



UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER 2012/2013

PROGRAMMES: BSc ANIMAL SCIENCE II
BSc. ANIMAL SCIENCE (DAIRY OPTION) II
BSc AGRONOMY II
BSc HORTICULTURE II
BSc AGRICULTURAL EDUCATION II

COURSE CODE: AS 204

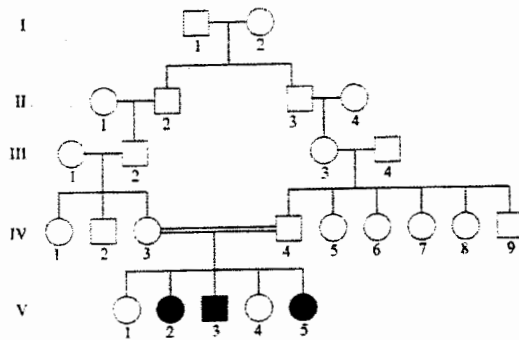
TITLE OF PAPER: PRINCIPLES OF GENETICS

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY 4 QUESTIONS

**THIS PAPER MAY NOT BE OPENED UNTIL THE CHIEF INVIGILATOR HAS
GRANTED PERMISSION**

1.
(a)



- i). What do we call this type of diagram/presentation? (2)
- ii). What is the most likely mode of inheritance depicted? (2)
- iii). Provide two reasons to support your choice of the mode of inheritance in ii) above. (4)
- iv). What do you think is the primary reason for so many individuals in the fifth generation suddenly expressing the trait? (2)
- v). What is the probability that IV.4 is a carrier? (1)
- vi). What is the probability that V.1 is a carrier? (2)
- vii). What is the probability that V.4 does not carry the defective gene? (2)

(b) Give FIVE reasons why Mendel succeeded where many scientists of his time or before his time had failed. (10)

2.

- a) If there is a single nondisjunction event during meiosis I what kind of gametes would be expected at the end of meiosis II? (Use a cell with $2n=2$ and diagrams to illustrate your answer). (8)
- b) Name the exact stage of meiosis in which the centromeres split? (3)
- c) State Mendel's first and second laws being sure to indicate which one is the first and which one is the second law. State a deviation from each of the laws. (8)
- d) Discuss the blending theory of inheritance and present two reasons why it was rejected. (6)

3.

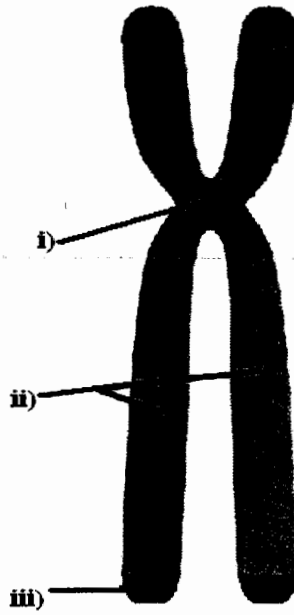
- a) Write notes on the following (6 points each)
 - i). Test crossing
 - ii). Chromosomal synapse
 - iii). Consanguineous marriages
- b) Describe incomplete dominance and codominance in such a way that a class of first year University biology students will clearly understand and be able differentiate these two. Give an example for each of these modes of inheritance. (7)

4.

- a) The pea flower is monoclinal meaning that it has both male and female parts (pistils and stamens) and therefore will normally self fertilize. Clearly explain how Mendel carried out his crossbreeding experiments with such flowers. (6)
- b) What is XXY? Explain how an individual with this genotype may arise. (10)
- c) Why it is that meiosis causes genetic variation whereas mitosis does not? (6)
- d) Explain the term "Recessive lethal". (3)

5.

a) Write the labels for the following diagram in your answer book (2 points each).



b) Using sketches/diagrams show how chromosomes are classified based on the location of their centromere. (6)

c) Describe what events take place in the following phases of the cell cycle (3 points each)

- i). G1 phase
- ii). S phase
- iii). G2 phase
- iv). M phase

d) State a chromosomal situation which leads to downy syndrome. (1)