KAKATIYA UNIVERSITY

Department of Biotechnology

Pre Ph .D Syllabus contents and Scheme of Examination

Paper	Paper code	Title of the paper	Duration of the Examination (hrs)	Min. Marks	Max. Marks
Paper-I	General	Research Methodology	3	40	100
Paper-II	Special I	Plant Biotechnology	3	40	100
	Special II	Microbial Biotechnology	3	40	100

(For the candidates admitted from the academic Year 2023-2024)

Note:

Every student, who has been enrolled in Ph.D. Course, shall have to deliver two Departmental seminars on his/her Ph D topic. Seminar will be of about 45-minutes duration. The presentation will be followed by questions session by the audience. Every student shall be required to submit the synopsis of the topic of his/her seminar duly certified and forwarded by the supervisor to the Head & Chairperson BOS of the Department so that the same can be displayed on the notice board

Department of Biotechnology

Kakatiya University, Warangal-506 009

Pre Ph.D. Syllabus

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Paper-I: Research Methodology

(Common Paper)

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 **12 Hours**

Publication ethics: Definition - Introduction and importance - Best practices/standards - Setting initiatives and guidelines - Conflicts of interest - Violation of publication ethics, authorship and contributor ship - Intellectual property right, 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.

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UNIT III: Biostats, Computer applications & Bioinformatics **12 Hours**

Introduction to biostatistics and its applications: Basic concepts of computer, Internet and networking concepts and Operating Systems such as Windows NT, UNIX and LINUX **Bioinformatics:** Biological databases: Concepts of databases, DNA databases and protein-sequencing databases, Concepts of DNA/protein-sequence alignment- Pair-wise & multiple-sequence alignments, methods like BLAST, FASTA.

Unit IV: General Biology: **12 Hours**

Principles and applications of phase contrast, fluorescence, scanning and transmission electron microscopy

Biodiversity & its conservation, Growth and nutritional types of bacteria, prokaryotic cell structure and function.

Cell cycle: Overview of eukaryotic cell cycle, regulation of cell cycle by cell growth and extra cellular signals, Cell cycle check points and Apoptosis

Enzymes: Definitions and nomenclature, Enzymes kinetics, derivation of michaelis-menten constant.

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Paper II: Plant Biotechnology

Unit-I: Plant Tissue Culture

1. Introduction to plant cell, tissue culture, Role of nutrients and growth regulators on plant growth, Micropropagation, cell suspension cultures and Production of Secondary metabolites
2. Somatic Embryogenesis and Synseed technology, embryo rescue of wide hybrids and conservation of Germplasm
3. Protoplast studies: Isolation, culture, fusion and selection of hybrid cells, somatic hybrids and cybrids and applications
4. Cell line selection: Induction and selection of mutants- drought and disease resistant.

Unit-II: Molecular Biology

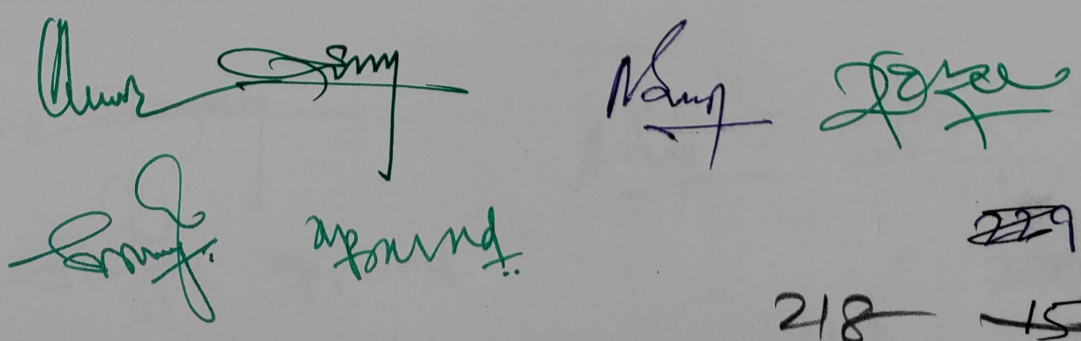
1. Cloning vectors: Plasmids (Ti and Ri Plasmids), Phagemids, Cosmids, Viral vectors, Shuttle Vectors and Binary Vectors; Gene cloning strategies, analysis and expression of cloned genes.
2. Blotting techniques: Southern, Western and Northern blotting techniques.
3. Molecular markers: RFLP, RAPD, AFLP, SSR and their applications.
4. PCR: Technology and its applications in plant biotechnology

Unit-III: Genetic Engineering-I:

1. Genetic transformation: *Agrobacterium* mediated transformation, electroporation and microinjection
2. Particle bombardment and selection of transformants and regeneration of transgenic plants
3. Introduction of r-DNA molecules into appropriate hosts and competent cells preparation.
4. Selectable markers and reporter and promoters genes in genetic transformation-types and their role.

Unit-IV: Genetic Engineering-II:

1. Molecular aspects of biotic and abiotic stress responses
2. Genetic engineering for herbicide, Insect, fungal, viral, drought, salinity and temperature tolerance.
3. Plastid transformation: Chloroplast genetic system, plastome engineering in higher plants & advantages.
4. GM Crops: Social, ethical and legal aspects.



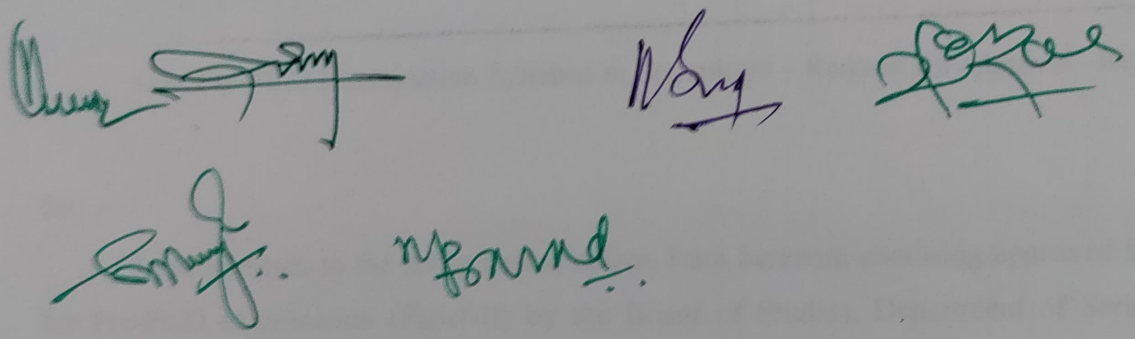
Unit- IV Fermentation Technology

1. Fermentation process, development of inocula, fermenters, Batch and Continuous fermentation processes.

2. Industrially important microorganisms, strain improvement and methods, preservation of microorganisms.

3. Industrial production of energy fuels (solvents), organic acids, enzymes (amino acids) and Bevarages

4. Health care products (antibiotics, vitamins), biomass, production (SCP), recombinant proteins, IPR and Biosafety.



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