Name: _____ Index No: _____ /

2528/303
2922/303
ENVIRONMENTAL BIOCHEMISTRY
AND TOXICOLOGY
Oct./Nov. 2013
Time: 3 hours

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

MODULE III

ENVIRONMENTAL BIOCHEMISTRY AND TOXICOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided above.
You should have non-programmable scientific calculator for this examination.
This paper consist of TWO sections; A and B.
Answer ALL questions in section A and any THREE questions from section B, in the spaces provided in this question paper.
Each question in section A carries 4 marks while each question in section B carries 20 marks.
Candidates should answer the questions in English.

For Examiner's Use Only

SECTION A

Questions	1	2	3	4	5	6	7	8	9	10	TOTAL SCORE
Candidate's Score											

SECTION B

Question	11	12	13	14	15	Total
Candidate's Score						

GRAND TOTAL

This paper consists of 16 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

SECTION A (40 marks)

Answer ALL questions in this section in the spaces provided.

1. Define the following terms:

(a) toxicant; (2 marks)

capable of causing damage by poisoning

(b) toxicity. (2 marks)

Degree to which a toxic substance may harm a cell or organism

2. List **four** absorption mechanisms of toxins across barriers. (4 marks)

3. Distinguish between dose response and dose effect. (4 marks)

4. Name any **four** organs of excretion of toxicants in the body. (4 marks)

kidney

lungs

liver

5. (a) Define biotransformation in human body. (2 marks)

(b) Identify any **two** effects of biotransformation. (2 marks)

6. Describe the **two** main classes of monosaccharides. (4 marks)

Aldoses

Ketoses

Define the following terms:

(a) reducing sugar; (2 marks)

Cause reduction

(b) non-reducing sugar. (2 marks)

(ii) Draw the dose response curve for the chemica. (4 marks)

(iii) Use the dose response curve in b(ii) to determine the LD50. (2 marks)

(iv) Given a dose value of 1.25, determine the response value. (5 marks)

14. (a) Distinguish between catabolism and anabolism processes. (4 marks)

(b) Describe the process of glycolysis starting with glucose molecule. (8 marks)

(c) Explain how sugar levels are regulated in human body. (8 marks)

15. (a) Describe the procedure for Jugular Vein blood sample collection. (8 marks)

(b) Explain the trophic level transfer of toxicants using DDT and fish eagle as an example. (12 marks)

Insulin - lowers

glucagon lowers

Somatostatin regulates insulin and glucagone.

8. Draw the structures of the following molecules:

(a) glycine; (2 marks)

(b) lysine. (2 marks)

9. Differentiate between oils and fats. (4 marks)

10. State any four factors affecting enzymes activity. (4 marks)

SECTION B (60 marks)

Answer any THREE questions from this section in the spaces provided after question 15.

11. (a) Table I shows some vitamins and their functions, but not matched. Identify the function of each of the vitamins. (8 marks)

Table I

Vitamin	Function
D	• Act as co-factor for specific carboxylation reaction • Offers resistance to infections
A	• Improve iron absorption • Blood clotting
K	• Keep normal calcium and phosphorus level in the body • New cell growth
C	• Aid in vision • Supports cell function

(b) Identify any six deficiency symptoms of vitamins in human beings. (6 marks)

(c) Describe a method of determining the presence of vitamin C in an orange fruit. (6 marks)

12. (a) Explain the transformation of amino acids. (8 marks)

(b) Explain the following purification techniques:

(i) cell fractionation; (6 marks)

(ii) membrane separation. (6 marks)

13. (a) Differentiate between acute exposure and chronic exposure. (4 marks)

(b) Table II shows dose response relationship of a chemical administered to 250 laboratory animals.

Table II

Group	Dose	Response	% Response
1	25	0	
2	50	100	
3	75	175	
4	100	225	
5	150	250	

(i) Complete the table above by determining the percentage response of the animals. (5 marks)