



NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: BIO403
COURSE TITLE: POPULATION CYTOGENETICS

CREDIT UNIT: 2

TIME: 2 HOURS

INSTRUCTION: ANSWER QUESTION ONE (1) AND ANY OTHER THREE (3) QUESTIONS

- 1a. What do you understand by 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 non 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.
- 2a. Account for 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 and
- ii. the allelic frequency. (7 marks)

- 3a. What is the significance of a Chi square test in population genetics studies? (3 marks)
- b. A locus that code for transferring a blood protein in *Clethrionomys 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)

4. Calculate i. the genotypic and ii. allelic frequencies for hemoglobin variants among Australians where multiple alleles are present. (15 marks)

Hemoglobin genotypes:

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

- 5a. Distinguish between population genetics and transmission genetics. (6 marks)

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

- i. Complete dominance (3 marks)
- ii. In complete dominance (3 marks)
- iii. Co-dominance (3 marks)

- 6a. 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)