EMBU UNIVERSITY COLLEGE

(A Constituent College of the University of Nairobi)

2015/2016 ACADEMIC YEAR

TRIMESTER EXAMINATION

FIRST YEAR EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN PLANT BREEDING AND BIOTECHNOLOGY

ACB 604: ADVANCED PLANT BREEDING

DATE: AUGUST 16, 2016 **TIME: 10:00AM-1:00PM**

INSTRUCTIONS:

Answer ANY FOUR Questions

QUESTION ONE (25 MARKS)

a) Outline the overlapping relationship between plant breeding and plant physiology as scientific disciplines. (2 marks)

b) Explain the applications and the implication of inbreeding in plant breeding programs. (3 marks)

c) Describe the procedure of producing a multiline cultivar. (10 marks)

d) Detail the procedure of producing haploids using chromosome elimination in barley. (10 marks)

QUESTION TWO (25 MARKS)

Write a proposal to the National Council for Science, Technology and Innovation aimed at developing an improved barley cultivar that is resistance to three diseases using marker-assisted gamete selection. (25 marks)

QUESTION THREE (25 MARKS)

a) As a maize breeder working for a seed company, explain the steps you will go about to develop hybrid seed using cytoplasmic male sterility. (10 marks)

b) Explain five features that promote cross-pollination in plants. (5 marks)

c) Organic farming is one of the emerging concepts in modern agriculture. Explain the benefits of participatory plant breeding when developing organic crops.

(10 marks)

QUESTION FOUR (25 MARKS)

a) Consider a population with two alleles 'A' and 'a' classified genotypically as follows:

AA	Aa	aa	Total
16	8	1	25

Calculate the allele frequencies in the population and genotype frequencies after one generation of random mating. (3 marks)

b) Explain the role of environmental variation in plant breeding. (2 marks)

c) Explain the concept of Genotype × Environment interaction in plant breeding.

(10 marks)

d) As a plant breeder, you are required to test 12 varieties, randomized in four replicates across 4 locations over 2 years.

i) Give an experimental design and layout that would fit this study. (3 marks)

ii) Give a linear model for this experiment. (3 marks)

iii) Draw a sample ANOVA showing the source of variation and degrees of freedom.

(4 marks)

QUESTION FIVE (25 MARKS)

a) Explain two advantages and three disadvantages of recurrent selection. (5 marks)

b) Discuss the factors that affect the choice of selection methods in plant breeding.

(10 marks)

c) Explain mass selection procedure stating its applications in plant breeding.

(10 marks)

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