



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES**

**SPECIAL EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN  
HORTICULTURE**

**2019/2020 ACADEMIC YEAR**

**RESIT EXAMINATION**

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**COURSE CODE: AHT 3412**

**COURSE TITLE: MOLECULAR PLANT BREEDING**

**EXAM VENUE:**

**STREAMS: BSc. Horticulture,**

**DATE:**

**EXAM SESSION:**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer ALL questions in section A and ANY other 2 Questions in section B.**
- 2. Candidates are advised not to write on question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

## **SECTION A [30 MARKS]**

**Answer ALL questions in this Section.**

- 1 a. Define Transcription ( 1 mark)
- b. Explain the importance of methylation state of DNA in gene expression (3 marks)
- c. State and briefly explain the process pre-mRNA goes through to maturation (3 marks)
- d. Using a diagram explain how genes are structured to ensure their expression (3 marks)
- 2 a. Explain polymerase chain reaction( PCR) highlighting the procedure involved (4 marks)
- b. Name two types of plant genes, their regulation site and function (2 marks)
- c. State and explain the vector independent gene transfers (4 marks)
3. a. State and explain applications of genetic engineering in plant breeding (4 marks)
- b. What are the major advantages of using segregating populations for quantitative trait loci ( QTL) mapping analysis ( 4 marks)
- c. Explain how molecular information may improve the efficiency of backcross breeding schemes ( 2 marks)

## **SECTION B [40 MARKS]**

**Answer any TWO QUESTIONS in this Section.**

- Q4. (a) Agro bacterium-mediated gene transfer is a very important phenomenon in molecular biology. Discuss it and its application in plant breeding (20 marks).
- Q5. Discuss the applications and benefits of molecular biology in plant breeding (20 marks).
- Q6. Discuss molecular markers used in plant breeding; highlight their merits, demerits and applications (20 marks).