

B)

- i) Name the four (04) main factors which contribute to the change in the gene frequencies of a population.
- ii) At a particular locus which controls the flower colour, there are two alleles, M and m . The mutation rate of M to m is 3.0×10^{-5} , whereas the mutation rate of m to M is 6.0×10^{-7} . Allele frequency (p) of M is 0.6.

Assumption: No other factor is operating in the population to disturb the equilibrium.

What is the equilibrium frequency of m allele in the population?

2.

A)

- i) Heritability of a trait is a measure of the degree of genetic variation among individuals in a population for that trait. Explain the advantage/s of estimating the heritability value of an interested trait when breeding a new crop variety.
- ii) Two homozygous varieties of tomato were crossed to produce F_1 hybrids. The average phenotypic variance in yield of three populations P_1 , P_2 and F_1 was 10.50. The variance of F_2 was 20.50.
 - a) Calculate the heritability of yield in the F_2 population.
 - b) Do you think that subsequent selection in future generations would be successful in further changing the yield in tomato? Briefly explain.

B)

- i) In corn, the inbred lines, A, B, C, D and E were crossed in all possible combinations in a diallel cross. The progeny produced the following data for the yield.

	A	B	C	D	E
A	30	31	42	30	31
B	41	38	40	35	33
C	40	37	39	37	36
D	30	42	37	35	30
E	30	35	30	28	23

- i) Calculate the General Combining Ability (GCA) of each line.
- ii) Select the best line for GCA.

3.

- A) Asexually propagated plants have a variety of modes of propagation. What are the different breeding methods identified for these plants?
- B) A clone is always propagated and maintained vegetatively. This is the main way by which a clone differs from a pure line of self-pollinated crops and inbred line of cross pollinated crops. Give the main differences among a pure line, an inbred line and a clone.
- C)
 - i) Give an account of the procedure of clonal selection of asexually propagated plants.
 - ii) What are the advantages and drawbacks of clonal selection?

4.

- i) Several types of selection methods are practiced for cross pollinated plants. What are they?
- ii) What is Recurrent Selection?
- iii) What is/are the advantage/s of Recurrent Selection as a plant selection method?
- iii) Name different types of Recurrent Selection methods available and briefly describe each method.
- iv) With the help of a flow chart explain the main steps involved in the Reciprocal Recurrent Selection method.

5.

A)

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

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

ii) Several possibilities are there in controlling plant reproduction either by manipulating incompatibility or by inducing Male Sterility.

- a) What is self-incompatibility? Briefly explain.
- b) What is Male Sterility? Briefly explain.
- c) Explain how Male Sterility is applied in a plant breeding programme.

6.

i) What is meant by Genetic Engineering of plants?

ii) What is/are the advantage/s of using Genetic Engineering in a plant breeding programme?

iii) Explain briefly about Genome Mapping and its applications in plant breeding

iv) Explain how Herbicide Resistant crop plants were developed using Genetic Engineering technique.