THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. DEGREE PROGRAMME – LEVEL 04

FINAL EXAMINATION – 2010/2011

BOTANY

BOU 2101/BOE 4101 – GENETICS and EVOLUTION

DURATION : TWO (02) HOURS

DATE : 22nd December 2010 TIME : 1.00 – 3.00 p.m.

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

PART A

1.

A) Explain what is meant by

i) Lethal factors.

ii) Co-dominance (Incomplete dominance).

B) A pair of co-dominant alleles is known to govern cotyledon leaf colour in soybeans. The homozygous genotype $C^G C^G$ produces dark green, the heterozygous genotype $C^G C^Y$ produces light green, and the other homozygous genotype produces yellow leaves so deficient in chloroplasts that seedlings do not grow to maturity.

i) If dark green plants are pollinated only by light green plants, what genotypic and phenotypic ratios would be expected in the mature progeny plants ?

ii) If light green plants are self-pollinated, determine the phenotypic and genotypic ratios in the seedling progenies.

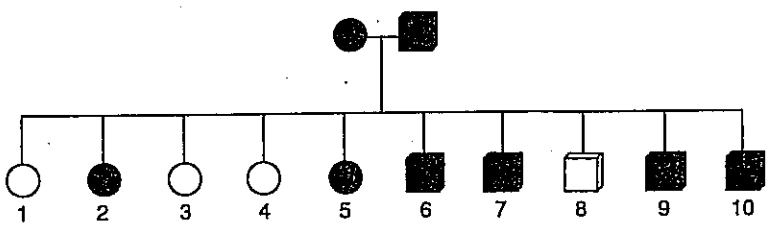
2.

A) Briefly explain the following.

i) Penetrance.

ii) Expressivity.

B) The affected individuals in the accompanying pedigree are chronic alcoholics (data from the National Institute of Alcohol Abuse and Alcoholism).



i) Explain the inheritance of this trait.

3.

A) Explain briefly the importance of three-point crosses in learning about the nature of gene linkage.

B) In *Drosophila*, kidney-shaped eye (*k*), cardinal eye (*cd*), and ebony body (*e*) are three recessive genes. If homozygous kidney, cardinal females are crossed with homozygous ebony males, the F_1 offspring are all wild-type. If heterozygous F_1 females are mated with kidney, cardinal, ebony males, the following 2,000 progeny appear:

880 kidney, cardinal	49 kidney
887 ebony	46 ebony, cardinal
64 kidney, ebony	3 kidney, ebony, cardinal
67 cardinal	4 wild-type

i) Determine the chromosomal composition of the F_1 females.

ii) Calculate the map distance between the linked genes and the gene order.

PART B

4. Discuss hominid evolution based on the fossil evidences from the last five million years.

5.

A) Write an account on speciation paying special attention to the type of speciation that occurs at the geographical level giving examples.

B) Explain the impact of extinction on evolution.

6. Write short notes on **two (2)** of the following.

i) Pre-zygotic isolating mechanisms.

ii) Hardy-Weinberg Principle.

iii) The Mesozoic era.

iv) The Miller - Urey Experiment, Re-creation of the Primeval Atmosphere.