



# P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

*Autonomous -ISO 9001 – 2015 Certified*

## **Title of the Paper (Plant Physiology and Metabolism)**

**Offered to:** BSc. BZC with Programme code **US03**

**Course Type:** Core (P)

**Year of Introduction:** 2021-2022

**Year of Revision:**

**Percentage of Revision:**

**Semester:** III/IV

**Credits:**

**Hours Taught:** 30 hrs. per Semester

**Max. Time:** 3 Hours

**Course Prerequisites:** Knowledge of Plant Physiology and Metabolism at +2 level

**Course Description:** This course will provide one with a basic and comprehensive skill in understanding plant water relations. Enable the student with depth of topics and helps them to gain appreciation of the mineral nutrition, enzymes and respiration. On the other hand, importance of understanding photosynthesis and photorespiration are also learnt. A part from these the student will be enhanced with the knowledge of nitrogen and lipid metabolism. The course provides a vast knowledge in plant growth development and stress physiology.

### **Course Objectives:**

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

1. To understand the plant water relations.

2. To understand the mineral nutrition, enzymes and respiration.
3. To understand the photosynthesis and photorespiration.
4. To understand the nitrogen and lipid metabolism.
5. To understand the plant growth-development and stress physiology.

**Course Outcomes:**

At the end of this course, students should be able to:

CO1: Comprehend the importance of water in plant life and mechanisms for transport of water and solutes in plants.

CO2: Evaluate the role of minerals in plant nutrition and their deficiency symptoms, Interpret the role of enzymes in plant metabolism.

CO3: Critically understand the light reactions and carbon assimilation processes responsible for synthesis of food in plants.

CO4: Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms.

CO5: Evaluate the phytohormones that regulate growth and development in plants, examine the role of light on flowering and explain physiology of plants under stress conditions.

**Syllabus**

**Course Details**

Unit	Learning Units	Lecture Hours
I	<ol style="list-style-type: none"> <li>1. Determination of osmotic potential of plant cells by plasmolytic method using <i>Rhoeo/ Tradescantia</i> leaves.</li> <li>2. Calculation of stomatal index and stomatal frequency of mesophyte and a xerophyte.</li> <li>3. Determination of rate of transpiration using Cobalt chloride method / Ganong's potometer (at least for dicot and a monocot).</li> <li>4. Effect of Temperature on membrane permeability by colorimetric method.</li> <li>5. Minor experiments – Osmosis, Arc-auxometer, ascent of sap through xylem, cytoplasmic streaming.</li> </ol>	

II	<ol style="list-style-type: none"> <li>1. Study of mineral deficiency symptoms using plant material/photographs.</li> <li>2. Demonstration of amylase enzyme activity and study the effect of substrate and Enzyme concentration.</li> <li>3. Separation of chloroplast pigments using paper chromatography technique.</li> <li>4. Demonstration of Polyphenol oxidase enzyme activity (Potato tuber or Apple fruit)</li> </ol>	
III	<ol style="list-style-type: none"> <li>1. Anatomy of C3, C4 and CAM leaves</li> <li>2. Estimation of protein by biuret method/Lowry method</li> </ol>	

**Textbook:**

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.

**Recommended Reference book:**

1. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

**Course Delivery method:** Face-to-face / Blended.

**Course has focus on:** Skill Development.

**Websites of Interest:**

<https://youtu.be/VPwLN6U1spk>

<https://youtu.be/wBDC8gFuobo>

<https://youtu.be/Fi33E5sC0To>

<https://youtu.be/Hc3Mg0Yc7kI>

<https://youtu.be/IigeZ7PtWQU>

<https://youtu.be/q50VbVyWy6o>

<https://youtu.be/ug5p2CRqjDk>

<https://youtu.be/W56RHxu2Hpc>

<https://youtu.be/3PYdMaCIUmw>

<https://youtu.be/VyKsT6q1O-s>

<https://youtu.be/1kTbPx0WFiA>

### **Co-curricular Activities:**

Question and answer session at the end of class.

Observing animations.

Written assignments.

Group Discussion (GD)/ Quiz.

Power Point Presentations.

### **Model Question Paper Structure for SEE**

**Max. Time: 3Hrs.**

**Max. Marks: 35**

1. Conduct the experiment 'A'(Major experiment), write aim, principle, material and apparatus/equipment, procedure, tabulate results and make conclusion. **10M**
2. Demonstrate the experiment 'B'(Minor experiment), write the principle, procedure and give inference. **5M**
3. Identify the following with apt reasons. **3x4=12M**
  - C. Plant water relations /Mineral nutrition
  - D. Plant metabolism
  - E. Plant growth and development
4. Record +Viva-voce **5+3=8M**