CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN PLANT BREEDING

AGRI 825: POPULATION AND QUANTITATIVE GENETICS

STREAMS: **TIME: 3 HOURS**

DAY/DATE: WEDNESDAY 11/12/2019 **2.30 P.M – 5.30 P.M**

INSTRUCTIONS
Answer all questions in section 1 and two in section II
Use of calculators is allowed
Do not write on the question paper

SECTION 1; ANSWER ALL QUESTIONS (20 MARKS)
QUESTION ONE

(a) Given the following pedigree (figure 1) construct a table showing the coefficients of relationship between each individual. [10 marks]

Figure 1: Relationship between different individuals.

(b) Wit examples discuss the type of gene actions found in a quantitative loci. [6 marks]

(c) Differentiate between general and specific combining ability. [4 marks]

SECTION TWO :ANSWER TWO QUESTIONS

QUESTION TWO (20 MARKS)

(a) Using a hypothetical locus, derive the equations for estimating additive and dominance genetic variance. [10 marks]

(b) The following data (table 1) was obtained from a cross of two cultivars of rice.

Table 1 : mean and variance in number of spikelets in a cross of two cultivars rice.

Genotype	Number of individuals mean analyzed		Variance ()
	20	24.5	79
	20	25.9	62
	20	24.3	67
	650	25.3	143
	20	24.4	133
	20	24.8	81

(i) Using the equations derived in part (a) above compute the genetic variance and degree of dominance for number of spikeles in rice (table 1) [6 marks]

(ii) Calculate heritability for the number of spikelets in rice (table 1) . [4 marks]

QUESTION THREE (20 MARKS)

Discuss the relative merits of North Carolina Design II and North Carolina design III for estimation of genetic variance . Illustrate your answers with models, matrices, ANOVA and expected mean squares.

QUESTION FOUR (20 MARKS)

(a) Discuss three factors causing change in genetic structure. [10 marks]

(b) Discuss three populations genetics selection models. [10 marks]
