

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

### FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENTION

**BOTA 111: GENERAL GENETICS**

**STREAMS: Y1S2**

**TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 11/8/2016**

**8.30 A.M. – 10.30 A.M.**

---

#### INSTRUCTIONS:

- Answer all questions in section A and any one in section B
- Use illustrations where appropriate to enhance your answers.

#### SECTION A: (50marks)

- (i) Explain the meaning of segregation of alleles. (2marks)
  - (ii) “All genes have allele, one dominant and the other recessive.” Using valid facts and examples, support or dispute this statement. (4marks)
- (a) A garden pea plant that is homozygous for the gene that controls seed texture is crossed with another that is homozygous recessive for the same gene.
    - (i) Give the genotypes of these two plants. (1mark)
    - (ii) Using an appropriate method, predict the phenotypes and phenotypic ratio of the  $F_2$  off spring from this cross. (6marks)
  - (b) The health facility in your village has asked you to lead a group of trainees in transfusing blood to waiting patients. Show how you would guide them by completing the table below. Use a tick ( $\checkmark$ ) and a cross (X) where appropriate. (4marks)

## BOTA 111

		Donor's blood			
Recipients		A	B	AB	O
blood	A				
	B				
	AB				
	O				

3. (a) (i) Explain why the phrase “sex-linked genes” is the same “X-linked genes.” (2marks)
- (ii) Give an example of a sex-linked gene in man. (1mark)
- (b) Explain why genetic disorders caused by recessive sex-linked mutant alleles in human beings are likely to affect males more than females. (4marks)
4. (a) “Mendel was extremely lucky to have used the garden pea plant as his study organism” Explain why. (2marks)
- (b) With the aid of a labeled diagram, describe the structure of a chromosome. (4marks)
5. (a) Distinguish between :
- (i) Mitosis and meiosis. (2marks)
- (ii) Duplication and deletion with regard to mutation. (2marks)
- (iii) Spermatogenesis and oogenesis. (2marks)
- (b) Briefly describe the undesirable effect of a deletion occurring in the short arm of chromosome No.5 in human beings. (3marks)
6. (a) A snapdragon bearing white flowers is crossed to another bearing red flowers.
- (i) Write down the genotypes of these plants. (2marks)
- (ii) Explain why the genotype of the offspring differs from that of the parents. (4marks)
- (iii) Show the genotypes and phenotype of the  $F_2$  progeny from this cross. (*Indicate each step in arriving at your answer*). (5marks)

**SECTION B (20MARKS)**

8. Using examples, describe in detail two methods commonly used in predicting outcomes of genetic crosses. (20marks)
  9. Discuss the structure of the nucleic acids. (20marks)
-