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| **CHUKA** |  | **UNIVERSITY** |

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN PLANT BREEDING**

**AGRI 823: PLANT CYTOGENETICS**

**STREAMS: M.sc (Y1S2) TIME: 2 HOURS**

**DAY/DATE: TUESDAY 05/10/2021 8.30 A.M. – 10.30 A.M.**

**INSTRUCTIONS**

* **Answer question one (Compulsory) and any other TWO Questions.**
* **Do not write anything on the question paper**

**Question one (20 marks)**

1. Reciprocal translocation heterozygotes produces semi-sterility in diploid plants by generating unbalanced meiotic products. Explain with suitable illustrations. (4 marks)
2. Describe two types chromosomes banding techniques and staining that are used in chromosomal analysis. (4 marks)
3. Discuss the chemical composition of chromosome. (6 marks)
4. Discuss two special types of chromosomes. (6 marks)

**Question two (20 marks)**

Discuss with suitable examples why amphidiploidy has been a major force in specification of plants in nature and artificial synthesis.

**Question three (20 marks)**

1. Discuss the possible barriers that you may experience while making a cross between a cabbage (*Brassica oleracea*) line and a Rapeseed (*Brassica napus*) line, giving potential remedy. (10 marks)
2. What phenotypic ratio would you expect in F1 from a cross between AAAa and Aaaa tetraploid individuals under random chromosome assortment where the A locus is located. (10 marks)

**Question four (20 marks)**

1. Explain with suitable examples the use of alien-addition and alien-substitution lines in crop improvement. (10 marks)
2. Discuss Fluorescent *In Situ* Hybridization with respect to karyotyping, giving its advantages and disadvantage. (10 marks)

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