

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCE WITH IT AND BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES**

FIRST YEAR FIRST SEMESTER 2018/2019 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE: SZL 103/ SBI 3113
COURSE TITLE: INTRODUCTION TO GENETICS AND EVOLUTION
EXAM VENUE: STREAM: (BED/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) Describe the short comings of the theories of heredity listed below:
 - a) Pangenesis (1.5 marks)
 - b) Preformationism (1.5 marks)
- 2) Explain Jean-Baptiste Lamarck's theory of transformism. (3 marks)
- 3) Explain the reasons why Charles Darwin's theory of evolution by natural selection was originally discounted. (3 marks)
- 4) Define the allelic interactions listed below:
 - a) Dominance (1 mark)
 - b) Codominance (1 mark)
 - c) Semi-dominance (1 mark)
- 5) State Mendel's first and second laws of heredity. (3 mark)
- 6) Describe Sutton's experiments that lead to the postulation of the chromosomal theory of inheritance. (3 mark)
- 7) Explain how tautomeric shifts cause genetic mutations. (3 mark)
- 8) Outline any three preconditions for natural selection to occur. (3 mark)
- 9) Distinguish between phyletic gradualism and punctuated equilibrium as models of evolution. (3 mark)
- 10) Explain how protein electrophoresis may be used to investigate genetic variation in a population. (3 mark)

SECTION B: ESSAY QUESTIONS (40 MARKS)

- 11) In corn, purple kernels are dominant over yellow kernels, and full kernels are dominant over shrunken kernels. A corn plant having purple and full kernels is crossed with a plant having yellow and shrunken kernels, and the following progeny are obtained:
 - purple, full 112
 - purple, shrunken 103
 - yellow, full 91
 - yellow, shrunken 94
 - a) What are the most likely genotypes of the parents and progeny? (10 marks)
 - b) Test your genetic hypothesis with a chi-square test. (10 marks)
- 12) Discuss the different types of chromosomal aberrations. (20 marks)
- 13) Using the example of the Galapagos finches, explain how adaptive radiation may lead to speciation. (20 marks)
- 14) Give an account of the human evolution based on the fossil record evidence. (20 marks)