



Semester – 5th

Branch	Subject Title	Subject Code
B.Sc. (Botany-Major)	Plant physiology and Metabolism	BOM1-151

Course Objectives: - This course will enable the students to-

To study the vital and the various metabolic activities in plants. To provide an overview of the plant biochemical and physiological processes that could be exploited both to reduce the environmental impact of modern agricultural practices and to develop strategies and tools to increase plant yield and quality and to illustrates knowledge of stress adaptations in biological systems.

Course Learning outcomes (CLO),

On successful completion of this course, the students will be able to:

1. This course provides learning opportunities in the field of plant physiology, metabolism and biochemical aspects.
2. It gives knowledge about significance of vegetation for sustaining life on earth by learning interesting physiological functions of plants.
3. Students can know the valuable contribution of plants for mankind and society with the help of this course.
4. The practical application of different aspects will be possible for entrepreneurship development.

Content

Unit – 1

Plant-Water Relations- Importance of water to plant life, physical properties of water, Diffusion and Osmosis, Absorption, Transport of water and transpiration, Physiology of Stomata.

Transport of Organic Substances- Mechanism of phloem transport, source-sink relationship, factors affecting solute translocation.

Unit - 2

Photosynthesis- Significance, historical background, chloroplast, photosynthetic pigments, concept of two pigment systems, light reaction, Calvin cycle, Hatch & Slack pathway, CAM plants, Photorespiration.

Nitrogen Metabolism- Biology of Nitrogen fixation- symbiotic and Asymbiotic, Importance of nitrate reductase and its regulation, ammonium assimilation, nitrogen cycle.

Unit – 3

Respiration and Bioenergetics- Mitochondria, aerobic and anaerobic respiration, Fermentation, Glycolysis. Krebs cycle, Electron transport mechanism, Oxidative Phosphorylation and ATP synthesis, Pentose phosphate pathway. Lipid Metabolism- Structure and function of lipids, fatty acid biosynthesis, beta oxidation, saturated and unsaturated fatty acids, storage and mobilization of fatty acids.

Unit - 4

Enzymology- Classification, nomenclature and characteristics of Enzymes, concepts of Holoenzyme, Apoenzyme, Coenzyme and Cofactors, regulation of enzyme activity, mechanism of action, factors affecting enzyme activity.

Plant Hormones- Discovery, structure, mode of action and physiological role of Auxins, Gibberellins, Cytokinin, Abscissic acid and Ethylene.



Unit - 5

Growth and Development- General knowledge of 12 vegetative and reproductive growth, phases of growth and development, kinetics of growth. Seed dormancy, Seed germination and factors of their regulations. Concepts of Photoperiodism and physiology of flowering, Florigen concept. Biological clocks, physiology of Senescence. Photomorphogenesis, Phytochromes and Cryptochromes their discovery, physiological role and mechanism of action.

Practicals

1. Separation of Photosynthetic pigments by Paper Chromatography and determining the Rf value
2. Determination of Rate of Photosynthesis in different wavelength of Light
3. Determination of rate of photosynthesis in different concentration of CO₂
4. Estimation of Ascorbic acid content in Plant sample
5. Study of Geotropism, Phototropism and Hydrotropism
6. Evolution of CO₂ during respiration
7. Evolution of O₂ during Photosynthesis
8. Moll's half leaf experiment
9. Determination of rate of growth by using Arc auxanometer.
10. Determination of osmotic potential of plant cell sap by plasmolytic method.
11. Determination of water potential of given tissue (potato tuber) by weight method
12. To study the induction of amylase activity To study the effect of different concentrations of IAA on Avena coleoptile elongation.