National Open University Of Nigeria
Plot 91, Cadastral Zone, NnamdiAzikiwe Expressway, Jabi - Abuja
Faculty of Sciences
JANUARY/ FEBRUAR, 2018 EXAMINATIONS

COURSE CODE: BIO 403
COURSE TITLE: POPULATION CYTOGENETICS
CREDIT UNITS: 2
TIME ALLOWED: 2 Hours
INTRUCTION: Answer question ONE (1) and any other THREE (3) questions

1a. Define genetic drift. (2 marks)
 b. State Hardy-Weinberg Law. (3 marks)
 c. 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)
 d. 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. (12 marks)
     i. Compute the allelic frequencies in the parent population.
ii. Using Hardy-Weinberg equation, predict the number of individuals of each genotype in the next generation.

2a.   How can allelic frequencies at an X-linked locus be determined from the genotypic frequencies using Equations (3 marks)
 b. Write short notes on the following:
     i. Selective mating (4 marks)
     ii. Adaptation (4 marks)
     iii. Migration (4 marks)

3a. How does mutation affect evolution? (3 marks)
 b. Give a detailed description of any three forms of genetic drift you know. (3 x 4 = 12 marks)

4a. What is the significance of a Chi square test in population genetics studies? (3 marks)
b. The hemoglobin variants among Australians where multiple alleles are present are shown in the Table below.
emoglobin genotypes:

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

 Calculate:
i. the genotypic frequencies. (6 marks)
ii. the allelic frequencies. (6 marks)

5a. Is there Hardy-Weinberg population in real life? (3 marks)

b. Outline the assumptions upon which Hardy-Weinberg law depends. (5 marks)

c. 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)