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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: BIO 403**

**COURSE TITLE: POPULATION CYTOGENETICS**

**TIME ALLOWED: 2 Hours**

**INTRUCTION: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER THREE QUESTIONS**

1. (a) Define genetic drift.(3 marks)

(b) In a population of 100,000 people carrying the recessive allele, a for albinism,

there are 100 aa albinos, 98,100 AA and 1,800 Aa heterozygous carriers.

 (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. (10 marks)

 (c) Give a detailed description of any **three** forms of genetic drift. (4 x 3 = 12 marks)

1. (a) Account for how allelic frequencies at an X-linked locus can be determined from the

genotypicfrequencies?(3 marks)

 (b) A locus that code for transferring a blood protein in *Clethrinomysgapperis*,

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)

 3. (a) Enumerate the significance of a Chi square test in population genetics studies?

(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. (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

4. (a) 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 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

ii. the allelic frequency. (7 marks)

5. (a)What do you understand by sex-linked traits? (3 marks)

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

 (i) Selective mating(4 marks)

(ii) Adaptation(4 marks)

(iii) Migration (4 marks)

6. (a) Give a detailed description founder effect. (3 marks)

 (b) Calculate the genotypic and allelic frequencies for hemoglobin variants among

Australians where multiple alleles are present. (15 marks)

Hemoglobin genotypes:

AA AS SS AC SC CC Total

4,034 1566 8 356 28 22 6,004