THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. DEGREE PROGRAMME – LEVEL 04

FINAL EXAMINATION – 2013/2014

BOTANY

BOU2101/BOE4101 – GENETICS and EVOLUTION

DURATION : TWO (02) HOURS

DATE : 13th June, 2014 TIME : 9.30 – 11.30 a.m.

ANSWER **FOUR (04)** QUESTIONS SELECTING AT LEAST **ONE (01)** FROM EACH PART.

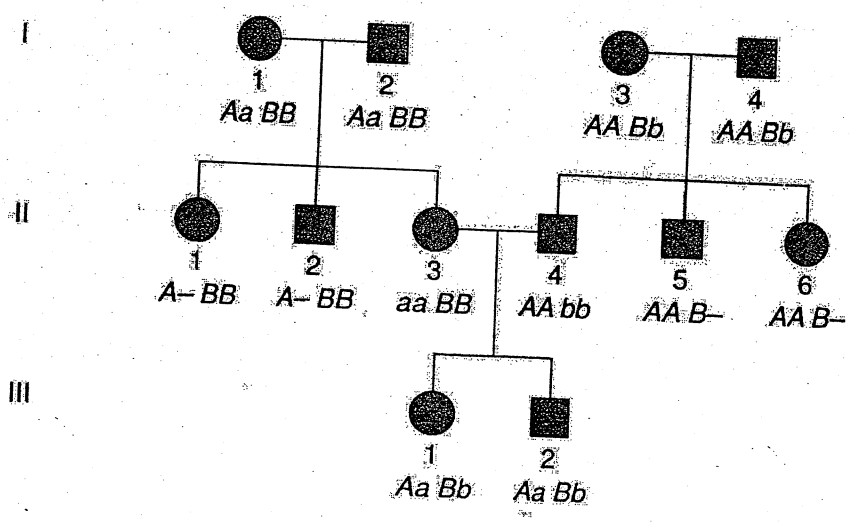
Answers to the questions in Part A and Part B should be written in separate answer books.

PART A

1.

A) Briefly explain the importance of Pedigree Analysis.

B) The following pedigree gives the pattern of inheritance that might be expected for a disease which is caused by two different genes, as for example several types of deaf-mutism in humans. Assume that individuals II-3 (who is deaf) and I-4 in this pedigree have a child.



i) What are the possible genotypes from this mating? and

ii) The probability that the child will be deaf?

Although individuals III-1 and III-2 in this pedigree have normal hearing, their parents were both deaf.

iii) What proportions of the progeny of a mating between two individuals with the genotype of these individuals would be expected to have normal hearing?

2.

A) Three-point crosses are useful in learning about the nature of gene linkage. Briefly explain.

B) A homozygous claret (*ca* = ruby eye colour), curled (*cu* = upcurved wings), fluted (*fl* = creased wings) fruit fly is crossed to a pure-breeding wild type fly. The F_1 females are testcrossed with the following results:

4	Fluted
173	Claret
26	Curled
24	Fluted, Claret
167	Fluted, Curled
6	Claret, Curled
298	Fluted, Claret, Curled
302	Wild-type

a) Are the loci linked?

b) If the loci are linked, give the gene order and map distance.

c) What were the linkage relationship between alleles at the Fluted & Claret, and Fluted & Curled loci?

3.

A) In order to determine the genotypes of the offspring of a cross where a corn trihybrid (AaBbCc) was selfed, a geneticist has three choices. He or she can take a sample of the progeny and,

i) self-fertilize the individual plants,

ii) testcross the plants or

iii) cross the individuals with a trihybrid (backcross)

Which method is preferred? Explain

B) In onions three bulb colours segregate: red, yellow, and white. A red parent is crossed to a white parent and all the offsprings are red. When these are selfed, the following data are obtained:

Red	119
Yellow	32
White	9

What is the mode of inheretance and how do you account for the ratio?

C) Corn has a colour gene and height gene with the following phenotypes:

CC. Cc:	purple	*TT*:	tall
cc:	white	*T*t:	medium height
		tt:	dwarf

If a dihybrd is selfed, give the resulting proportions of genotypes and phenotypes produced.

PART B

4. Describe the process of specialization giving suitable examples.

5. Explain how the process of natural selection operates.

6. Write short notes on any **three** of the following

   a. *Homo erectus*

   b. The Miller Urey Experiment

   c. Body cavities of metazoans

   d. Pleistocene epoch

   e. Evolution of the horse