



1ST SEMESTER 2016/2017

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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMMES: BACHELOR OF SCIENCE IN AGRONOMY YEAR THREE
BACHELOR OF SCIENCE IN HORTICULTURE YEAR THREE

COURSE CODE: CP 301

TITLE OF PAPER: CROP BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER QUESTION 1 AND ANY OTHER THREE (3)
QUESTIONS OF YOUR CHOICE

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CHIEF INVIGILATOR

QUESTION 1

Discuss in detail the following terms as they are applied in crop breeding programmes;

- a) Crop breeding as an art and science. (6 Marks)
- b) Inbreeding depression and heterosis (6 Marks)
- c) Combining ability and progeny testing (6 Marks)
- d) Recombinant DNA technology (7 Marks)

[25 MARKS]

QUESTION 2

- a) Discuss in detail how the megagametophyte and the microgametophyte are formed in crop plants. (10 Marks)
- b) What is the role of the megagametophyte and microgametophyte in crop genetics? (3 Marks)
- c) Describe in detail, the Independent Assortment Mendelian Law and its relevance in crop breeding. Your answer should be supported with relevant practical examples, clearly indicating the genotypes and phenotypes involved. (12 Marks)

[25 MARKS]

QUESTION 3

- a) Discuss the role of the CGIAR in germplasm conservation. (18 Marks)
- b) Discuss the need for germplasm conservation in crop breeding programmes. (7 Marks)

[25 MARKS]

QUESTION 4

Growers of a popular green pepper (*Capsicum annum*) - variety 'SWEET GIANT' have observed its susceptibility to a new disease caused by *Fusarium solani*, which results in fruit rots. Supposed you have been hired by the growers to design a breeding programme where you have to incorporate the fruit rot resistance genes (RR) from the wild relative of green pepper (*Capsicum campylopodium*) into the cultivated susceptible variety (rr). Discuss how you can conduct the breeding programme, and your discussion should include the following topics;

- a) Hybridisation of the parents (3 Marks)
- b) Full selection procedure (17 Marks)
- c) Variety testing and release (5 Marks)

[25 MARKS]

QUESTION 5

- a) Define a molecular marker and give any two (2) examples. (5 Marks)
- b) Give the uses of molecular markers in crop breeding programmes. (14 Marks)
- c) Give any three (3) advantages of incorporating molecular markers during the selection stage in crop breeding programmes. (6 Marks)

[25 MARKS]