

2023

**BOTANY — HONOURS**

**Paper : CC-10**

**(Genetics)**

**Full Marks : 50**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

1. Answer **any five** questions from the following : 2×5
  - (a) What is meant by incomplete linkage? Cite an example.
  - (b) State two differences between extranuclear and maternal inheritance.
  - (c) What is the function of Rec A protein?
  - (d) Define overlapping genes with an example.
  - (e) How many different nullisomics are possible in an organism with  $2n = 14$  chromosome?
  - (f) What are LINEs and SINEs?
  - (g) Differentiate Dominant and Recessive epistasis.
  - (h) What is polygenic inheritance?
2. Answer **any two** questions from the following : 5×2
  - (a) Write a note on different types of repetitive DNA elements of eukaryotic genome.
  - (b) Write note on (**any one**) :
    - (i) Any one method of DNA repair
    - (ii) AC-DS system in maize.
  - (c) Describe, in brief, molecular mechanism of Base-pair substitution.
  - (d) Describe the basic principle and significance of ISH.
3. Answer **any three** from the following :
  - (a) Explain the following types of chromosomal aberrations and their meiotic configurations with suitable diagrams : 2½×4
    - (i) Deletion
    - (ii) Duplication
    - (iii) Translocation
    - (iv) Pericentric inversion.

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Please Turn Over

- (b) What is the role of homeotic genes in floral development? Explain the ABC model of flower development with suitable diagrams. Why this model has been extended to quartet model of flower development? 2+6+2
- (c) Explain how crossing over was cytologically detected in Maize. 10
- (d) Three linked genes viz. *Purple* (Pu)/*White* (pu) corolla, *hairy* (H)/*smooth* (h) leaves and *thorny* (Th)/*glossy* (th) stem are present in *Solanum incanum* plant. After test crossing heterozygous parents, following progenies are obtained :

White, smooth, thorny – 113

Purple, hairy, thorny – 4

Purple, smooth, thorny – 2538

Purple, smooth, glossy – 601

White, hairy, thorny – 626

White, hairy, glossy – 2708

White, smooth, glossy – 2

Purple, hairy, glossy – 116

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Draw the linkage map showing gene order and distances between the three loci. Calculate the coefficient of coincidence. 2+6+2

- (e) What are amphidiploids? Explain, with the example of a crop species, how an amphidiploid arises in the course of evolution. 2+8