



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGR 305: PLANT BREEDING

DATE: 3/12/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS:

- Answer *ALL* questions from Section A and any other *TWO* from Section B
- No PHONES in the examination room
- Do not write on question paper

SECTION A: COMPULSORY: (30 MARKS)

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in plant breeding (4 marks)
- Homomorphic system of self-incompatibility
 - Cleistogamy
 - Selection differential
 - Homozygous lines
- b) With an illustration, distinguish between three way cross and two way cross in outcrossing crops (2 marks)
- c) Explain three factors affecting heritability of genes in breeding new cultivars (3 marks)
- d) Using suitable illustration, explain why Mendelian genetic is important in plant breeding for crop improvement (6 marks)
- e) Explain three reasons why plant genetic resource conservation is important in crop improvement and to the community (3 marks)
- f) Explain three mechanisms of self-incompatibility in breeding crops for high yield (3 marks)

- g) As a plant breeder in charge of developing legumes, describe six steps you would follow in developing a new variety of soybean varieties (6 marks)
- h) Explain three reasons why breeding for high yield using apomixis is difficult (3 marks)

QUESTION TWO (20 MARKS)

- a) With specific examples, explain the role of plant breeding in crop improvement and stability of developed varieties (10 marks)
- b) Explain five ways a wheat breeder can employ to generate variation for utilization in development of superior genotypes (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain five methods a plant breeder can employ in breeding improved varieties in groundnuts (15 marks)
- b) Explain five ways you would employ as a plant breeder to induce breeding and overcome self-incompatibility in crops such as Brassicas (5 marks)

QUESTION FOUR (20 MARKS)

- a) Describe one modern appropriate method that you would use in combining high yield and disease resistance controlled by major gene in beans in an effort to shorten the time taken to release a variety (12 marks)
- b) Plant breeders have rights to protection of their products, explain four forms of intellectual property rights (IPR) a plant breeder can seek to be protected (8 marks)

QUESTION FIVE (20 MARKS)

- a) Explain three mechanisms of disease resistance exploited by plant breeders in an effort to develop horizontal resistance to diseases (9 marks)
- b) With an illustration, describe Marker assisted Recurrent Selection (MARS) method of breeding that you may apply in breeding of new varieties of chickpeas (11 marks)