MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations 2015/2016

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

DEPARTMENT OF AGRICULTURAL EDUCATION

FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

KRM 204: PRINCIPLES OF ANIMAL BREEDING

DATE: 20/4/2016 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

This paper consists of FIVE questions
Answer question one and other two questions in this paper

QUESTION ONE

a) State Mendel's laws on principles of breeding and inheritance (3 marks)

b) i) List and describe the components of the phenotypic variation (3 marks)

ii) Partition the genotypic variation and describe its components (3 marks)

c) Distinguish between quantitative and qualitative traits (4 marks)

d) Define the following

i) Selection (1 mark)

ii) Selection intensity (1 mark)

iii) Genetic response (1 mark)

iv) Generation interval (1 mark)

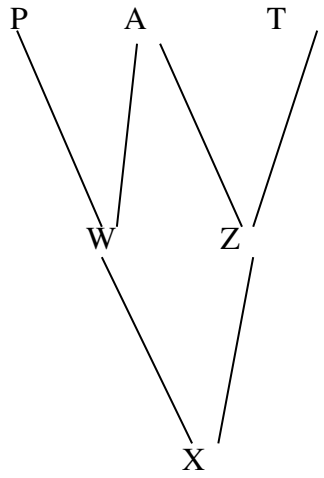
v) Average effect (1 mark)

vi) Heterosis (1 mark)

vii) Inbreading depression (1 mark)

e) Outline the **TWO** major causes of resemblance among siblings (half or full) giving examples in each case (4 marks)

f) Given the pedigree below, calculate the inbreeding coefficient of individual X. (3 marks)



g) What are the consequences of inbreeding (3 marks)

QUESTION TWO

a) Define the following

i. Gene frequency (1 mark)

ii. Population (1 mark)

b) Describe how the factors that influence the proportions of alleles affect their frequencies in populations. (15 marks)

c) In a population of 500 Hereford cattle, the horned trait (h) is a recessive gene and has a frequency of 0.3. What proportion of the allele is phenotypically polled? (3 marks)

QUESTION THREE

a) i) Distinguish between genetic and breeding value. (1 mark)

ii) List down the methods that can be used to estimate breeding values of traits of economic importance in livestock. (5 marks)

b) The information below refers to a trait measured in a livestock population:

Phenotypic variance= 100

Additive variance= 35

Non-additive genetic variance= 5

Permanent environmental variance= 4

Temporary environmental variance = 36

Population average = 7cm

Average of selected parents= 10cm

i) Calculate the heritability estimate (3 marks)

ii) Calculate the repeatability estimate (3 marks)

c) Five litter mate sisters of a boar average 9.2 pigs in their first litter in a herd that has average 8.4. If heritability (h^2) for litter size is 0.15 and correlation between the common environment effect and the phenotype for full sibs (c^2), is 0.39, Calculate:

i) The breeding value estimate of the boar (4 marks)

ii) The accuracy of the breeding value estimate (2 marks)

iii) List two advantages of using repeated measures of the animal's phenotype to estimate breeding values. (2 marks)

QUESTION FOUR

Outline the advances and application of biotechnology in animal breeding (20 marks)

QUESTION FIVE

a) Define Cross breeding (1 mark)

b) Explain the term, 'useful heterosis'. (2 marks)

c) List and describe the reasons for cross breeding. (12 marks)

d) Outline the advantages and disadvantages of rotational crossing using purebred sires. (5 marks)