MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

THIRD YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGR 305: PLANT BREEDING

DATE: 20/01/2021 **TIME: 2.00-4.00 PM**

INSTRUCTIONS;

Answer *ALL* questions from Section A and any other *TWO* from Section B:

SECTION A: COMPULSORY: (40 MARKS)

QUESTION ONE

a) Define the following terms in relation to plant breeding

i. Homozygous (2 marks)

ii. Aneuploidy (2 marks)

iii. Apomixis (2 marks)

iv. Chasmogamy (2 marks)

b) i) Explain THREE roles of Mendelian genetics in plant breeding (6 marks)

ii) Differentiate between environmental and hereditary sources of variation (2 marks)

c) Distinguish between *in situ* and *ex situ* forms of preserving germplasm (2 marks)

d) i) Explain THREE conventional methods used by researchers in breeding new green grams varieties (6 marks)

ii) Describe TWO differences between self and cross pollinated crops (4 marks)

e) i) Explain SIX steps used by plant breeders to develop new sorghum varieties (6 marks)

ii) Explain TWO main differences between vertical and horizontal disease resistance (2 marks)

f) Explain TWO factors that affect heritability of genes in breeding new cultivars (4 marks)

SECTION B: Answer Any THREE Questions (60 Marks)

QUESTION TWO

a) Explain FOUR forms of intellectual property rights (IPR) that a plant breeder can sought to be protected (8 marks)

b) Explain FOUR modern methods of plant breeding adopted by researchers to speed up the process of breeding for traits controlled by minor/polygenes (12 marks)

QUESTION THREE

a) Using a backcross illustration, explain how a breeder can develop rice varieties that are resistant to leaf rust disease (11 marks)

b) Explain THREE mechanisms of disease resistance exploited in plant breeding (9 marks)

QUESTION FOUR

a) Explain FOUR breeding methods used to improve field bean varieties (12 marks)

b) Explain THREE mechanisms that enhance self-incompatibility in crops (8 marks)

QUESTION FIVE

a) Explain FIVE roles of plant breeding in crop improvement and sustainable agriculture (10 marks)

b) Explain FIVE ways employed by wheat breeders to generate variation in varieties (10 marks)