Bot-403 & 404 PLANT PHYSIOLOGY AND DEVELOPMENT Credit Hours: 3(2+1)

THEORY:

Course Outline:

The Course Content Includes an elaborate account of Photosynthesis, Respiration, Assimilation of Nutrients, Translocation of Food, and Light Mediated Stomatal Movements.

Course Detail:

Photosynthesis: General Concepts, organization of the photosynthetic apparatus and light absorbing antenna system, Ultrastructure and composition of photosystem-I and II. Absorption and action spectra of different pigments. Mechanism of photosynthesis; light absorption, charge separation or oxidation of water (water oxidizing clock), electron and proton transport through thylakoid protein-pigment complexes. Photophosphorylation and its mechanism.CO_2 fixation mechanisms (C3, C4, CAM pathway).

Respiration: Overview of respiration; Mechanism of respiration- Glycolysis, Oxidative pentose phosphate pathway, The Citric Acid Cycle, Regulation of glycolysis and Krebs cycle, Mitochondrial Electron transport and ATP synthesis. Aerobic and anaerobic respiration. Energetics of respiration. Glyoxylate cycle.

Translocation of photosynthetic: Pathway of Translocation; mechanism of phloem transport;materials translocated; Phloem loading and unloading; Photosynthate allocation and partitioning. **Assimilation of inorganic Nutrients (N, S, P):** The nitrogen cycle; Nitrogen fixation; Pathways of assimilation of nitrate and ammonium ions. Sulphur Assimilation; Phosphorous Acquisition. **Stomatal biology:** Light dependent stomatal opening; photoreception of blue light by zeaxanthin and phototropins; Factors affecting stomatal movement.

Practicals:

1. Extraction and quantitative measurement of chlorophyll extracted from the leaves by spectrophotometer.
2. Estimation of Oxygen utilized by a Respiring Plant by Winkler's method.
3. Measurement of Carbon Dioxide Evolution during Respiration of Germinating Seeds by the Titration Method.
4. To Categorize C3 and C4 plants through their anatomical and physiological characters.
5. To regulate stomatal opening by light of different colors and pH

Recommended Readings:

1. L.Taiz, E.Zeiger, I.M. Møller, A. Murphy (2015).*Plant Physiology and Development,* 6th Edition. Sinauer Associates Inc., Sunderland MA. ISBN: 0-87893-831-1,700pp
2. R. L. Jones, H. Ougham, H. Thomas, S. Waaland (2012). *The Molecular Life of Plants***.** Wiley Blackwell**.** ISBN: 978-0-470-87011-2012 766pp
3. B. B. Buchanan (Editor), W. Gruissem (Editor), R. L. Jones (Editor) 2nd Edition (2015). *Biochemistry and Molecular Biology of Plants.*Wiley-Blackwell. ISBN: 978-0-470- 71421-8 1280pp
4. E. Grotewold, J. Chappell, E. A. Kellogg (2015).*Plant Genes, Genomes, and Genetics.* Wiley-Blackwell ISBN: 978-1-119-99888
5. Plant Physiology and Development (http://6e.plantphys.net/)
6. The Arabidopsis Book (https://aspb.org/publications/other-aspb-publications/the-arabidopsis-book/).
7. Plant Physiology (http://www.plantphysiol.org/).
8. Annual Review of Plant Biology (http://www.annualreviews.org/journal/arplant).

9. The Plant Cell (http://www.plantcell.org/site/teachingtools/).
10. Teaching tools in Plant Biology (http://www.plantcell.org/content/teaching-tools-plant-biology).
11. Basic Biology Concepts Khan Academy (http://lej4learning.com.pk/category/basic-sciences/biology).
12. Current protocols in Plant Biology (http://www.currentprotocols.com/WileyCDA/Section/id-810246.html).

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