



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCE
Department of Biological Sciences
2025_2 EXAMINATIONS

BIO403: Population Genetics

Time: 2 Hours

Credit Units: 2

Instruction: Attempt THREE (3) questions only. QUESTION 1 is compulsory.

1. (a) Define Population Genetics (2 marks)
(b) Explain concisely the following in relation to Hardy-Weinberg Equilibrium:
 - (i) Large population size (6 marks)
 - (ii) Random mating (8 mark)(c) In a population of 1000 people. There are 160 recessive homozygous and 480 heterozygous genotypes.
Calculate:
 - (i) their genotypic frequencies (7 marks)
 - (ii) the frequencies of the dominant and recessive alleles (7 marks).

Total Marks = (30 marks)
2. (a) It takes several generations to approach equilibrium frequencies if the alleles are sex-linked and the sexes differ in allelic frequency. Discuss (8 marks)
(b) Write short notes on the following:
 - i. Bottleneck Effect (4 marks)
 - ii. Founder Effect (4 marks)
 - iii. Small Population (4 marks)

Total Marks = (20 marks)
3. (a)i. List any four (4) effects of gene flow on a population (4 marks)
ii. Discuss how natural selection bring about evolutionary changes. (7 marks)
(b) Give a comprehensive description of genetic variability (9 marks)

Total Marks = (20 marks)
4. (a) Discuss the importance of Hardy-Weinberg law in understanding sex-linked traits in a population. (8 marks)
(b) A set of Nigerians have the following multiple alleles of haemoglobin:
Types

AA	AS	SS	AC	SC	CC	Total
2,017	783	4	173	14	11	3,002

Calculate the:
 - i. Genotypic frequencies (6 marks)
 - ii. Allelic frequencies for the haemoglobin variants (6 marks)

Total Marks = (20 marks)
5. (a) Out of 5,320 plants, only 5 % produced white flowers controlled by gene c while the remaining plants produce purple flowers controlled by dominant form of the gene.
Calculate the:
 - i. genetic frequencies of the floral colours within the population of the plants (9 marks)
 - ii. exact number of plants expected to be in each genotypic group (3 marks)(b) Write short notes on the following:
 - i. Adaptation (4 marks)
 - ii. Migration (4 marks)

Total Marks = (20 marks)