

**III. BOTANY SPECIFIC (DSE 4):**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10****Instruction to Question Setter for****Mid Semester Examination (MSE):**

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

**End Semester Examination (ESE):**

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**RESEARCH METHODOLOGY****Theory: 60 Lectures****Unit 1: Basic concepts of research**

Research-definition and types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs empirical). Research methods vs methodology. Literature-review and its consolidation; Library research; field research; laboratory research.

**(10 lectures)****Unit 2: General laboratory practices**

Common calculations in botany laboratories. Understanding the details on the label of reagent bottles. Molarity and normality of common acids and bases. Preparation of solutions. Dilutions. Percentage solutions. Molar, molal and normal solutions. Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling.

**(12 lectures)****Unit 3: Data collection and documentation of observations**

Maintaining a laboratory record; Tabulation and generation of graphs. Imaging of tissuespecimens and application of scale bars. The art of field photography.

**(6 lectures)****Unit 4: Overview of Biological Problems**

History; Key biology research areas, Model organisms in biology (A Brief overview): Genetics, Physiology, Biochemistry, Molecular Biology, Cell Biology, Genomics, Proteomics Transcriptional regulatory network.

**(6 lectures)****Unit 5: Methods to study plant cell/tissue structure**

Whole mounts, peel mounts, squash preparations, clearing, maceration and sectioning; Tissue preparation: living vs fixed, physical vs chemical fixation, coagulating fixatives, non-coagulant fixatives; tissue dehydration using graded solvent series; Paraffin and plastic infiltration; Preparation of thin and ultrathin sections.

**(6 lectures)**

**Unit 6: Plant microtechniques**

Staining procedures, classification and chemistry of stains. Staining equipment. Reactive dyes and fluorochromes (including genetically engineered protein labeling with GFP and other tags). Cytogenetic techniques with squashed plant materials.

(12 lectures)

**Unit 7: The art of scientific writing and its presentation**

Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Powerpoint presentation. Poster presentation. Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism.

(8 lectures)

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**DSE-4 LAB: RESEARCH METHODOLOGY**

60 Lectures

1. Experiments based on chemical calculations.
2. Plant microtechnique experiments.
3. The art of imaging of samples through microphotography and field photography.
4. Poster presentation on defined topics.
5. Technical writing on topics assigned.

**Reference Books:**

- Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
  - Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
  - Ruzin, S.E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.A.
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