



THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. DEGREE PROGRAMME – LEVEL 04

FINAL EXAMINATION – 2015/2016

BOTANY

BOU2101/BOE4101 – GENETICS and EVOLUTION

DURATION : TWO (02) HOURS

DATE : 07th July, 2016

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

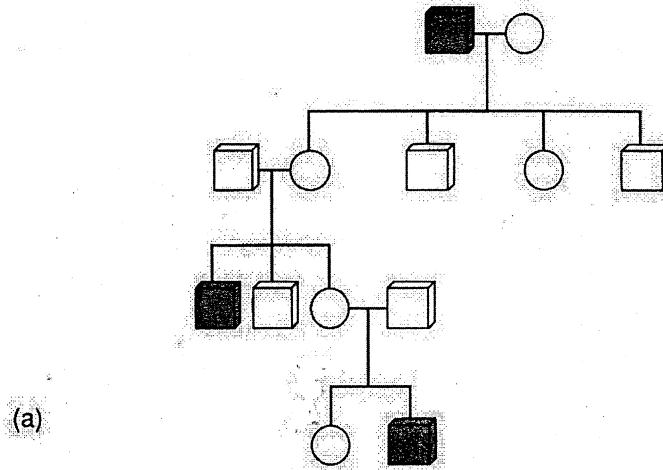
1.

A)

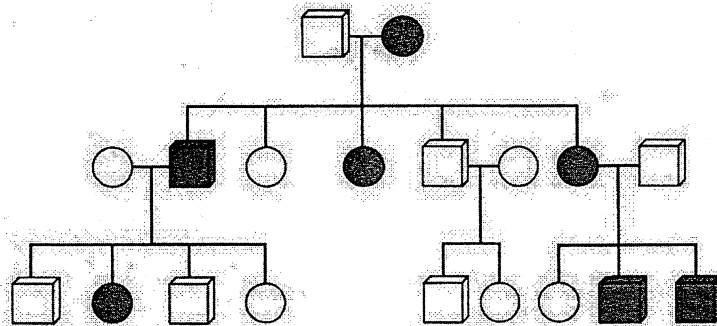
- i) Explain the term “Probability” used in experimental science such as Genetics.
- ii) Mendal self-fertilized a dihybrid plant that had round, yellow peas. In the offspring generation:
 - a) What is the probability that a pea picked at random will be round and yellow?
 - b) What is the probability that five (05) peas picked at random will be round and yellow?

B)

- i) Briefly explain the importance of Pedigree Analysis.
- ii) What are the possible modes of inheritance in the following pedigrees, (a) and (b)? Also indicate the inheritance which is/are not possible for the given pedigrees.



(b)



2.

- A) What is the difference between dominance and epistasis?
- B) Why did not any pairs of genes used by Mendel show epistasis?
- C) In a plant species three flower colours segregate: red, yellow, and white. A red parent is crossed to a white parent and all the offsprings are red. When these are selfed, the following data are obtained:

Red	118
Yellow	32
White	10

Explain the results obtained for the above cross indicating the mode of inheritance.

3.

A)

- i) What are sex-linked genes?
- ii) In *Drosophila* white eye is a X-linked recessive trait, and ebony body is an autosomal recessive trait. A homozygous white-eyed female is crossed with homozygous ebony male.
 - a) What phenotypic ratio do you expect in the F₁ generation?
 - b) What phenotypic ratio do you expect in the F₂ generation?
 - c) Suppose the initial cross was reversed: ebony female crossed with white-eyed male. What phenotypic ratio do you expect in the F₂ generation?

B)

- i) Three-point crosses are useful in learning about the nature of gene linkage. Briefly explain.
- ii) A study was conducted on three linked genes in wheat.

C/c - coloured Vs colourless grains.

R/r - round Vs oval grains.

W/w - non-waxy Vs waxy leaves

A test-cross involving triple recessives and F₁ plants heterozygous for the three gene pairs gave the following phenotypes in the progeny.

Colourless, oval, non-waxy	-	215
Coloured, round, non-waxy	-	103
Coloured, oval, non-waxy	-	2637
Coloured, oval, waxy	-	700
Colourless, round, non-waxy	-	725
Colourless, round, waxy	-	2807
Colourless, oval, waxy	-	101
Coloured, round, waxy	-	212

Explain how the three genes were originally linked in parents and the distance between the genes.

PART B

4. (a) What is meant by natural selection?

(b) With suitable examples discuss the different modes of natural selection.
5. What are reproductive isolating mechanisms that can stop a population from interbreeding and possibly lead to the formation of a new species?
6. Write short notes on any three of the followings;
 - (a) Anatomical features that distinguish human from the apes
 - (b) Different degrees of phenotypic variations within species
 - (c) Neanderthal man
 - (d) Agents that change the allele frequencies in population
 - (e) The Miller Urey Experiment

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