

**KAKATIYA UNIVERSITY, WARANGAL
FACULTY OF SCIENCE**

Pre-Ph.D (Botany)

Paper – I: Research Methodology

Unit I: Research problem and reporting results

12 Hours

Formulation of Research Problem: Identification and formulating the research problem - Assessing the status of the problem - Formulating the objectives - Review of literature and patents - Identifying gap areas - Development of research plan: Exploration, description, diagnosis and experimentation.

Reporting and thesis writing: Preparation of manuscript for Publication of Research paper - Oral presentation - Importance of effective communication - Types of report and structure: Research paper, Research project proposal, GANTT Chart, Research project report, Thesis - Illustrations - Pictures and tables - Footnotes - Acknowledgement - Bibliography - Citation styles.

UNIT II: Research publications and Statistics

12 Hours

Publication ethics: Definition - Introduction and importance - Best practices/standards - Setting initiatives and guidelines - Conflicts of interest - Violation of publication ethics, authorship and contributorship - Intellectual property rights, Publication misconduct, complaints and appeals - Predatory publishers and journals - Plagiarism and Software tools (Turnitin, Urkund and Ouriginal)

Research metrics: Open Access and Subscribed journals - Indexed journals - Science Citation Index (SCI) - Engineering Index (EI) - Scopus Indexing - Consortium for Academic and Research Ethics (CARE) listed journals - SNIP, SJR, IPP, Cite Score. Impact factor of journal as per journal citation report - Individual and Institutional Metrics: Definition and Importance of h-index, g-index, i10-index.

Statistics: Measures of central tendencies: Mean, Median and mode
Standard deviation (SD) and variance, coefficient variance (CV)
Tests of significance: 't' test and Chi-square test
Correlation of variance (ANOVA)

UNIT III:

12 Hours

Thallus Organization, reproduction and life cycles in Algae, Heterothallism, Heterokaryosis and parasexuality in Fungi. General account of bacterial and viral diseases and their control. General account of Lichens and their types.

Gametophyte and sporophyte evolution in Bryophytes, Heterospory and origin of seed habit. Reproductive biology and economic importance of Gymnosperms of India, fossilization, Techniques in paleobotany.

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213 - 146

Physical and chemical mutagens, molecular basis of gene mutations, structural and numerical changes in chromosomes, fine structure of gene, cloning vectors, molecular markers in genome analysis.

Scenario of biodiversity in India and conservation strategies, photochemistry and photosynthesis a general account, over view of plant respiration, biological nitrogen fixation, mechanism of biotic and abiotic stress tolerance.

UNIT IV:

12 Hours

Plant-microbe interaction with plant roots rhizosphere-mycorrhizae, ecosystem, microbial communities in nature and their function, fermentation technology and products.

Role of vitamins, carbohydrates and nitrogen source on growth and differentiation, physiological and biochemical changes associated with growth and differentiation of cultured cells

Morphogenetic aspects of growth and development with special reference to differentiation, symmetry, correlation and polarity, Pollen and pistil interaction.

DNA finger printing, strategies for development of transgenics, strategies for engineering biotic and abiotic and abiotic stress tolerance in plants.

Reference Books:

1. C. R. Kohari, 1990 Research Methodology: Methods and Techniques. New Age International, 418p.
2. S. C. Sinha, A. K. Dhiman, 2002, Research Methodology, Ess Publications, 2 Volumes.
3. Kumar Ranjit, 2005, Research Methodology- A step by step Guide for Beginners, 2nd edition, Pearson Education.
4. Alasdair MacIntyre, 1967, A short story of Ethics, London.
5. P. Chaddah, 2018, Ethics in Competitive Research, Do not get scooped; Do not get plagiarized, ISBN: 978-9387480865.
6. Indian National Science Academy (INSA) Ethics in Science and Education, Research and Government (2019) ISBN: 978-81939482-1-7.
http://www.insaindia.res.in/pdf/Ethics_Books.pdf.
7. Hilary Glasman Deal, Science Research Writing, Imperial college press.