



National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Sciences
Department of Pure and Applied Sciences
OCTOBER/NOVEMBER, 2019 EXAMINATIONS

COURSE CODE: BIO403

COURSE TITLE: POPULATION GENETICS

CREDIT: 2 Units

TIME ALLOWED: 2 Hours

INTRUCTION: Answer Question ONE (1) and any other THREE (3) Questions

- 1a. Define the term genetic drift. (2 marks)
- b. Explain how mutation affects evolution (3 marks)
- c. Is there Hardy-Weinberg population in real life? (3 marks)
- d. Enumerate **five** assumptions upon which Hardy-Weinberg law depends. (5 marks)
- e. Hemoglobin variants among Africans where multiple alleles are present are shown in the Table below.

Hemoglobin genotypes:

AA	AS	SS	AC	SC	CC	Total
4,034	1566	8	346	28	22	6,004

Calculate the:

- i. genotypic frequencies. (6 marks)
- ii. allelic frequencies. (6 marks)

2a. Highlight the significance of a Chi square test in population genetics studies (3 marks)

- b. Write **short notes** on the following:
 - i. Migration (4 marks)
 - ii. Selective mating (4 marks)
 - iii. Adaptation (4 marks)

3a. Using Equations, show how allelic frequencies at an X-linked locus can be determined from the genotypic frequencies (3 marks)

- b. Give a detailed description of any three forms of genetic drift you know. (12 marks)

- 4a. It takes over several generations to approach equilibrium frequencies if the alleles are sex-linked and the sexes differ in allelic frequency. Discuss (8 marks)
- b. The number of individuals living in a town is 600. A study showed that the number of Individuals in the town with different M-N blood group phenotypes are as follows:

Phenotype	No. of individuals
M	90
MN	150
N	60

Calculate:

- i. the genotypic frequency. (4 marks)
 - ii. the allelic frequency. (3 marks)
- 5a. State Hardy-Weinberg Law. (3 marks)
- b. In a population of 200,000 people carrying the recessive allele, a, for albinism, there are 200 aa albinos, 196,200 AA and 3,600 Aa heterozygous carriers.
- i. Compute the allelic frequencies in the parent population. (6 marks)
 - ii. Using Hardy-Weinberg equation, predict the number of individuals of each genotype in the next generation. (6 marks)