1ST SEMESTER 2019/2020

UNIVERSITY OF ESWATINI

RE-SIT/SUPPLEMENTARY EXAMINATION PAPER

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

COURSE CODE: CPR 403/CP 301

TITLE OF PAPER: CROP BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ALL QUESTIONS

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

QUESTION 1

a) Discuss the art and science of crop breeding. (6 Marks)
b) Give five specific objectives of crop breeding. (10 Marks)
c) Define crop germplasm and give reasons why it is important in crop breeding. (5 Marks)
d) Discuss the two approaches of crop germplasm conservation. (4 Marks)

[25 Marks]

QUESTION 2

a) Discuss the meaning of all terms in the equation: $V_P=V_A+V_D+V_I+V_E+V_{GXE}$ (12 Marks)

b) Differentiate between broad sense heritability and narrow sense heritability when used in crop breeding. (6 Marks)

c) Discuss the use of the equation in crop breeding programmes: $G_S=K \times \sqrt{V_p} \times h^2b$ (4 Marks)

d) Discuss the non-additive gene action controlling the expression of quantitative traits in crop breeding. (3 Marks)

[25 MARKS]

QUESTION 3

a) Describe floral mechanisms that facilitate cross pollination in the following crop plants;
   i) Spinach (*Spinacia oleracea*) (3 Marks)
   ii) Maize (*Zea mays*) (4 Marks)
   iii) Cauliflower (*Brassica oleracea* var *botrytis*) (5 Marks)
b) What are the genetic implications of cross pollination in crop plants? (3 Marks)
c) Discuss the different reproductive mechanisms involved in gametophytic apomixes. (10 Marks)

[25 MARKS]

QUESTION 4

a) Define the negative and positive mass selection procedures of variety development. (4 Marks)
b) What is the purpose of progeny testing in pure line selection breeding method? (3 Marks)
c) In terms of selection, what are the main differences between the pedigree and bulk population breeding methods? (6 Marks)
d) Define marker assisted selection (MAS) and highlight its advantages in crop breeding programmes. (12 Marks)

[25 MARKS]