THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04 – 2013/2014

Botany – BOU2101 – Genetics and Evolution

ASSESSMENT TEST – OPEN BOOK TEST (OBT)

Reg. No. ----------

DURATION : ONE HOUR (2.30p.m. to 3.30p.m.) DATE : 07. 04. 2014

ANSWER ALL QUESTIONS
(This paper contains four (04) questions and six (06) pages)

1. The gene (*r*) for white eyes in *D. melanogaster* is recessive and sex-linked.; males are heterogametic.

   a) Symbolize on the chromosomes the genotype of a white-eyed male, red-eyed male, red-eyed female (two genotypes), and white-eyed female.

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2. The shape and the colour of turnips are controlled by two independent pairs of alleles that show no dominance; each genotype is distinguishable phenotypically. The colour may be red (AA), purple (A^1A), or white (A^1A^1) and the shape may be long (BB), oval (B^1B) or round (B^1B^1).

   Using the Punnet square method, diagram a cross between red, long ($AABB$) and white, round ($A^1A^1B^1B^1$) turnip and summarize the F_2 results under the headings phenotypes, genotypes, genotypic frequency, and phenotypic ratio.

   a) THE PUNNET SQUARE

   b) PHENOTYPES GENOTYPES GENOTYPIC FREQUENCY PHENOTYPIC RATIO

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3. In an experiment with *Drosophila melanogaster*, females with cut wings (*ct*), vermilion eyes (*v*) and forked bristles (*f*) were mated to wild type males. The F_1 females were then backcrossed to *ct v f* males and 1000 progeny were scored :

Phenotype	No. of Progeny	Phenotype	No. of Progeny
+ + +	341	ct v +	96
ct v f	329	+ + f	104
ct + +	47	ct + f	16
+ v f	53	+ v +	14

i) Determine whether the loci are linked.

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ii) If the genes are linked, determine the gene order.

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iii) Diagram the cross and determine the distances between the genes.

4. Explain the following terms very briefly with examples.

(a) Dominance

(b) Partial (incomplete) dominance

(c) Co-dominance