**GOVERNMENT PG COLLEGE, AMBALA CANTT (WEEK WISE LESSON PLAN)**

**Course file session 2023-24 (Even Sem)**

**Name of Professor: DR. ANJU TANWAR**

**CLASS AND SECTION: B.Sc. MEDICAL, VIth Sem, SUBJECT: BOTANY**

**Paper – I Biochemistry and Plant Biotechnology**

**SYLLABUS**

**Internal Assessment-10 Max. Marks – 40**

**Time– 3 Hrs.**

**UNIT-I**

Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action. Growth and development: Definitions; phases of growth and development; Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis; phytochromes and their discovery, physiological role and mechanism of action. Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; B-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

**UNIT-II**

Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation. Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of Agro-bacterium; vectors for gene delivery and marker genes.

**Suggested Readings:**

1. Bhojwani, S.S. 1990: Plant Tissue Culture Applications and Limitations. Elsevier Science Publishers, New York, USA.

2. Lea, P.J. and Leegood, R.C. 1999: Plant Biochemistry and Molecular Biology, John Wiley & Sons, Chichester, England.

3. Nelson, D.L. and Cox, M.M. 2005: Lehninger Principles of Biochemistry. 4th Edition. W.H. Freeman and Company, New York.

4. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.

5. Palmer, T. and Bonner, P. 2008: Enzymes-Biochemistry, Biotechnology, Clinical Chemistry (2nd Edition). East West Press Pvt. Ltd., New Delhi.

6. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA. 7. Rawn, J.D. 2004: Biochemistry. Panima Publishing Corporation, New Delhi.

**COURSE OUTCOME**

A students acquiring B.Sc. (Medical) degree will be skilled in the following fields:

* Practical Implementation and Theoretical Knowledge: Student will learn to carry out practicals in the field and Laboratory with minimal risk.
* Conservation of Botanical Gardens: Through field work in the Botanical Gardens, students are able to learn Integrated Conservation Approaches for plants. Students will also be able to learn Plant Propagation Techniques.
* Environment Sustainability: Students shall be able understand the impact of plants in Societal and Environmental contexts and demonstrate the knowledge of and need for sustainable development.
* Modern Tool Usage: Apply appropriate techniques, resources and modern instructions and equipment for Biochemical, Physiological, Molecular, Plant Tissue Culture of Plants.
* They will be able to explain various plant process, metabolism, concepts of gene, genome, experimental teachings and methods of their area of specialization in botany.
* Students visit Industries and prepare report on Sources, types and control of air and water pollution as a part of their curriculum requirement. Field exposures are given for better understanding of plant distribution and collection
* Understand the Interactions between Plants, Environment and Human Beings and our role in Environment conservation.

**WEEK WISE LESSON PLAN FOR THE MONTH JANUARY**

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| **Week no** | **Schedule dates** | **Topics to be covered** |
| **1** | 1-6 Jan | - |
| **2** | 8-13 Jan | Discovery of Enzymes  Nomenclature of Enzymes; Characteristics of Enzymes |
| **3** | 15-20 Jan | Concept of Holoenzyme and Apoenzyme  Concept of coenzyme and cofactor; Mechanism of enzyme action; Regulation of enzyme activity |
| **4** | 22-27 Jan | Growth and Development; Phases of growth and development  General introduction to plant Hormones |
| **5** | 29-31 Jan | Discovery and mechanism of action of Auxins Discovery and mechanism of action of Gibberellins |

**WEEK WISE LESSON PLAN FOR THE MONTH FEBRUARY**

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| **Week no** | **Schedule dates** | **Topics to be covered** |
| **1** | 1-3 Feb | Discovery and mechanism of action of Cytokinin  Discovery and mechanism of action of Absicic acid and Ethylene |
| **2** | 5-10 Feb | Photomorphogenesis  Structure and functions of Lipids; Synthesis of Fatty acids |
| **3** | 12-17 Feb | Beta oxidation of Fats  Saturated and unsaturated Fats; Storage and Mobilization of Fatty acids |
| **4** | 19-24 Feb | Introduction to Nitrogen Fixation; Biology of Nitrogen Fixation; Nitrate Reductase: Importance & Regulation |
| **5** | 26-29 Feb | Ammonium assimilation in Plants  Nitrate reduction and Nitrite reduction; Ammonia formation and incorporation; Ammonia incorporation |

**WEEK WISE LESSON PLAN FOR THE MONTH MARCH**

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| **Week no** | **Schedule dates** | **Topics to be covered** |
| **1** | 1-2 March | General outline of DNA Recombinant Technology  Tools used in DNA Recombinant Technology: Vectors And Enzymes |
| **2** | 4-9 March | Basic steps used in DNA Recombinant Technology; Types of Cloning, Genomic Library, c-DNA Library, Transposable elements |
| **3** | 11-16 March | Cellular Totipotency; Differentiation of plant tissue culture: Dedifferentiation, Re-differentiation Assessment Test |
| **4** | 18-23 March | Biology of *Agrobacterium*  *Agrobacterium* mediated gene transfer  Various vectors utilized for gene delivery Test |
| **5** | **25-30** March | **HOLI VACATIONS** |

**WEEK WISE LESSON PLAN FOR THE MONTH APRIL**

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| **Week no** | **Schedule dates** | **Topics to be covered** |
| **1** | 1-6 April | Marker genes  Aspects of Plant Tissue Culture  Tissue culture Laboratory visit |
| **2** | 8-13April | Assessment Test, Assignment Submission |
| **3** | 15-16April | Revision of the whole syllabus   * Through audio-visual practice * Diagram practice, Specimen and slide study * Group discussion, Seminars and power point presentations   Oral and written tests |
| **4** | 22-27April | Revision of the whole syllabus   * Through audio-visual practice * Diagram practice, Specimen and slide study * Group discussion, Seminars and power point presentations   Oral and written tests |
| **5** | **29-30A**pril | **FINAL PRACTICALS** |

Dr. Anju Tanwar