National Open University of Nigeria

Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja

Faculty of Sciences

Department of Pure and Applied Sciences

NOVEMBER, 2018 EXAMINATIONS

COURSE CODE: BIO403

COURSE TITLE: POPULATION CYTOGENETICS

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. How does mutation affect 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. 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)

3a. What is 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)

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. 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. (3 x 4 = 12 marks)