



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF TECHNOLOGY IN INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY, AND BACHELOR OF SCIENCE IN FOOD TECHNOLOGY & QUALITY ASSURANCE

SBT 2175/AAB 4203: INTRODUCTION TO GENETICS

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES

2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions

Answer question **ONE** (compulsory) and any other **TWO** questions

Question ONE

- a) Explain the following terms :
- (i) Genome (2marks)
 - (ii) Transcription (2marks)
 - (iii) Translation (2marks)
- b) State and explain Mendel's First Law (3marks)
- c) Explain the importance of cross over in variation (2marks)
- d) (i) Explain the terms sex-linked trait (2marks)
- (ii) Outline the different ways of detecting dominant X – linked genes in human pedigree (4marks)
- e) In a disputed parentage cases the child is blood type O while the mother is blood type A. What blood type would exclude a male from being the father? (3marks)
- f) Explain the non-disjunction in human female gamete that would give rise to Klinefelters and by normal male gametes. (4marks)

- g) Discuss briefly the rationale used by Mendel in relating his monohybrid results to his postulates **(3marks)**
- h) Explain the significance of genetic exchange in the process of evolution **(3marks)**

Question TWO

In a cross between a black and a white guinea pig all members of the F₁ generation are black. The F₂ generation is made up of approximately $\frac{3}{4}$ black and $\frac{1}{4}$ white guinea pigs.

- a) Draw this cross, showing genotypes and phenotype **(6marks)**
- b) Outline the cross showing mating of TWO F₂ white guinea pigs. **(4marks)**
- c) Two different mating were made between black members of the F₂ generation. Illustrate the crosses that showed.
- (i) All black **(4marks)**
- (ii) $\frac{3}{4}$ black $\frac{1}{4}$ white. **(4marks)**
- d) Explain the term “back cross”. **(2marks)**

Question THREE

Pigment in the mouse is only produced when the C allele is present. Individuals of cc. genotype have no colour of colour is present, it may be determined by the A, a alleles AA or Aa results in grey (agouti) colour, while aa result in black coats.

- a) What F₁ and F₂ genotypic ratios are obtained from a cross between AACC and aacc mice? **(6marks)**
- b) In three crosses between grey females whose genotypes were unknown and males of the aacc genotype, the following phenotypic ratios were obtained:
- i) 8 grey; 8 colourless
- ii) 9grey; 10 black
- iii) 4 grey, 5 black; 10 colourless

Work out the genotypes of the female parents in:-

- (i) Above **(4marks)**
- (ii) Above **(4marks)**
- (iii)Above **(4marks)**
- c) Explain the phenomenon demonstrated in (b) above **(2marks)**

Question FOUR

- a) Discuss the theories explaining the replication of DNA **(6marks)**
- b) Explain the concept of complementarity of nucleic acid bases. **(5marks)**
- c) Describe the process of gene regulation in eukaryotes **(9marks)**

Question FIVE

- a) Discuss the major groups of mutagens **(8marks)**
- b) Explain the major mechanisms involved in mutations **(8marks)**
- c) Explain the various ways of preventing mutations **(4marks)**