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THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME – LEVEL 05
FINAL EXAMINATION – 2014/2015
BOTANY
BOU3106/BTU3111/BOE5106/BTE5111 – PLANT BREEDING

DURATION : TWO (02) HOURS

DATE : 29. 10. 2015 TIME : 1.30 – 3.30 p.m.

ANSWER ANY FOUR (04) QUESTIONS

1.

A)

i) Explain the following terms,

a) Breeding value (A)
b) Dominance deviation (D)

ii) Find the breeding values and dominance deviations of the following genotypes.

(Assume allele frequency (q) of A_1 is 0.4)

GENOTYPE	A_1A_1	A_1A_2	A_2A_2
GENOTYPIC VALUE	115	150	95

B)

i) Explain the term"Heritability".

ii) Two homozygous varieties of rice were crossed to produce F_1 hybrids. The average phenotypic variance in yield of three populations P_1, P_2 and F_1 was 10.60. The variance of F_2 was 20.60.

a) Calculate the heritability of yield in the F_2 population.

b) Will subsequent selection be successful in changing the yield in rice in future generations ?

2.

A) The breeding methods applicable to a crop species depend on its mode of reproduction and floral morphology. According to these characteristics, plant breeders recognize four (04) fundamental populations.

i) Briefly describe the four fundamental plant populations recognized by plant breeders based on above characteristics.

B)

i) Explain the term "Population Mean".

ii) Briefly discuss the factors causing the differences in Means.

C)

i) Name the four (04) main factors which contribute to the change in Gene Frequencies of a population.

ii) Explain briefly how each factor causes change in gene frequency.

3.

a) What are the uses of tissue culture techniques in plant breeding?

b) Explain what embryo rescue is, and describe its use/s.

c) Somaclonal variations are often found among plants which have been propagated through tissue culture.

i) What is somaclonal variation ?

ii) Explain how somaclonal variation can be utilized for crop improvement.

4.

a) A mutation is a sudden change in hereditary material of a cell. Write a brief account on the types of mutations observed in plants.

b) Describe the procedures used for mutation breeding in self-pollinated and cross-pollinated plants.

c) What are the applications and achievements of mutation breeding in plants?

d) What are the limitations of mutation breeding in plants ?

e) Give a brief account on how mutations and mutation breeding relate to plant biotechnology.

5.

a) Several selection methods are applied for breeding of cross pollinated plants. What are they?

b) What is recurrent selection?
Name and describe the different types of recurrent selection methods.

b) Use a flow chart to explain the main steps involved in the Simple Recurrent Selection method.

6.

a) 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.

b) Several possibilities are there in controlling plant reproduction either by manipulating incompatibility or by inducing male sterility.

i) What is self-incompatibility? Briefly explain.
ii) What is male sterility ? Briefly explain.