Syllabus for B.Sc. (Hons) Agriculture Year – III (Sem. VI)

Subject Code: 16AS0615

Subject Short Name: Biochem. 6.1

Subject Name: Essentials of Plant Biochemistry

Objective:

1. To impart the fundamental knowledge on structure and function of cellular components.
2. To enable students with the intense knowledge of structure and function of biomolecules and the biological processes in plants.
3. To be familiar with carbohydrates, lipids, enzymes, proteins and vitamins.
4. To understand the nucleic acid and metabolism process.

Credits Earned: 3 Credits (2+1)

Course Outcomes: After completion of this course, Students will be able to

- Know the basics of biochemistry and role of enzymes and vitamins in plants.
- Define the structure of DNA/RNA, types, replication, transcription, translation etc.
- Understand biochemistry and properties of water, buffer and pH.
- Understand the role of carbohydrates, lipids and proteins in plants.
- Discuss the synthesis pathways of biomolecules and metabolism.

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Progressive Assessment (PA)	Viva (V)	Term work (TW)	
2	0	2	3	40	20	20	10	10	100

Theory Content:

Unit	Topics	Contact Hours
1	Biochemistry - Introduction and importance; plant cell and its components	**2**
2	Properties of water, pH and buffer	**1**
3	Bio-molecules - Structure, classification, properties and function of carbohydrates, amino acids, proteins, lipids and nucleic acids	**5**

4	Vitamins – physiological and metabolic role	**2**
5	Enzymes: General properties; Classification; Mechanism of action; Michaelis and Menten and Line Weaver Burk equation and plots; Introduction to allosteric enzymes, use of enzymes	**4**
6	Metabolic energy and its generation – Metabolism – Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation; Regulation of metabolic pathways	**5**
7	Biosynthetic Pathways – Photosynthesis, Gluconeogenesis, nitrogen fixation, fatty acid and starch formation	**3**
8	Secondary metabolites, Terpenoids, Alkaloids, Phenolic and their applications in food and pharmaceutical industries	**2**
	Total	**24**

Practical Content:

Unit	**Topics**	**Contact Hours**
1	Preparation of standard solutions and reagents	**2**
2	Determination of pH	**2**
3	Qualitative tests of carbohydrates and amino acids	**2**
4	Quantitative estimation of soluble sugars and starch	**2**
5	Estimation of protein by Kjeldhal method and Lowry's method	**2**
6	Preparation of mineral solution from ash, Estimation of fat by Soxhlet method	**2**
7	Determination of acid value, saponification value and iodine number	**2**
8	Estimation of ascorbic acid	**2**
9	Qualitative/quantitative tests of secondary metabolites	**2**
	Total	**18**

Reference Books:

- Nelson and Cox. 2008. Lehninger Principles of Biochemistry. Fourth/Fifth edition. Freeman

(Can be downloaded)

- Conn, Stumpf, Bruening and Doi. 2006. Outlines of Biochemistry. Fifth Edition. Wiley
- Horton, Moran, Rawn, Scrimgeour, Perry. 2011. Principles of Biochemistry. Fifth Edition. Pearson/Prentice Hall (Can be downloaded)
- Heldt. 2005. Plant Biochemistry. Elsevier (Can be downloaded)
- Goodwin and Mercer. 2005. Introduction to Plant Biochemistry. 2nd edition. CBS.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
25%	25%	20%	10%	10%	10%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the class-rooms.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory/ field.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.