INTI International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session : April 2018

Programme : Foundation In Science (CFSI)

Course : **BIO1204**

Date of Examination : 27th July 2018 (Friday)

Time : 08:00am – 10:00am Reading Time : NIL

Duration : 2 Hours

Special Instructions :

This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided.

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Nil

Examiner(s) : **Ooi Saik Huey**

Moderator : Assoc. Prof. Dr. Sreeramanan Subramaniam

*This paper consists of **10** printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN SCIENCE (CFSI)
BIO1204: BIOLOGY 2
FINAL EXAMINATION: APRIL 2018 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) Describe **ONE (1)** general structure and **ONE (1)** general function of four main types of tissues.

type of tissue	**epithelial**	**connective**	**muscle**	**nervous**
function				
structure				
example of cells or tissue				

(4 marks)

(b) Cramps felt during menstruation are caused by involuntary contraction of what type of muscle?

(1 mark)

(c) Describe the **FOUR (4)** stages of food processing.

(4 marks)

(d) Explain how the structure of the small intestine promotes nutrient absorption.

(2 marks)

(e) List the **THREE (3)** nutritional needs common to all animals.

(3 marks)

(f) State **FOUR (4)** classes of essential nutrients.

(4 marks)

(g) Distinguish between diastole and systole.

(2 marks)

(h) Explain how heartbeats are controlled by pacemaker.

(5 marks)

Question 2

(a) Fig. 2.1 shows part of the immune response to the first infection by a bacterial pathogen that has entered the body through the lining of a bronchiole. **J** and **K** are stages in the immune response.

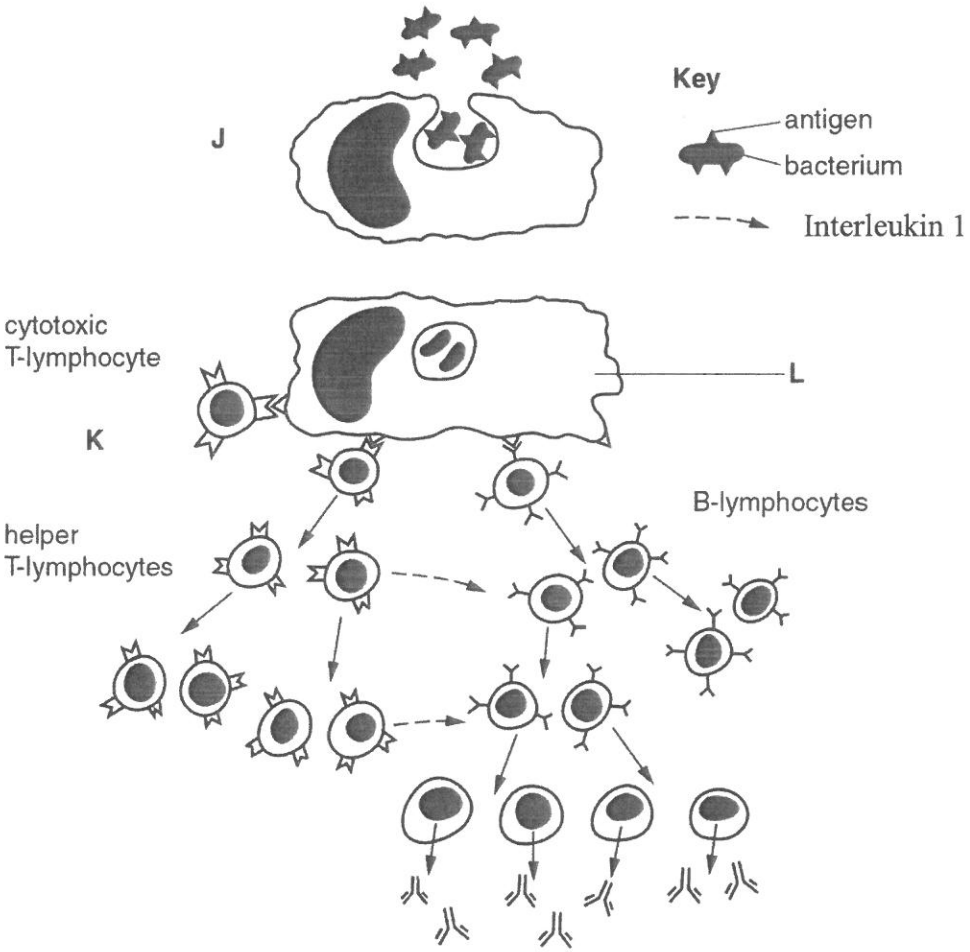

Fig. 2.1

(i) Name the structure **J** and **L**.

(2 marks)

(ii) State what is happening at stage **J**.

(1 mark)

(iii) Explain the role of cell **L** at stage **K** in the immune response.

(2 marks)

(iv) With reference to Fig. 2.1, explain how the response to a second infection by this bacterial pathogen differs from the first.

(3 marks)

(b) Fig. 2.2 shows a section through part of the cortex of a kidney.

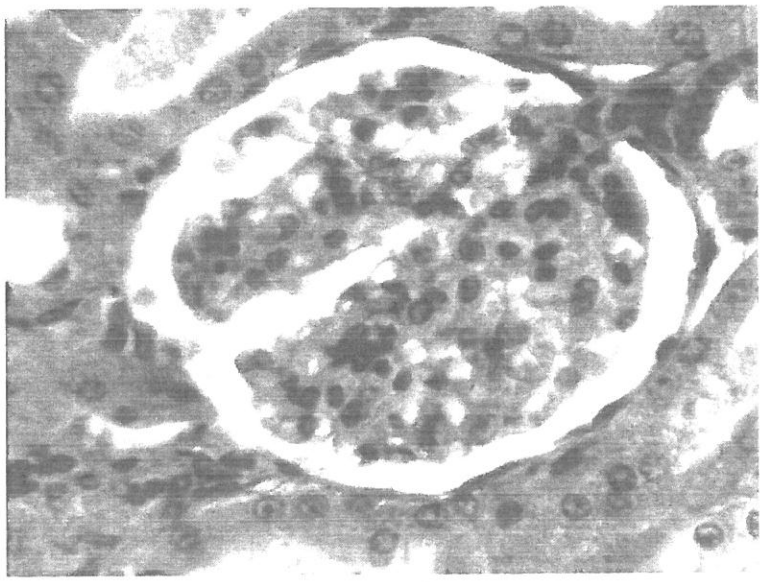

Fig. 2.2

(i) On Fig. 2.2, draw label lines and use the letters **G** and **R** to identify :
- a glomerulus with the letter **G**.
- a renal capsule with the letter **R**.

(2 marks)

(ii) State the name of the hormone that is involved in the control of the water potential of the blood.

(1 mark)

(c) Table 2.1 shows the concentration of some compounds in the fluids of a glomerulus, a renal capsule and a collecting duct of the kidney.

Table 2.1

compound	concentration / g 100 cm^{-3}		
	blood plasma entering glomerulus	filtrate in renal capsule	urine in collecting duct
water	90	90	96
proteins	8.0	0.0	0.0
glucose	0.1	0.1	0.0
urea	0.03	0.03	2.0

With reference to Table 2.1,

(i) Explain why proteins occur in the blood entering the glomerulus but not in the filtrate in the renal capsule

(2 marks)

(ii) Explain why there is glucose present in the filtrate but not in the urine

(2 marks)

(iii) Explain the difference in the concentration of urea between the filtrate and urine.

(3 marks)

(d) Describe the functions of and interrelationships between the hypothalamus and the anterior and posterior pituitary glands.

(7 marks)

Question 3

(a) Explain what is meant by an endocrine gland.

(2 marks)

(b) Fig. 3.1 shows the structure of part of a seminiferous tubule of a human testis.

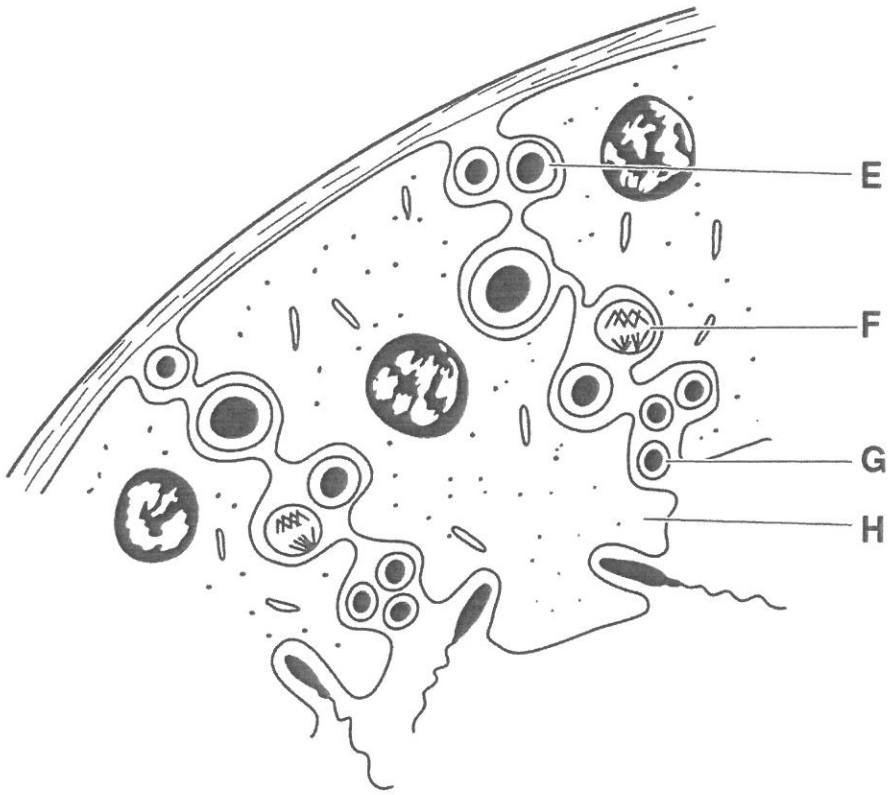

Fig. 3.1

(i) Name cells **E**, **F**, **G** and **H**.

(4 marks)

(ii) Describe how cell **F** is produced from cell **E** in the process of spermatogenesis.

(4 marks)

(iii) Describe the maturation of a **G** into a spermatozoon (sperm).

(4 marks)

(c) Outline the differences in the process of gametogenesis in a man compared with that in a woman.

(3 marks)

(d) Fig. 3.1 outlines how a cholinergic synapse works.

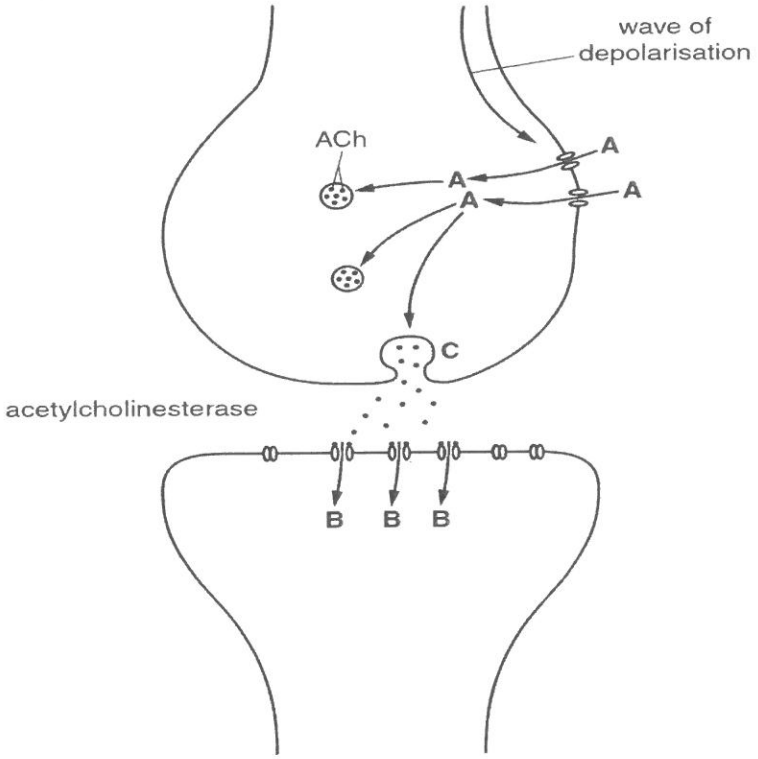

Fig. 3.1

With reference to Fig. 3.1,

(i) Name **A** and **B**

(2 marks)

(ii) Name the process occurring at **C**

(1 mark)

(iii) State the effect of **B** entering the post-synaptic neurone

(1 mark)

(iv) Explain the role of acetylcholinesterase in the synapse.

(2 marks)

(v) Explain how synapses ensure one-way transmission of nerve impulses.

(2 marks)

Question 4

(a) Compare **THREE (3)** structures of monocots and eudicots. (3 marks)

(b) State the **FIVE (5)** major types of plant cells. (5 marks)

(c) Describe the processes and events that lead to double fertilization. (5 marks)

(d) Describe how sugars load from sugar source to sugar sink. (5 marks)

(e) Describe the main function of the Casparian strip. (2 marks)

(f) Describe **ONE (1)** function of each **FIVE (5)** major types of plant hormones. (5 marks)

Question 5

(a) Compare Type I, Type II, and Type III survivorship curves. (3 marks)

(b) State and explain **THREE (3)** different types of dispersion patterns. (6 marks)

(c) Fig. 5.1 is a photograph taken at low tide in a mangrove swamp in Mozambique.

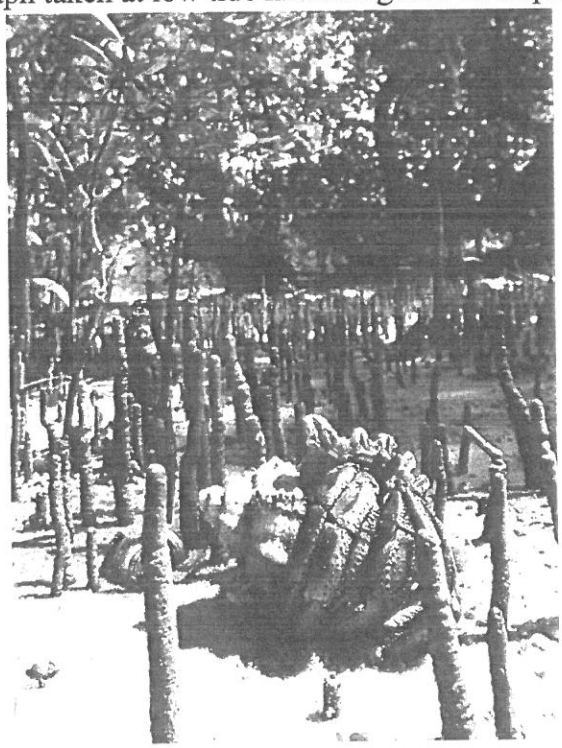

Fig. 5.1

The photograph shows a hermit crab surrounded by the pneumatophores ('breathing roots') of mangrove trees. The hermit crabs live inside the shells of dead molluscs. Large birds, such as Goliath herons, feed on the hermit crabs. The vertical pneumatophores are an adaptation to the soil in the swampy, coastal environment that contains very little oxygen. They are exposed to the air at low tide. The soil has a very high salt content as the sea often covers the area. Some bacteria are able to grow deep in the rich organic mud where the oxygen concentration is very low.

Listed below are eight ecological terms that can be applied to the mangrove swamp and the organisms that live there.
Use only the information given above to match each organism with the most appropriate term from the list. You may use each letter once, more than once or not at all.

mangrove trees	
all the organisms in the mangrove swamp	
bacteria deep in the mud	
all the hermit crabs in the swamp	

A primary consumer
B population
C community
D niche
E secondary consumer
F ecosystem
G decomposer
H producer

(4 marks)

(d) Fig. 5.2 shows some feeding relationships in an Arctic ecosystem.

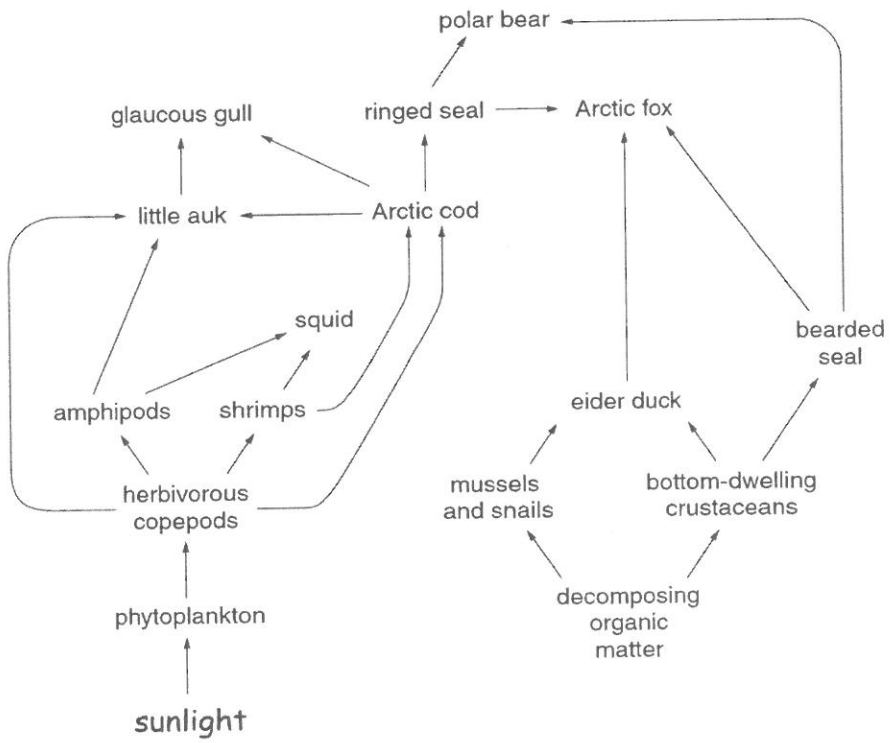

Fig. 5.2

Using the information shown in Fig. 5.2,

(i) Name **TWO (2)** organisms that are feeding as secondary consumers
(2 mark)

(ii) Explain why it is difficult to assign some organisms to trophic levels.
(1 mark)

(iii) The efficiency of energy transfer through a trophic level is calculated by comparing the energy available to that trophic level with the energy available to the next trophic level.
It has been estimated that the efficiency of energy transfer by herbivorous copepods is about 17%.

State **TWO (2)** factors that are likely to influence the efficiency of energy transfer by herbivorous copepods.
(2 marks)

(e) Corals are simple marine animals and usually exist in colonies of thousands of individuals.

Fig. 5.3 shows a coral colony.

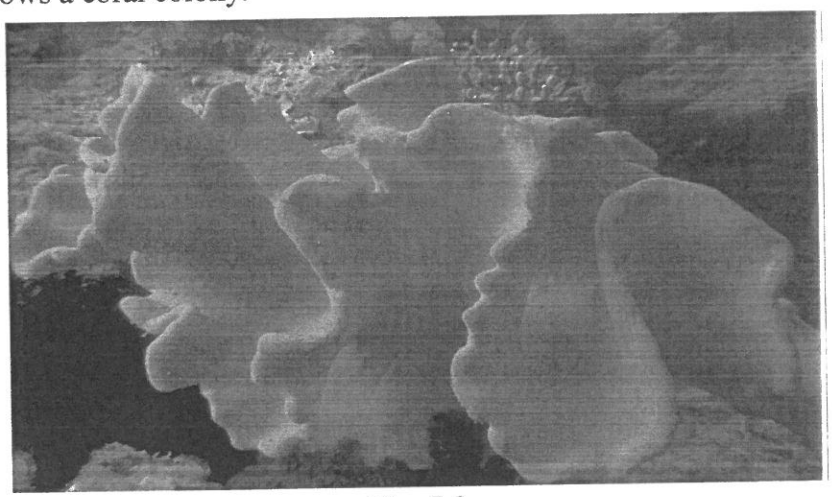

Fig. 5.3

Corals absorb calcium carbonate from the sea to build their skeletons, which help to form large coral reefs. Coral reefs provide a home for about 25% of known fish species and have the highest biodiversity of any marine ecosystem.

(i) Outline what is meant by the term *ecosystem*.
(2 marks)

(ii) Coral reefs are at risk of damage due to human activities. All the coral reefs in three regions were classified as being at low, medium or high risk of damage. Table 5.1 shows the areas of coral reef at risk of damage in these three regions.

Table 5.1

region	area of coral reef at risk of damage / 1000 km^2			percentage of coral reef at high risk of damage
	low	medium	high	
Caribbean Sea	9	8	7	29
Indian Ocean	20	15	10	
Pacific Ocean	60	30	9	

Complete Table 5.1, giving your answers to the nearest whole number. Suggest how human activities could damage coral reefs.

(5 marks)

~The End~

BIO1204 (F)/APR2018/OSH