



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

ANS 241: QUANTITATIVE GENETICS AND ANIMAL BREEDING

DATE: 30/11/2020

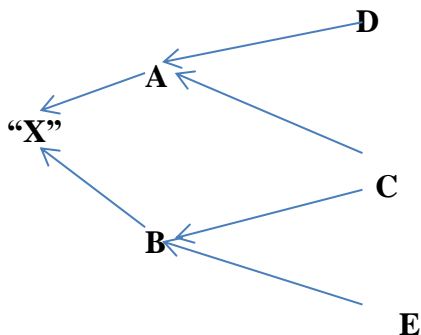
TIME: 2:00 – 4:00 -PM

INSTRUCTIONS:

Answer Question ONE and ANY other Two Questions

QUESTION ONE (30 MARKS)

- a) Explain **FOUR** differences between continuous and discontinuous variation (4 marks)
- b) Using the Mendelian laws of inheritance, explain the causes of the following
 - i. Offspring of Angus cattle are red coat colour, polled; black coat colour, polled; black coat colour, horned and red coat colour horned. (2 marks)
 - ii. Polled and horned individuals in a cattle population when mated result in only polled individuals (2 marks)
- c) Using examples explain the following terminologies
 - i. Complete dominance (2 marks)
 - ii. Additive gene action (2 marks)
- d) Given the pedigree below, calculate the inbreeding coefficient of individual “x” (4 marks)



- e) Distinguish between the following terminologies
- i. Population and base population (2 marks)
 - ii. Qualitative and quantitative traits (2 marks)
 - iii. Inbreeding depression and heterosis (2 marks)
- f) State **FOUR** methods that can be used to estimate the breeding value of livestock (4 marks)
- g) Explain **TWO** disadvantages of using the selection indexes for selecting parents in a breeding program (4 marks)

SECTION B. Answer any TWO questions in this section

QUESTION TWO (20 MARKS)

- a) Explain **FIVE** factors that may change population gene and genotypic frequencies (10 marks)
- b) Dairy farmers in west Pokot want to improve their dairy herds but cannot afford quality bulls for breeding. Explain **FIVE** reasons why artificial insemination will be the best option for them to adopt (10 marks)

QUESTION THREE (20 MARKS)

- a) The data below presents weaning weights for 10 calves.

Calf	1	2	3	4	5	6	7	8	9	10
Weaning weight (kg)	204	183	193	189	173	191	208	203	198	200

- i. Calculate the mean weaning weight of the calves (3 marks)
 - ii. Calculate the variance in weaning weights for the calves (4 marks)
 - iii. If heritability (h^2) estimates for weaning weights trait in beef calves is 0.25, calculate the variance that is due to additive gene action (3 marks)
- b) Explain **FIVE** reasons for cross breeding (10 marks)

QUESTION FOUR (20 MARKS)

- a) Explain **FIVE** disadvantages of hormone use as a biotechnological option for improving livestock production in developing countries (10 marks)
- b) The Kenya Dual Purpose Goat (KDPG) is a synthetic meat and milk breed recently developed by Kenya Agriculture and Livestock Research Organisation by crossing Galla X East African goat X Toggenburg X Anglo-Nubian.
- i. Using illustrations outline the mating steps that could have been followed to arrive at this breed. (5 marks)
- ii. Explain **FIVE**-characteristics that offspring from (i) above are likely to have. (5 marks)

QUESTION FIVE (20 MARKS)

Explain **FIVE** major constraints for the improvement of livestock production in Kenya under the following

- a) Animal breeding and genetic gain (10 marks)
- b) Sector policy (10 marks)