

# BIOLOGY II

012

31 Oct. 2014 08.30AM - 11.30AM



## ADVANCED LEVEL NATIONAL EXAMINATIONS, 2014

**SUBJECT: BIOLOGY**

**PAPER II: THEORY**

**COMBINATIONS: - BIOLOGY-CHEMISTRY-GEOGRAPHY (BCG)**

**- MATHEMATICS-CHEMISTRY-BIOLOGY (MCB)**

**- PHYSICS-CHEMISTRY-BIOLOGY (PCB)**

**DURATION: 3 HOURS**

### INSTRUCTIONS :

1. Write your names and index number on the answer booklet as written on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
2. Do not open this question paper until you are told to do so.
3. This paper consists of **two** sections: **A** and **B**.

- **Section A:** Attempt **all** questions. (70 marks)
- **Section B:** Attempt any **three** questions. (30 marks)

## SECTION A: ATTEMPT ALL QUESTIONS. (70 marks)

1. (a) Give two advantages of the electron microscope over a light microscope. (2marks)

(b) What is the difference between magnification and resolution? (3marks)

2. Give at least four differences between Eukaryotic and Prokaryotic cells. (4marks)

3. The table below refers to features of animal, plant and Prokaryotic cells.

Copy the table and place (✓) in the appropriate box if the feature is present and (X) if the feature is absent. (5marks)

Feature	Animal cell	Plant cell	Prokaryotic cell
Cell wall made of cellulose			
Endoplasmic reticulum			
Mesosome			
Ribosome			
Golgi apparatus			

4. Explain which way water will move by osmosis in each of the following sets of cells. (6marks)

N°1		N°2		N°3	
Cell A	Cell B	Cell A	Cell B	Cell A	Cell B
Y= -50 kpa	Y= -250 kpa	Y= -500 kpa	Y=0 kpa	Y= -200 kpa	Y=-200 kpa

**$\Psi = Y_w$  = water potential**

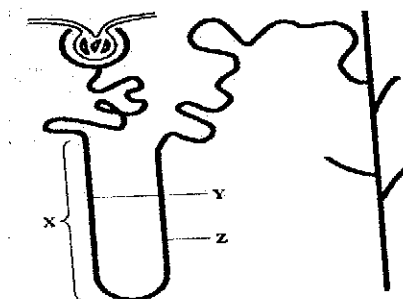
**Kpa = kilopascals**

5.(a) Give two similarities between DNA replication and transcription. (2marks)

(b) Give two differences between DNA replication and translation. (2marks)

6. Vaccination, together with identification and isolation of infectious persons as helped to eradicate smallpox, but not measles, tuberculosis, malaria and cholera. Giving one reason for each of the four diseases, explain why each one is more difficult to eradicate than smallpox. (4marks)

7. The diagram below represents a Nephron from a human kidney.



(a) Name the part labeled X (1mark)

(b) Sodium chloride is actively pumped out of Z into the medulla of the kidney.

This sodium chloride moves back into Y. Explain the effect of the sodium chloride concentration in the medulla of the kidney on the reabsorption of water from the collecting duct.

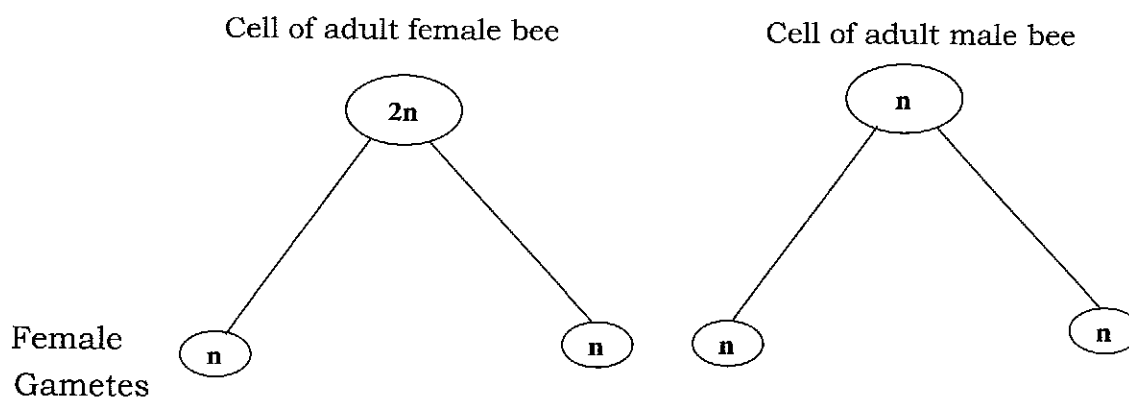
(2marks)

(c) Most of the sodium chloride filtered into the glomerular filtrate is reabsorbed.

From which part of the nephron does this reabsorption take place?

(2marks)

8. The queen honey bee can lay both fertilised and unfertilized eggs. Fertilised eggs develop into diploid females and unfertilized eggs develop into haploid males. The diagram below shows the formation of gametes in female bees and male bees.



(a) Giving a reason for your answer in each case, name the type of cell division in the bee that produces :

i. Female gamete.

(2marks)

ii. Male gamete.

(2marks)

(b) The table below shows some features which contribute to variation in the offspring of bees. Copy and complete the table with a tick (✓) if the feature may contribute or a cross (X) if it does not.

(3marks)

Feature	Female offspring	Male offspring
Crossingover		
Independent segregation of chromosomes		
Random fusion of gametes		

9. (a) Explain the meaning of the term "gene frequency".

(2marks)

(b) List three factors which may alter the gene frequency in a small population.

(3marks)

10. The temperature control centre coordinates the mechanism which regulate body temperature.

(a) Where is the temperature control centre in the brain?

(1mark)

(b) Describe how the temperature control centre detects a rise in body temperature and produces an increase in the rate of sweating.

(2marks)

11. In the world, forests are being burned and ploughed for agriculture.

How is this likely to affect the carbon content of:

(a) the air

(2marks)

(b) The soil ?

(2marks)

Explain your answer.

12. Explain the following ecological terms:
- (a) Pyramids of biomass. (2marks)
  - (b) Net primary production. (2marks)
  - (c) Community. (2marks)
13. With reference to flowering plants, distinguish between :
- (a) Pollination and fertilization. (2marks)
  - (b) Pollen grain and male gamete. (2marks)
14. (a) There are two sounds during each heart beat. Explain the source of these sounds. (2marks)
- (b) What is the function of the smooth muscle in the walls of the arteries? (2marks)
15. Explain the following terms in relation to the nervous system.
- (a) Action potential. (2marks)
  - (b) Refractory period. (2marks)

**SECTION B: ATTEMPT ONLY THREE QUESTIONS. (30 marks)**

- 16.(a) What is meant by the terms :
- i. "Continuous variation"? (2marks)
  - ii. "Discontinuous variation"? (2marks)
- (b) How does each of the variations arise? (6marks)
17. Fats and glycogen are energy storage compounds in animals.
- (a) Compare the suitability of the two substances as storage compounds. (4marks)
  - (b) State the advantage of storing fats over glycogen. (3marks)
  - (c) Why is glycogen a more suitable energy compound in muscles than fat? (3marks)
18. In an oil seed plant species, the allele for tallness is dominant over that for dwarfness. Meanwhile the allele for chlorophyll production and non-chlorophyll production show incomplete dominance.
- The heterozygous plants are variegated.
- (a) Using suitable symbols, construct a diagram of a cross between a tall plant with green leaves and a dwarf plant with variegated leaves, to show the genotypes of the offsprings. (8marks)
  - (b) Explain why 25% of the offsprings above would fail to survive. (2marks)
- 19.(a) Define the term "parasitism". (2marks)
- (b) Give all possible ways which enable a parasite to live with its host. (8marks)
20. Describe the sequence of events that occur when a nerve impulse arrives at a neuromuscular junction. (10marks)