UNIVERSITY OF SWAZILAND

1st SEM. 2013/2014

FINAL EXAMINATION PAPER

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

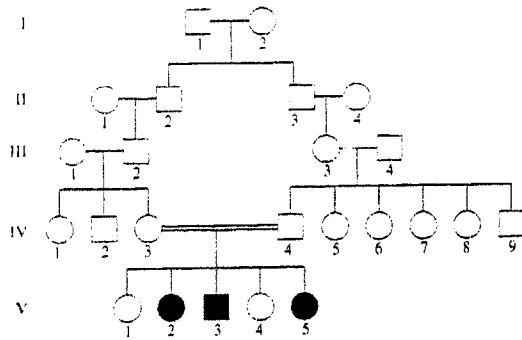TITLE OF PAPER: PRINCIPLES OF GENETICS

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE CHIEF INVIGILATOR

Question 1

(a)

i). What do we call this type of diagram/presentation? **(2 points)**

ii). What is the most likely mode of inheritance in the pedigree above? **(2 points)**

iii). Provide two reasons to support your choice of the mode of inheritance in ii) above. **(4 points)**

iv). What do you think is the primary reason for so many individuals in the fifth generation suddenly expressing the trait? **(2 points)**

v). What is the probability that IV.4 is a carrier? **(1 points)**

vi). What is the probability that V.1 is a carrier? **(2 points)**

vii). What is the probability that V.4 does not carry the defective gene? **(2 points)**

(b) Excluding being lucky, give <u>FIVE</u> reasons why Mendel succeeded where many biologists of his time had failed. **(10 points)**

Question 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 points)**

b) Name the exact stage of meiosis in which the centromeres split? **(3 points)**

c) State Mendel's first and second laws. State a deviation from each of the laws. **(8 points)**

d) Explain the blending theory and give two reasons why this theory was later abandoned. **(6 points)**

Question 3

a) Write short notes on the following

   i). Test crossing **(5 points)**

   ii). Pangenesis **(5 points)**

   iii). Consanguineous marriages **(5 points)**

b) With the aid of an example for each, describe incomplete dominance and codominance inheritance. **(10 points)**

Question 4

a) The pea flower is monoclinous 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 points)**

b) What is XXY? Explain how an individual with this genotype may arise. **(10 points)**

c) Why it is that meiosis causes genetic variation whereas mitosis does not? **(6 points)**

d) Explain the term "Recessive lethal". **(3 points)**

Question 5

a) Write the labels for the following diagram in your answer book **(2 points each)**
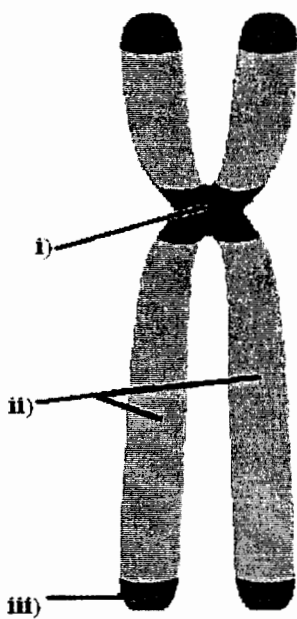
b) Using sketches/diagrams show how chromosomes are classified based on the location of their centromere. **(6 points)**

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

    i). G1phase
    ii). S phase
    iii). G2 phase
    iv). M phase

d) Name one sex linked recessive condition. **(1 point)**