

2404/301  
TAXONOMY, ECOLOGY, SOIL STUDY,  
HERBARIUM, AQUARIUM AND  
VIVARIUM  
June/July 2018  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN APPLIED BIOLOGY**

TAXONOMY, ECOLOGY, SOIL STUDY, HERBARIUM,  
AQUARIUM AND VIVARIUM

3 hours

**INSTRUCTIONS TO CANDIDATES**

*You should have an answer booklet and scientific calculator for this examination.  
This paper consists of TWO sections: A and B.  
Answer ALL the questions in section A and any THREE questions from section B.  
Each question in Section A carries 4 marks while each question in Section B carries 20 marks.  
Maximum marks for each part of a question are indicated.  
Candidates should answer the questions in English.*

This paper consists of 4 printed pages.

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

SECTION A (40 marks)

Answer ALL the questions in this section.

mono - one cotyledon  
 - one vascular bundle  
 - parallel leaf venation  
 - have one cotyledon  
 di - two cotyledons  
 - have two vascular bundles  
 - separate sets of organs

1. Distinguish between prokaryotes and eukaryotes in relation to:-

	Pro	Eu	
(a) flagella;	has 70S smaller ribosomes	has 80S larger ribosomes	(2 marks)
(b) ribosomes.	flagella present (which helps in movement)	Absent: movement by means of cilia.	(2 marks)

2. Differentiate between the classes monocotyledoneae and dicotyledoneae. (4 marks)

3. List four common features in both arthropods and annelids. (4 marks)

4. (a) Define "trophic level". (2 marks)

(b) Explain the relationship between gross primary production, net primary production and respiration in an ecosystem. (2 marks)

5. Figure 1 shows part of the nitrogen cycle.

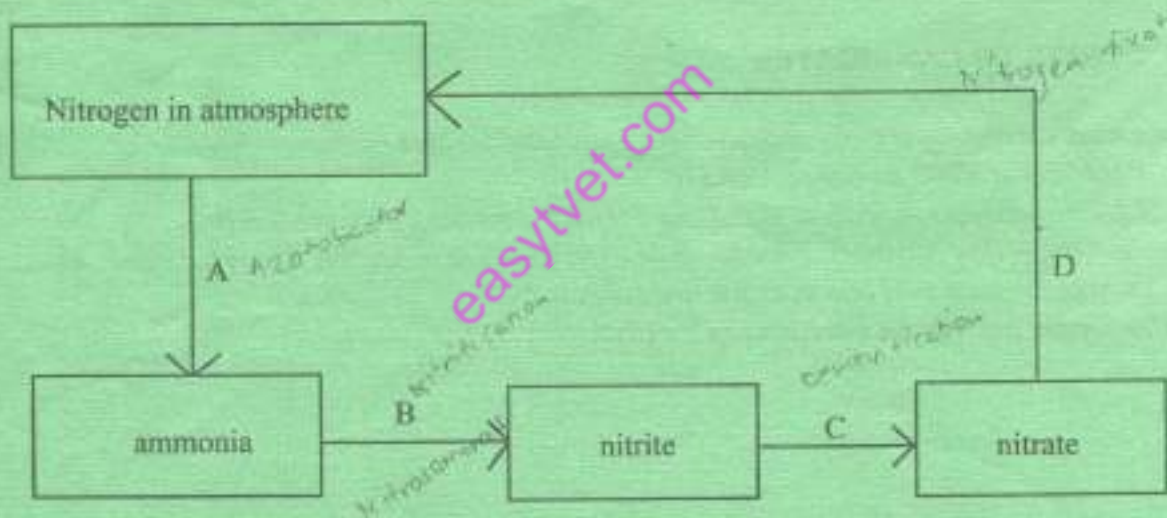


Figure 1

(a) Give the genus of bacteria responsible in each of the reactions A, B, C and D. (2 marks)

(b) Describe the conditions in which the bacteria responsible for reaction D will thrive. (2 marks)

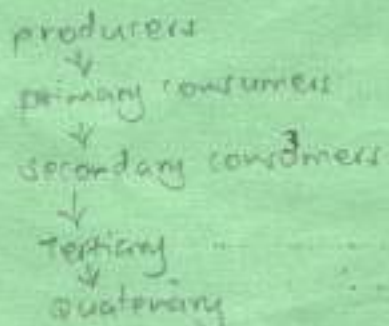
6. The size of a population may be limited by density-dependent factors or density-independent factors. Explain. (4 marks)

7. Define the following terms:
- (a) soil field capacity; (1 mark)
- (b) permanent wilting point; (1 mark)
- (c) available water capacity of soil. (2 marks)
8. List any **four** effects of soil erosion. *disturbed crop growth, may lead to death of animals, may lead to migration* (4 marks)
9. Explain the components of fluid-preserved specimens in a museum. (4 marks)
10. Identify **four** different methods of feeding fish in a fish pond. (4 marks)

### SECTION B (60 marks)

Answer any **THREE** questions from this section.

11. (a) Use a dichotomous key to illustrate the grouping of all living organisms into the five kingdom system of classification. (12 marks)
- (b) (i) Give the **five** classes of the phylum arthropoda. (5 marks)
- (ii) State the general characteristics of class gastropoda. (3 marks)
12. (a) Explain the universal soil loss equation. (4 marks)
- (b) Explain **four** different properties of humus responsible for increased soil fertility. (12 marks)
- (c) Define the following terms:
- (i) tillage pan;
- (ii) soil mottling. (4 marks)
13. (a) Explain the flow of energy in an ecosystem. (10 marks)
- (b) (i) Outline the procedure for estimation of fresh biomass of the producers in a grassland ecosystem. *Through use of capture-recapture* (7 marks)
- (ii) Classify all biotic components of an ecosystem into three classes. (3 marks)



14. Explain the various processes through which light affects activities of living organisms. (20 marks)  
*- photosynthesis, leaf fall, photorespiration, transpiration*
15. (a) Evaluate the importance of herbarium. (10 marks)
- (b) (i) Explain the significance of herbarium plant collection. (6 marks)
- (ii) Outline precautions taken when collecting plants for herbarium. (4 marks)

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