

M.Sc. PART- II (SEMESTER III)
(CCS- 302.3): Cytogenetics and Plant Breeding
(SPECIAL PAPER- I) CYTOGENETICS

Unit I: (16 marks)

1. What is meiosis? Describe meiosis-I. Add a note on its significance.
2. What is chromosomal disjunction? Describe mechanism and theories of crossing over in meiosis.
3. What is cell cycle? What are the differences between mitotic and meiotic cell division? Give their significance in eukaryotes.
4. Describe the genetic control of meiosis and theories of crossing over.
5. Describe modes of meiosis, its genetic control and theories of crossing over.

Short Notes: (8 marks)

1. Chromosome disjunction.
2. Synaptonemal complex
3. Cyclins and cdks
4. Recombination models
5. Cell cycle

Short Notes: (4 marks)

1. Check points in cell cycle
2. Cell cycle
3. Chromosomal non disjunction
4. S phase
5. Genetic control of meiosis

Unit II: (16 marks)

1. What is polyploidy? How it is induced? Describe its role in crop improvement with suitable examples.
2. What is chromosomal aberration? Give its distinct types and describe their role in syndromes.
3. Define Nullisomy. How does it originate? Give the use of nullisomics.
4. Give the classification of numerical variations in chromosomes with suitable examples.
5. Define inversion. Give different types of inversion and their origin using suitable diagrams.

Short Notes: (8 Marks)

1. Structural variations in chromosomes.
2. B-chromosome, its origin and consequences.
3. Induced polyploidy
4. Allopolyploidy
5. Structural hybrids

Short Notes: (4 Marks)

1. Translocation heterozygote
2. Inversion
3. Aneuploidy
4. Down's syndrome
5. Turner's syndrome

Unit III: (16 marks)

1. Evaluate critically the importance of alien genetic resources in crop improvement.
2. What is genome? Explain evolution of bread wheat.
3. Explain genome analysis of cotton and origin of new world cotton.
4. What are alien genetic resources? Discuss their use in crop improvement with their limitations.
5. What is genome? How genome is analyzed by using conventional methods? Describe genome analysis in any crop plant you have studied.

Short Notes: (8 Marks)

1. Alien genetic resources in crop improvement
2. Genome of Triticale
3. Genome of Wheat
4. Meiotic analysis in hybrids
5. Genome of Tobacco

Short Notes: (4 Marks)

1. *Triticale*
2. Gene transfer using amphidiploids,
3. Bridge species
4. Hybrids between species with different chromosome number
5. Hybrids between species with same chromosome number

Unit IV: (16 marks)

1. Define apomixis? Describe the types of apomixes in higher plants and give its significance in plant breeding.
2. Describe various stages of life cycle in *Drosophila* with their genetic regulation of development.
3. Describe the stages of life cycle in *Drosophila*. Add a note on salivary gland chromosome in *Drosophila*.
4. Describe genetic regulations of development in *Drosophila*. Add a note on special type of chromosomes.
5. Describe the production and use of haploids, dihaploids and double haploids in breeding.

Short notes: (8 Marks)

1. Apomixis and its importance in plant breeding
2. Endomitosis and polyteny in *Drosophila*
3. Parthenogenesis and apomixes
4. Various stages of life cycle in *Drosophila*
5. Genetics of dihaploids and double haploids

Short notes: (4 Marks)

1. *Drosophila* culture
2. Apomixis
3. Dihaploids
4. Double haploids
5. Male and female *Drosophila*