UNIVERSITY OF EMBU

<u>2016/2017 ACADEMIC YEAR</u>

<u>FIRST SEMESTER EXAMINATION</u>

<u>THIRD YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE</u>

<u>ACS 305: INTRODUCTION TO POPULATION AND QUANTITATIVE GENETICS</u>

<u>DATE: DECEMBER 2, 2016</u>   <u>TIME: 4:00-6:00PM</u>

<u>INSTRUCTIONS:</u>

<u>Answer Question ONE and ANY other TWO Questions</u>

QUESTION ONE (30 MARKS)

a) i) Many communities don't encourage consanguineous marriages. Explain the reason

(3 marks)

ii) Discuss the main features of polygenic inheritance   (4 marks)

iii) Using a graph, illustrate a population in Hardy-Weinberg equilibrium   (3 marks)

b) i) A wheat plantation has 84000 seedlings out of which 210 seedlings are albinos caused by a recessive gene (rr) in homozygous state. Find the frequency (%) of heterozygous (Rr) plants in this plantation.   (3 marks)

ii) Differentiate between founder effects and population bottleneck   (4 marks)

iii) Discuss the probable causes of inbreeding depression in populations   (3 marks)

c) i) Citing appropriate examples, explain threshold characters   (2 marks)

ii) Alzhemia is a form of mental retardation due to a rare autosomal recessive allele. About 1 in 10,000 elderly people are affected with the disease. Calculate the frequency (%) of carriers (heterozygotes) in this population. (4 marks)

iii) Students in University of Embu were studying skin colour of 100 pigs at the farm.

They found out that 55 (DD) were dark coloured, 30 (Dd) were medium dark and 15 (dd) were white. What was the allele frequency for d and the genotypic frequency for dd. (4 marks)

QUESTION TWO (20 MARKS)

a) A student studying a mutating population was expected to make classifications. Discuss various ways that he used to go about this task. (12 marks)

b) Describe the four main patterns of speciation. (8 marks)

QUESTION THREE (20 MARKS)

a) Discuss the contribution of Nilsson Ehle to understanding of continuous traits. (10 marks)

b) Environment plays a big role in gene expression. Discuss such situations in nature. (10 marks)

QUESTION FOUR (20 MARKS)

a) There are several manifestations of genetic polymorphism in Nature. Discuss (10 marks)

b) Explain factors that influence genetic equilibrium in a population (10 marks)

QUESTION FIVE (20 MARKS)

a) A researcher noted that gene frequencies were fluctuating from time to time. Explain the main factors that were associated with this phenomenon (10 marks)

b) Chromosome number in an organism must be consistent. Discuss situations when this is not adhered to in nature. (10 marks)

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