GWANDA STATE UNIVERSITY

FACULTY OF LIFE SCIENCES

DEPARTMENT OF ANIMAL SCIENCE

LAS 2101 ANIMAL BREEDING AND GENETICS 1

End of Semester Final Examination Paper　　　　　　　　　　**November 2019**

This examination paper consists of 3 pages

Time Allowed:	**3 hours**
Total Marks:	**100**
Special Requirements:	**Scientific calculator**
Examiner's Name:	**Mr R. Ndlovu**

INSTRUCTIONS

1. Answer **all** questions in Section A

2. Answer **only two** questions in Section B

MARK ALLOCATION

QUESTION	MARKS
SECTION A	60
SECTION B	40
TOTAL ATTAINABLE MARKS	**100**

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Section A: Answer **ALL** questions

Question 1

a) Define genetics. **[1]**

b) List the **three** subdivisions of genetics and summarise what each covers. **[3]**

c) In a tabular form list the similarities and differences between meiosis and mitosis. **[16]**

Question 2

a) Distinguish between the following terms as used in animal breeding:

  i) homozygous and heterozygous. **[2]**

  ii) phenotype and genotype. **[2]**

  iii) penetrance and expressivity. **[2]**

  iv) Codominance and overdominance. **[2]**

  v) species and breed. **[2]**

b) A group of pigs has a monogenic trait with two alleles A_1 and A_2. Of this group, 375 animals have the genotype A_1A_1, 218 animals have the genotype A_1A_2 and 37 animals have the genotype A_2A_2.

  i) Calculate the genotype frequencies in the group. **[6]**

  ii) Calculate the gene frequencies of the two alleles in the group. **[4]**

Question 3

a) Using examples distinguish qualitative, quantitative and threshold traits indicating heritabilities of the traits. **[11]**

b) Write informative notes on three measures of relationship and how they are important in animal breeding. **[9]**

Section B: Answer any **TWO** questions

Question 4

a) Describe in detail the forces that may lead to a change in gene and genotype frequencies.**[15]**

b) Describe genetic correlation and its significance in selection programs.   **[5]**

Question 5

a) Explain how broad-sense and narrow sense heritabilities differ.   **[5]**

b) In a large herd of cattle, **three** different characters showing continuous distribution are measured, and the variances in the following table are calculated:

	Quantitative traits		
Variance	Shank length	Neck length	Fat content
Phenotypic	320.2	730.4	106.0
Environmental	248.1	292.2	53.0
Additive genetic	46.5	73.0	42.4
Dominance genetic	15.6	365.2	10.6

i) Calculate the broad- and narrow-sense heritabilities for each trait.   **[10]**

ii) In the population of animals studied, which character would respond best to artificial selection? Justify.   **[5]**

Question 6

Discuss the use of biotechnology in livestock improvement programmes under the following headlines:

a) Artificial insemination.   **[10]**

b) cloning.   **[5]**

c) Transgenics.   **[5]**

END OF QUESTION PAPER

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