BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024

M.Phil. BOTANY [FT / PT] Programme

(For the candidates to be admitted from the academic year 2009-2010 onwards)

Semester I	Title of the Course	Marks			Credits
		IA	UE	Total	
Course -I	Research Methodology	40	60	100	4
Course - II	Advances in Plant Sciences	40	60	100	4
Course- III	Paper on Topic of Research (Guide will prepare the syllabus and it will be sent to the COE)	40	60	100	4
Course – IV	Teaching and Learning skills (Common Paper)	40	60	100	4
Semester II					
	Dissertation and Viva-Voce Viva Voce 50 marks Dissertation 150 marks			200	8

For each Course other than the Dissertation

Continuous Internal Assessment (CIA) – 40 Marks

End Semester Examination (ESE) – 60 Marks

Total – 100 Marks

Question paper pattern for Course I - III

10 questions compulsory 10 x 01 = 10 Marks (2 from each unit)

5 questions 05 x 04 = 20 Marks (either or, one from each unit)

3 questions from 5 03 x 10 = 30 Marks (one question from each unit)

Total 60 Marks

Question paper pattern for Course IV

5 Questions 05 x 12 = 60 Marks (either or type, one from each unit)

CIA components

Tests (2x10) - 20 Marks

Term Paper – 10 Marks

Seminar - 10 Marks

SEMESTER 1 - COURSE 1 - RESEARCH METHODOLOGY

Unit 1 - Centrifugation and microscopy

Centrifugation: Principle and Types of centrifuges. Ultracentrifugation, density gradient centrifugation and continuous centrifugation.

Microscopy - Differential interference contrast (DIC), polarization, fluorescent Microscopy, dark field and phase contrast microscopy. Electron microscope- SEM and TEM. Atomic Force Microscopy.

Unit 2 - Spectrometry, Electrophoresis and Separation techniques

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

Electrophoresis: Principle of Gel electrophoresis, Polyacrylamide gel electrophoresis (PAGE & SDS PAGE) and Agarose gel electrophoresis, comet assay and capillary electrophoresis. Two dimensional electrophoresis and isoelectrofocussing.

Chromatography: Principle, Procedures and Application of TLC, PC, Gel Filtration and Ion exchange, Affinity Chromatography, GC, GLC, HPLC/FPLC and HPTLC.

Unit 3 - Molecular biological techniques

Molecular biological techniques: Isolation and amplification of nucleic acid- Genome DNA (E.coli), Plasmid DNA, total RNA, Polymerase chain reaction – Types and its application.

Gene cloning techniques: Phosphatase treatment of cloning vectors, use of adapters and linkers in cloning-screening of recombinants-labelling of nucleic acids by radioactive methods plaque and colony hybridization-southern blotting and western blot-Northern blot-DNA finger printing and Microarray.

Unit 4 - Biostatistics

Biostatistics: Collection and Presentation of Experimental data – Measures of Central Tendency: Arithmetic Mean, Median, Mode, Position of averages, Geometric Mean, Harmonic mean and percentile – Measures of Dispersion: Range, Inter quartile range, variance, standard deviation and standard error.

Correlation and Regression: Correlation coefficient – Types of correlation – Regression-Simple and Linear regression – Biological significance of correlation and regression – Tests of significance: Basis of statistical inference – Student's 't' test for mean, difference of means and test for correlation and regression coefficients – Chi-square test – Analysis of variance and DMRT.

Unit 5 - Data collection, analysis and Research publications

Data collection and analysis-Web browsing and searching- Electronic biological data bases – NCBI, PubMed, Sequence and Structure data bases. Research publications, Preparation of manuscripts-full paper, short communications and LCD preparations. Review paper, Thesis writing, Bibliography, Index card and Proof reading.

References:

1. Batschelet, E. 1991. Introduction to Mathematics for Life Scientists. Springer International Student Edn., Narosa Publishing House, New Delhi.

2. Becker, J.M., Caldwell, G.A. and Zachgo, E.A. 1996. Biotechnology: A Laboratory Course, 2nd Edn. Academic Press, Inc., San Diego, California.

3. Cannel, J.P. 1998. Natural Products Isolation. Humana Press, New Jersey, USA.

4. Chirikjian, J.G.1995. Biotechnology: Theory and Techniques Vol. I.Plant Biotechnology, Animal Cell Culture, Immunobiotechnology. Jones and Bartlett Publishers, London, England.

5. Cynthia Gibas and Per Jambek.2001. Developing Bioinformatics computer skills, Shroff Pub., Mumbai.

6. Forthofer, L. 1995. Introduction to Biostatistics, Academic Press, New York.

7. Gupta, S.C. and Kapoor, V.K. 2002. Fundamentals of Mathematical Statistics, (11th Edn.). Sultan Chand & Sons, New Delhi.

8. Harborne, J.B. 1998. Phytochemical Methods. Chapman & Hall, London.

9. Jordan, D.W. and Smith, P. 2002. Mathematical Techniques. Oxford University Press, New Delhi.

10. Primrose, et al.2005. Principles of gene manipulation. Black Well Science, London.

11. Sambrok and Russel. 2001. Molecular cloning-A laboratory manual. Cold Spring Laboratory Press, New York.

12. Sharma, B.K 1996. Instrumental Methods of Chemical Analysis. Goel Publishing House, Meerut.

13. Sokal, R. R. and Rohlf, F.J. 1987. Introduction to Biostatistics (Biology-Statistics Series). W.H. Freeman & Company, New York.

14. Snedecor,GW and Cochran,WG. 1967. Statistical methods.Oxford & IBH Pub.New Delhi.

15. Wilson, K. and Walker, J. 1997. Practical Biochemistry: Principles and Techniques. Cambridge University Press, Cambridge.

16. Zar, J. H. 2006. Biostatistical Analysis: Prentice-Hall.

17. Gurumani, N. 2006. Research Methodology for Biological Sciences, MJP publishers.

A Unit Tamil Nadu Book House, Chennai.

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COURSE- II - ADVANCES IN PLANT SCIENCES

Unit – I. Plant Genome organization

Plant Genome Organization – Structural features of a representative plant gene. Chromatin and gene families in plants. Organization of chloroplast and mitochondrial genome. Nucleus encoded and chloroplast encoded genes for chloroplast proteins. Targeting of proteins to mitochondria.

Unit – II. Gene expression and Protein Engineering

Regulation of prokaryotic and eukaryotic gene expression and gene silencing. Genetic code, protein synthesis – Initiation and their regulation – Elongation and elongation factors, aminoacylation of tRNA, aminoacytl tRNA synthesis, translation, inhibitors, post – translation modification of proteins.

Unit – III. Genetic Engineering

Genetic engineering in plants – Selectable markers, reporter genes and promoters used in plant vectors – Plant transformation technology – Ti and Ri Plasmids, Mechanism of gene transfer in plants – Direct gene transfer methods – Electroporation, microprojectile bombardment methods, microinjection. Transgenic plants – virus resistance, pest resistance, herbicide resistance, resistance to Fungi and Bacteria.

Unit – IV. Nitrogen Metabolism and Fixation

Nitrate and ammonium assimilation, aminoacid biosynthesis, molecular basis of symbiotic nitrogen fixation by *Rhizobium*. Non –symbiotic (Acetobacter) association and associative (Azospirillum). Phosphate solubilization and mobilization.

Unit – V. Molecular marker – aided breeding

Molecular marker – aided breeding – RFLP maps, linkage analysis, RAPD markers, microsatellites, SCAR (Sequence Characterized Amplified Regions), SSCP (Single Standard Conformational Polymorphism), AFLP, QTL, map base cloning, Molecular marker assisted selection.

References:

1. H.S.Chawla. 2001. Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd.

2. Peter J.Lea, Richard C.Leegood. 1999. Plant Biotechnology & Molecular Biology. John Wiley & Sons.
3. Maarten J.Chrispeels and David E.Sadava. 2000. Plants, Genes and Agriculture. Jones and Barlett Publishers.
4. Bray CM. 1983. Nitrogen metabolism in plants, Longman.
5. Westhoff, P. 1998. Molecular plant development from gene to plant. Oxford University Press, Oxford, UK.
6. Plummer, DT. 1988. An introduction to practical Biochemistry. Tata McGraw Hill Pub. Co. Ltd., New Delhi.
7. S.B.Primrose, R.M.Twyman and R.W.Old. 2001. Principles of gene manipulation, Blackwell Science.
8. S.B.Primrose. 1994. Molecular biotechnology, Blackwell Scientific Pub. Oxford.
9. Slater, N.Scott and M.Fowler. 2003. Plant biotechnology. The genetic manipulation of plants. Oxford University Press

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COURSE –IV – TEACHING AND LEARNING SKILLS

Objectives:

- acquaint different parts of computer system and their functions
- understand the operations and use of computers and common Accessories
- develop skills of ICT and apply them in teaching learning context and Research
- appreciate the role of ICT in teaching, learning and Research
- acquire the knowledge of communication skill with special reference to its elements, types, development and styles
- understand the terms communication Technology and Computer mediated teaching and develop multimedia / e-content in their respective subject

- understand the communication process through the web
- acquire the knowledge of Instructional Technology and its Applications
- develop different teaching skills for putting the content across to targeted audience

Unit I – Computer Application Skills

Computer system: Characteristics, Parts and their functions – Different generations of Computer – Operation of Computer: switching on / off / restart, Mouse control, Use of key board and some functions of key – Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations

Unit II – Communication Skills

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and written; Non-verbal communication – Intrapersonal, Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and writing – Methods of developing fluency in oral and written communication – style, Diction and Vocabulary – Classroom communication and dynamics

Unit III – Communication Technology

Communication Technology: Bases, Trends and Developments – Skills of using Communication Technology – Computer Mediated Teaching: Multimedia, E-content – Satellite-based communication: EDUSAT and ETV channels, Communication through web: Audio and Video applications on the Internet, interpersonal communication through the web.

Unit IV – Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation – Versatility of lecture technique – Demonstration, Characteristics, Principles, Planning Implementation and Evaluation – Teaching – Learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion – Models of teaching: CAI, CMI and WBI

Unit V – Teaching Skills

Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills

References:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi

2. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh

3. Information and Communication Technology in Education: A Curriculum for Schools and programme of Teacher development, Jonathan Anderson and Tom Van Weart, UNESCO, 2002

4. Kumar K.I (2008) Educational Technology, New Age International Publishers, New Delhi

5. Mangal, S.K. (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana

6. Michael D. and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York

7. Pandey S.K. (2005) Teaching Communication, Commonwealth Publishers, New Delhi

8. Ram Babu A. and Dandapani S (2006) Microteaching (Vol.1&2) Neelakamal Publications, Hyderabad
9. Singh V.K. and Sudarshan K.N. (1996) Computer Education, Discovery Publishing Company, New York
10. Sharma R. A. (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
11. Vanaja. M. and Rajasekar S. (2006) Computer Education, Neelkamal Publications, Hyderabad.

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