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**OFFICE OF THE DEPUTY PRINCIPAL**
**ACADEMICS, STUDENT AFFAIRS AND RESEARCH**

# UNIVERSITY EXAMINATIONS

# 2020 /2021 ACADEMIC YEAR

**FOURTH YEAR FIRST SEMESTER MAIN EXAMINATION**

# FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

**COURSE CODE:** **BOT 400E**

**COURSE TITLE:** **ADVANCED GENETICS**

**DATE:** 9TH MARCH 2021 **TIME: 9.00 A.M – 12.00 P.M**

## INSTRUCTIONS TO CANDIDATES

- **SEE INSIDE**

**THIS PAPER CONSISTS OF 3 PRINTED PAGES** **PLEASE TURN OVER**

**REGULAR – MAIN EXAM**

**BOT 400E: ADVANCED GENETICS**

**STREAM: BED (SCIENCE)** **DURATION: 3 Hours**

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**INSTRUCTIONS TO CANDIDATES**

i. *Answer **ALL** questions from section A and any **THREE** from section B.*

ii. *Diagrams should be used whenever they serve to illustrate the answer.*

iii. *Do not write on the question paper.*

**SECTION A (24 MARKS)**

**Question One**

a) Highlight four advantages of *Pisum sativum* over other experimental organisms in genetics. (4 Marks)

b) Differentiate between:-

i. Homogametic sex and Heterogametic sex (2 Marks)

ii. Dorminant allele and Recessive allele (2 Marks)

c) Write notes on: -

i. Gene pool (1 Mark)

ii. Allele frequency (2 Mark)

d) State the principle of independent assortment. (1 Mark)

**Question Two**

a) Define a multiple allele. (2 Marks)

b) Outline three advantages of euploidy in domestic plants. (3 Marks)

c) Cystic fibrosis occurs in the population with a frequency of 1 in 2200. Calculate the frequency of the carrier genotype. [**HINT:** Carrier is heterozygous genotype] (5 Marks)

d) Precisely describe outbreeding in plant breeding. (2 Marks)

**SECTION B (36 MARKS)**

**Question Three**

a) Define Hardy-Weinberg equilibrium. (1 Mark)

b) State six prevailing conditions in a Hardy-Weinberg equilibrium. (3 Marks)

c) Discuss factors producing changes in populations. (8 Marks)

**Question Four**

A homozygous purple-flowered short-stemmed plant was crossed with a homozygous red-flowered long -stemmed plant and the $F_1$ generation was test crossed with a double homozygous recessive plant, the following progeny were produced.

52 purple flower, short stem

47 purple flower, long stem

49 red flower, short stem

45 red flower, long stem

Explain these results. (12 Marks)

**Question Five**

a). Describe a gene as:-

i. A unit of recombination (2 Marks)

ii. A unit of function (2 Marks)

b) Explain four main features of a genetic code. (8 Marks)

**Question Six**

Outline the events that occur during the process of protein synthesis. (12 Marks)

**Question Seven**

There are three types of selection process occurring in natural and artificial populations. Discuss. (12 Marks)

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