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UNIVERSITY OF SWAZILAND

1st SEM. 2015/2016

SUPPLEMENTARY EXAMINATION PAPER

**PROGRAMMES**: B.Sc. ANIMAL SCIENCE III
B.Sc. ANIMAL SCIENCE (DAIRY OPTION) III
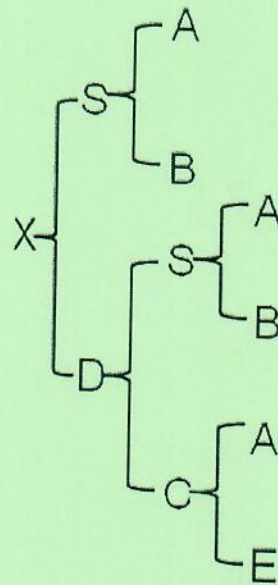
**COURSE CODE**: AS 301

**TITLE OF PAPER**: ANIMAL BREEDING

**TIME ALLOWED**: TWO (2) HOURS

**INSTRUCTIONS**: ANSWER <u>ANY FOUR</u> QUESTIONS

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**Question 1** Study the pedigree diagram and answer the questions below it



a) Convert the pedigree diagram into an arrow diagram.  (6 Marks)
b) What is the relationship covariance between **C** and **S**?  (1 Marks)
c) What is the relationship covariance between **S** and **D**?  (4 Marks)
d) List **any three pairs** of animals which are <u>not</u> related in this pedigree.  (3 Marks)
e) List **all** the animals that are inbred. Explain why you say these animals are inbred?  (3 Marks)
f) Calculate the inbreeding coefficient of **all** the animals you listed in (e) above.  (8 Marks)

## Question 2

a) List <u>six</u> assumptions of the Hardy Weinberg law  (6 Marks)
b) What is E.B.V. and why do we use it instead of B.V.?  (4 Marks)

In Njiri, a wild breed of pig, coat colour is under the control of a single locus with two codominant alleles. Animals which are homozygous (BB) are black, those which are heterozygous are gray while the homozygous recessive are white

d) 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 ($\alpha$) level at 0.05  (15 Marks)

## Question 3

a) What are the **two** basic approaches used by animal breeders to improve the genetic makeup of animals?  (2 Marks)

b) Spider syndrome is a lethal recessive gene with lambs affected being unable to stand and dying soon after birth. Heterozygote animals are normal. A ram (#R306) is mated to five ewes. All the five ewes have previously produced a "spider" lamb. From the matings with ram #R306 each ewe produced a single lamb and all lambs produced were normal. Calculate the level of confidence (L.O.C.) of ram number #R306.  (4 Marks)

c) Given the information in b) above, what is the minimum number of successful matings is required to achieve a level of confidence (L.O.C) of 90%.  (3 Marks)

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

e) Discuss Selection of extremes and Independent culling levels.  (10 Marks)

## Question 4

a) Write an equation that shows the factors which determine selection response. Explain each of the terms in the equation.  (15 Marks)

b) Discuss the effect of negative assortative mating on gene and genotypic frequencies in a population?  (10 Marks)

## Question 5

a) Define the following terms:
 • Random mating  (2 Marks)
 • Selection intensity  (2 Marks)
 • Selection response  (2 Marks)

b) What do you understand by the term genetic engineering?  (2 Marks)

c) Discuss some of the ethical issues that arise with genetic engineering  (4 Marks)

d) Discuss tandem selection  (13 Marks)