DEPARTMENT OF GENETICS AND PLANT BREEDING

GPBR 113 **Credits 3(2 + 1)**

BASIC GENETICS AND PLANT BREEDING

Theory

Introduction - Cell, its Organelles, Mitosis and Meiosis - Historical developments - Mendel's Laws of inheritance - Exceptions to Mendel's Laws - Monohybrid, Dihybrid Ratios, Examples - Gene actions and epistatic interactions - Multiple alleles and Pleiotropism - Polygenic inheritance, Qualitative and Quantitative traits - Linkage and crossing over - Chromosomal aberrations, structural and numerical - Mutations and Mutagens.

Scope and objectives of Plant Breeding - Centres of origin – Germplasm, gene banks, gene sanctuary - Components of plant genetic variance - Modes of reproduction and Genetic consequences - Modes of Pollination and Genetic consequences - Methods of Plant Breeding - Introduction, NBPGR & its activities - Selection, Selection intensity and Selection differential, Heritability and Genetic advance - Mass selection - Pureline selection - Hybridization, Objectives, Types, Examples - Handling of segregating generations - Pedigree method - Bulk method - Backcross method - Self-incompatibility and Male sterility systems and their utilization - Heterosis and Inbreeding depression, Basis of Heterosis, Exploitation - Inbred lines, development and evaluation - Steps in producing Single cross, Three-way cross and Double cross hybrids _ Population improvement - Synthetics and Composites - Methods of breeding for vegetatively propagated crops - Breeding for biotic and abiotic stresses.

Practicals

1. Monohybrid ratio and its modifications
2. Dihybrid ratio and its modifications
3. Gene interactions
4. Epistatic interactions
5. Chi-square analysis
6. Two point test cross
7. Three point test cross
8. Life cycle of higher plants
9. Plant breeder's kit

10. Floral biology, Selfing and Crossing techniques. rice, maize
11. Floral biology, Selfing and Crossing techniques - sorghum, bajra
12. Floral biology, Selfing and Crossing techniques - pigeon pea, groundnut
13. Floral biology, Selfing and Crossing techniques - sunflower, safflower
14. Floral biology, Selfing and Crossing techniques - castor, cotton
15. Floral biology, Selfing and Crossing techniques - bhendi, brinjal
16. Floral biology, Selfing and Crossing techniques - chillies, tomato

References

1.	Genetics	Verma P S and Agarwal V K 1978. S. Chand and Company, New Delhi
2.	Fundamentals of Genetics	Singh B D 1990. Kalyani Publishers, New Delhi
3.	Plant Breeding	Singh B D 1993. Kalyani Publishers, New Delhi
4.	Plant Breeding Principles and Methods	Singh B D 1983. Kalyani Publishers, New Delhi