

**FIJI NATIONAL UNIVERSITY**

College of Agriculture, Fisheries &amp; Forestry

School of Agriculture &amp; Forestry

Department of Crop Science

Bachelor of Science in Agriculture – Year III

Trimester II – Final Examination – 2019

**HOR 704: BREEDING OF HORTICULTURAL CROPS****Time Allowed: 3.00 hours (excluding reading time) Total Marks: 100****INSTRUCTIONS:**

1. This paper consists of **four** pages.
2. Please check to see that all your paper is complete.
3. Answer all the Objective Type and Descriptive Type Questions in the Answer Booklet only.
4. Please write on the Answer Booklet according to the order of the questions.
5. **NO** written or printed material and mobile phones are allowed in the examination hall.
6. Marks allocated for each question appears at the side of each question so allocate your time accordingly.
7. This paper is divided into **Two (2)** parts. First part contains Objective Type Questions, which is having **two (2)** Sections – A and B. Second part is Descriptive Type Questions, which is having **six (6)** questions. All questions are compulsory.

**I. OBJECTIVE TYPE QUESTIONS (40 Marks)**

Section A: Multiple choice questions. (10 Marks)

Section B: Short answers. (30 Marks)

**II. DESCRIPTIVE TYPE QUESTIONS (60 marks)**

There are **six (6)** descriptive type questions, which all questions are compulsory. Please provide precise answers. Please write on the Answer Booklet according to the order of the questions. Answer every question from a new page to facilitate evaluation.

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Student ID No.: .....

Date.....

### I. OBJECTIVE TYPE QUESTIONS

Note: Answer only on the answer booklet.

Total Marks: 40

A. Multiple choice questions: please select the correct answer.

(10x1=10 Marks)

1. Which of the following **BEST** describes olericulture?
  - a. The study dealing with perennial plants for the kitchen
  - b. The study dealing with woody plants for the kitchen
  - c. The study dealing with herbaceous plants for the kitchen
  - d. The study dealing with annual plants for the kitchen
2. Which of the following is **NOT** one of the classification of fleshy fruits?
  - a. Aggregate
  - b. Legume
  - c. Simple
  - d. Multiple
3. Which of the following is **NOT** the flower color of a single daisy wild flower type in *Chrysanthemum*?
  - a. Yellow
  - b. Orange
  - c. Lavender
  - d. White
4. Which of the following is **NOT** one of the applications of pure line selection?
  - a. Limited practical use in the breeding of major cultivated species
  - b. For varieties grown for processing market
  - c. Machine harvesting
  - d. The second step for the development of domestication
5. In breeding, source of resistance can **NOT** be obtained from which of the following?
  - a. An unknown variety
  - b. Germplasm collection
  - c. Related species
  - d. Through mutations
6. Mechanisms of drought resistance does **NOT** include which of the following?
  - a. Drought accumulation
  - b. Dehydration avoidance
  - c. Dehydration tolerance
  - d. Sum total of drought avoidance and tolerance
7.  $A \times B \times C$ , how many possible "three-way cross hybrids" you can have?
  - a. 1
  - b. 9
  - c. 6
  - d. 3

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8. In backcross method, the probability of eliminating undesirable allele can be calculated using which of the following formula?
    - a.  $(1 - p)^n - 1$
    - b.  $1 - (1 - p)^n$
    - c.  $1 - (1 - p)/n$ .
    - d.  $n - (1 - p)/n$
  9. General speaking in bulk method, selection process usually begins from which of the following generation?
    - a. 3
    - b. 5
    - c. 7
    - d. 9
  10. Which of the following is **CORRECT** regarding agriculture's dependence on genetic resources?
    - a. Agriculture and genetic resources are critically interdependent
    - b. All agricultural commodities descend from improved genetic resources using biotechnology from around the world
    - c. Before the development of modern varieties, farmers cultivated wild species
    - d. The advances in yield, quality, and other desired traits have resulted from the use of plant biotech

**B. Short answers.**

**(10x3=30 Marks)**

11. What types of inputs are constantly required in the continuing process of enhancement through selective breeding?
12. How do you describe the random change in allele frequency from one generation to the next?
13. What is the Fijian guava variety, released by the Sigatoka Research Station in 2017?
14. How do you define a cross between an inbred line and an open pollinated variety?
15. In a breeding program, what would a breeder prefer to use for introducing the traits and then incorporate these into production?
16. Please provide one of the strategies to avoid self-pollination in plants.
17. Lacking of genetic diversity in farmers' fields, what incidences could possibly occur?
18. What type of growth feature has shown in the wild relatives of papaya?
19. According to National Chrysanthemum Society, Inc., USA, how many classes are included in today's highly evolved chrysanthemums?
20. Avocado has numerous cultivars, what are the three horticultural races which have undergone separate domestication?

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**II. DESCRIPTIVE TYPE QUESTIONS****(60 Marks)**

**Note: Please provide precise answers. Each question is ten marks.**

1. Assuming two purebred populations and the trait of interest is adult plant height. The Rosemary (R) population has an average height of 13 feet and Batikolikoli (B) has an average of 24 feet. The progeny (F1) produced by RxB has individual heights in below table. Please **provide** formula, calculate the "**Heterobeltiosis**" value and explain what you found. 10

Individuals from RxB	1	2	3	4	5	6	7	8	9	10
Heights (feet)	23.6	30.6	28.3	26.6	27.3	24.5	25.2	31.5	26.3	24.5

2. You have sampled a population in which you know that the percentage of the homozygous recessive genotype (rr) is 14%. Using this 14%, please **provide** formulas and calculation for the following (please use two decimal points for your calculation): 10
- a) The frequency of the "r" allele.
  - b) The frequency of the "R" allele.
  - c) The frequencies of the genotypes "RR" and "Rr."
3. Please **provide** and elaborate methods of breeding for disease resistance. 10
4. Please **provide** the values of genetic resources for food and agriculture. 10
5. Please **provide** and elaborate the main features of ideotype breeding. 10
6. Please **provide** a brief discussion on the six main breeding techniques. 10

**The End**

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