This question paper contains **4+2** printed pages]

Roll No. ☐☐☐☐☐☐☐☐☐☐☐

S. No. of Question Paper : **36**

Unique Paper Code : **32161303**   **I**

Name of the Paper : **Genetics**

Name of the Course : **B.Sc. (H) Botany**

Semester : **III**

Duration : **3 Hours**   Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all.

Question No. **1** is compulsory.

I.   (*a*)   Define the following (any *five*) :   5×1=5

       (*i*)   Pseudoallele

       (*ii*)   Plaque

       (*iii*)   Alkylating Agents

       (*iv*)   Hemizygous

       (*v*)   Polygenic Inheritance

       (*vi*)   Test Cross.

P.T.O.

(b) Expand the following (any *four*) :   4×1=4

(i) NCO

(ii) SCA

(iii) MMS

(iv) F_1

(v) QTL.

(c) State any *one* important contribution of the following

scientists (any *five*) :   5×1=5

(i) H. G. Muller

(ii) C. Stern

(iii) Reginald Punnet

(iv) Lucien Cuenot

(v) Carl Correns

(vi) Sutton and Boveri.

(d) Answer the following (any *five*) :   5×1=5

(i) Write down the term used for depicting the degree

of expression in an organism having a particular

genotype.

(ii) What does an arrow signify in a pedigree

analysis ?

(iii) What would be the phenotypic ratio when two

non-allelic genes controlling a single trait interact

in an additive manner ?

(iv) What is the chemical nature of H substance ?

(v) What is the probability of obtaining a child with

blood group O+ from parents with blood group O+

and AB+ ?

(vi) Write down the chromosomal formula for a double

monosomic individual.

2. (a) Differentiate between (any *three*) :   3×4=12

(i) Dominance and Epistasis

(ii) Euploidy and Aneuploidy

(iii) Multiple Alleles and Polygenes

(iv) Allopatric and sympatric speciation.

(b) Write down the chromosomal formulae for :   2×1=2

(i) Turner's Syndrome

(ii) Edward's Syndrome.

P.T.O.

3. (a) Write short notes on any *two* :   2×5=10

    (i) Hardy Weinberg's Law

    (ii) rII locus in bacteriophage T4

    (iii) Genetic mechanism of leaf variegation in Four o'clock plant.

    (b) An allele W, for white wool is dominant over allele *w* for black wool. In a sample of 900 sheep, 891 are white and 9 are black. Calculate allelic frequencies within this population, assuming, the given population is in Hardy-Weinberg equilibrium.   4

4. (a) Elaborate ClB method for detecting mutations.   7

    (b) Using a forked line method list the genotypes for the following dihybrid crosses :   7

    DdGg × DdGg

    D/d Plant height (Tall and Dwarf)

    G/g Seed color (Yellow and Green)

5. (a) How has polyploidy contributed towards evolution of agriculture crops ? Elaborate with any *two* suitable examples.   10

    (b) Describe criss-cross inheritance giving a suitable example.   4

6. (a) Explain the experiment that provided cytological proof of crossing over.   8

    (b) Discuss base excision repair mechanism of DNA damage repair.   6

7. Ebony body colour (*e*), rough eyes (*ro*), brevis bristles (*bv*) are three recessive mutations in fruit flies. A wild type fly (*e+ ro+ bv+*), was crossed with triple mutant fly (*e ro bv*). F_1 progeny were heterozygous and they were crossed with mutant homozygous recessive males. The results of the test cross are as follows :

Wild type	*e+ ro+ bv+*	625
Ebony, rough eyes, brevis bristles	*e ro bv*	634
Ebony	*e ro+ bv+*	165
Rough eyes, brevis bristles	*e+ ro bv*	158
Brevis bristles	*e+ ro+ bv*	93
Ebony, rough eyes	*e ro bv+*	91
Rough eyes	*e+ ro bv+*	5
Ebony, brevis bristles	*e ro+ bv*	4

(a) Are the above genes linked ? Give reasons for your answer.   2

(b) Diagram the crosses giving the genotype of parents and F_1.   3

(c) What is the order of the genes ?   2

(d) Calculate the map distance between the genes and construct the linkage map.   3

(e) Calculate the coefficient of coincidence.   2

(f) Calculate the interference and comment on its significance.   2