RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

Bachelor of Science in Applied Sciences
Second Year - Semester II Examination – January/February 2023

BIO 2302 – PRINCIPLES OF ECOLOGY

Time: Two (02) hours

Answer <u>FOUR (04)</u> questions.

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1. a) Nitrogen is a component of DNA and of proteins that make up cells, but the nitrogen gas in the atmosphere is in a form most organisms cannot use directly. Describe how "nitrogen fixation" makes the nitrogen gas usable to plants. **(30 marks)**

   b) List <u>six (06)</u> ways that phosphorous cycling differs from nitrogen cycling **(18 marks)**

   c) Discuss the impacts of anthropogenic activity on the nitrogen and sulfur cycles and its contribution for the global warming. **(52 marks)**

2. a) "Species interactions are important for the balancing of ecosystems". What are the different types of species interactions that exist in an ecosystem? Provide examples for each interaction.

   (25 marks)

   b). Citing suitable examples, outline <u>five (05)</u> importance of studying above interactions in ecology.

   (15 marks)

   c). Describe, with suitable examples, how some species use "resource partitioning" to avoid competition. **(60 marks)**

3. Describe the process of ecological succession from a pioneer community to a climax community, taking in to consideration species diversity and interactions, accumulation of biomass and energy flow. **(100 marks)**

4. Muire (1944) made an intensive study of wolves (*Canis lupus*) and Dall mountain sheep (*Ovis d. dalli*) in Mount McKinley National Park in Alaska over a period of several years. Dall sheep possess horns which remain preserved for a long period after the animal dies. The age that a sheep dies can be determined from the horns. Muire collected data on 608 sheep thus providing an impressive set of data from which the age at which these sheep die may be determined. The summarized data is provided in the following table:-

Age (years)	Deaths
0.0.5	54
0.5-1	145
1-2	12
2-3	13
3-4	12
4-5	12
5-6	30
6-7	46
7-8	48
8-9	69
9-10	132
10-11	187
11-12	156
12-13	90
13- 14	3

a) Using the above information, calculate the survivorship schedule for this sheep population.

(64 marks)

b) Sketch the survivorship curve for sheep and speculate what could have caused the qualitative shape of the curve. **(18 marks)**

c) Which age class has:

      i. the highest natality rate?

      ii. the lowest natality rate? **(06 marks)**

d) What is the life expectancy of age 9-10 years and comment on the population growth of this population? **(12 marks)**

5. Write short notes on the followings:

   a) List the difference between K selected and r selected species.

   b) Different types of niches in the ecosystem.

   c) The occurrence of mimicry among plants and animals.

   d) Population Growth models   **(25 marks each)**

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