



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**SPECIAL EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION  
SCIENCE WITH IT**

**MAIN CAMPUS - REGULAR**

**COURSE CODE: SZL 103**

**COURSE TITLE: INTRODUCTION TO GENETICS AND  
EVOLUTION**

**EXAM VENUE: STREAM: (BSC. BIO)**

**DATE: EXAM SESSION:**

**TIME: 2 HOURS**

**Instructions:**

- 1. Answer ALL questions in Section A and Any two questions in Section B**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

### **SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)**

1. Explain the following theories of heredity:
  - a. Pangenesis (1 mark)
  - b. Preformationism (1 mark)
  - c. Lamarckism (1 mark)
2. State the Boveri-Sutton chromosome theory of inheritance. (3 marks)
3. Distinguish between the following terminologies:
  - a. Genotype and phenotype. (1 mark)
  - b. Dominant and recessive. (1 mark)
  - c. Monohybrid and dihybrid crosses. (1 mark)
4. Describe the basis of Darwin's theory of evolution by natural selection. (3 marks)
5. Make a distinction between anagenesis and cladogenesis. (3 marks)
6. Outline the sources of genetic variation. (3 marks)
7. Define altruism and explain its overall benefit to a species. (3 marks)
8. Describe the three possible ways through which natural selection can act on a character. (3 marks)
9. Define radioactive clocks and explain their role in studying evolution. (3 marks)
10. Outline any three molecular techniques used in genetic studies of evolution. (3 marks)

### **SECTION B: ESSAY QUESTIONS (40 MARKS)**

- 11) In pigeons, a dominant allele *C* causes a checkered pattern in the feathers; its recessive allele *c* produces a plain pattern. Feather coloration is controlled by an independently assorting gene; the dominant allele *B* produces red feathers, and the recessive allele *b* produces brown feathers. Birds from a true-breeding checkered, red variety are crossed to birds from a true-breeding plain, brown variety.
  - a) Predict the phenotype of their progeny. (3 marks)
  - b) If these progeny are intercrossed, what phenotypes will appear in the F<sub>2</sub>, and in what proportions? (7 marks)
  - c) Use Mendel's laws of heredity to explain the results obtained in the F<sub>2</sub> generation.
- 12) Give an account of the hominid evolution citing the probable selective forces that guided it. (20 marks)
- 13) Discuss the concept of adaptive radiation citing examples of placental mammals and the horse family (20 marks).
- 14) Discuss the conflict between Mendelism and Darwinism and its resolution. (20 marks)