

S.D.N.B. VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)

(REACCREDITED WITH "A" GRADE BY NAAC)

CHENNAI 600 044

SYLLABUS AND REGULATIONS

CBCS

**M. Phil – DEPARTMENT OF PLANT BIOLOGY & PLANT
BIOTECHNOLOGY**

FOR THE ACADEMIC YEAR 2011 - 2012

**S.D.N.B. VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS),
CHENNAI – 44**

M.Phil. - PLANT BIOLOGY & PLANT BIOTECHNOLOGY

S. No	Paper	Title of Paper	Hrs/week Theory/	Marks Internal	Marks External
		SEMESTER I			
1.	Paper I MP11	Research Methodology	4	25	75
2.	Paper II MP12	Applied Research Methodology	4	25	75
3.	Paper III MP13	Algal Biotechnology (or) Fungal Biotechnology	4	25	75
		SEMESTER II			
4.	MPPR	Research work for dissertation	-	20	80

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M.Phil. - PLANT BIOLOGY & PLANT BIOTECHNOLOGY

S. No.	Paper	Title of paper
	SEMESTER I	
1.	Paper I MP11	Research methodology
2.	Paper II MP12	Applied Research Methodology
3.	Paper III MP13	Algal Biotechnology (or) Fungal Biotechnology
	SEMESTER II	
4.	MPPR	Research work for dissertation

PATTERN OF QUESTION PAPER

Time : 3 hrs

Max Marks: 75

SECTION – A **(2 x 10 = 20)**

Answer any Ten Questions out of Twelve:

(Questions must cover all the units)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

SECTION – B **(5 x 5 = 25)**

Answer any five Questions out of Seven:

(Questions must cover all the units)

- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.

SECTION – C **(3 x 10 = 30)**

Answer any four Questions out of six:

(Questions must cover all the units)

- 20.
- 21.
- 22.
- 23.
- 24.
- 25.

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PAPER I - RESEARCH METHODOLOGY

SEMESTER I

Paper-I

Theory: 4 /Wk

Code: MP11

UNIT I

Principles of Microscopy (Light, Fluorescent, Phase Contrast, Scanning and Transmission, Electron Microscopy) – Confocal and 3-D Microscopy – Photomicrography, Principles of Microtomy.

UNIT II

Principles and Applications of:

- a) Chromatography—Affinity chromatography, Ion-exchange, Molecular sieve, and HPLC.
- b) Spectrophotometry—UV-Visible spectrophotometer, NMR, GC-MS.
- c) Autoradiography and Liquid Scintillation Counter.

UNIT-III

Buffers, pH and use of pH meter. General Principles of Electrophoresis: SDS-PAGE, Agarose gel electrophoresis, 2D-Electrophoresis and Gel Documentation. Histochemical and Immunotechniques: Antibody generation, detection of molecules using ELISA, Western blot and Immunoprecipitation. Principles and techniques of Southern and Northern hybridization. Principles, types and applications of PCR. DNA finger-printing-RFLP, RAPD and AFLP. DNA sequencing and Microarray technique.

UNIT IV

Intellectual Property Rights (IPR): Patenting—Patents, Trade secrets, Copyrights, Trademark. Genetically Modified Organism (GMO), Plant genetic resources (PGR), General Agreement of Tariffs and Trade (GATT), and Trade Related Intellectual Property (TRIP). Plant Breeder's Rights. Biosafety - Physiological and ecological aspects containment facilities for Genetic engineering experiments.

UNIT V

Measures of Mean, Median and Mode: Standard Deviation and Standard Error. Regression and Correlation coefficient analysis; Student's t-test; Analysis of Variance (ANOVA); Chi-Square test. Bioinformatics: BLAST N & P, Gene discovery using EST. Genbank Database-NCBI, EMBL & DDBJ. Protein sequence Database-Swiss Port & PDB. Experimental design, Literature collection, components, Format of thesis and dissertation. Preparation of Research report – Thesis/ dissertation - Manuscript/ research article – monograph/ review.

SUGGESTED REFERENCES

1. Wayne W. Daniel. 2000. Biostatistics : A foundation for Analysis in the Health Sciences. Wiley Series in Probability and Statistics.
2. Prem S. Mann. 2004. Introductory Statistics. Fifth Edition. John Wiley and Sons (ASIA) Pvt. Ltd.
3. S. C. Rastogi, N. Mendiratta, and P. Rastogi. Bioinformatics Methods and Applications Genomics, Proteomics, and Drug Discovery.
4. Atwood, T. K. and Parry-Smith, D. J . 2009. Introduction to Bioinformatics.
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21. Steward, M. W. 1984. Antibodies: Their structure and function. Chapman and Hall Ltd.
22. Strickberger, M. W.1990. Genetics. Third Edition. Macmillan Publishing Company.
23. Suzuki, D. T. *et al.* 1986. An introduction to genetic analysis. Third Edition. W.H. Freeman & Co.
24. Watson, J. D. *et al.* 1987. Molecular Biology of the Gene. Fourth Edition. The Benjamin Cummings Pub. Co.

25. Brown, T. A. 2001. Gene Cloning and DNA Analysis, 4th edition, Black Well Science.
26. Cibelli, J. R. P., Lanza, K. H. S., Campbell and M. D. West. 2002. Principles of Cloning, Academic Press.
27. Date, J.W. and M.V. Schantz, 2002. From genes and genomes. John Wiley and Sons Ltd.
29. Old, R.W. and Primrose, S.B. 1998. An introduction to genetic engineering, Principles of gene manipulation, Blackwell Science, Germany.
30. Primrose, S., R. Twyman and B. Old. 2001. Principles of gene manipulation, Blackwell Science Ltd., USA.
31. Watson, J.D., M. Jilman, J. Witkowski and M. Zoller., 2001. Recombinant DNA, Scientific American Books, USA.

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PAPER II – APPLIED RESEARCH METHODOLOGY

SEMESTER I Paper-II

**Theory: 4 /Wk
Code: MP12**

UNIT I

BIOSYSTEMATICS: Aims of Taxonomy – taxonomy terms – Need for classification – development of classification – types of classification – modern systems of classification - cladistics. ICBN – Monographs and Revision of floristic works – flora, keys and synopses. Primitive and advanced characters, analytical and synthetic characters, homologous and analogous characters, qualitative and quantitative characters.

UNIT-II

MICROBIAL NUTRITION AND GROWTH: Types of culture media (for algae, fungi and bacteria) – Isolation of pure cultures – Kinetics and Measurement of microbial growth – Continuous culture of microorganisms – sterilization techniques – control of microorganisms by physical and chemical means – Principles of Microbial Nutrition – Requirement for Carbon, Sulphur and other growth factors. – Role of oxygen in nutrition – nutritional types.

UNIT III

DIVERSITY OF THE MICROBIAL WORLD: Approaches to bacterial taxonomy (base composition of DNA and its significance, RNA finger printing and sequencing) – Constituent groups of archaeobacteria and eubacteria – protists (general characteristics of algae, fungi, protozoa and slime molds)- Viruses and their classification.

UNIT IV

PLANT TISSUE CULTURE: Introduction – Plant cell culture and protoplasm, Agrobacterium and genetic engineering in plants, Crown Gall disease— Ti- plasmid - incorporation of tDNA into the nuclear DNA of plant cells, DNA mediated transfection of plant protoplast, biolistics, and plant viruses as vectors.

UNIT V

MOLECULAR BIOLOGY AND GENETICS: Plant genetic engineering, restriction enzymes, cloning vehicles, detection and selection of cloned genes, gene cloning strategies in plants, cloning plastid and mitochondrial genes, analysis of expression of cloned genes. Plant viral vectors, Caulimoviruses, Gemini viruses, insertion elements, transposons, T elements in Yeast, Maize mitochondrial elements, RNA viruses, viroids.

SUGGESTED REFERENCES

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2. Lawrence, G.H. 1969. Introduction to Vascular Plants. Oxford IBH, Delhi.
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7. Prem S. Mann. 2004. Introductory Statistics. Fifth Edition. John Wiley and Sons (ASIA) Pvt. Ltd.
8. S. C. Rastogi, N. Mendiratta, and P. Rastogi. Bioinformatics Methods and Applications Genomics, Proteomics, and Drug Discovery.
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17. Smith - Keary, P. 1991. Molecular Genetics. Macmillan Pub. Co. Ltd. London.
18. Strickberger, M. W.1990. Genetics. Third Edition. Macmillan Publishing Company.
19. Watson, J. D. *et al.* 1987. Molecular Biology of the Gene. Fourth Edition. The Benjamin Cummings Pub. Co.
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PAPER III – ALGAL BIOTECHNOLOGY

SEMESTER I
Paper-III

Theory: 4 /Wk
Code: MP13

UNIT I

Algal Biomass: Culture and Cultivation of economically important freshwater and marine algae. Algae as a source of food and fodder

UNIT II

Algal Biotechnology: Application of cell fusion, tissue culture and hybridization techniques in algae. Phycoremediation. Microorganism for sewage and industrial waste disposal.

UNIT III

Biofuels and Biofertilizers: Methane and hydrogen production, energy and chemicals. Liquid seaweed fertilizer and Algae as Biofertilizer.

UNIT IV

Algal Polysaccharides (Agar Agar, Carageenan and Alginic acid), Algae in Pharmaceutical Industries.

UNIT V

Algae and pollution, Eutrophication, Algae as indicator of pollution, atmospheric algae.

SUGGESTED REFERENCES

1. Becker, S. W. 1994. Micro Algae Biotechnology and Microbiology. Cambridge University Press.
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PAPER III – FUNGAL BIOTECHNOLOGY

SEMESTER I

Theory: 4 /Wk

Paper-III

UNIT I

AEROMYCOLOGY: History of Aeromycology, Aerial environment; Microbial propagules in air, Air sampling techniques. Isolation, identification and maintenance of airborne fungi. Seasonal and diurnal periodicities of air spora. Aerobiology in relation to plant pathology. Aeroallergens.

UNIT II

PHYLLOPLANE FUNGI: Sample collection, Preparation of media, Processing of collected samples. Isolation, identification and maintenance of Phylloplane fungi. Antagonism . Use of phylloplane fungi as biocontrol agents. Fungi colonizing leaf litter.

UNIT III

ENDOPHYTIC FUNGI: Sample collection, Preparation of media, Processing of collected samples. Isolation, identification and maintenance of Endophytic fungi. Screening of endophytic fungi for the production of bioactive compounds. Analysis and Application of bioactive compounds.

UNIT IV

SOIL MYCOFLORA: Soil environment, components of soil, diversity and abundance of dominant soil microorganisms; Methods of isolation of soil mycoflora; Soil organic matter decomposition; Transformations of carbon, nitrogen, sulphur and iron in soil. Mycorrhizal Association: Ectomycorrhiza, Endomycorrhiza, and Ectendomycorrhiza.

UNIT V

APPLICATIONS OF FUNGI: Medicinal aspects of fungi – antimicrobials, anticancer and other diseases. Enzymes from Fungi, Organic acids from Fungi, Mushroom cultivation, nutrition values and processing, Single cell protein (yeast), Environmental Applications of fungi.

REFERENCES SUGGESTED

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3. *Biological Containmants in Indoor Environments*, ASTM STP 1071.
4. *Field Guide for the Determination of Biological Contaminants in Environmental Samples*, AIHA.
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6. *Guidelines on Assessment and Remediation of Fundi in Indooor Environments*. New York City Department of Health.
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