**COURSE TITLE: PHYSIOLOGY OF PLANTS (THEORY)**
**COURSE CODE: BOT.III.C-5**
**MARKS: 100 (75Theory +25 Practical)**
**CREDITS: 4 ( 3 Theory +1 Practical)**
**COURSE DURATION: 45 HOURS**

**Course objective:**
Relate physiological mechanism of plants and their functioning.
Analyze biosynthesis of valuable plant metabolites (primary/ secondary) and their role.

**Course outcome:**
Upon successful completion of the course, students will be able to:
CO 1: Analyse Physiological processes in plants.
CO 2: Formulate, design experiments and interpret data.
CO 3: Learn to demonstrate and describe the physiological process through practical's and mini projects.
CO 4: Estimate and evaluate methods of quantitation of pigments, enzymes and metabolites.

| Sr. No | UNITS, TOPICS AND SUB-TOPICS | Hours |
|---|---|---|
| | **MODULE -I: PLANT WATER RELATIONS AND SOLUTE TRANSPORT** | **15** |
| 1.1 | Water and its significance to plants | |
| 1.2 | Osmotic & water potential of cell | |
| 1.3 | Transpiration, stomatal regulation & anti-transpirants | |
| 1.4 | Uptake, transport and translocation of water | |
| 1.5 | Essentiality of mineral nutrition and its uptake (active, passive and its role on membranes) | |
| 1.6 | Transport of organic solutes (source sink relationship) | |
| | **MODULE II: PHOTOSYNTHESIS AND STRESS PHYSIOLOGY** | **15** |
| 2.1 | Chloroplast and Light harvesting complexes | |
| 2.2 | Z scheme of photosynthesis & Mechanisms of electron transport | |
| 2.3 | $CO_2$ fixation (C3, C4 and CAM pathways) | |
| 2.4 | Photoprotective mechanisms (photorespiration) | |
| 2.5 | Environmental change and its impact on photosynthesis<br>Responses of plants to abiotic (water, temperature and salt) stresses | |
| | **MODULE III: PLANT GROWTH AND DEVELOPMENT AND SECONDARY METABOLITES** | **15** |
| 3.1 | Role of phytochromes & cryptochromes and its functions | |
| 3.2 | Plant hormones, transport and physiological functions | |
| 3.3 | Photoperiodism and & vernalization | |
| 3.4 | Senescence, seed dormancy & germination | |
| 3.5 | Biosynthetic pathway of terpenes, phenols and alkaloids and their functions | |
| | **TOTAL** | **45** |

**COURSE TITLE: PHYSIOLOGY OF PLANTS (PRACTICALS)**
**COURSE CODE: BOT.III.C-5**
**MARKS: 25**
**CREDITS: 1**
**PRACTICAL SESSION: 15 ( *Inclusive of 3 PA*)**

| Sr. No | TOPICS | PRACTICAL SESSIONS |
|---|---|---|
| 1 | Determination of osmotic potential of plant cell sap by plasmolytic method. | 2 |
| 2 | Determine water potential of given tissue by falling drop/ tissue weight method | 2 |
| 3. | Chromatographic separation of plant pigments and plant sugars by paper chromatography | 3 |
| 4 | Quantitation of total free amino acids | 2 |
| 5 | **Mini Project**:<br>1. Mineral deficiency symptoms in plants<br>2. Secondary metabolites in plants.<br>3. Oxygen consumption during respiration<br>4. Role of Plant hormones in plant growth<br>5. Starch production during photosynthesis<br>6. Use of hydroponic technique for plant growth | 6 |
| | | **15** |

**REFERENCES:**


1. Harvey J.M. Hou, Najafpour, M. Mahdi**.,** Moore, G**.** F.**,** Allakhverdiev **S.** I. (2017) Photosynthesis: Structures, Mechanisms, and Applications. Springer Publications.
2. Jordan Smith (2016) Plant and Crop Physiology. Syrawood Publishing House.
3. Taiz, Lincoln., Zeiger, Eduardo., Møller, I. Max and Murphy Angus (2018) Fundamentals of Plant Physiology. Oxford University Press.
4. Taiz Lincoln and Zeiger, Eduardo (2015).Plant Physiology and Development. Sinauer Associates Inc.U.S.
5. Ray Noggle G and Fritz George J. (2010) Introductory Plant Physiology. Prentice Hall.
6. Taiz, L. and Zeiger, E. (2006). Plant Physiology, 4th edition, Sinauer Associates Inc .MA, USA.
7. Salisbury F. B. and Ross C. W. (2002). Plant Physiology 3rd edition. CBS publishers and distributers.
8. Goodwin Y.W., and Mercer E.I. (2003) Introduction to Plant Biochemistry. 2nd edition CBS Publishers and distributors.
9. Moore T.C. (1989). Biochemistry and Physiology of Plant Hormones Springer –Verlag, New York,USA.
10. Singhal G.S., Renger G., Sopory, S.K., Irrgang K.D and Govindjee (1999).Concept in Photobiology; Photosynthesis and Photomorphogenesis. Narosa Publishing House, New Delhi.
11. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
12. Nelson , D.I. and Cox M. M. (2000). Lehninger. Principles of biochemistry, 3rdedition, Macmillan U.K.
11. Plummer D. T. (1985). An introduction to Practical Biochemistry 2nd edition. Tata Mcgraw Hill Publishing company Ltd.

**CURRENT LITERATURE (JOURNAL ARTICLES):**

Plant Physiology, The Plant Cell, Journal of Plant Physiology, Physiologia Plantarum, Plant Physiology and Biochemistry, Postharvest Biology and Technology, Journal of the American Society for Horticultural Science, Nature, Scientific American and Science