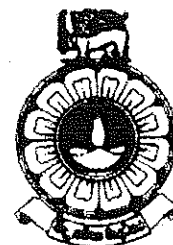


The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc/ B. Ed Degree Programme



00094

Department	: Botany
Level	: Level 5
Name of the Examination	: Final Examination
Course Title and - Code	: Plant Breeding (BYU5306/BOU3106/BYE5306/BOE5106)
Academic Year	: 2020/2021
Date	: 25.03.2022
Time	: 2.00 – 4.00 pm
Duration	: 02 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **06** questions in **04** pages.
3. Answer any **04** questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labelled diagrams where necessary
6. Involvement in any activity that is considered as an exam offense will lead to punishment.
7. Use blue or black ink to answer the questions.
8. Clearly state your index number in your answer script.

1.

- a) Average effect (α), Breeding value (A) and Dominance deviation (D) are important components of population genetics.

The wing length (l) in *Drosophila* is a quantitative trait. The wing lengths of three genotypes in *Drosophila* at 4 weeks of age are as follows;

	Genotypes		
	++	+l	ll
Wing length in mm	12	10	7

Determine the average effects of the genes. (Assume allele frequency (q) of l is 0.4).

- b) Frequencies of three genotypes in three sample populations are as follows. Calculate the Breeding Values (A) of these genotypes in the population. (Hint: take the average) (Gene frequency of allele A (p) is 0.4).

Genotype	Frequencies		
	Population 1	Population 2	Population 3
AA	0.05	0.26	0.60
AB	0.38	0.54	0.33
BB	0.57	0.20	0.07

2.

- a) Several types of selection methods are practiced for improving cross pollinated plants. Identify these methods.
- b) What is recurrent selection?
- c) Name the four (04) types of recurrent selection and explain them.
- d) Use a flow chart to explain the main steps in Simple recurrent selection.

3.

- a) Heritability of a trait provides a measure of its genetic variation. What is the use of estimating the heritability value of an interested trait in a breeding programme?
- b) What is the difference between broad-sense and narrow-sense heritability?
- c) Two homozygous varieties of rice were crossed to produce F_1 hybrids. The average phenotypic variance in yield of the three populations P_1 , P_2 and F_1 was 10.50. The variance of F_2 was 20.50. Calculate the heritability of yield in the F_2 population.
- d) In rice, the inbred lines, Bg300, Bg352, Bw364, At362, Bg366, and Bg406 were crossed in all possible combinations in a diallel cross. The progeny produced the following data for yield.

	Bg300	Bg352	Bw364	At362	Bg366	Bg406
Bg300	30	32	41	32	30	33
Bg352	40	39	41	34	32	36
Bw364	41	38	42	35	36	35
At362	32	41	38	34	29	34
Bg366	31	35	30	29	21	24
Bg406	30	37	40	35	27	28

Calculate the General Combining Ability (GCA) of each line and select the best line for GCA.

4.

- a) Discuss the main differences among a pure line, an inbred and a clone.
- b) Give an account of the procedure of clonal selection of asexually propagated plants.
- c) What are the advantages and drawbacks of clonal selection?

5.

a)

- i) What are the practices adopted in seed production of a new variety?
- ii) Describe the various classes of seeds that are recognized by seed certification agencies.
- iii) Out-line the procedure by which a new variety reaches the farmer.
- iv) Describe how a variety is certified.

b) Whether a plant is predominantly selfed or predominantly outcrossed will depend on several factors.

- i) What are these factors?
- ii) Give a brief account of each factor.

6.

a) What are hybrid varieties?

b) What is Hybrid Vigour?

c) Explain briefly how hybrid vigour is utilized in a breeding programme.

d)

- i) Use a flow chart to explain the **Modified Bulk** method of breeding a self pollinated crop.
- ii) Give a comparison of **Pedigree** and **Bulk** methods of breeding self pollinated crops