



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

**UNIVERSITY EXAMINATION FOR:**

**BACHELOR OF TECHNOLOGY IN INDUSTRIAL MICROBIOLOGY &**

**BIOTECHNOLOGY**

**AAB 4108: INTRODUCTION TO GENETICS**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**DATE: Pick Date May 2016**

## **Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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## **Question ONE**

- a) i) State the Mendel's Second Law of Inheritance (1 mark)  
ii) Using an example, explain the term "Incomplete dominance" (2 marks)
- b) Explain the application of Mendelian Genetics in Society (3 marks)
- c) Distinguish between  
i) Multiple alleles and polygenes (2 marks)  
ii) Continuous variation and Discontinuous variation (2 marks)
- d) i) Explain the term "Linkage" as used in genetics (2 marks)  
ii) Explain the concept of linkage mapping and its application (3 marks)
- e) Using examples, discuss briefly the concept of extra-chromosomal inheritance (4 marks)
- f) Outline the characteristics of DNA that confirm it as the genetic material (3 marks)

- g) Give **TWO** causes of endogenous DNA damage (2 marks)
- h) Explain **THREE** mechanisms of balancing selection in population genetics (3 marks)

### **Question TWO**

In a cross between pure breeding Lentil plants that produced yellow, round seeds with pure breeding plants that produced green, wrinkled seeds, the two seed traits (colour and texture) were found to be inherited independently. However, the alleles for yellow and round traits were dominant.

- (a) Using appropriate symbols, determine the possible combinations of genotypes and phenotypes produced in the F<sub>1</sub> generation (4 marks)
- (b) Using the Punnett square, predict the phenotypic and genotypic ratios of the F<sub>2</sub> seeds produced when F<sub>1</sub> seeds are self-fertilized (12 marks)
- (c) Explain the results in (a) and (b) above (4 marks)

### **Question THREE**

- a) Discuss the concept of sex determination in man (5 marks)
- b) Explain Lyons hypothesis (4 marks)
- c) Using an example, discuss the inheritance of X-link genes in humans (5 marks)
- d) Describe briefly any **THREE** chromosomal abnormalities in humans (6 marks)

### **Question FOUR**

- a) Describe the Watson-Crick model of DNA (8 marks)
- b) Explain the process of DNA replication (5 marks)
- c) Describe briefly the operon concept in gene regulation (7 marks)

### **Question FIVE**

- a) Discuss the exogenous causes of DNA damage (6 marks)
- b) Discuss the chemical processes involved in induced mutations (10 marks)