

**JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

Programme: B.Sc.

Semester: VI

BOTANY PAPER VII

CYTOLOGY, GENETICS, EVOLUTION AND PLANT BREEDING

Course Code: 18VIBO7

No. of Hours: 45

COURSE OBJECTIVES:

- Understand the Mendelian and neo Mendelian genetics.
- To Know about interaction of genes, multiple alleles and linkage and crossing over.
- To Know about the evolutionary sequence of various groups of plants.

LEARNING OUTCOMES:

- Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.
- Elucidate the role of extra-chromosomal genetic material for inheritance of characters.
- Understand the application of principles and modern techniques in plant breeding.

UNIT I Cytology 14 HRS

Microscopy- Principles of Light (dual properties of light, wavelength, amplitude, resonance) Magnification and Resolution. Types of Microscopy – and Confocal. Brief account of electron microscopy (SEM and TEM), significance and uses.

Chromosome: structure, number and types. Karyotype (asymmetrical and symmetrical types) and Idiogram. Nucleosome concept. Chromosomal aberrations – numerical, structural & their significance.

UNIT 2 Cell division 7 HRS

A brief concept of Cell cycle and apoptosis / Programmed cell death. Cyclin Dependent Kinases and checkpoints. Mitosis – Phases, mitotic apparatus, cytokinesis, mitotic inhibitors, significance. **Meiosis** – Phases and significance.

A brief account of Synaptonemal complex.

UNIT III Genetics 12 HRS

Introduction, Mendelian principles / laws. Non Mendelian inheritance: Incomplete dominance and Interaction of genes - Supplementary, Complementary, Epistasis, Multiple factor inheritance (plant examples), Genetic problems. Linkage & crossing over. Chromosome mapping in maize.

Cytoplasmic inheritance – Plastid inheritance (*Mirabilis*) and male sterility in maize.

UNIT IV Plant breeding and vegetative propagation 6 HRS

Plant Breeding- Objectives and methods of plant breeding, Hybrid Vigour.
Vegetative propagation- Introduction and methods: Artificial- cutting, grafting, layering. Natural - Root, stem and leaves with one example each. Importance of Quarantine methods.

UNIT V Organic evolution 6 HRS

Introduction. Origin of life, Chemical evolution of life- Contributions of Oparin, Stanley Miller. Theories of organic evolution – Lamarckism, Darwinism and Neo-Darwinism.

REFERENCES

1. Botter. Text Book of Genetics. L.B. Publications.
2. Chahal. Principles and Procedures of Plant Breeding. L.B. Publications.
3. Gopalakrishnan, T.S., IttaSambasivaiah&Kamalakar Rao. Principles of organic evolution.
4. Gupta, P.K. Cytology, Genetics & Evolution. Rastogi Publication.
5. Hughes. Plant Molecular Genetics. L.B. Publications.
6. Khanna, S.S. Genetics, Heredity & Evolution.
7. Klug. Concept of Genetics.7th Ed. L.B. Publications.
8. Singh. Cytology & Genetics. L.B. Publications.
9. Sinha and Sinha. Cytogenetics, Plant Breeding & Evolution. Vikas Publications.
10. Sinnot, E.W. Dunn, L.C. &Dobzonsky, T. (1958). Principles of Genetics. Tata Mac Graw Hill, New York.
11. Stickburger, M. (1990). Genetics 3rd (Eds.). MacMillan Publishing Company.

BOTANY PRACTICAL – VII

1. Onion root tip to study mitosis
2. Onion / Rheo flower buds to study meiosis.
3. Study of permanent slides of mitosis and meiosis
4. Karyotype of *Allium cepa* -
5. Genetic problems I
6. Microscopy– Sketch / Photo – (Identification 01, diagram 01, Principle -02)
7. Genetic problems II
8. Natural and artificial vegetative propagation
9. Test and Repetition

ACTIVITY FOR VISEMESTER Submission – Record and Permanent slides (2 slides)