SUPPLIMENTARY FINAL EXAMINATION 2010/2011

UNIVERSITY OF SWAZILAND

PROGRAMME: BSc. ANIMAL SCIENCE III & BSc. ANIMAL SCIENCE DAIRY OPTION III

COURSE CODE: AS 301

**TITLE OF PAPER**: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER QUESTION NUMBER 1 AND ANY OTHER 3 QUESTIONS

THIS PAPER MAY NOT BE OPENED UNTIL THE CHIEF INVIGILATOR HAS GRANTED PERMISSION

1. **(THIS IS A COMPULSORY QUESTION! You must answer this question and any other THREE questions of your choice)**

   Study the pedigree diagram below and answer the questions below the diagram.
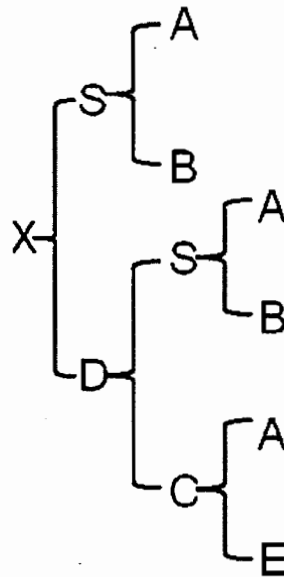
   i.   Convert this pedigree diagram into an arrow diagram. (6)
   ii.   What is the relationship covariance between C and S? (1)
   iii.   What is the relationship covariance between S and D? (4)
   iv.   List any three pairs of animals which are not related in this pedigree. (3)
   v.   List all the animals that are inbred. (2). Explain why you say these animals are inbred? (1)
   vi.   Calculate the inbreeding coefficient of all the animals you listed in (v) above. (8)

2.
   i. If a population is in Hardy Weinberg equilibrium, show the relationship between gene and genotype frequency. (10)
   ii. In Njiri, a wild breed of pig, coat colour is under the control of a single locus with two codominantly inherited alleles. Animals which are homozygous (BB) are black, those which are heterozygous are gray while the homozygous recessive are white.
   A representative sample from a naturally breeding population of these pigs yielded the following numbers: 200 black, 100 gray and 200 white. Is this population in Hardy Weinberg equilibrium? Set alpha error (α) level at 0.05. (15)

3.
   i).   What are the two basic approaches used by animal breeders to improve the genetic make up of animals? (4)
   ii).   List and discuss three methods of selecting animals. (6)

iii). A migration will always cause a change in the gene frequency of the native population. Briefly discuss this statement. (6)

iv). List three approaches for testing bulls for recessive traits? (6)

v). List three broad areas of genetic engineering application in animals. (3)

4.

i). Define the following terms:
   a. Genetic engineering (2)
   b. Full sibs (2)
   c. Mating system (2)
   d. Narrow sense heritability (2)
   e. Selection index (2)

ii). Mr. Johnston is a pig producer. He selects replacement boars from his own herd. Currently he is trying to increase the litter size through selection. Can he select for litter size in the boars? (5)

iii). List five animal traits for which an animal breeder can determine repeatability. (5)

iv). List five quantitative traits of importance in livestock. (5)

5.

a) Write a short assay (not exceeding 2 pages) titled "The importance of animal breeding in rural areas of Swaziland". (10)

b) Write an equation showing the factors which determine the phenotype of an animal. Explain each of the terms in the equation. (10)

c) What is the effect of inbreeding on genotypic and allele frequencies in a population? (5)