



THE OPEN UNIVERSITY OF SRI LANKA  
B. Sc. DEGREE PROGRAMME – LEVEL 04 – 2011/2012  
Botany – BOU 2101/ BOE 4101 – Genetics and Evolution

ASSESSMENT TEST II – OPEN BOOK TEST (OBT)

Reg. No. \_\_\_\_\_

DURATION : ONE HOUR(11.00 am to 12.00 noon)      DATE : 22.10.2011

ANSWER ALL QUESTIONS

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

1.

a) What are lined genes?

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b) In rice, two pairs of genes ie. R/r and W/w are going to be considered in a research program to develop a better rice cultivar. The F<sub>1</sub> progeny obtained from a cross between two homozygous rice cultivars were testcrossed.

The following testcross progeny was observed,

<i>RW</i>	720
<i>Rw</i>	188
<i>rW</i>	191
<i>rw</i>	711

i) State whether these two genes are linked ? If yes, explain your answer

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

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iii) Predict the genotypes of the original parents of  $F_1$  s.

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2. An insect from a strain breeding true for white eyes was crossed to an insect from a strain breeding true for red eyes. The  $F_1$ s all had red eyes. The  $F_1$ s were crossed to produce an  $F_2$  generation that consisted of 175 red eyed: 62 cream eyed: 81 white eyed.

a) Which phenomenon is illustrated by the results?

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b) Provide genotypes for the parents,  $F_1$ s and  $F_2$ s of this cross.

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\_\_\_\_\_  
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c) Illustrate the biochemical pathway that best explains the steps in pigment Production, and indicate the step affected by the gene.

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\_\_\_\_\_

3.

a) Heritability of genes is very important in breeding programs. What is heritability ?

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b) What is the relationship between heritability and environment?

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c) The total genetic variance of 3-months body weight in a population of a trout fish variety is 350 lb<sup>2</sup>. The environmental variance is 430 lb<sup>2</sup>. What is the heritability estimate of this trait ?

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4.

In pumpkin the genes for groved (g), hairless (hl) and fleshy (fl) are known to be linked. Plants heterozygous for these gene pairs,  $g^{+}g \ hl^{+}hl \ fl^{+}fl$  were testcrossed and the progeny is listed below.

Phenotypes of progeny			Number
smooth	hairless	normal	140
groved	hairy	fleshy	141
smooth	hairy	fleshy	8
groved	hairless	normal	10
smooth	hairy	normal	98
groved	hairless	fleshy	101
groved	hairy	normal	2
—	—	—	0
			500

a) What is the correct sequence of these linked genes?

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b) What are the map distances between the loci?

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