



THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04 – 2015/2016

Botany – BOU2101 – Genetics and Evolution

ASSESSMENT TEST – OPEN BOOK TEST (OBT)

Reg. No. -----

DURATION : ONE HOUR (4.15. to 5.15 p.m.)

DATE : 19. 04. 2016

ANSWER ALL QUESTIONS

(This paper contains four (04) questions and five (05) pages)

1.

(a) What is Penetrance?

(b) Explain the term Expressivity.

(c) What are the possible reasons for incomplete penetrance and variable expressivity?

(d) The hairy chest is a human trait found in men. This shows reduced penetrance. The possible reasons could be either due to Y linkage or autosomal inheritance. Explain both mechanisms with the help of complete pedigree diagrams.

2. There were two pairs of genes i.e. C/c and D/d considered in a rice breeding programme.

The F_1 progeny resulting from a cross between two homozygous rice lines for the above alleles were testcrossed, resulting the following testcross progeny.

CD	810
Cd	278
cD	281
cd	801

(a) Comment on the linkage relationship of these two genes? Explain your answer

(b) If the two genes are linked, state the amount of recombination occurred between them.

(c) Give the genotypes of the original parents produce the F_1 s.

3.

(a) Explain the term Heritability.

(b) The total genetic variance of 150 day body weight in a population of swine is 240 lb². The environmental variance is 340 lb². Calculate the heritability estimate of this particular swine trait?

(c) Measuring heritability for a group of organisms in two different environments, or for two different populations in the same environment may give different results.

Explain briefly the reason/s for this.

4.

(a) What is Epistasis ?

(b) Two white flowered strains of *Lathyrus odoratus* were crossed, producing an F_1 with only pink flowers. Random crossing among the F_1 produced 96 progeny plants, 53 exhibiting pink flowers and 43 with white flowers.

i) What phenotypic ratio is illustrated by the F_2 ?

ii) What type of interaction is involved?

iii) What were the probable genotypes of the parental strains?
