



NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF AGRICULTURAL SCIENCES
CROP AND SOIL SCIENCES DEPARTMENT

EXAMINATION: 2021_2 POP EXAMINATION

COURSE CODE: CRP305

COURSE TITLE: CROP GENETICS AND BREEDING

INSTRUCTIONS: ANSWER THREE (3) QUESTIONS. QUESTION 1 IS COMPULSORY (30 marks) AND ANY OTHER TWO (2) QUESTIONS (20 marks each)

TIME: 2HRS

QUESTIONS

1 a) Highlight five (5) features of a gene (10 marks)

b. Given:

$$V_{ph} = 30 \text{ units}^2 \quad V_A = 15 \text{ units}^2 \quad V_D = 10 \text{ units}^2 \quad V_G = 20 \text{ units}^2 \text{ and } V_I = 5 \text{ units}^2$$

Calculate both broad and narrow sense heritability values (20 marks)

2 Suppose a plant breeder started with a population with a mean of 8" tall. His desire is to increase the mean height. From the population he calculated heritability to be 0.15 or 15% with phenotypic variance of 5 inches. The breeder decided to select the top 20% of 100 individual plants. Calculate the genetic advance and what will be the mean in the next generation. (Assuming the K value= 1.40) (10 marks)

b. Explain two (2) types of Homomorphous Incompatibility. (10 marks)

3 Peas with yellow round seeds with another variety with green wrinkled seeds were crossed and a set of gametes were produced.

i. What was the outcome of gametes in the F_1 generation? (5 marks)

ii. Tabulate the outcome of the crosses upon selfing of the F_1 generation (15 marks)

4 List three (3) factors that encourage self pollination and two (2) factors that encourage cross pollination. (5 marks)

b. Complete the table below:

| Mode of reproduction | Types of variety to be produced | Genetic make up |
|----------------------|---------------------------------|-----------------|
| Vegetative | _____ | Homozygous |
| Self pollination | _____ | _____ |
| Cross pollination | _____ | _____ |

(5 marks)

c. How can you transfer a dominant gene to the next generation? (10 marks)