


ANNAMALAI UNIVERSITY

Department of Botany
(UGC-SAP & DST-FIST Sponsored Department)

M.Phil - BOTANY &
M.Phil - PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Paper I (Methodology)

UNIT - I

MICROSCOPY: Principle and application of Light, Polarization, Phase Contrast and Fluorescent Microscope. Bright and dark field condensers. Principle and preparation of material for Transmission Electron Microscope and Scanning Electron Microscope.

MICROMETRY: Stage and Ocular Micrometers, Haemocytometer, Camera Lucida.

MICROTOMY: Paraffin Microtomy - Rotary and Rocking microtomes, Sledge microtome, hand microtome, Ultra microtome, Freezing edge microtome.

CYTOLOGICAL TECHNIQUES: Pre treatment, Fixation, Staining, Mounting, Detailed schedule for making permanent slides of microtome sections, Procedures for making permanent slides of hand sections, Detailed schedule for making root tip squash, Detailed procedure for making smear of anthers.

UNIT - II

SEPARATION: PRINCIPLES OF SEPARATION TECHNIQUES: METHODS: General methods of Separation, General methods of Detection, Dialysis and Ultrafiltration, Thin Layer Chromatography (TLC), Paper chromatography, High Performance Liquid Chromatography (HPLC), Gas - Liquid chromatography (GLC), Ion - exchange chromatography, Gel permeation Chromatography, Affinity chromatography.

ELECTROPHORESIS: Principles - Paper, Cellulose, Acetate, Agar Starch Electrophoresis, PAGE, SDS PAGE, Separation of proteins through electrophoresis.

CENTRIFUGE: Ultracentrifugation - Ultracentrifuge, refrigerated centrifuge, Cell fractionation.

UNIT - III

SPECTROSCOPY: Beer - Lambert relationship, Deviations from the Beer Lambert law Quantitative measurements Absolute methods, Comparative methods, Analysis of mixtures, Difference Spectroscopy. Visible, UV, IR and Fluorescence Spectrophotometers.

Radiation sources. Monochromators - Glass filters, Interference filters, prisms, Diffraction gratings. Detectors - ultraviolet and visible region of the spectrum, infrared region of the spectrum. Optical materials, Optical system. Atomic absorption, Molecular absorption - ultraviolet and visible region and infrared region, Emission of radiation.

ATOMIC SPECTROSCOPY TECHNIQUES: Flame Emission Photometry, Plasma Emission Spectroscopy, Atomic Absorption Spectrophotometry.

UNIT - IV

ELECTROANALYTICAL METHODS

POTENTIOMETRY: Potentiometric measurements, Measurement of pH, Ion selective Electrodes.

CONDUCTIMETRY: Conductimetric measurements, Application of conductimetric measurements.

RADIO - ISOTOPES: Nature of Radioactivity. Types of radioactivity, Decay, Units of radio activity, Safety, .Detection and measurement of radioactivity: Gieger - Muller tubes, Scintillation counters, Autoradiography, .Biological uses of isotopes: Tracers, Isotope dilution analysis, Radio activity analysis.

ECOLOGICAL INSTRUMENT: Uses of Luxmeter, Anemometer, Rain gauge, Air samplers and Bomb Colorimeter.

UNIT - V

EXTRACTION AND ESTIMATION OF: Carbohydrates, Amino acids, Proteins, Lipids, Nucleic acids and Pigments (Chlorophyll and Carotenoids).

ESTIMATION OF ACTIVITIES OF: Catalase, Peroxidase, Polyphenol oxidase and Amylases.

TISSUE CULTURE TECHNIQUES: Explant preparation, Sterilization, Media preparation, Various types of media, Cell culture, Cell suspension culture, Isolation of protoplasts, Protoplast culture, Protoplast fusion, Haploid production, Anther culture, Pollen culture, Embryo Culture, Somatic embryogenesis, Callus induction, Micropropagation.

REFERENCE BOOKS

1. Anbalagan, K. Electrophoresis - a practical approach. Life Science Book House, Madurai.
2. Aneja, K.R. Experiments in Microbiology, Plant pathology and Tissue culture. Wiley Estern Ltd., Madras.
3. Dwivedi, J.N and Singh, R.B. Essentials of plant techniques. Scientific Publishers, Jodhpur.
4. Gasque, C.E. A manual of Laboratory Experiences in Cell Biology, Universal Book stall, New Delhi.
5. Holme, D.J and Hazel Peck. Analytical Biochemistry (1993). Hohn widley & Sons Inc. New York.
6. Kumar, N.C. An introduction to plant tissue and Cell culture. Emkay publications, Delhi.
7. Plummer, D.T. An introduction to Practical Biochemistry. Tata Mc Graw - Hill Publishing Company Limited, New Delhi.
8. Sadasivam, S and A. Manikam. Biochemical methods. Wiley Eastern Ltd.
9. Sharma, V.K. Techniques in Microscopy and Cell Biology. Tata Mc Graw _ Hill publishing Company Ltd., New Delhi.
10. Wilson, K and John Walker. Principles and Techniques of practical Biochemistry, Cambridge University Press.

M.Phil - BOTANY &
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Paper II (Syllabus)

UNIT - I

Sampling and sampling theory. Type of sampling – RBD, CRD. - Frequency distribution – Central tendency, mean, mode, median. - Measurement of Dispersion – Deviation, Degree of freedom, confidence limit, standard error. - Test for significance – ‘t’ test, one way and two way analysis of variance. - Correlation – Types, methods of studying correlation. Co-efficient of determination and non determination, partial and multiple correlation. - Regression Analysis – Regression line, partial and co-linear. Regression – multiple regression.

UNIT - II

COMPUTER: Classification of Computers: - Input and out put devices. Compiler, Assembler and Interpreter source and object programmes – Flow chart – software packages used for statistics. MS Words – MS Excel – MS Power point. Use of computers in preparation of graphs, chart, histogram. Bio informatics – Major search engines – Web browsing – Major web sites for journals and scientific information.

UNIT - III

General account of: Intellectual property Rights – patent, Trade mark, copyright, patent application – Notification, sanctioning, Indian patent Act – TRIPS, Farmer’s right, status of WTO. Bio-safety – Regulations, Bioethics, Handling of recombinants in the Laboratory and field experiments. Laboratory safety – Handling of Glasswares, Acids – Alkalines, Poisons and hazardous chemicals – First Aid.

UNIT - IV

General account of: Transgenics and their uses in human welfare. Environment and economics. Economic losses due to deforestation – pollution. Application of Biotechnology for Food, Agriculture, Medicine, Environment and Energy. Biodiversity – meaning – measurement – biodiversity loss – causes of loss – and their impact and conservation. Remote sensing techniques – application in environmental control – Agriculture – Forestry – Oceanography.

UNIT - V

SCIENTIFIC WRITTING:

Choosing the problem for research – Review of literature. Primary, secondary and tertiary sources. Bibliography – indexing and abstracting. Storage and retrieval of information – Reporting the results of research in conference – Oral presentation, poster presentation – written reports. Planning and preparing a thesis and scientific papers. Proof correction. Data bases – Agris – Agricola – Current contents – Biological abstracts.

REFERENCE BOOKS

1. Rangasamy, R. 1995. A text book of Agricultural statistics. New age international, New Delhi.
2. Sundararaj et al., 1972. Design and analysis of field experiments. University of Agricultural sciences, Bangalore.
3. Ridgman, W.J. 1975. Experimentation in Biology. Blackie, London.
4. Sundara Rao and J. Richard. 1999. An introduction to Bio statistics. Printice Hall of India Pvt. Ltd., New Delhi.
5. Krishnamoorthy, R. 1994. Computer programming and application. J.J. Publication, Madurai.

6. Nelson, S.L. 1999. Office 2000. The complete reference - Tata Mc Grow - Hill publishing company Ltd, New Delhi.
7. Dienes, S.S. 1995. Microsoft office - professional. BPB Publication, New Delhi.
8. Hoffmar. 1996. The Internet - instant Reference. BPB Publication, New Delhi.
9. Kumar, H.D. 1998. A text book of Biotechnology. Affiliated East - West Press Pvt. Ltd., New Delhi.
10. Pushparagadan, P., K. Ravi and V. Santhosh. 1997. Conservation and Economic evaluation of Biodiversity - Vol I and II. Oxford and IBH Publishing Company, New Delhi.
11. Agarwal, K.C. 2000. Biodiversity. Agrobios, Jodhpur.
12. Dicastri, E and T. Youues. 1996. Biodiversity Science and Development. CAB International, Cambridge.
13. Pearce and Moran. 1994. The Economic value of Biodiversity. Earth scan publication Ltd., London.
14. Karpagam, M. 1999. Environmental Economics. Sterling Publishers Pvt., Ltd., New Delhi.
15. Day, R.A. 1994. How to write and publish a scientific paper. Cambridge University Press, London.
16. Connor and Peter wood ford. 1979. Writing Scientific papers in English. Pitman Medical Publishing company, London.