

**EGERTON UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**SECOND SEMESTER 2011/2012**

**SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN  
AGRICULTURAL EDUCATION AND EXTENSION**

**AGRO 222: PLANT BREEDING**

**SREAM:** BSc AGED L2B3

**TIME:** 2 HRS.

**DAY:**

**DATE:**

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**INSRUCTIONS:**

1. Attempt **BOTH** questions in **SECTION A** and **ANY TWO** in **SECTION B**.
2. Marks are indicated in brackets after each question.

**SECTION A**

Q 1. (a) Name,

- |       |  |                 |
|-------|--|-----------------|
| (i)   | the statutory body in Kenya that certifies seed.                   | <b>(1 mark)</b> |
| (ii)  | the chemical that is commonly used to induce polyploidy in plants. | <b>(1 mark)</b> |
| (iii) | two international institutions that are engaged in plant breeding. | <b>(1 mark)</b> |

(b) Write the formula used to predict genetic gain. **(2 marks)**

(c) Mention,

- |      |  |                  |
|------|--|------------------|
| (i)  | the types of biotechnology commonly used in plant breeding.    | <b>(2 marks)</b> |
| (ii) | the evolved features that enhance cross-pollination in plants. | <b>(4 marks)</b> |

(d) Indicate the possible exploration areas for plant genetic resources. **(3 marks)**

(e) Enumerate the aspects the seed inspectors examine in the field during the seed certification process. **(3 marks)**

(f) Illustrate how a varietal cross is made. **(3 marks)**

Q 2. (a) Define the following terms as used in plant breeding:

- |       |                  |                  |
|-------|------------------|------------------|
| (i)   | Trait            | <b>(2 marks)</b> |
| (ii)  | Gene bank        | <b>(2 marks)</b> |
| (iii) | Transgenic plant | <b>(2 marks)</b> |

(b) Explain,

(i) why plant breeding is defined as an art and a science. (4 marks)

(ii) the concept of gene-for-gene hypothesis in respect to host plant resistance to pests. (4 marks)

(c) State the advantages and disadvantages of mass selection. (4 marks)

## SECTION B

Q 3. Discuss distant hybridization in plant breeding. (16 marks)

Q 4. (a) Explain how response to selection can be maximized. (8 marks)

(b) Elaborate on the breeding strategies of improving apomictic crop plants. (8 marks)

Q 5. (a) (i) What is inbreeding depression? (2 marks)

(ii) The following information on number of pods per plant was derived from a chickpea trial conducted at Egerton University in 2010:

◆ **Table 1: Data on the number of pods per plant for parents 1 (P<sub>1</sub>) and 2 (P<sub>2</sub>).**

P <sub>1</sub>	P <sub>2</sub>
73	53
67	49
70	50
71	52
69	51

◆ Heterosis based on higher parent value = 0.42

Calculate,

(1) the mean value of F<sub>1</sub>. (4 marks)

(2) heterosis based on mid-parent value. (4 marks)

(b) Explain the likely consequences of selfing F<sub>1</sub> and the subsequent generations in **maize** and **beans**. (6 marks)

Q 6. (a) Outline the general procedure of developing hybrid varieties. (6 marks)

(b) With illustration, briefly discuss backcross breeding method. (10 marks)