UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE

ACS 412: GENOMICS AND MOLECULAR BREEDING

DATE: APRIL 9, 2018 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

a) Differentiate the following
   i) Transposable elements and gene prediction (2 marks)
   ii) Candidate gene and epigenetics (2 marks)

b) List any challenges that faced scientists when they tried to sequence the wheat genome for the first time (2 marks)

c) List any four Internet-based genomic computational tools for analyzing sequences (2 marks)

d) Differentiate eukaryotic genomes from prokaryotic genomes (3 marks)

e) Explain four reasons why you would encourage Kenyan farmers to embrace growing *bt* maize (4 marks)

f) Write short notes on the following
   a) Positional cloning (3 marks)

b) Gene silencing (4 marks)

g) Explain the benefits of conducting genome wide association in a bean population (4 marks)

h) Outline the principle of gel-elecrophoresis in detection of DNA polymorphism (4 marks)

QUESTION TWO (20 MARKS)

a) Plant genomics is a mounting and constantly evolving field of study which has gained rapid development of advanced research in the past years. Discuss the value of plant genomics to the society (16 marks)

b) Discuss reasons why DNA is important to living organisms (4 marks)

QUESTION THREE (20 MARKS)

a) Discuss reasons why *Arabidopsis thaliana* has been used as a model organism in genetic experiments to study gene expression (10 marks)

b) Discuss the benefits of genetic mapping to the 21st century (10 marks)

QUESTION FOUR (20 MARKS)

a) Suppose you are to design a microarray experiment for your research. Outline the factors to consider for a successful experiment (8 marks)

b) Mutations are a source of genetic variation in a population. Discuss this statement (12 marks)

QUESTION FIVE (20 MARKS)

a) Discuss the reasons why you would encourage a traditional plant breeder to employ molecular markers in his breeding programme (15 marks)

b) Discuss protein function to an organism (5 marks)

END