



**1<sup>st</sup> SEMESTER 2011/2012**  
**UNIVERSITY OF SWAZILAND**  
**FINAL EXAMINATION PAPER**

**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 ANY 4 QUESTIONS

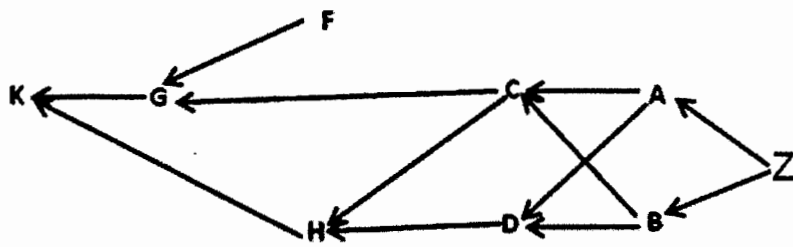
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PERMISSION**

1. (a) Discuss random mating and inbreeding under the following headings. (24)
  - i). Definition
  - ii). Effect on genotypic frequencies
  - iii). Effect on allele/gene frequencies
 (b) Name the two basic tools that can be used in genetic improvement of livestock (1)
2. Briefly discuss the following
  - i). Quantitative vs qualitative traits (provide at least one example of each) (6)
  - ii). Selection differential (4)
  - iii). Heritability (6)
  - iv). Types of ancestry in genetic relationships (4)
  - v). Relationship between selection differential and selection intensity (5)
3. (a) The following variances were calculated for three traits in a herd of pigs (*Sus scrofa*)

Trait	VP	VG	VA
Back fat thickness	40.6	22.3	10.8
Body length	62.4	36.4	13.4
Age to maturity	55.8	38.7	12.8

- i). Calculate broad sense and narrow sense heritability for each trait in this herd (6)
  - ii). Which of these traits would be expected to respond best to artificial selection. Why? (4)
- (b) List any **five** assumptions of the Hardy-Weinberg equilibrium (5)
- (c) A farmer says he heard someone saying he could use grading up to improve his flock of goats from mongrel (mixed breed of unknown genotype) to boar breed. He is not quite sure what is involved and why this approach is preferable. Inform the farmer of the procedure of grading up, list one major advantage as well as show him the expected progenetic make up of his animals over five generations of grading up. (10)

4. Study the pedigree diagram below and answer the questions below it



a) Calculate the relationship coefficient between the following animals

- i). C and H (5)
- ii). H and K (5)
- iii). D and K (5)
- iv). G and C (2)
- v). C and K (2)
- vi). C and D (2)

b) Show the relationship between gene and genotypic frequencies under Hardy Weinberg equilibrium (4)

5. (a) Prof. M. Gumedze is investigating albumin types of ostriches on a commercial ostrich farm. He found that there were two types of albumin, one migrating fast and the other migrating slowly on agarose gel. He also reported that the albumin types exhibit codominance (heterozygotes exhibit the two albumin types). Previous studies have suggested that there may be linkage between the the albumin locus and daily weight gain. He went on to type 1000 ostriches and reported the following information.

Genotype	Ostrich numbers
FF	540
SS	10
FS	450

- i) Calculate the allele frequencies (4)
- ii) What are the expected genotypic frequencies? (6)
- iii) Advance a possible reason for the lower than expected SS in the flock (2)

(b) Discuss tandem selection under the following headings

- i). Definition of tandem selection (2)
- ii). Disadvantages of tandem selection (4)
- iii). Advantages of tandem selection (4)

(c) Why is the mean of progeny produced by a group of selected animals lower that the mean of the selected parents. (3)