SET -I

Unique Paper Code: 32161303
Name of the Paper: Genetics
Name of the Course: B.Sc.(H) Botany CBCS
Semester: III

Duration: 3 + 1 Hours **Maximum Marks: 75**

Attempt any *four* questions in all. All questions carry equal marks.

1. Describe the detailed structure of phage T4 rII locus in an attempt to unravel the fine structure of the gene. Explain the mechanism of mitochondrial inheritance in yeast. (12.75 + 6)

2. With the help of neat diagrams explain the meiotic behaviour of a pericentric inversion heterozygote. Differentiate between autopolyploidy and allopolyploidy giving suitable examples. (10.75 + 8)

3. What do you understand by reproductive isolation mechanisms and show how do they lead to speciation? Describe various forces that can alter the allelic frequencies in a population. (6.75 + 12)

4. Explain in detail the genetical and biochemical basis of inheritance of ABO blood group system in human beings. In a dihybrid cross in pea, two randomly selected plants with purple flowers were crossed and in the F_2 population, 95 purple, 30 red and 43 colorless flowers' bearing plants were obtained. Use the given information to find out the probable segregation ratio. Also, explain the genetic basis of segregation. Write down the genotypes and phenotypes of parents, F_1 and F_2 plants. (10 + 8.75)

5. What are mutagens? Explain the mechanism of action of various chemical mutagens. Discuss the evolutionary significance of transposons. (12 + 6.75)

6. What is coupling and repulsion hypothesis? Explain with the help of proper crosses. In corn, the recessive genes for *an* (anther ear), *br* (brachytic) and *f* (fine stripe) are present on chromosome I. An F_1 female heterozygous for all the three genes when test crossed with a hemizygous recessive parent, produced the following progeny

+ + +	88
+ + *f*	21
+ *br* +	2
+ *br f*	339
an + +	355
an + *f*	2
an br +	17
an br f	55

(I) Using proper nomenclature represent the genotype of the parents, F_1 and F_2.
(II) Determine the recombination frequencies between each pair of genes, their order and map the distance between the genes on the chromosome.
(III) Define coefficient of coincidence. Calculate its value for the given data.

(6.75 + 12)