

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME – LEVEL 04
FINAL EXAMINATION – 2016/2017
BOTANY
BOU2101/BOE4101 – GENETICS and EVOLUTION



DURATION : TWO (02) HOURS

DATE : 26th July, 2017

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.

- i) What are the differences between sex-linked, sex-limited and sex-influenced traits?
- ii) Describe how it can be determined whether a trait is sex-linked or sex-limited.
- iii) A female fly with orange eye is crossed with a male fly with short wings. The F₁ females have wild-type (red) eyes and long wings ; the F₁ males have orange eyes and long wings. The F₁ flies are crossed to yield,

47 long wings, red eyes
 45 long wings, orange eyes
 17 short wings, red eyes
 14 short wings, orange eyes

with no differences between sexes (XX – female, XY – males)

- a) Diagram the cross and explain the results (Consider each trait separately).
- b) Give the genotypes of parents.

2.

- i) What are three-point crosses?
- ii) Why three-point crosses are considered a valuable approach to learn about the nature of the linkage of genes?
- iii) A wild-type strain of flies was crossed to another strain homozygous for the recessive mutant alleles, *m*, *r* and *v*. The F₁ females were backcrossed to the recessive male strain, and the following type and number of progeny were observed.

+	+	+	331
<i>m</i>	+	+	2
+	<i>r</i>	+	73
+	+	<i>v</i>	14
<i>m</i>	<i>r</i>	+	10
<i>m</i>	+	<i>v</i>	80
+	<i>r</i>	<i>v</i>	0
<i>m</i>	<i>r</i>	<i>v</i>	309

			820

- a) What is the gene order?
- b) Calculate the map distances between these genes.

3.

A

- i) What are the four (04) types of changes that can occur in the chromosome structure?
- ii) Describe briefly what happens in each type.

B

- i) Name four (04) common aneuploidy conditions in humans and indicate the chromosomal constitution that is responsible for each condition.

C

- i) What is Heritability?
- ii) Corn growing in a field had a lysine (amino acid) content of 2.0%, with a variance of 0.16. When grown in a greenhouse under controlled and uniform conditions, the mean lysine content was again 2.0%, but the variance was 0.09. What is the heritability of lysine content in corn?

PART B

4. "Evolution of organisms is supported by an overwhelming amount of scientific evidences". Justify this statement.

5.

- (a) What is meant by speciation?
- (b) With reference to suitable examples describe the different methods of speciation.

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

- a. *Homo erectus*
- b. Industrial melanism
- c. Hardy-Weinberg Principle
- d. Evolutionary links
- e. Proteinoid Microspheres