(i) Printed Pages : 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0155

Exam. Code : 0002

B.A. /B.Sc. (General) 2nd Semester

(2054)

BOTANY

Paper : B (Genetics)

Time Allowed : Three Hours] **[Maximum Marks : 36**

Note :— (1) Attempt **five** questions in all.

(2) Question No. 1 is compulsory and select **one** question from each unit.

1. (A) Choose the correct answer out of the given options :

(1) Which law of Mendel states that an individual can have two different alleles for a particular gene ?

(a) Law of Dominance

(b) Law of Segregation

(c) Law of Independent Assortment

(d) Law of Codominance.

(2) What is the primary factor influencing the frequency of genetic recombination in linked genes ?

(a) The distance between genes on the chromosome

(b) The type of alleles present

(c) The size of chromosomes

(d) The number of chromosomes.

(3) In a dihybrid cross with epistasis, what phenotypic ratio is expected in the F2 generation ?

(a) 9 : 3 : 3 : 1

(b) 1 : 2 : 1

(c) 1 : 2 : 3 : 1

(d) 1 : 1 : 1 : 1

(4) Pleiotropy in non-allelic gene interaction occurs when :

(a) Multiple genes interact to produce a single phenotype

(b) A single gene affects multiple phenotypic traits

(c) Genes are located on different chromosomes

(d) Dominance occurs between alleles

(5) Who proposed the Chromosome Theory of Inheritance ?

(a) Gregor Mendel

(b) Thomas Hunt Morgan

(c) Alfred Hershey

(d) Barbara McClintock

(6) Which DNA repair mechanism involves the removal and replacement of a damaged nulceotide ?

(a) Base excision repair

(b) Nucleotide excision repair

(c) Mismatch repair

(d) Double strand break repair $1 \times 6 = 6$

(B) Fill in the blanks :

(i) In Mendel's dihybrid cross involving seed colour and seed shape _____ was the phenotypic ratio in the F2 generation.

(ii) _____ observed that proper embryonic development of sea urchins does not occur unless chromosomes are present.

(iii) _____ example of polygenic inheritance.

(iv) _____ type of mutation results in the change of a single nucleotide, leading to a different amino acid in the protein.

(v) Ultraviolet (UV) radiation is an example of _____.

(vi) _____ example of a chemical mutagen. 1×6=6

UNIT—I

2. Discuss the role of Mendel's Laws in the development of modern genetic theory. 6

3. Describe Mendel's Law of Dominance and how it applies to the expression of phenotypic traits. 6

UNIT—II

4. Differentiate between the following terms with suitable examples :

(a) Complete Dominance and Incomplete Dominance

(b) Allelic gene Interactions and Non-allelic gene Interactions.

3×2=6

5. Define the term "chromosomes". Explain the structural features and types of chromosomes. 6

UNIT—III

6. Define mutation. Explain the following types of mutations briefly :

   (a) Induced mutations

   (b) Suppressor mutations. 6

7. Explain the concept of non-coding DNA and its role in gene regulation with suitable examples. 6

UNIT—IV

8. Describe the process of transcription and explain its significance in gene expression. 6

9. Illustrate the term Rh antigen. Explain the clinical significance of Rh antigens in human blood. 6