Name of the Programme: M.Sc. Part-I (Biochemistry)

Course Code: CHB-524 **Title of the Course:** Plant Biochemistry

Number of Credits: 4

Effective from AY: 2022-23

Pre-requisites for the Course:	Students should have graduate level knowledge either in chemical or life sciences or should have qualified change of discipline test.	
Course Objectives:	1. To acquaint students with biochemistry of plants and the mechanisms of photosynthesis. 2. To introduce to students the details of pigment production, toxin production, antioxidative and stress tolerance mechanisms in plants.	
Content:		**No of hours**
	1.Electron transport system in plants a. Oxidative phosphorylation in plants (cyclic and non-cyclic photo-phosphorylations) b. Mitochondrial respiratory complexes c. Order and organization of electron carriers d. Electrochemical gradient e. Chemiosmotic theory f. ATP synthase and mechanism of ATP synthesis g. Generation of NADPH	10
	2. Nitrate assimilation a. Structural features of nitrate reductase and nitrite reductase b. Incorporation of ammonia into organic compounds c. Regulation of nitrate assimilation d. Nitrogen fixing plants	8
	3. Photosynthesis a. Photosynthetic apparatus, pigments of photosynthesis, the role of carotenoids b. Photosystems I and II, their location c. Hill reaction, complexes associated with thylakoid membranes d. Light-harvesting complexes, e. Path of carbon in photosynthesis: C3 and C4 pathway of carbon, reduction and its regulation, Photorespiration.	10
	4. Special features of secondary plant metabolism a. Terpenes (classification, biosynthesis), lignin, tannins, pigments, phytochrome, waxes, alkaloids, b. Biosynthesis of nicotine c. Functions of alkaloids, d. Cell wall components.	8
	5. Toxins of plant origin a. Phytohemagglutinins, lathyrogens, nitriles, protease inhibitors, glycosides, proteinaceous toxins, tannins, oxalates, anti-vitamins, volatile oils, furocoumarins, lectins, solanins and chaconines b. Mechanism of toxin action c. Toxicological effects of plant toxin	8

	6. Stress metabolism in plants a. Environmental stresses, salinity, water stress, heat, chilling, anaerobiosis, pathogenesis, heavy metals, radiations and their impact on plant growth and metabolism b. Criteria of stress tolerance.	10
	7.Antioxidative defence system in plants a. Reactive oxygen species and their generation Enzymic and non-enzymic components of antioxidative defence mechanism.	6
Pedagogy:	Mainly lectures and tutorials. Seminars / term papers /assignments / presentations / self-study or a combination of some of these can also be used. ICT mode should be preferred. Sessions should be interactive in nature to enable peer group learning.	
References/ Readings:	1. M.K. Campbell, 2012. Biochemistry. 7 th edition. Boston: Cengage Learning, 2012. 2. L. Taiz, and E. Zeiger, Plant Physiology. Sinauer Associates Inc., U.S.A, 2010.. 3. W.G. Hopkins and Huner, N.P. 2009. Introduction to Plant Physiology. U.S.A. John Wiley & Sons, 2008 4. P.N. Campbell, and A.D. Smith, Biochemistry Illustrated. London: Churchill Livingstone, 2011. 5. J.M. Berg, J.L. Tymoczko, and L. Stryer, Biochemistry, New York: W.H. Freeman and Company, 2011. 6. D.L.Nelson, and M.M. Cox, A.L. Lehninger, Lehninger Principles of Biochemistry. New York: W. H. Freeman and Company, 2008.	
Course Outcomes:	1.The students will be able to describe and outline the mechanisms of plant photophosphorylation, photosynthesis 2.The students will be able explain the functions of plant pigments and other biomolecules. 3.The students will be able to explain mechanisms of pigment production 4.The students will be able to develop understanding of stress tolerance and antioxidant production by plants.	