UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER 2012

TITLE OF PAPER : ECOLOGY

COURSE CODE : B304

TIME ALLOWED : THREE HOURS

INSTRUCTIONS :
1. SECTION A CARRIES 40 MARKS AND IS COMPULSORY
2. CHOOSE ANY TWO QUESTIONS FROM SECTION B, EACH OF WHICH CARRIES 30 MARKS
3. REMEMBER TO USE APPROPRIATE TERMINOLOGY AND ILLUSTRATIONS.

SPECIAL REQUIREMENTS: NONE

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

SECTION A: COMPULSORY QUESTION

QUESTION 1

(a) Using illustrations, explain the global distribution of the major biomes.

(30 Marks)

(b) In a population of 200 caterpillars today, and the daily probability of mortality is 0.10, how many caterpillars would you expect after 4 days? (3 Marks)

(c) If $\lambda = 1.01$ and $N_0 = 100$ what is the expected population size after 25 time steps?

(3 Marks)

(d) Why is species diversity of value to humans? (4 Marks)

(40 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 2

(a) Name two anthropogenic inputs to the N cycle and mention an important source for each.

(4 Marks)

(b) Discuss 3 factors that determine community structure. (12 Marks)

(c) Recall the model of island biogeography proposed by MacArthur and Wilson. Draw two functions in a graph to indicate immigration ("I") and extinction ("E"). On the graph, indicate the expected number of species ("S") and turnover rate ("T") at equilibrium.

(14 marks)

(30 Marks)

QUESTION 3

a) Discuss the factors that control soil formation over a broad geographic range and how interactive controls modify the effects of these state factors? (12 Marks)

b) Explain how soil processes and properties would differ between sites with extremely high and extremely low precipitation under a warm climate. (8 Marks)

c) Define the following terms:

   a. Population
   b. Niche
   c. Foraging
   d. Cohort
   e. Biodiversity (10 Marks)

(30 Marks)

QUESTION 4

A group of researchers was interested in how forest fragmentation affects a species of lizard. They found that in fields, which have greater solar radiation and higher temperatures than forests, this species was found to have a greater risk of mortality due to desiccation.

a) Which of the following processes is the species relying on most in order to maintain reasonable body temperatures while in sunny fields?

   (i) Conductive cooling
   (ii) Convective cooling
   (iii) Evaporative cooling

(2 Marks)

b) Why does this process cool the species (use the concepts of latent and sensible heat in your response)? (4 Marks)

c) Name the four main habitats (ecosystems) in Swaziland. (4 Marks)

d) List 4 invasive alien plant species found in Swaziland. (4 Marks)

e) Discuss the relationship between home range size and body size. (10 Marks)

f) Explain the difference between a home range and territory. (6 Marks)

(30 Marks)

QUESTION 5

(a) Differentiate between adaptation and acclimation. (4 Marks)

(b) Using illustrations, briefly describe the following dispersion patterns of individuals of a population:

i. random
ii. clumped
iii. uniform
iv. dispersed. (12 Marks)

(c) Outline the major levels of organization in ecology including their order of hierarchy. (14 marks)

(30 Marks)