Syllabus of M.Phil. Course in Botany

B.R.A. Bihar University, Muzaffarpur

SEMESTER I

PAPER – I **Research Methodology & Computer Science**

Full Marks : 100

Theory Paper : 70 Internal Assessment : 30

Unit – I

Theory of scientific and research methods in Natural Science (Botany); Deduction, Induction and Generalization, Design, Execution, Analysis and Evaluation of Experiments.

Unit – II

Biostatistics : Collection & Presentation of Experimental Data, Measures of Central Tendenciy, Arithmetic Mean, Median & Mode, Geometric Mean.

Unit - III

Harmonic Mean & Percentile, Measures of of Dispersion , Range, Inter-quartile Range, Variance, Standard Deviation, and Standard Error, Correlation Coefficient , Types of Correlation, Regression, Simple & Linear Regression, Biological Significance of Correlation & Regression, Test of Significance, Basis of Statistical Inference, Student's "**t**" Test for Mean, Difference of Means, Test for Correlation & Regression Coefficients, Chi-square Test, Analysis of Variance (ANOVA) & DMRT.

Unit – IV

Computer System : An overview, Basic Applications of Computer in Different Fields Botany, Components of a Computer, Preparation of Abstract, Manuscript, Dissertation, Thesis & Reports, Typing, Editing, Saving, Printing Documents, Setting Margins, Page Numbering, Spacing, Title, Heading, Key Words, Tables, Illustrations, Corrections & Insertions, Inserting Pictures, Creating Graphs, Charts, Tables in Word & Excel.

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Unit - V

Web Browsing and Searching Biological Data Bases, NCBI, Pub Med, Sequence & Structure Data bases, Research Publications, Bibliography, Index Cards, LCD (Power Point) Presentation.

Preparation of Research Manuscripts – Full Paper, Short Communications, Review Paper, Book Review, Thesis Writing; Writing Research Grant Proposal & Reports, Presentation of Research Works in Seminar/Symposia etc.

PAPER – **II Principles & Techniques of Analytical Research Methods In Botany**

Full Marks : 100

Theory Paper : 70 Internal Assessment : 30

Unit – I

Centrifugation : Principles & Types of Centrifuges, Ultracentrifugation, Density Gradient Centrifugation, Continuous Centrifugation.

Unit – II

Microscopy : Differential Interference Contrast (DIC), Polarization, Fluorescent Microscopy, Dark Field & Phase Contrast Microscopy, Electron Microscope – SEM & TEM, Atomic Force Microscopy.

Unit – III

Spectrometry, Electrophoresis & Separation Techniques : Spectrometry – Principle, Beer Lambert's Law, UV,IR,FTIR, Atomic Absorption Spectroscopy, CD, Stop Flow, Mass, MALDI-TOF & NMR.

Electrophoresis : Principle of Gel Electrophoresis, PAGE, SDS PAGE and Agarose Gel Electrophoresis, Comet Assay & capillary Electrophoresis, Iso electrofocussing & 2D – Electrophoresis.

Unit - IV

Chromatography : Principle, Procedures & Application of TLC, PC, Gel Filtration & Ion Exchange Affinity Chromatography, GC, GLC, HPLC, FPLC & HPTLC.

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Unit –V

Molecular Biological Techniques : Isolation & Amplification of Nucleic Acidss Genomic DNA, Plasmid DNA, DNA from Higher Plants, Total RNA, mRNA, PCR – Types & Applications, Genomic & cDNA Library, Gene Cloning Techniques (Recombinant DNA Technology), Screening of Recombinant Clones, Autoradiography, Southern Blotting, Northern Blotting, Western Blotting, DNA Sequencing, DNA Fingerprinting.

PAPER – III Advances in Plant Science

Full Marks : 100

Theory Paper : 70 Internal Assessment : 30

Unit I
Molecular Taxonomy: Scope; Methods in Molecular taxonomy and Systematics; Processing molecular data and Phylogenetic inference using different Methods (Parsimony, Maximum Likelihood, Bayesian); Use of Chloroplast, Nuclear and Mitochondrial DNA sequences in Plant systematics; Phylogenetic trees and concepts; Applications of molecular Phylogenetics.

Unit II
Biotechnology and Advanced cell biology: Algal Biotechnology. Role of Fungi in industry. Gymnosperm biotechnology. Genetic engineering in plants, transgenic plants. Plant Cell Compartments, Membrane Structure and Membranous Organelles, Membrane transport mechanisms, Protein Sorting and Veside Traffic. Cell division regulation -Recent developments in cell cycle research. Mechanism of cell cycle regulation. Cell cycle regulation in multi-cellular organisms; Cell cycle regulation and plant cell growth.

Unit III
Plant Biotechnology: In-vitro culture techniques; Plasticity and totipotency, Culture types – callus, cell suspension culture, Protoplast, Root culture, Shoot tip and Meristemculture, Embryo culture, Microspore culture. Plant regeneration – Somatic embryogenesis, Organogenesis; Applications of tissue culture in plant breeding, Horticultre and Forestry; Industrial Applications of Tissue culture for secondary metabolite production; Agrobacterium-mediated plant transformations. Edible plant Vaccine (EPV) technology; Molecular Farming/pharming-metabolic engineering of plants.

Unit IV
Medicinal Plants and Phyto-chemistry: Floristic diversity and medicinal plant research scenario in India; Diagnostic features, bioactive molecules and therapeutic value of some common medicinal plants; Standardization of herbal drugs; Commercial cultivation of medicinal plants; Neutraceuticals and medicinal food; Bio-prospecting, bio-piracy and protection of traditional medicinal knowledge (IPR). Methods of Plant Analysis; Phenolic compounds; The terpenoids; Organic acids, lipids and related compounds; Nitrogen Compounds; Sugars and their derivatives; Macromolecules.

Unit V
Ecology and Conservation Biology: Scope of ecology; Community organizationconcept of habitat, functional role and niche, key stone species, dominant species, ecotone, edge effect. Natural Resources, Global warming and catastrophic threat to global biological diversity; Degradation and Restoration of Natural Ecosystems; Remote Sensing and its applications; Resource Policies, Conflict Management, Environmental Planning, International Environmental Policies and organizations and conventions.

21.12.18 21.12.18 Professor & Head University Department of Botany B. R. A. Bihar University 21.12.18 21/12/18 (External Expert)