INTI INTERNATIONAL UNIVERSITY

FOUNDATION IN SCIENCE (CFSI)
BIO1204: BIOLOGY 2
FINAL EXAMINATION: MAY 2016 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Table 1.1 shows a comparison of the contents of various solutes in the blood plasma entering the kidney, glomerular filtrate and urine.

Table 1.1

Solute	Concentration of solute (g/liter)		
	Blood plasma	Glomerular filtrate	Urine
Glucose	1.0	1.0	0
Protein	70.0	0	0
Sodium ions	3.0	3.0	3.0
Potassium ions	0.15	0.15	1.5
Urea	0.25	0.25	20.0

(i) Name the process by which dissolved nutrients in blood plasma enter the Bowman's capsule.

(1 mark)

(ii) Why glucose is not found in the urine excreted?

(2 marks)

(iii) Why protein is not found in the glomerular filtrate?

(2 marks)

(b) Compare the permeability of the descending and ascending limbs of the loop of Henle.

(4 marks)

(c) Fig. 1.1 shows the early development of an embryo.

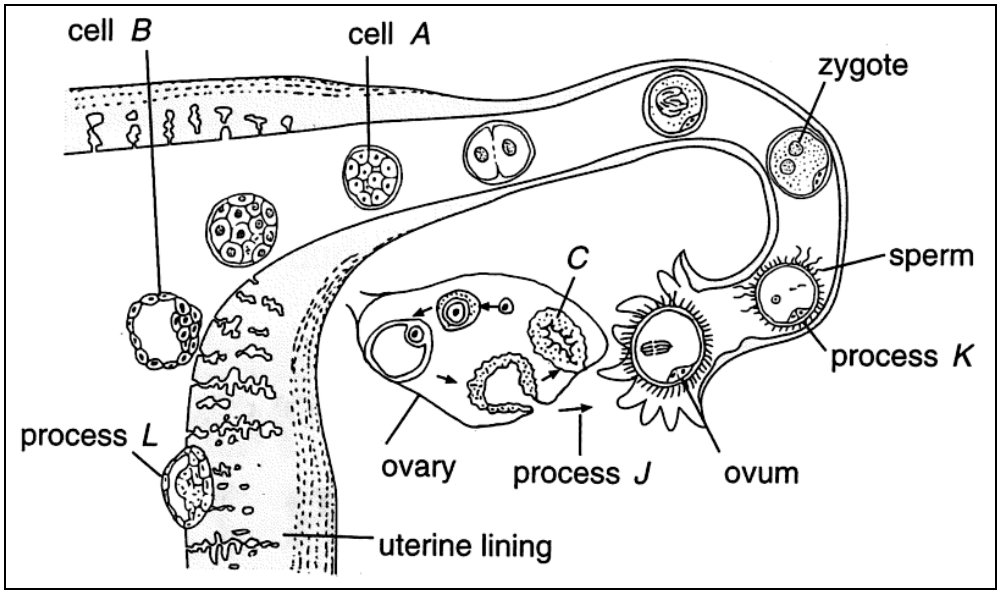

Fig. 1.1

(i) Identify the processes labeled J, K and L and structure B.

(4 marks)

(ii) When will the meiotic division of the ovum be completed?

(1 mark)

(iii) Name **TWO (2)** hormones secreted by structure C and **ONE (1)** function of each hormone respectively.

(4 marks)

(d) Fig. 1.2 shows the structure of a synapse.

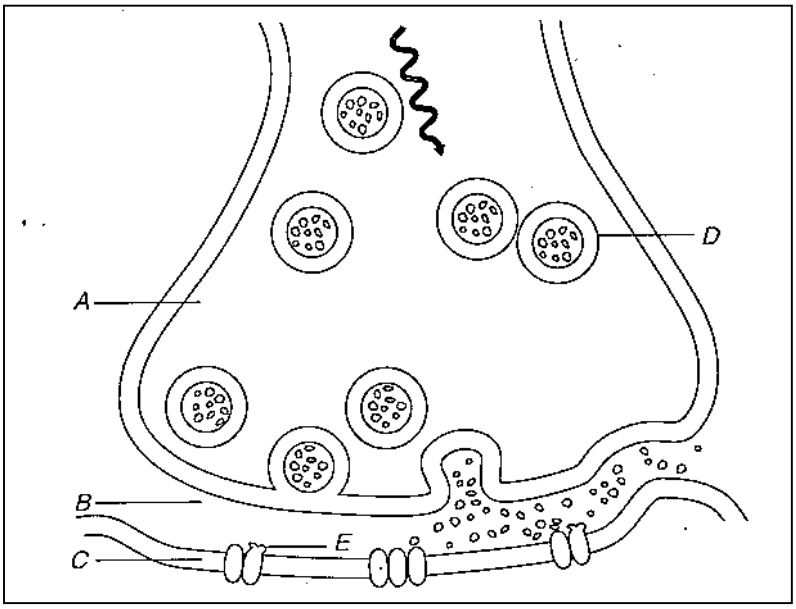

Fig. 1.2

(i) Identify the structures labeled A, B, and C.

(3 marks)

(ii) Identify the structure labeled D. Name the chemical found inside it.

(2 marks)

(iii) Why synaptic transmission is slow compared to the transmission of impulse along an axon of a neuron?

(2 marks)

Question 2

(a) Fig. 2.1 shows an interaction between **TWO (2)** cells involved in a cell mediated immunity response.

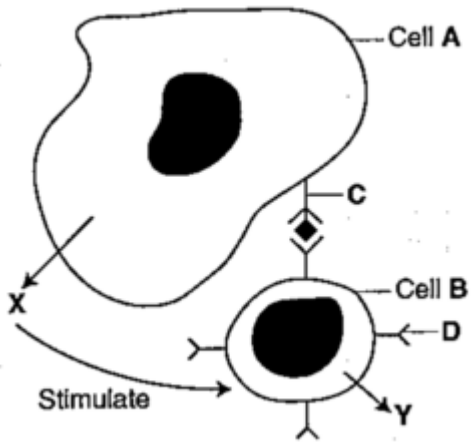

Fig. 2.1

(i) Identify cell A, cell B, structures C and D.

(4 marks)

(ii) Explain the relationship between the function of cell A with structure C.

(4 marks)

(iii) State the name and function of substance X secreted by cell A.

(4 marks)

(iv) State the name and function of substance Y secreted by cell B.

(4 marks)

(b) Discuss how adrenal glands respond to short term stresses. Your answer should include structures and hormones that caused the responses.

(7 marks)

(c) State **ONE (1)** difference between nervous and endocrine system.

(2 marks)

Question 3

(a) Imagine that you have just taken a bite of a steak (assuming it is mostly protein). List in sequence the structures through which it passes in its journey through the digestive system (starts with mouth) and explain what happens in each structure.

(7 marks)

(b) Fig. 3.1 is an electron micrograph of cells from the lining of the small intestine.

Fig. 3.1

(i) Identify the structures labeled A and state the role for the cell.

(2 marks)

(ii) There are many mitochondria in cell B. Suggest why cell B contains a large number of mitochondria.

(2 marks)

(iii) There are many goblet cells within the epithelium lining the trachea and the bronchi in the gas exchange system. State **THREE (3)** roles of goblet cells in the gas exchange system.

(3 marks)

(iv) State **TWO (2)** ways in which the cells lining the alveoli in the lungs differ from cell B shown in Fig. 3.1.

(2 marks)

(c) Fig. 3.2 is a vertical section of the heart to show the regions concerned with initiating and conducting impulses.

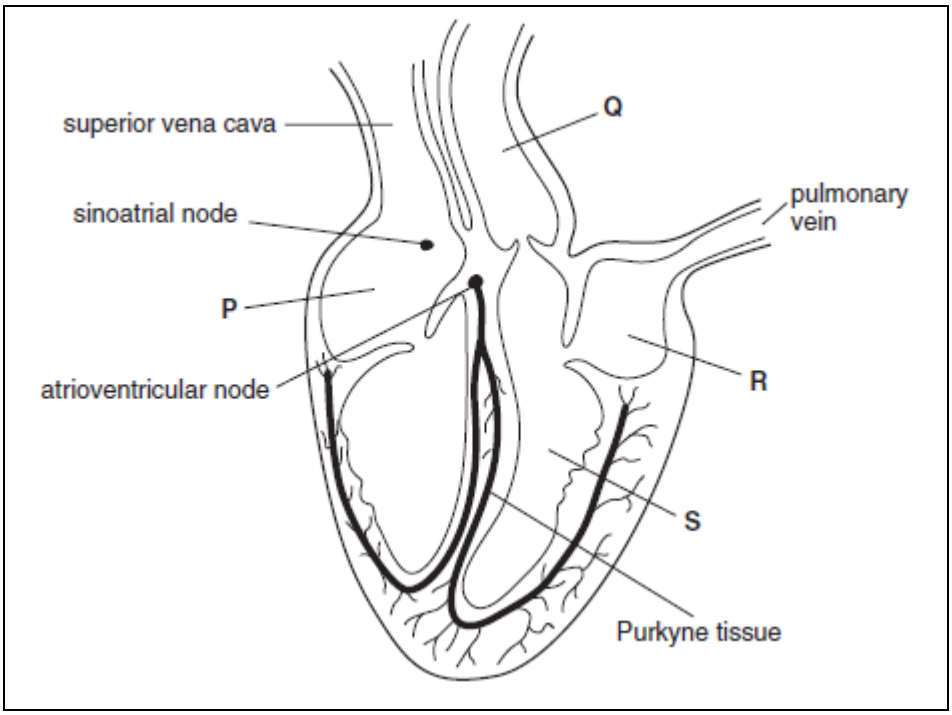

Fig. 3.2

(i) Name the structure labeled P, Q, R and S.

(4 marks)

(ii) Explain why the wall of chamber **S** is much thicker than the wall of chamber **R**.

(2 marks)

(d) Copy and complete Table 3.1 by numbering each event to show the sequence occurring in the initiation and control of one heart beat. Use 1 as the first event in the sequence.

Table 3.1

Event	Sequence
Impulses pass down septum through conducting fibres known as the bundle of His	
Atrioventricular node sends out impulses	
Impulses travel across atrial walls	
Impulses reach base of ventricles (apex of heart)	
Impulses pass up through Purkyne fibres in ventricle walls	
Sinoatrial node sends out impulses	

(3 marks)

Question 4

(a) State **FIVE (5)** differences between monocots and dicots.

(5 marks)

(b) Table 4.1 contains some information about xylem vessels and phloem sieve tube elements in plants. Complete Table 4.1.

Table 4.1

Features	Xylem vessels	Phloem sieve tube elements
Living cells	(i)	yes
Substances transported	(ii)	(iii)
Direction of flow of substances	One direction, roots to leaves	(iv)
Permeability of cell walls to water	Not permeable	(v)
Cell wall material	(vi)	Cellulose

(6 marks)

(c) Copy and complete **Table 4.2** to show the comparison of the **FIVE (5)** hormones in plants.

Table 4.2

Hormones	Function	Site of production
Auxin	**(I)**	**(II)**
Cytokinin	**(III)**	**(IV)**
Gibberellins	**(V)**	**(VI)**
Ethylene	**(VII)**	**(VIII)**
Abscisic acid	**(IX)**	**(X)**

(10 marks)

(d) Fig. 4.1 shows the relationship between bacteria and legume plants.

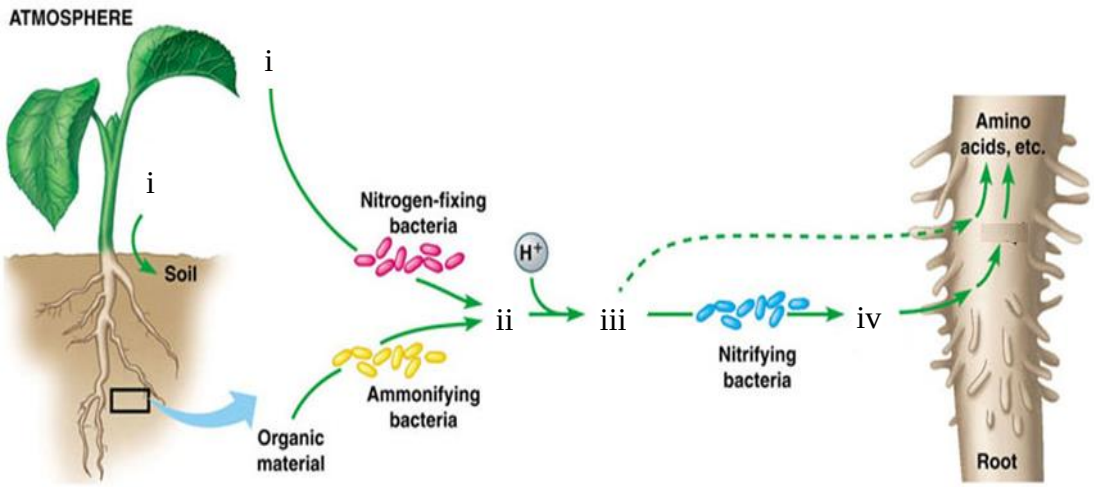

Fig. 4.1

(i) Identify compounds i to iv in Fig. 4.1.

(2 marks)

(ii) Briefly explain the mutual benefit between legume plants and nitrogen fixing bacteria.

(2 marks)

Question 5

(a) Fig. 5.1 illustrates three types of survivorship curves. Explain and give **ONE (1)** example of an organism for each curve.

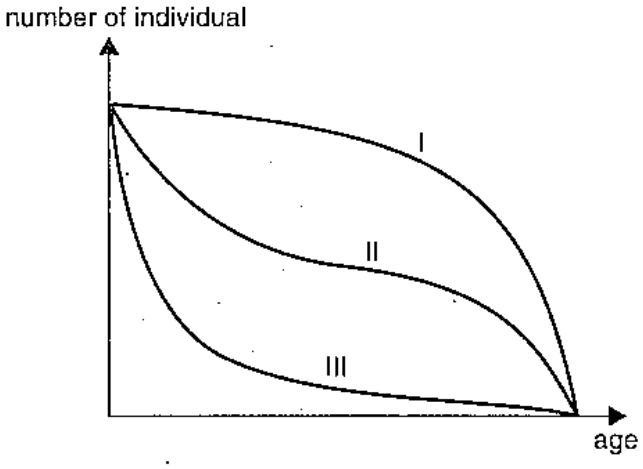

Fig. 5.1

(6 marks)

(b) The tiger, *Panthera tigris*, is classified as an endangered species by the International Union for the Conservation of Nature and Natural Resources (IUCN). The IUCN publishes an annual list of endangered species called the Red List. Fig. 5.2 shows the number of tigers in the wild between 1900 and 2010.

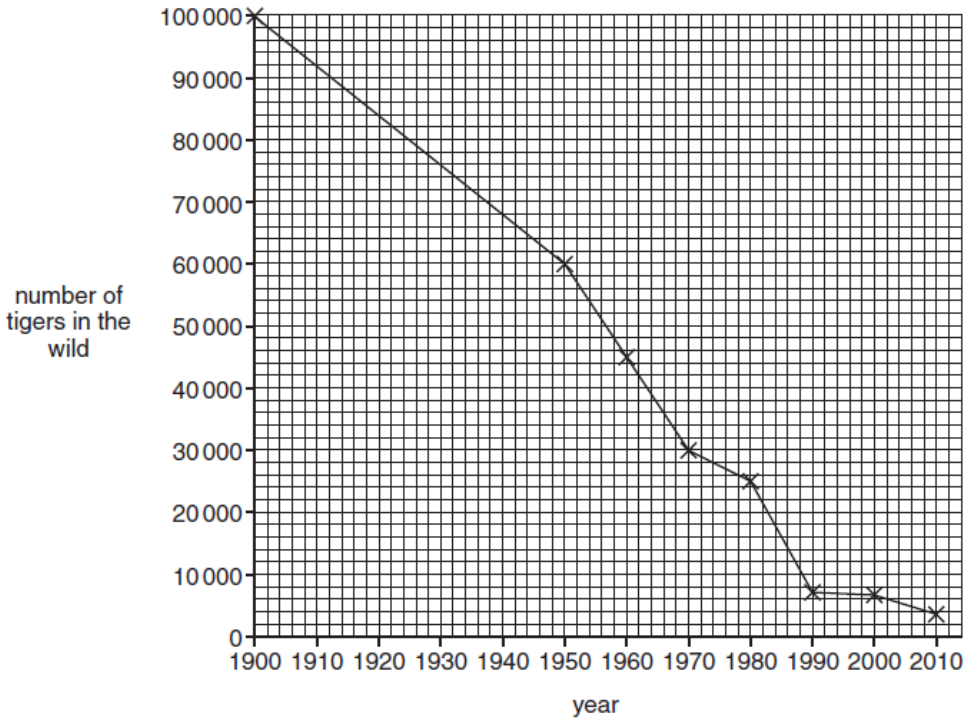

Fig. 5.2

(i) Calculate the overall rate of decrease in number of tigers between 1900 and 2010. Give your answer to the nearest whole number.

(2 marks)

(ii) Suggest **FOUR (4)** reasons why a named species has become endangered.

(4 marks)

(c) Fig. 5.3 shows a three-toed sloth, *Bradypus variegatus*, that lives in forest ecosystems in Central America. The sloths living in these forests form part of the community. Sloths feed mainly on the leaves (rich in cellulose) of many different tree species that grow in the under canopy in the forest. There are bacteria and other microorganisms in the stomachs of sloths. The main predators of sloths are jaguars, harpy eagles, snakes and humans.
With reference to the information above,

Fig. 5.3

(i) State the trophic level occupied by the sloth in the food chain.

(1 mark)

(ii) Suggest why there are few predators, such as jaguars and harpy eagles, in the forest ecosystem even though there are many producers, such as trees.

(4 marks)

(d) Fig. 5.4 illustrates the accumulation of gases in the atmosphere as a result of human activities.

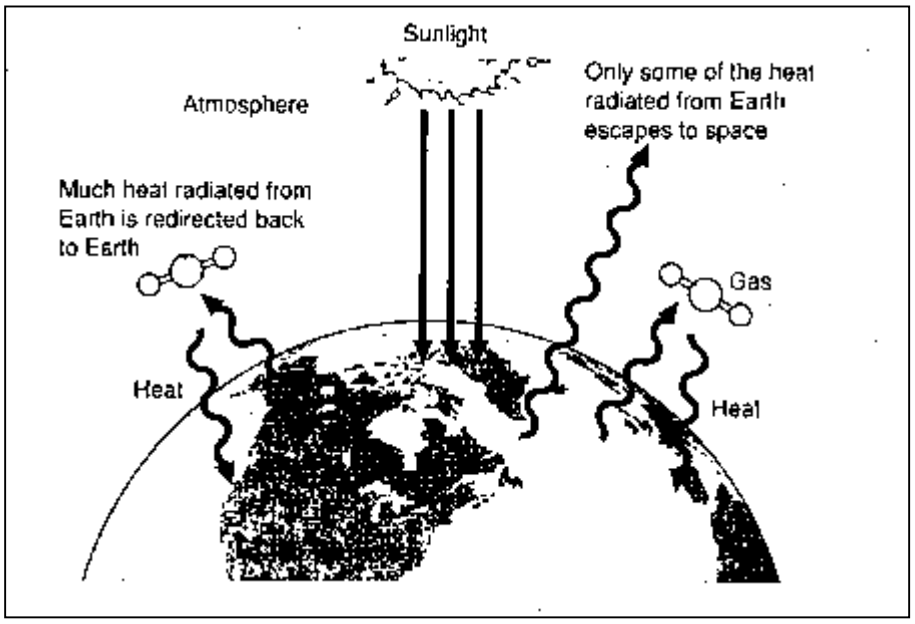

Fig. 5.4

(i) Give **TWO (2)** examples of gases that accumulate in the atmosphere as a result of human activities.

(2 marks)

(ii) How do these gases cause global warming?

(6 marks)

-THE END-

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