BIO403: Population Genetics
Time: 2 Hours
Credit Units: 2
Instruction: Attempt THREE (3) questions only. QUESTION 1 is compulsory.

1. (a) Define Population Genetics (2 marks)
   (b) Explain concisely the following in relation to Hardy-Weinberg Equilibrium:
       (i) Large population size (6 marks)
       (ii) Random mating (8 mark)
   (c) In a population of 1000 people. There are 160 recessive homozygous and 480
       heterozygous genotypes.
       Calculate:
       (i) their genotypic frequencies (7 marks)
       (ii) the frequencies of the dominant and recessive alleles (7 marks).
       Total Marks = (30 marks)

2. (a) It takes several generations to approach equilibrium frequencies if the alleles
       are sex-linked and the sexes differ in allelic frequency. Discuss (8 marks)
   (b) Write short notes on the following:
           i. Bottleneck Effect (4 marks)
           ii. Founder Effect (4 marks)
           iii. Small Population (4 marks)
       Total Marks = (20 marks)

3. (a)i. List any four (4) effects of gene flow on a population (4 marks)
       ii. Discuss how natural selection bring about evolutionary changes. (7 marks)
   (b) Give a comprehensive description of genetic variability (9 marks)
       Total Marks = (20 marks)

4. (a) Discuss the importance of Hardy-Weinberg law in understanding sex-linked traits
       in a population. (8 marks)
   (b) A set of Nigerians have the following multiple alleles of haemoglobin:
   Types

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

   Calculate the:

       i. Genotypic frequencies (6 marks)
       ii. Allelic frequencies for the haemoglobin variants (6 marks)
       Total Marks = (20 marks)

5. (a) Out of 5,320 plants, only 5 % produced white flowers controlled by gene c while the
       remaining plants produce purple flowers controlled by dominant form of the gene.
       Calculate the:
       i. genetic frequencies of the floral colours within the population of the plants (9 marks)
       ii. exact number of plants expected to be in each genotypic group (3 marks)
   (b) Write short notes on the following:
       i. Adaptation (4 marks)
       ii. Migration (4 marks)
       Total Marks = (20 marks)