National Open University Of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science
OCTOBER/NOVEMBER 2016 EXAMINATION

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

1a. What do you understand by the term genetic drift? (3 marks)
b. Account for any **three** forms of genetic drift. (3 x 4 = 12 marks)
c. In a population of 100,000 people carrying the recessive allele, a for albinism, there are 100 aa albinos, 98,100 AA homozygous none albino carriers and 1,800 Aa heterozygous carriers (10marks)
(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.

2. (a) Explain the significance of a Chi square test in population genetics studies (3 marks)
(b) Calculate:
i. The genotypic
ii. Allelic frequencies for haemoglobin variants among Australians where multiple alleles are present (12 marks)

Hemoglobin genotypes:

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

3. (a) Give a **detailed** account of the fact that it takes over several generations to approach equilibrium frequencies if the alleles are sex- linked and the sexes differ in allelic frequency (8 marks)
(b) The number of individuals living in a town is 300. 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)

4a. Give a detailed description of Founder effect (3 marks)

(b) Write **short notes** on the following:

(i) Selective mating (4 marks)

(ii) Adaptation (4 marks)

(iii) Migration (4 marks)

5. (a) How can allelic frequency be calculated? (3 marks)

(b) A locus that code for transferring a blood protein in *Clethrinomys gapperis*, three genotypes are found at the transferring locus: MM, MJ and JJ in a population of *C. gapperis* trapped in North America in 2010, 12 MM, 53 MJ, 12 JJ individuals are found. Calculate the expected number of individuals with each of the observed genotypes (12 marks)

6. Differentiate between population genetics and transmission genetics (6 marks)

(b) Write **short notes** on the following:

i. Natural selection (3 marks)

ii. Co-dominance (3 marks)

iii. Darwinian fitness (3 marks)