

**BOWEN UNIVERSITY, IWO**  
**COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE**  
**2022/2023 FIRST SEMESTER EXAMINATION**  
**PAB 401: POPULATION GENETICS**  
**THEORY**

Answer *any three* questions.

*Time allowed: 2 hrs. 15 min.*

1. (a) Genetic information contained in DNA to build proteins involves a few distinct steps. List and discuss. (12 marks)  
(b) Discuss the origin of population genetics (10 marks)  
(c) Enumerate any **three** different varieties of proteins present in the human body. (3 marks)
2. (a) List the seven pea plant characters Gregor Mendel chose for his breeding experiments. (14 marks)  
(b) Write concisely on the term "Testcross" (11 marks)
3. (a)(i) State the Hardy-Weinberg principle (2 marks)  
(ii) Enumerate the necessary conditions for the Hardy-Weinberg equilibrium to operate on a population of individuals: (6 marks)  
(b) The allele frequency of **D** is 0.6 and **d** is 0.4. If the population is in Hardy-Weinberg equilibrium, what is the frequency of heterozygotes? (5 marks)  
(c) The inability to taste a bitter substance, phenylthiocarbamide (PTC) is due to a recessive allele. The phenotypic frequency of non-tasters is 0.3. Assuming there are two alleles in the population, **T** (for tasters) and **t** (for non-tasters); and the population is in Hardy-Weinberg equilibrium, Calculate the frequency of these two alleles. (12 marks)
4. Write short notes on the following:  
(a) Gene Flow and its overall effect on a population (5 marks)  
(b) Genetic drift, causes and effects (5 marks)  
(c) Non-random mating and its effects (5 marks)  
(d) Darwinian Natural Selection and Evolution (6 marks)  
(e) Selection Coefficient and Relative Fitness (4 marks)
5. (a) Concisely discuss the role of **chromosomal mutation** on evolution. (10 marks)  
(b) Using a chart or schematic diagram, demonstrate how the modern bread wheat (*Triticum aestivum*) was derived. (5 marks)  
(c) Discuss the advantages offered by Molecular Data when studying the process and patterns of Evolution (10 marks)