she is confirmed to be positive and with a low CD4 cell count.

a. Name two protozoan parasites of the digestive tract the woman is likely to be infected with. (2)
b. Explain how the infecting species may be confirmed in the laboratory. (3)
c. Explain the cause of the diarrhoea associated with the parasites mentioned in (a) above. (3)
d. The doctor makes an endoscopic examination of the intestinal mucosa of the woman.
    i. Write down two possible findings the doctor may make following endoscopic examination of the intestinal mucosa. (2)
    ii. What effect does the low CD4 cell count on the symptoms of the diseases? (2)
    iii. Name one drug associated with each possible diagnosis the doctor is likely to prescribe following confirmation of the infecting species of parasite. (2)
e. Explain three pieces of advice the doctor is likely to recommend to the HIV-positive woman in order to prevent bouts of diarrhoea due to the same parasites in future. (6)

[20 marks]

QUESTION 5

A child reports to a hospital with a ground itch or dermatitis that the doctor describes as a pruritic, erythematous and papulovescular eruption at the site of skin penetration of the infective larva.

a. Name three worms that are likely to cause a ground itch at the site of larval penetration. (3)
b. Explain how the laboratory technologist may go about to determine the actual species that has infected the child, assuming the disease had already developed to intestinal involvement. (6)
c. The doctor explain that if untreated, the disease may result to pulmonary and severe intestinal disease.
    i. Name the infective stage of the parasite. (1)

ii. Describe briefly the pulmonary symptoms that may be associated with untreated disease. (2)

iii. Describe briefly the late intestinal complications that may develop from untreated disease. (3)

iv. Name one drug that may be used to successfully treat the child. (1)

d. Describe two pieces of advice you may give to the parents of the child to prevent future infection with similar parasites. (4)

[20 marks]

QUESTION 6

a. What are the exact locations of adult worms of the following parasites in the bodies of humans?

i. *Schistosoma mansoni* (1)

ii. *Schistosoma haematobium* (1)

b. Name common name of the vector responsible for transmissions of schistosomiasis. (1)

c. Name the following with respect to schistosomiasis:

i. the infective stage of humans (1)

ii. the stage that hatches from the egg (1)

iii. the species that causes urinary schistosomiasis in man (1)

d. During infection with urinary schistosomiasis, frequency urination is a common symptoms if the disease remains untreated. Explain the cause for urinary schistosomiasis. (3)

e. Explain the method of diagnosis that may be employed to confirm infection with urinary schistosomiasis. (3)

f. Name one drug that may be used to treat urinary schistosomiasis. (1)

g. Methods of prevention of infection with urinary schistosomiasis often involve individual protection. Describe FIVE methods by which an individual may prevent infection with urinary schistosomiasis. (5)

h. List two community methods that may reduce human infections with urinary schistosomiasis. (2)

[20 marks]

QUESTION 7

a. Prevalence of pinworm is common among pre-school children.

i. Briefly describe the symptoms that are likely to lead to suspicion of pinworm in a pre-school child. (3)

ii. What is the common name for pinworm? (1)

iii. Describe the predisposing factors in pre-school children that make pinworm infection common. (3)

iv. Name one drug you may prescribe to a pre-school child infected with pinworm. (1)

v. What precautions would you take to reduce infection with pinworm in a family with several pre-school children? (3)

b. A two-year old child is found to be malnourished. The mother of the child claims that the child eats well, shows a lot of appetite and always finishing a substantial among of her food every day. The doctor orders a stool examination and the egg below is found to occur abundantly.

i. Name the parasite responsible for malnourishment of the child. (1)

ii. Mention one possible method the child could have acquired infection with the parasite. (2)

iii. Explain what causes malnutrition in the child. (3)

iv. Name one drug you may recommend for the successful treatment of the child. (1)

v. What advice would you give to the mother of the child to prevent infection with the same parasite in the future? (2)

[20 marks]

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ME

QUESTION 1: COMPULSORY [All students MUST answer this question]

Indicate your response to this question by writing the letter corresponding to your chosen answer among those provided for each sub-question.

i. Some parasites cause disease by multiplying inside red blood cells causing them to rupture resulting in anaemia. An example of a parasite that causes anaemia because of red blood cell depletion is
   A. *Necator americanus*
   B. *Ancylostoma duodenale*
   C. *Plasmodium falciparum*
   D. *Toxoplasma gondii*
   E. *Ascaris lumbricoides*

ii. A facultative parasite is one that
   A. has become dependent on a single species of host
   B. can parasitize a wide variety of hosts
   C. entirely dependent on the host for its survival and multiplication
   D. is capable of in, on or off the host
   E. has no intermediate host

iii. Which one of the parasites below has a ciliated adult stage?
   A. *Trichomonas vaginalis*
   B. *Entamoeba histolytica*
   C. *Balantidium coli*
   D. *Ascaris lumbricoides*
   E. *Plasmodium falciparum*

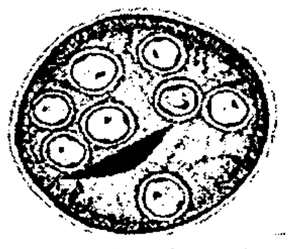
iv. A young girl reported to a healthcare facility with complaints of tenesmus, abdominal cramps, fever and dysentery. Upon further examination, the girl was found to have colitis and a bulged right leaf of the diaphragm. The girl is likely to be suffering from:
   A. giardiasis
   B. amoebiasis
   C. balantidiasis
   D. trichomoniasis
   E. taeniasis solium

v. A protozoan parasite is recovered from the blood of a patient. Its life cycle is studied and it is found that it reproduces by asexual and sexual methods. Which one of the protozoan parasites below is the parasite likely to be?
   A. *Entamoeba histolytica*
   B. *Isospora belli*
   C. *Plasmodium falciparum*
   D. *Toxoplasma gondii*
   E. *Cryptosporidium parvum*

vi. Chloroquine was the drug of choice for treatment of people with uncomplicated malaria in Swaziland before the National Malarial Control Programme changed the treatment policy in April, 2010. Which one of the reasons given below is the correct one for withdrawal of chloroquine?

A. Many people treated with chloroquine developed resistance
B. Chloroquine was to be used as prophylaxis by those visiting endemic areas outside Swaziland
C. Artemether-lumefantrine was easier to use even among pregnant mothers and tolerated by infants
D. Artemether-lumefantrine was offered free to the country by the manufacturers of the drug
E. There were increasing reports of malaria parasites that showed less susceptibility to chloroquine in Swaziland

vii. A laboratory technologist examines the stool of a patient who has severe dysentery and acute diarrhoea and sees the parasite shown below:



The laboratory technologist is likely to conclude that:

A. this parasite is responsible for the dysentery and acute dysentery
B. the patient is likely to be infected with another similar parasite responsible for the dysentery
C. the patient does not have a serious illness because the parasite infecting the patient is only a commensal of the small intestines
D. the patient does not need treatment because the infection is likely to be self-limiting
E. the patient may be infected with *Balantidium coli*

viii. Worms are recovered from the faeces of an infected child and found to have the following characteristics: Unsegmented, have separate sexes and their bodies are cylindrical. The child is likely to be infected with:

A. *Wuchereria banchrofti*
B. *Ascaris lumbricoides*
C. *Taenia solium*
D. *Fasciola hepatica*
E. *Schistosoma mansoni*

ix. Niclosamide is NOT recommended for the treatment of taeniasis solium because:

A. *Taenia solium* has developed resistance to the drug
B. Niclosamide increases the risk of cysticercosis
C. Niclosamide increases the chance for abortion and still births in pregnant women
D. Niclosamide is very bitter and encourages patient defaults
E. Niclosamide induces vomiting thereby reducing its effectiveness in successfully treating the patient

x. The parasite below was recovered from freshly shed faeces of a man.

The parasite is likely to be:

A. an oocyst of *Cryptosporidium parvum*
B. an oocyst of *Isospora belli*
C. an oocyst of *Toxoplasma gondii*
D. an oocyst of either *Cryptosporidium parvum* or *Isospora belli*
E. an oocyst of either *Cryptosporidium parvum* or *Toxoplasma gondii*

[20 marks]

QUESTION 2

a. *Cryptosporidium parvum* is classified under the subclass Coccidia and *Plasmodium falciparum* under subclass Haemosporina yet the two belong to the same subphylum Sporozoa.
   i. Give two reasons why *Cryptosporidium parvum* and *Plasmodium falciparum* are classified under the same subphylum. (2)
   ii. Give two reasons why *Cryptosporidium parvum* and *Plasmodium falciparum* are classified under different subclasses. (2)
   iii. Explain why *Toxoplasma gondii* is sometimes classified under the same subclass (Coccidia) as *Cryptosporidium parvum*. (2)

b. *Giardia lamblia* and *Trypanosoma rhodesiense* are classified under subphylum Mestigophora but in separate groups.
   i. Give two reasons why *Giardia lamblia* and *Trypanosoma rhodesiense* are classified under the same subphylum. (2)
   ii. Explain why *Giardia lamblia* and *Trypanosoma rhodesiense* are placed in different groups during classification. (2)

c. *Trichomonas vaginalis*, despite being placed in the same subphylum and group as *Giardia lamblia*, has different methods of transmission, diagnosis and hence prevention.
   i. During diagnosis, what structural features would you use to differentiate between *Giardia lamblia* and *Trichomonas vaginalis* trophozoites? (4)
   ii. What symptoms are associated with *Trichomonas vaginalis* infection in man? (2)
   iii. One of the methods suggested to reduce trichomoniasis incidence in men is reduction of the number of sexual partners, '*if possible*'. Why is it necessary to state 'if possible' during health promotion to control trichomoniasis in men? (2)
   iv. Other than reducing the number of sexual partners, how can a man prevent infection with *Trichomonas vaginalis*? (2)

[20 marks]

QUESTION 3

a. Schistosomiasis and malaria are two infections that are associated with prevalence of hosts other than humans.
   i. Name one intermediate host of schistosome parasites. (1)
   ii. Name one final host of the malaria parasites. (1)

b. Describe:
   i. one method by which humans become infected with schistosomiasis. (1)
   ii. one method by which humans commonly become infected with malaria. (1)

c. Describe briefly the symptoms that would lead to suspicion of infection with:
   i. *Schistosoma haematobium* (3)
   ii. *Plasmodium falciparum* (3)

d. Describe the method of diagnosis you would use to confirm infection with:
   i. *Schistosoma mansoni* (3)
   ii. *Plasmodium falciparum* (3)

e. Name one drug you are likely to recommend for the successful treatment of a patient suffering from uncomplicated malaria if working at a healthcare facility in Swaziland. (1)

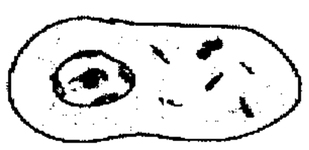
f. Name one drug you may recommend for prophylaxis to a Swazi who intends visiting a malaria endemic area outside the country. (1)

g. Other than using a prophylactic drug, what methods would you suggest for the prevention of infection with malaria to a Swazi visiting an endemic area. (2)

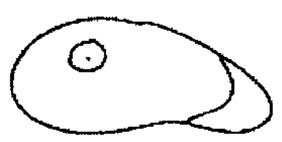
[20 marks]

QUESTION 4

A young boy complains of dysentery and occasional diarrhoea and the attending nurse sends him to the laboratory for a stool examination and Sigmoidoscopy. The laboratory technician identifies the two parasites (A and B) below:



A



B

a. Name the two parasites A and B. (2)

b. Which of the parasites is responsible for the dysentery? Explain. (3)

c. How could the boy have acquired the parasites? (2)

d. Explain two features the laboratory technician might have used to differentiate the parasites. (4)

e. Upon conducting sigmoidoscopy, the laboratory technician identifies ulcers and abscesses in the upper colon of the boy. Explain how the parasite causes ulcers. (2)

f. How can the ulcers caused by this parasite be differentiated from those caused by *Balantidium coli*? (2)

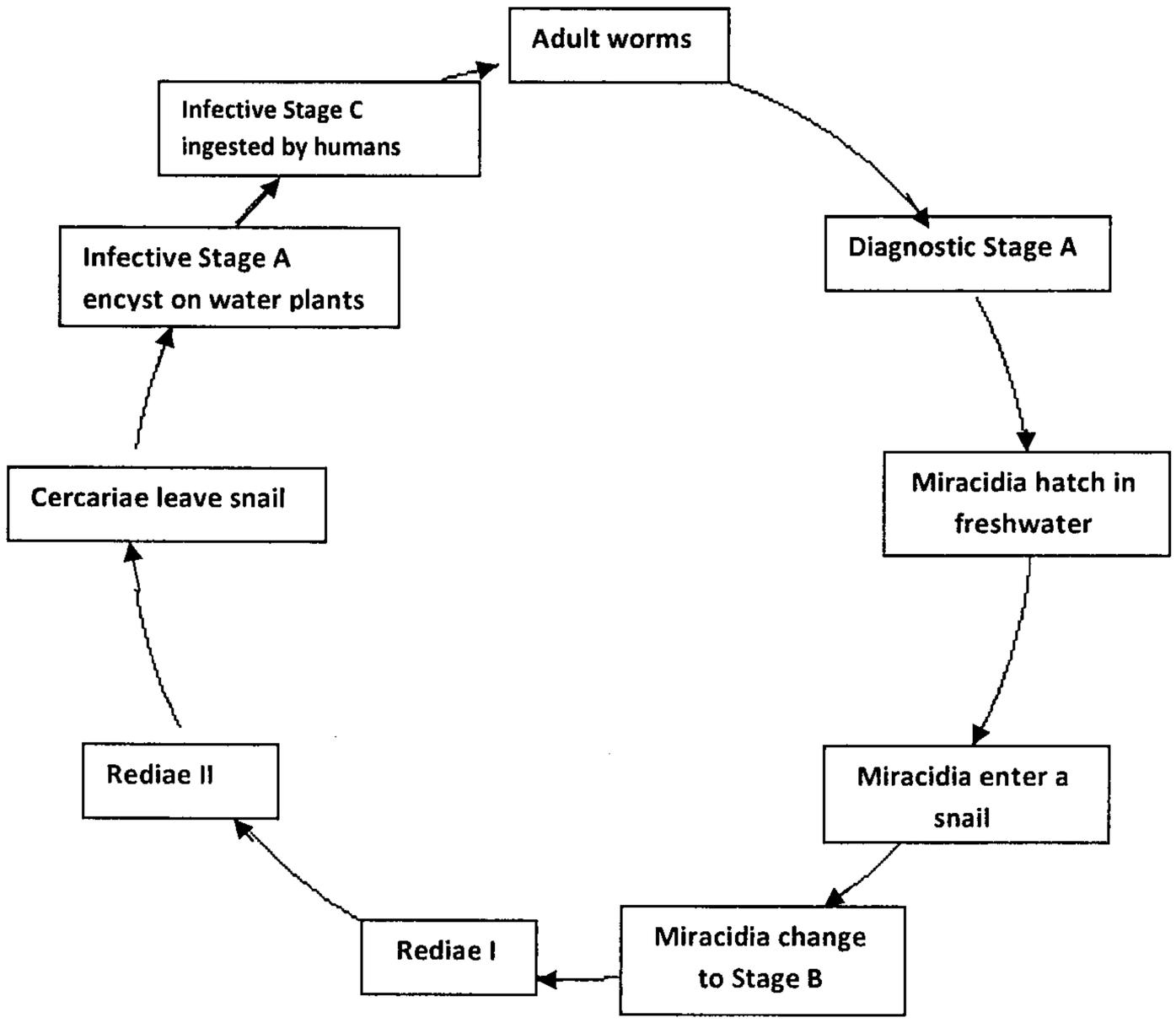
g. Name one drug you would recommend to successfully treat the boy. (1)

h. What advice would you give to the parents of the boy to prevent future infection with both parasites? (4)

[20 marks]

QUESTION 5

a. Given below is part of the life cycle of *Fasciolopsis buski*.



i. Name the diagnostic stage A. (1)
ii. Name the stage B. (1)
iii. Name the infective stage C. (1)
iv. Give two names of possible water plants on which stage C is likely to encyst. (2)
v. Explain two methods human infections with stage C may be prevented. (2)
vi. Discuss two community interventions you may suggest to reduce prevalence of *Fasciolopsis buski*. (4)

b. *Fasciola gigantica* is a common parasite of cattle in Swaziland.
i. Explain how cattle become infected with *Fasciola gigantica*. (2)
ii. A man ingests undercooked liver containing *Fasciola gigantica* adult worms. Is the man in danger of acquiring infection with the parasite? Explain. (3)

c. *Fasciola hepatica* is a parasite of humans that is structurally very similar to *Fasciola gigantica*. Discuss two community measures that you may recommend to reduce prevalence of *Fasciola hepatica* infections. (4)

[20 marks]

QUESTION 6

Consider the helminths below:

- *Enterobius vermicularis*
- *Trichuris trichiura*
- *Necator americanus*
- *Ascaris lumbricoides*

a. Which helminth commonly causes prolapses of the rectum in children? (1)
b. Which helminth is commonly referred to as a "*pinworm*" and why? (2)
c. Which helminth is likely to cause anaemia in children and why? (3)
d. Which helminth is likely to cause malnutrition in children and why? (3)
e. Explain the method you are likely to use to confirm infection with *Enterobius vermicularis* in a child? (4)
f. What drug would you recommend to successfully treat infection with:
    i. *Enterobius vermicularis* (1)
    ii. *Necator americanus* (1)
    iii. *Ascaris lumbricoides* (1)
g. Discuss TWO community interventions you may suggest to reduce incidence of trichuriasis and ascariasis in children. (4)

[20 marks]

QUESTION 7

a. Name three parasites that often caused lymphatic filariasis in man. (3)
b. Name the vector responsible for transmitting these filarial parasites to man. (1)
c. Explain the briefly the four stages of the disease that are likely to occur in a man infected with these parasites. (4)
d. What method of diagnosis may be used to confirm the infection. (3)
e. Describe the treatment process, including one treatment drug of choice, you would recommend to successfully treat an infected man or prevent development of complications. (5)
f. A different type of filariasis is causes a disease called river blindness.
    i. Name the filarial worm responsible for river blindness. (1)
    ii. Explain how river blindness may be acquired by an infected patient. (3)

[20 marks]