PH.D. COURSE WORK: PAPER I - RESEARCH METHODOLOGY

Subject Code: Ph.D. – RM *Credits*: 5

Unit I

Centrifugation - Principles and types of centrifuges; Ultracentrifugation, Density gradient centrifugation and continuous centrifugation. Microscopy- Light microscope, Differential interference contrast, Polarization, Fluorescence microscopy, Dark field and Phase contrast. Electron microscope: SEM, TEM and AFM. Spectrometry: Beer lamberts law, UV, IR, FTIR, AAS and NMR. Principle, procedure, types and applications of Electrophoresis and Chromatographic techniques.

Unit II

Structure of DNA, RNA and Protein, Replication, Transcription and Translation. Isolation of plant and plasmid DNA. DNA quantification methods. Types of PCR and their applications. Gene Expression, Operon. Restriction endonucleases and DNA modifying enzymes. cDNA libraries. Gene cloning and overexpression, types of DNA sequencing methods. Microarray, Gene transfer methods.

Unit III

Protein structure prediction; PAGE, 2D PAGE, X-ray crystallography, Mass spectrometry and Protein microarray. Introduction to Bioinformatics: Nucleic acid and Protein databases, sequence homology, gene finding, protein modelling and structure prediction. Sequence alignment and homology searching - BLAST, ClustalW. Nanotechnology and its application.

Unit IV

Statistics scales of measurement: Concept of graphical, exploratory and inferential data analysis, Important variables of forestry sector, Probability and probability distributions, Correlation and regression: Linear and nonlinear regressions, parabolic, exponential, power and logarithmic functions. Tests of significance – t, F, z, and χ^2, significance of correlation & regression coefficients, analysis of variance (ANOVA) - one way & two way. Multivariate statistical techniques: Multivariate Analysis of Variance. Principal Component Analysis, Factor analysis and Cluster analysis.

Unit V

History and Philosophy of science, Phases of Scientific Enquiry, Different modes of scientific communication: Proposal writing, Research paper writing, Thesis writing. Oral forms of scientific communication, Scientific journalism (Print/media), Legal forms of communication of science.

References:

- Khan IA & Khanum A, 1994. *Fundamentals of Biostatistics.* Vikas publications, Hyderabad.
- Dear KBG, Mead R & Relay J. 1987. *Statistical Tools for Agro-Forestry Research – Bivariate Analysis for Intercropping Experiments*. ICRAF, Nairobi.
- Matin J. (1976) *Principles of Database Management*. Prentice Hall
- Nalwa H.R. Encyclopadia of Nanoscience and Technology
- Pase UG &Sukhatme MU. (1978) *Statistical Methods for Agricultural Workers*. ICAR.
- Kothari CR. 1991. Research Methodology – Methods and Techniques, Wiley Eastern Ltd, New Delhi.

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PH.D. COURSE WORK: PAPER II - CONSERVATION BIOLOGY

Subject Code: Ph.D. - CB *Credits*: 4

Unit I

Biodiversity – Basic principles, definition and classification of resources, Biodiversity act of India and related International conventions. Biodiversity assessment, conservation and management, patterns and problems of resource depletion, resource economics and resource over use. Ecology: definition, history and scope, types of ecology. Population dynamics, Significance of habitat, ecological niche and nutrient cycles. Major world ecosystems: aquatic (marine and wetland) and terrestrial ecosystems.

Unit II

Biodiversity conservation: Species diversity, community diversity, ecosystem diversity and landscape preservation. Remote sensing and its application in natural resources management. Climate change and biogeochemical cycles. Conservation of resources: Current biodiversity loss, concepts of endemism, rare, endangered & threatened species (RET) and extinction; IUCN: Red Data Book and hot spots. Phytogeography: Phytogeographic regions of India. Conservation of plant genetic resources.

Unit III

Pollution: Definition and classification of environmental pollution. Environmental pollution: problems and control. Relationship between air, water, land and radiation pollution. Global warming, greenhouse gases, acid rain, ozone depletion, climatic changes. Bioremediation & Phytoremediation. Deforestation, wasteland development & restoration of degraded lands. Environmental laws, environmental monitoring and bio-indicators, environmental education. Environmental protection act

Unit IV

Wildlife management and conservation in India; Mitigating human – wildlife conflict: fences, trenches, walls, lure crops, repellents, translocation and compensation. Wildlife census: Purpose, techniques. Direct and indirect methods of population estimation. Wildlife (Protection) Act, 1972. *Ex-situ* and *in-situ* conservation. Protected areas - sanctuary, national parks & biosphere reserves, Special projects for wildlife conservation. Political and legal aspects of biodiversity

Unit V:

Applications of Biotechnology in forestry & bioresources: plant tissue culture & cryopreservation, gene bank, seed bank and pollen bank. *In vitro* propagation: scope and history, culture techniques, media and explants preparation, sterilization, callus culture, organogenesis, meristem culture, suspension culture, somatic embryogenesis, anther culture and protoplast fusion. DNA barcoding of plants. Application of molecular markers in genetic variation and genotyping. Molecular techniques: RAPD, RFLP, AFLP, SSR, ISSRs and SNPs. DNA fingerprinting.

References:

- Arvind Kumar. *Biodiversity and environment*. A.P.M. Publishing Corporation, New Delhi
- IUCN (2007). *The 2000 IUCN red list of threatened species*. IUCN. England.
- Negi SS.2006. *India's Forests, Forestry and Wildlife*. Indus Publ
- Odum, E.P. 1983. *Basic Ecology*. Saunders College Publishing, Holt Saunders, Japan, 613.
- Odum, E.P. *Fundamentals of Ecology*, Natraj Publisher, Dehradun
- Ignacimuthu S, 1996. Applied Plant Biotechnology. McGrow Hill publications Co. Ltd, New Delhi.
- Sodhi NS & Ehrlich PR, 2010. *Conservation Biology for All*. http://ukcatalogueonly.com

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PH.D. COURSE WORK: PAPER III – REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Subject Code: Ph.D. - RBA *Credit*: 4

Unit I

Plant Taxonomy: Principles, scope and importance. Systems of classification: artificial, natural and phylogenetic systems. Cladistics in taxonomy. Modern trends in taxonomy: numerical taxonomy, cytotaxonomy, chemotaxonomy and molecular taxonomy. Herbarium, monographs and floras. ICBN and nomenclature. Anatomy and embryology in solving taxonomic problems. Morphology: root, stem, leaf, flower, fruit, seed, etc. Morphological variations, systematic position, interrelationships & economic importance of selected families: Nymphaeaceae, Malvaceae, Rutaceae, Fabaceae, Apocynaceae, Lamiaceae, Piperaceae, Lauraceae, Aristolochiaceae, Moraceae & Liliaceae.

Unit II

Flower development: Regulation of floral architecture and diversification; Floral organogenesis. Pollination regulation of flower development. Vegetative to reproductive evocation, floral homeotic mutations in *Arabidopsis*, *Antirrhinum* and *Petunia*. Axis development in flower, gender expression in monoecious and dioecious plants. Root and stem development.

Unit III

Phenology: Leaf, flower and fruiting phenology. Regulation of anther and ovule development. Microsporogenesis and microgametogenesis, megasporogenesis and megagametogenesis, male sterility - mechanisms and applications, pollen embryogenesis. Diversity and quantitative estimation of mating system; Differential reproductive success.

Unit IV

Palynology: *In vivo* and *in vitro* pollen germination, pollen tube growth and guidance, double fertilization, self-compatibility mechanisms, incongruity. Pollen dispersion distances, Pollen handling forced flowering for seed orchard manipulation. Plant-pollinator interaction: floral display, attractants and rewards, pollen load, foraging behaviour, physicochemical aspects of pollination. Pollination energetics, gene flow, applied pollination ecology, pollen: ovule ratio. Climatic change & pollinators.

Unit V

Developmental biology & diversity of fruit types, fruit abortion in relation to resource allocation, dispersal and gene flow. Embryogenesis and embryonic pattern formation; endosperm development and differentiation. Seed development: pattern, regulation of gene expression and imprinting; agamospermy & parthenocarpy, pseudogamy & autonomous development of endosperm. Embryo and endosperm culture. Seed dormancy, overcoming seed dormancy. Seed viability test.

References:

- Barrett SCH, 2008. Major evolutionary transitions in flowering plant reproduction. Chicago Press.
- Cronquist, A. 1988. The Evolution and Classification of Flowering Plants (2nd ed.) Allen Press, U.S.A.
- Davis PH & Heywood VH, 1991. Principles of Angiosperm Taxonomy. Today & Tommorow Publications, New Delhi.
- Faegri K & van der Pijl L, 1979. The Principles of Pollination Ecology. Pergamon Press Oxford.
- Lawrence GHM, 1951. Taxonomy of Vascular Plants. Oxford and IBH Publications Ltd. New Delhi.
- Raghavan V, 2000. Developmental Biology of Flowering Plants, Springer Verlag, New York.
- Bhojwani & Bhatnagar, 1990. Embryology of Angiosperms, Vikas Publishing House Ltd., New Delhi.

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Minutes of the Doctoral Committee meeting held on 31.03.2016 at 11:00 AM

at the Department of Botany & Microbiology, A.V.V.M. Sri Pushpam College, Poondi – 613 503 for Mr. J. Sureshkumar

Doctoral Committee Members Present & their signature:

1. **Dr. M. AYYANAR**
   Assistant Professor
   Department of Botany and Microbiology
   A.V.V.M. Sri Pushpam College (Autonomous)
   Poondi – 613 503
   Thanjavur District

   Research Supervisor

   31/3/16

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   Assistant Professor
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   Poondi-613 503. Thanjavur Dt.

2. **Dr. T. FRANCIS XAVIER**
   Assistant Professor
   Dept. of Plant Biology & Plant Biotechnology
   St. Joseph's College (Autonomous)
   Tiruchirappalli – 620 002

   Doctoral Committee member

   Dr. T. FRANCIS XAVIER, M.Sc., Ph.D.
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   Department of Botany
   St. Joseph's College (Autonomous)
   Tiruchirappalli - 620 002, Tamil Nadu, India

3. **Dr. T. KUMAR**
   Assiociate Professor
   Department of Botany and Microbiology
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   Poondi – 613 503
   Thanjavur District

   Doctoral Committee member

   31/3/16

   Dr. T. KUMAR,M.Sc.,M.Phil.,B.Ed.,Ph.D
   Associate Professor,
   Department of Botany & Microbiology,
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   Poondi-613 503. Thanjavur Dt, Tamil Nad
   Cell: 9443881311

The doctoral committee met on 31.03.2016 at 11:00 AM in the Dept. of Botany & Microbiology, A.V.V.M. Sri Pushpam College, Poondi to review the work and to finalize the papers for the course work for **Mr. J. Sureshkumar**. Based on the presentation of the candidate, the committee unanimously opined that research work so far carried out and the plan of work for Ph. D is satisfactory.

As per the Ph.D. regulations of Bharathidasan University, Tiruchirappalli, the committee recommends that the candidate should undergo Course work of two papers.

The candidate's chosen area being diversity, conservation and reproductive biology, the committee feels that, the candidate should pursue first course in **'Conservation Biology'** and second course on **'Ecology and Diversity of Pteridophytes'** to obtain an in-depth knowledge in this field. The committee prepared and finalized the syllabi.

Course Code	Title of the Course	Credits
Ph.D. – CB	Conservation Biology	4
Ph.D. – EDPT	Ecology and Diversity of Pteridophytes	4

PH.D. COURSE WORK: PAPER I - CONSERVATION BIOLOGY

Subject Code: Ph.D. - CB *Credits*: 4

Unit I

Biodiversity – Basic principles, definition and classification of resources, Biodiversity act of India and related International conventions. Biodiversity assessment, conservation and management, patterns and problems of resource depletion, resource economics and resource over use. Ecology: definition, history and scope, types of ecology. Population dynamics, Significance of habitat, ecological niche and nutrient cycles. Major world ecosystems: aquatic (marine and wetland) and terrestrial ecosystems.

Unit II

Biodiversity conservation: Species diversity, community diversity, ecosystem diversity and landscape preservation. Remote sensing and its application in natural resources management. Climate change and biogeochemical cycles. Conservation of resources: Current biodiversity loss, concepts of endemism, rare, endangered & threatened species (RET) and extinction; IUCN: Red Data Book and hot spots. Phytogeography: Phytogeographic regions of India. Conservation of plant genetic resources.

Unit III

Pollution: Definition and classification of environmental pollution. Environmental pollution: problems and control. Relationship between air, water, land and radiation pollution. Global warming, greenhouse gases, acid rain, ozone depletion, climatic changes. Bioremediation & Phytoremediation. Deforestation, wasteland development & restoration of degraded lands. Environmental laws, environmental monitoring and bio-indicators, environmental education. Environmental protection act

Unit IV

Wildlife management and conservation in India; Mitigating human – wildlife conflict: fences, trenches, walls, lure crops, repellents, translocation and compensation. Wildlife census: Purpose, techniques. Direct and indirect methods of population estimation. Wildlife (Protection) Act, 1972. *Ex-situ* and *in-situ* conservation. Protected areas - sanctuary, national parks & biosphere reserves, Special projects for wildlife conservation. Political and legal aspects of biodiversity

Unit V:

Applications of Biotechnology in forestry & bioresources: plant tissue culture & cryopreservation, gene bank, seed bank and pollen bank. *In vitro* propagation: scope and history, culture techniques, media and explants preparation, sterilization, callus culture, organogenesis, meristem culture, suspension culture, somatic embryogenesis, anther culture and protoplast fusion. DNA barcoding of plants. Application of molecular markers in genetic variation and genotyping. Molecular techniques: RAPD, RFLP, AFLP, SSR, ISSRs and SNPs. DNA fingerprinting.

References:

- Arvind Kumar. *Biodiversity and environment*. A.P.M. Publishing Corporation, New Delhi
- IUCN, 2007. *The 2000 IUCN red list of threatened species*. IUCN. England.
- Negi SS, 2006. *India's Forests, Forestry and Wildlife*. Indus Publ
- Odum EP. *Fundamentals of Ecology*, Natraj Publisher, Dehradun
- Ignacimuthu S, 1996. Applied Plant Biotechnology. McGrow Hill publications Co. Ltd, New Delhi.
- Sodhi NS, Ehrlich PR, 2010. *Conservation Biology for All*. http://ukcatalogue.oup.com

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PH.D. COURSE WORK: PAPER II - ECOLOGY & DIVERSITY OF PTERIDOPHYTES

Subject Code: Ph.D. - EDPT *Credit*: 4

Unit I

Introduction: Origin of Pteridophytes. General characters and Classifications of Pteridophytes (Sporne KR, 1954). Comparative taxonomic study of following orders of Pteridophytes and related genea: Rhyniales (*Rhynia*), Psilotales (*Psilotum*), Lycopodiales (*Lycopodium*), Isoetales (*Isoetes*), Selaginellales (*Selaginella*), Equisetales (*Equisetum*), Marattiales (*Marattia*), Ophioglossales (*Ophioglossum*), Osmundales (*Osmunda*), Filicales (*Gleichenia, Cyathea, Pteridium, Nephrolepis, Blechnum, Asplenium, Dryopteris* and *Adiantum*), Marsileales (*Marsilea*), Salviniales (*Salvinia* and *Azolla*).

Unit II

Life History: Life cycle of ferns and lycophytes. Comparative studies on the vegetative and reproductive organographies, evolutionary tendencies and affinities of the members belonging to different groups: Rhyniopsida, Zosterophyllopsida, Trimerophytopsida, Psilopsida, Lycopsida (Lycopodiales, Selaginellellales, Lepidodendrales, and Isoetales) and Sphenopsida (Hyeniales, Sphenophyllales, Calamitales and Equisetales).

Unit III

Morphology and Evolution: Stelar concept, types and evolution. Origin and evolution of sporangium. Spores: Types, germination pattern and gametophyte development. Soral evoiution in Pteridophytes. Cytology of pteridophytes – chromosome number and polyploidy. Apogamy, apospory and parthenogenesis in Pteridophytes. Heterospory and seed habit. Telome theory. Morphogenesis of sporophytes.

Unit IV

General account of fossil Pteridophytes: Psilopsida, Lycoposida, Sphenopsida and Pteridopsida. Economic importance of Pteridophytes. General account of the contribution of Indian Pteridologists. Current trends of research in pteridophytes.

Unit V

Ecology: Diversity of Pteridophytes – an ecological perspective, genetic and ecological importance. Ecological insights from Pteridophytes population dynamics. Pteridophytes adaptations to xeric environments, Pteridophytes disturbance and succession. Problem of Pteridophytes: their impact and management, current and future directions in fern ecology.

References:

- Gangulee HC, Kar AK, 1989. *College Botany (Vol II)*. New Central Book Agency Pvt. Ltd. Kolkata.
- Nampy S, Madhusoodanan PV. *Fern flora of south India - Taxonomic revision of Polypoidioid ferns.* Daya publishing house, New Delhi.
- Pandey BP, 2012. *College Botany (Vol. II)*, S. Chand & Co., New Delhi
- Rashid A. 1976. *An introduction to Pteridophyta.* Vikas Publications House Pvt. Ltd. New Delhi.
- Smith GM, 1938. *Cryptogamic Botany (Vol. II). Bryophytes and Pteridophytes.* McGraw hill, London.
- Spome KR, 1962. *The Morphology of Pteriodophytes*. Hutchinson University Library, London.
- Vashista PC, 1971. *Botany for Degree students: Pteridophyta.* S. Chand & Co., New Delhi.

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PAPER I - MEDICAL BOTANY

Subject Code: Ph.D. -MB *Credits*: 4

Unit I: History and Classification of medicinal plants

History, systems and developments of Indian Systems of Medicine. AYUSH - Ayurveda, Yoga, Unani, Siddha and Homeopathy. Classification of medicinal plants based on the plant parts used and phytoconstituents; Root drugs - *Aconitum napellus*, Bark drugs - *Cinchona officinalis*, Stem drugs – *Santalum album*, Leaf drugs - *Digitalis purpurea*, Flower drugs - *Syzygium aromaticum*, Fruit drugs- *Papaver somniferum*, Seed drugs - *Strychnox nux-vomica*, Whole plant - *Moringa oleifera*.

Unit II: Siddha system of medicine

Historical background of Siddha medicine. Scope and methods of practice of Siddha medicine. Salient features of Siddha medicine: Comparative account with other systems (Allopathy, Ayurveda, Unani and Homeopathy). Methods of preparation of the following -extracts, Oils, Thailam, Legium, Chooranam and Kashayam (three examples each) - A brief account of the medicinal values of elements in Siddha medicine (gold, iron, silver).

Unit III: Medicinal plants and Health care

Remedial plants for Cancer, diseases of nervous system, circulatory system, respiratory system, urinary system and reproductive system. Psycho-active plants. Allergens: types - aero-allergens, pollen, spore allergens, skin allergens, drug allergy, phytotherapy for allergic symptoms. Poisonous plants - classification, description, mode of action, symptoms and treatments - some poisonous plants of various plant groups.

Unit IV: Cultivation of medicinal plants and Micropropagation

Herbal gardens - Introduction and scope, Principles and process involved; Plant growing methods, propagation techniques. Biotechnological methods of plant propagation - Micropropagation – Somatic embryogenesis and somoclonal variation – Standardization of cultivation protocols of selected medicinal plants; in vitro production of secondary metabolites. Alternative method of secondary metabolite production – Organ culture, Cell culture, Biotransformations (Plant cells).

Unit V: Traditional health care system and Ethnobotany

Local traditional health care system; Herbal home remedies of South India; Indigenous knowledge system on medicinal plants; Herbal formularies: Infusions and decoctions, oil extractions, ointments, lotions, washes, suppositories; Ethnobotany – Tribals of South India and tribal medicines.

Reference Books:

- Harborne JB, 1998. Phytochemical methods. Springer (India) Ltd., New Delhi.
- Hartmann HT, Kester DE, 1983. Plant propagation, Englewood Cliffs, Prentice Hall.
- Jain SK, 1981. Glimpses of Ethnobotany. Oxford & IBH, New Delhi.
- Kumar NC, 1993. An Introduction to Medical Botany, Emkay Publications, New Delhi.
- Nadkarani, 1981. Materia medica, Popular Prakasam Publication, New Delhi.
- Roseline A, 2011. Pharmacognosy. MJP publishers, Chennai.

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PAPER II - PHYTOCHEMISTRY AND PHARMACOLOGY

Subject Code: Ph.D. -PP

Credits: 4

UNIT I: Pharmacognosy and Phytochemicals

Pharmacognosy - Collection and processing of medicinal plants; Guidelines for harvesting, processing and marketing of medicinal plants. Preparation of crude drugs; Drug adulteration. Methods of drugs evaluation - Morphological characters and organoleptic methods. Microtomy and advanced histological techniques as applied to pharmacognostical specimens. General methods of phytochemical and biological screening - Extraction - Purification and isolation of plant constituents.

UNIT II: Extraction techniques

Chromatography - general principles of chromatography. Paper chromatography - principle, sample application - ascending, descending and radial - detection of amino acids and sugars. Thin layer chromatography – principle and applications. Column chromatography - principle, factors affecting resolution. Principle, operational procedure and applications of High Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC).

UNIT III: Phytopharmaceuticals

Phenotypic and genotypic variability affecting phytopharmaceuticals. Prospects and economics of medicinal and aromatic plants in India. Drugs used for Central nervous system, Endocrinal disorders, Dermatological infections, Fertility related problems, Cardiovascular, Gastrointestinal and Respiratory system disorders.

UNIT IV: Experimental Pharmacology

Experimental methodologies involved in the discovery of drugs (*in vivo* and *in vitro*). Animal handling and animal care – Ethnical clearance. Drug screening methods involved in evaluation of anti-ulcer, anti-hypertensive, anti-diabetic, anti-cancer, anti-inflammatory, anti-diarrhoeal, anti-pyretic, anti-asthmatics drugs and cough suppressants. Drug screening methods used in screening anti-fungal, anti-helminthic, anti-bacterial and anti-viral agents.

UNIT V: Toxicology

Basic concepts in toxicology: Introduction to toxicology and its subdivisions. Types of adverse drug reaction, Risk assessment and toxicity testing, Non-metalic environmental toxicants, Chelators and heavy metal intoxication. General mechanisms of toxin action. Allergic reactions to drugs. Pharmacological Principles: Routes of drug administration, absorption, distribution. Metabolism and excretion of drugs. Drug tolerance, drug resistance, drug dependence, drug habituation, synergism and antagonism in drug combination.

REFERENCES

- Beckett AH, Stenlake JB, 1989. Practical Pharmaceutical Chemistry. Part 1. Athlane press.
- Evans WC, 2002. Pharmacognosy, WB. Saunders & Co., London.
- Ghosh MN, 1984. Fundamentals of experimental pharmacol. Scientific book agency, Calcutta
- Patrick GL, 2001. An Introduction to Medicinal chemistry, 2nd.ed. Oxford University press
- Vogel HG, Vogel WH, 1997. Drug Discovery and Evaluation - Pharmacological assays. Springer.

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Mr. S. Amalraj

Ref. No.: 16649/Ph.D.K1/Botany/Full Time/Oct. 2017/ 21.09.2017

PAPER I - RESEARCH METHODOLOGY

***Subject Code*: 17PHDBO1** *Credits*: 4

Unit I: Instrumentation

Centrifugation - Principles and types of centrifuges. Microscopy- Light, Fluorescence microscopy, Dark field and Phase contrast. Electron microscope: SEM, TEM and AFM. Spectrometry: Beer lamberts law, UV, IR, FTIR, AAS and NMR. Principle, procedure, types and applications of electrophoresis and chromatographic techniques.

Unit II: Techniques in Molecular Biology – Part I

Protein structure prediction; PAGE, 2D PAGE, X-ray crystallography. Introduction to Bioinformatics: Nucleic acid and Protein databases, sequence homology, protein modelling and structure prediction. Nanotechnology and its applications in biological sciences.

Unit III: Techniques in Molecular Biology – Part II

Structure of DNA, RNA and Protein, Replication, Transcription and Translation. Isolation of plant and plasmid DNA. DNA quantification methods. PCR and their applications. Restriction endonucleases and DNA modifying enzymes. cDNA libraries. Gene cloning, DNA sequencing methods. Microarray, Gene transfer methods.

Unit IV: Statistical analysis

Statistics scales of measurement: Probability and probability distributions, Correlation and regression: Linear and nonlinear regressions. Tests of significance - correlation and regression coefficients, analysis of variance (ANOVA). Multivariate Analysis of Variance. Principal Component Analysis, Factor analysis and Cluster analysis.

Unit V: Thesis and manuscript writing

Different modes of scientific communication: proposal writing, research paper writing, thesis writing. Science Citation Index; Journal Impact Factor; Scopus Index; Plagiarism. Oral forms of scientific communication, scientific journalism (print/media) and legal forms of communication in science.

Reference Books:

- Khan IA & Khanum A, 1994. *Fundamentals of Biostatistics.* Vikas publications, Hyderabad.
- Dear KBG, Mead R & Relay J. 1987. *Statistical Tools for Agro-Forestry Research – Bivariate Analysis for Intercropping Experiments*. ICRAF, Nairobi.
- Nalwa H.R. Encyclopadia of Nanoscience and Technology
- Pase UG &Sukhatme MU. (1978) *Statistical Methods for Agricultural Workers*. ICAR.
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Mr. S. Amalraj

Ref. No.: 16649/Ph.D.K1/Botany/Full Time/Oct. 2017/ 21.09.2017

PAPER II - MEDICAL BOTANY

***Subject Code*: 17PHDBO2** *Credits*: 4

Unit I: History and Classification of medicinal plants

History, systems and developments of Indian Systems of Medicine. AYUSH - Ayurveda, Yoga, Unani, Siddha and Homeopathy. Classification of medicinal plants based on the plant parts used and phytoconstituents; Root drugs - *Aconitum napellus*, Bark drugs - *Cinchona officinalis*, Stem drugs – *Santalum album*, Leaf drugs - *Digitalis purpurea*, Flower drugs - *Syzygium aromaticum*, Fruit drugs- *Papaver somniferum*, Seed drugs - *Strychnox nux-vomica.*

Unit II: Siddha system of medicine

Historical background of Siddha medicine. Scope and methods of practice of Siddha medicine. Salient features of Siddha medicine. Methods of preparation of the following - extracts, Oils, Thailam, Legium, Chooranam and Kashayam (three examples each) - A brief account of the medicinal values of elements in Siddha medicine (gold, iron, silver).

Unit III: Medicinal plants and Health care

Phenotypic and genotypic variability affecting phytopharmaceuticals. Prospects and economics of medicinal and aromatic plants in India. Drugs used for Central nervous system, Endocrinal disorders, Dermatological infections, Fertility related problems, Cardiovascular, Gastro-intestinal and Respiratory system disorders.

Unit IV: Cultivation of medicinal plants and Micropropagation

Herbal gardens - Introduction and scope, Principles and process involved; Plant growing methods, propagation techniques. Biotechnological methods - Micropropagation - Somatic embryogenesis and somoclonal variation; *in vitro* production of secondary metabolites. Alternative method of secondary metabolite production – Organ culture, Cell culture,.

Unit V: Traditional health care system and Ethnobotany

Local traditional health care system; Herbal home remedies of South India; Indigenous knowledge system on medicinal plants; Herbal formularies: Infusions and decoctions, oil extractions, ointments, lotions, washes, suppositories; Ethnobotany – Tribals of South India and tribal medicines.

Reference Books:

- Harborne JB, 1998. Phytochemical methods. Springer (India) Ltd., New Delhi.
- Hartmann HT, Kester DE, 1983. Plant propagation, Englewood Cliffs, Prentice Hall.
- Jain SK, 1981. Glimpses of Ethnobotany. Oxford & IBH, New Delhi.
- Kumar NC, 1993. An Introduction to Medical Botany, Emkay Publications, New Delhi.
- Nadkarani, 1981. Materia medica, Popular Prakasam Publication, New Delhi.
- Roseline A, 2011. Pharmacognosy, MJP publishers, Chennai.

20/7/18

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Poondi, Thanjavur-613 503, Tamil Nadu, India

Mr. S. Amalraj

Ref. No.: 16649/Ph.D.K1/Botany/Full Time/Oct. 2017/ 21.09.2017

PAPER III - PHYTOCHEMISTRY AND PHARMACOLOGY

***Subject Code*: 17PHDBO3** *Credits*: 4

UNIT I: Pharmacognosy and Phytochemicals

Pharmacognosy - Collection and processing of medicinal plants; Guidelines for harvesting, processing and marketing of medicinal plants. Preparation of crude drugs; Drug adulteration. Methods of drugs evaluation - Morphological and organoleptic methods. General methods of phytochemical and biological screening - Extraction - Purification and isolation of plant constituents.

UNIT II: Human Diseases and Preventive aspects – Part I

Diseases - definition - Examples for bacterial, viral and fungal diseases. Cancer – Growth characteristics of cancer cells. Agents causing cancer- physical, chemical, biological. Cancer therapy- surgery, radiation and chemotherapy. Cancer prevention. Liver diseases – jaundice, hepatitis –causes and symptoms. Dietary prevention of disease progression.

UNIT III: Human Diseases and Preventive aspects – Part II

Cardiovascular diseases - causes and symptoms. HDL and LDL as risk factors. Hypolipidemic medicinal plants and their products. Diabetes mellitus - causes and types. Type I and type II diabetes mellitus. Antidiabetic drugs. Dietary prevention of diabetes mellitus. Kidney stones – causes –influence of diet.

UNIT IV: Experimental Pharmacology

Experimental methodologies involved in the discovery of drugs (*in vivo* and *in vitro*). Animal handling and animal care – Ethical clearance. Drug screening methods in screening of anti-fungal, anti-helminthic, anti-bacterial and anti-viral agents. Drug screening methods for evaluation of anti-ulcer, anti-hypertensive, anti-diabetic, anti-cancer, anti-inflammatory, anti-diarrhoeal, anti-pyretic, anti-asthmatics drugs and cough suppressants.

UNIT V: Toxicology

Toxicology - Basic concepts - Introduction to toxicology. Types of adverse drug reaction, Risk assessment and toxicity testing. General mechanisms of toxin action. Allergic reactions to drugs. Pharmacological Principles: Routes of drug administration, absorption, distribution. Metabolism and excretion of drugs. Drug tolerance, drug resistance, drug dependence, drug habituation, synergism and antagonism in drug combination.

Reference Books:

- Beckett AH, Stenlake JB, 1989. Practical Pharmaceutical Chemistry. Part 1. Athlane press.
- Evans WC, 2002. Pharmacognosy, WB. Saunders & Co., London.
- Ghosh MN, 1984. Fundamentals of experimental pharmacol. Scientific book agency, Calcutta
- Patrick GL, 2001. An Introduction to Medicinal chemistry, 2nd.ed. Oxford University press
- Vogel HG, Vogel WH, 1997. Drug Discovery and Evaluation - Pharmacological assays. Springer, New York.

25/7/18

29/7/18

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Ph. D PROGRAMME

DOCTORAL COMMITTEE REPORT

1. Name of the scholar : **P. MANOGAR**

2. Registration Number : **Ref.No:46338/Ph.D. K1/ Botany/ Fulltime/ January 2016/ Date:31.12.2015**

3. Research Centre : Dept. of Botany & Microbiology,
A.V.V.M. Sri Pushpam College (Autonomous),
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4. Research Supervisor : **Dr. S.VIJAYAKUMAR**
Assistant professor,
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Poondi-613 503, Thanjavur Dt.

5. Doctoral Committee Members : **1. Dr. SANJEEV KUMAR SINGH**
Professor,
Department of Bioinformatics,
Alagappa University, Karaikkudi- 630003.

2. Dr. R. MURUGAN
Assistant Professor,
Department of Botany,
Government Arts College (Autonomous)
Kumbakonam -612001

6. Date of Doctoral committee Meeting : **20.04.2016**

7. Coursework and credit by the Doctoral Committee from the syllabi offered by : Doctoral Committee Members

S. No	Subject Code	Subject Title	Credits
1.	Ph. D Paper 1	Cyanobacterial Biotechnology	4
2.	Ph. D Paper 2	Bio-Informatics	4
		Total	8

Doctoral Committee Members

Sanjeev K Singh

1.Dr. SANJEEV KUMAR SINGH

2. Dr. R. MURUGAN

Research Supervisor

S. Vijayakumar

Dr. S. VIJAYAKUMAR

Dr. R.MURUGAN M.Sc., M.Phil., M.Ed., PGDBF., Ph.D.,
Asst.Professor & Head, Dept. of Botany,
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Assistant Professor,
Dept. of Botany & Microbiology,
A.V.V.M. Sri Pushpam College(Autonomous)
POONDI-613 503, Thanjavur.

CYANOBACTERIAL BIOTECHNOLOGY

Unit- I

Cyanobacteria: Morphology of Cyanobacteria –Structure of cyanobacterial organisms-cells-Reproduction –Economic importance of cyanobacteria.

Unit- II

Anti-cannabinoids activity- New anti- cannabinoid drugs from cyanobacteria- Existing anti- cannabinoid drugs- Receptors of cannabinoid diseases, chemical analogues of cyanobacterial drugs.

Unit-III

Anti-Nuerogenerative diseases- likely Huntington's disease, Alzheimer's disease and Parkinson's disease- Polysaccharides- Carbohydrate-binding proteins- New anti-nuerogenerative disease drugs from cyanobacteria- Sulfoglycolipids.

Unit- IV

Antibacterial activity-multi drug resistant bacteria- Various bacterial disease causing receptors from various organisms- Existing antibacterial drugs- New antibacterial drugs from cyanobacteria.

Unit-V

Drug discovery from bioactive compounds- Cyanobacterial bioactive compounds- analogues of bioactive compounds – Drug receptor interaction – Evaluation of new drugs using docking software.

References:

1. N. G. Carr, Brian A. Whitton The Biology of Cyanobacteria, University of California Press, 1982 - Science - 688 pages

2. T. A. Sarma Handbook of Cyanobacteria, December 18, 2012 by CRC Press

3. Naveen K. Sharma Cyanobacteria An Economic Perspective John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK.

4. Antonia Herrero and Enrique Flores The Cyanobacteria: Molecular Biology, Genomics and Evolution Instituto de Bioquímica Vegetal y Fotosíntesis, Centro de Investigaciones Científicas Isla de la Cartuja, 41092 Sevilla, Spain.

Sanjeev K. Singh

Dr. Sanjeev K. Singh
Professor
Department of Bioinformatics
Alagappa University, Karaikudi

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S. Vijayakumar 20/4/16

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BIOINFORMATICS RESOURCES AND APPLICATIONS

Unit- I

Overview of Bioinformatics- Literature databases- NCBI- PubMed - Sequence and Structure databases- Genomics and Proteomics- Biodiversity-System Biology

Unit- II

Protein and Nucleic Acid Sequence Databases- PIR, Swiss-port, Gene Bank- pattern and motif searches – PROSITE, BLOCKS, PRINTS, PFAM – PDB

Unit-III

Structural databases- SCOP, CATH-Protein structure visualization tools- RasMol, Swiss PDB viewer, Docking Software- Maestro

Unit-IV

Sequence alignment: Scoring matrices – Substitution matrices (PAM and BLOSUM)- Local and Global alignment concepts- Dotplot – Dynamic programming methods- Statistics of alignment score – Database searching – FASTA and BLAST searches- Multiple sequence alignment- CUSTAL W- 5 TCOFFEE – Structure based sequence alignments- Profile methods- Gribskov profile-PSI- BLAST

Unit-V

Evolutionary analysis – sequence level – distances – clustering methods- construction of dendrograms – rooted and unrooted tree representation- Phylogenetic trees- PHYLIP.

Reference Books:

1. Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003.
2. D. Higgins and W. Taylor (Eds), Bioinformatics –Sequence, structure and databanks, Oxford University Press, New Delhi, 2000.
3. R. Durbin, S.R. Eddy, A. Krogh and M. Mitchison, Biological Sequence Analysis, Cambridge University, Press Cambridge, UK, 1998.
4. G, Gibson & S.V. Muse, A Primer of Genome Science, Sinauer Associates.
5. A. Baxevanis and B.F. Ouellette. Bioinformatics: A practical Guide to the analysis of Genes and Proteins, Wiley – Inter science, Hoboken, NJ, 2005.
6. A.M Campbell & L.J. Hayer, Discovering Genomics, Proteomics & Bioinformatics, CSHL Press, 2003.
7. C.S. Tsai, an Introduction of Computational Biochemistry, Wiley-Liss, New York, 2002.
8. T.E. Creighton, Protein Function a Practical Approach, Oxford University press, 2004.
9. S.R. Pennington & M.J. Dunn, Proteomics - from protein sequence to function, BIOS Scientific Publishers, 2002

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Ph. D., PROGRAMME

DOCTORAL COMMITTEE REPORT

1. Name of the scholar	:	**S. RAJALAKSHMI**
2. Registration Number	:	**Ref.No.:29393/Ph.D. KI/ Botany / Full Time/ October2016/ Date: 28.09.2016**
3. Research Centre	:	Dept. of Botany & Microbiology, A.V.V.M. Sri Pushpam College (Autonomous), Poondi-613 503, Thanjavur Dt.
4. Research Supervisor	:	**Dr. S.VIJAYAKUMAR** Assistant professor, Dept. of Botany and Microbiology, A.V.V.M. Sri Pushpam College (Autonomous), Poondi-613 503, Thanjavur Dt.
5. Doctoral Committee Members	:	**1. Dr. N. VIJAYAKUMAR** Assistant Professor, Department of Biochemistry& Biotechnology, Annamalai University, Chidambaram – 608 002. **2. Dr. T. FRANCIS XAVIER** Assistant Professor, Department of Botany, St. Joseph's College (Autonomous) Tiruchirapalli - 620 002.
6. Date of Doctoral committee Meeting	:	**21.12.2016**
7. Coursework and credit by the Doctoral Committee from the syllabi offered by	:	Doctoral Committee Members

S. No	Subject Code	Subject Title	Credits
1.	Ph. D Paper 1	Medical Botany & Pharmacognosy	4
2.	Ph. D Paper 2	Research Methodology	4
3	Ph. D Paper 3	Bioinformatics	4
		Total	12

Doctoral Committee Members

1. Dr. N. VIJAYAKUMAR

N. Vijayakumar

[Dr. N. Vijayakumar
Assistant Professor
Department of Biochemistry & Biotechnology
Annamalai University, Chidambaram.]

Research Supervisor

S. Vijayakumar

Dr. S. VIJAYAKUMAR

2. Dr. T. FRANCIS XAVIER

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Dr. S.VIJAYAKUMAR M.Sc., M.Phil., Ph.D.
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Dept. of Botany & Microbiology,
A.V.V.M. Sri Pushpam College(Autonomous),
POONDI-613 503, Thanjavur.

MEDICAL BOTANY AND PHARMACOGNOSY

Unit I

Medical Botany: Introduction, History, Definition – Classification – Common medicinal plants cultivation, storage, collection and habitats of medicinal plants – Importance of medicinal plants.

Unit II

Indian systems of medicine – Siddha, Ayurveda, Homeopathy & Unani – Local medicinal plants – Useful parts – Chemical constituents – medicinal uses – medicinal plant drugs.

Unit III

Herbal medicines for human ailments – Heart, kidney, liver, eye, skin, hair, stomach problems, diabetics, blood pressure, headache, cough, cold fever, digestive problems, joint pains.

Unit IV

Pharmacognosy – Introduction commercial drugs, crude drugs – classifications of drugs history – pharmaceuticals aids – Chemistry of drug and drug evaluation of natural products.

Unit V

Drug adulteration and detection – Substitution – Detection of Adulterations Elementary knowledge on Alkaloids, Volatile oils, Resins, Triterpenoid drugs.

Books for Reference:

1. Kumar, N.C., (1993) An Introduction to Medical Botany & Phrmacognosy.
2. Shah, S.C. and Qudary 1990. A text book of Phrmacognosy.
3. Nadkarni, 1981. Indian Material Medica.
4. Jain, S.J., Rao, C. 1976. A hand book of field and Herbarium techniques.
5. Gamble, J.S., 1973, Flora of the Presidency of Madras.
6. Jain, S.K., Indian Medicinal Plants, 1980.
7. Balu, S., Murugan, R. & Pandiyan, P., 2005. Herbal Technology.

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Dr. N. Vijayakumar
Assistant Professor.
Department of Biochemistry & Biotechnology.
Annamalai University
Chidambaram

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 - Electrophoresis

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.

Unit-3-Separation techniques

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- 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.

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.

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BIOINFORMATICS RESOURCES AND APPLICATIONS

UNIT - I

Overview of Bioinformatics – Literature databases – NCBI – PubMed – Sequence and Structure databases – Genomics and Proteomics – Biodiversity – Systems Biology

UNIT – II

Protein and Nucleic Acid Sequence Databases – PIR, Swiss-prot, GenBank – pattern and motif searches – PROSITE, BLOCKS, PRINTS, PFAM – PDB.

UNIT – III

Structural databases– SCOP, CATH - Protein structure visualization tools – RasMol, Swiss PDB Viewer, Docking software-Hex

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Sequence alignment: Scoring matrices - Substitution matrices (PAM and BLOSUM) - Local and Global alignment concepts – Dotplot – Dynamic programming methods - Statistics of alignment score - Databases searching - FASTA and BLAST searches - Multiple sequence alignment – CLUSTALW -5 TCOFFEE- Structure based sequence alignments - Profile methods –Gribskov profile – PSI-BLAST

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4. G. Gibson & S.V.Muse, A Primer of Genome Science, Sinauer Associates, Inc. Publishers, 2002.
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6. A. M.Campbell & L. J. Heyer, Discovering Genomics, Proteomics & Bioinformatics, CSHL Press, 2003.
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Ph.D. Course Work

Credit: 4

Subject Code	: **Ph.D-MBP**
Title of the Paper	: **Medical Botany and Pharmacognosy**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit – I

Medical Botany, Medicinal plants – Introduction History, Definition - Classification - Common Medicinal plants cultivation, storage collection and habitats of Medicinal plants – Importance of medicinal plants.

Unit – II

Indian system of medicine – Siddha, Ayurveda, Homeopathy and Unani – Local medicinal plants – Useful parts – chemical constituents - medicinal uses- Medicinal plant drugs.

Unit – III

Herbal medicines for human ailments – Heart, Liver, Kidney, Eye, Skin, Hair, Stomach problems, diabetics, blood pressure, Headache, Cough, Cold fever, Digestive problem, Joint pains.

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Pharmacognosy – Introduction commercial drugs, Crude drugs – Classification of drugs History – Pharmaceuticals aids - Chemistry of drug and Drug Evaluation of natural products.

Unit – V

Drug Adulteration and detection – Substitution – detection of Adulterations, Elementary knowledge on Alkaloids, Volatile oils, Resins, Phenol - Terpenoids.

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- Shah, S.C. & Qudary, 1990. A Text Book of Pharmacognosy.
- Nadkarni, 1981. Indian Material Medica.
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25/6/16

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Ph.D. Course Work

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Subject Code	: **Ph.D-MBP**
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25/6/16

31/11/16

Ph.D. Course Work

Credit: 4

Subject Code	: **Ph.D-MBP**
Title of the Paper	: **Medical Botany and Pharmacognosy**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit – I

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Ph.D. Course Work

Credit: 5

Subject Code	: **Ph.D-EB**
Title of the Paper	: **Environmental Biotechnology**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit I

Environmental degradation – Pollution: Industrial pollution, oil pollution and Biomagnifications. Waste land formation: Abandoned mine lands, ravines, deforestation, shifting cultivation, Impact of Dams, Loss of soil fertility. Global environmental changes. Global warming, Green house effect, Climatic Changes, acid rain and ozone depletion - Population dynamics – Reduction of biodiversity and Web Interaction, Radiation pollution.

Unit II

Remote sensing and its applications in resource management and pollution monitoring. Biosensors, bioremediation – pollution abatement, Application of biotechnology in pulp and paper industry, Biotechnological applications in tannery and distillery. Pesticide waste disposal. Removal of spilled oil by oleophilic microbes. Use of genetically engineered microbes (Super bug) - Bioleaching.

Unit III

Aerobic and anaerobic methods of waste water treatment oxidation, ponds, filters (Trickling and Rotary) –Use of aquatic plant in waste water treatment. Biodegradation of pollutants, Bioenergy from waste, Biomass and biogas production and SCP – Use of sludge and recycling of treated water. Urban waste management.

Unit IV

Applications of Biotechnology in forestry, agriculture and wasteland development – Restoration of degraded lands, Reforestation – use of mycorrhizae and microbes in restoration of soil fertility, biofertilizers. Microbial participation in natural cycles of minerals, vermicompost – Biological control of pest population.

Unit V

Conservation of resources – Endangered flora and fauna, their identification and documentation – Red Data Book – Conservation strategies, Ex-situ approach, collection, garden seed storage, tissue culture and cryopreservation, gene bank, pollen bank and seed bank. In-situ approach – Biosphere reserves. National parks and sanctuaries – political and legal aspects of biodiversity. The Environmental protection Act – 1986. Biodiversity convention - Riode Janeiro - 1992, peace friendly concept – Environmental Education.

Ph.D. Course Work

Credit: 4

Subject Code	: **Ph.D-MBP**
Title of the Paper	: **Medical Botany and Pharmacognosy**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit – I

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Ph.D. Course Work

Subject Code : Ph.D-EB Credit: 5
Title of the Paper : Environmental Biotechnology
Research Scholar : B.BHAVANI
Reference No : 16431/Ph.D.K1/Botany/Part time/October2017/Date:21.09.2017
Research Advisor : Dr.S.VASANTHA

Unit I

Environmental degradation – Pollution: Industrial pollution, oil pollution and Biomagnifications. Waste land formation: Abandoned mine lands, ravines, deforestation, shifting cultivation, Impact of Dams, Loss of soil fertility. Global environmental changes. Global warming, Green house effect, Climatic Changes, acid rain and ozone depletion - Population dynamics – Reduction of biodiversity and Web Interaction, Radiation pollution.

Unit II

Remote sensing and its applications in resource management and pollution monitoring, Biosensors, bioremediation – pollution abatement, Application of biotechnology in pulp and paper industry, Biotechnological applications in tannery and distillery. Pesticide waste disposal, Removal of spilled oil by oleophilic microbes. Use of genetically engineered microbes (Super bug) - Bioleaching.

Unit III

Aerobic and anaerobic methods of waste water treatment oxidation, ponds, filters (Trickling and Rotary) –Use of aquatic plant in waste water treatment. Biodegradation of pollutants, Bioenergy from waste, Biomass and biogas production and SCP – Use of sludge and recycling of treated water. Urban waste management.

Unit IV

Applications of Biotechnology in forestry, agriculture and wasteland development – Restoration of degraded lands, Reforestation – use of mycorrhizae and microbes in restoration of soil fertility, biofertilizers. Microbial participation in natural cycles of minerals, vermicompost – Biological control of pest population.

Unit V

Conservation of resources – Endangered flora and fauna, their identification and documentation – Red Data Book – Conservation strategies, Ex-situ approach, collection, garden seed storage, tissue culture and cryopreservation, gene bank, pollen bank and seed bank. In-situ approach – Biosphere reserves. National parks and sanctuaries – political and legal aspects of biodiversity. The Environmental protection Act – 1986. Biodiversity convention - Rio de Janeiro - 1992, peace friendly concept – Environmental Education.

Ph.D. Course Work

Credit: 4

Subject Code	: **Ph.D-MBP**
Title of the Paper	: **Medical Botany and Pharmacognosy**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit – I

Medical Botany, Medicinal plants – Introduction History, Definition - Classification – Common Medicinal plants cultivation, storage collection and habitats of Medicinal plants – Importance of medicinal plants.

Unit – II

Indian system of medicine – Siddha, Ayurveda, Homeopathy and Unani – Local medicinal plants – Useful parts – chemical constituents - medicinal uses- Medicinal plant drugs.

Unit – III

Herbal medicines for human ailments – Heart, Liver, Kidney, Eye, Skin, Hair, Stomach problems, diabetics, blood pressure, Headache, Cough, Cold fever, Digestive problem, Joint pains.

Unit – IV

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Unit – V

Drug Adulteration and detection – Substitution – detection of Adulterations, Elementary knowledge on Alkaloids, Volatile oils, Resins, Phenol - Terpenoids.

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1. Ignacimuthu, S.I. (1998). Applied Plant Biotechnology. McGraw Hill Publications, Co., Ltd., New Delhi
2. Kudesia, V.P. and Kudesia, R., (1978). Environmental Health and Technology. McGraw Hill Publications Co., Ltd., New Delhi.
3. Harvinder Sohal and Srivastava, A.K., (1982). Environmental and Biotechnology. Blackwell Publishers, New Delhi.
4. Kumar, H.D., (1982) Modern Concepts of Ecology – Vikas Publishing House Pvt. Ltd.

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Ph.D. Course Work

Subject Code	: Ph.D-BP	Credit: 5
Title of the Paper	: Biology and Diversity of Pteridophytes	
Research Scholar	: R.Kalpana Devi	
Reference No	: 34381/Ph.D.K1/Botany/FT/Oct 2014/DT:24.03.2015	
Research Advisor	: Dr.S.VASANTHA	

UNIT I

Pteridophytes - Introduction, Origin, General characteristics, Distribution, Habitat, Range. Classification of Pteridophytes - Reimer (1954) and Sporne (1976), Diversity of ferns – an ecological perspective.

UNIT II

Speciation and evolutionary trends in Pteridophytes: Soral and Sporangial characters, Stelar evolution, Structure and evolution of archegonium in Pteridophytes, Geological time scale, General account of fossil Pteridophytes (Rhynia, Horneophyton, Calamites, Cladexylon, Sphenophylales and Coenopteridales.

UNIT III

Cytology, Polyploidy and Hybridization, Heterospory and origin of seed habitat, Mechanism of spore dispersal, Apospory, Apogamy, Vegetative Apomixis, Alteration of Generation, Telome theory.

UNIT IV

Morphology, anatomy and reproduction of major groups – Psilopsida, Lycopsida, Sphenopsida and Pteropsida.

UNIT V

Ecological and economic importance of Pteridophytes, Cultivation and maintenance of ornamental ferns, Tissue culture of Pteridophytes.

Books for Reference

1. Ignacimuthu, S.J. (1996). Applied Plant Biotechnology. McGraw Hill Publications, Co., Ltd., New Delhi.
2. Kudesia, V.P. and Kudesia, R., (1978). Environmental Health and Technology. McGraw Hill Publications Co., Ltd., New Delhi.
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Poondi, Thanjavur Dist

Ph.D. Course Work

Credit: 4

Subject Code	: Ph.D-MBP
Title of the Paper	: Medical Botany and Pharmacognosy
Research Scholar	: R. SATHISH KUMAR
Reference No	: 7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016
Research Advisor	: Dr.S.VASANTHA

Unit – I

Medical Botany, Medicinal plants – Introduction History, Definition - Classification – Common Medicinal plants cultivation, storage collection and habitats of Medicinal plants – Importance of medicinal plants.

Unit – II

Indian system of medicine – Siddha, Ayurveda, Homeopathy and Unani – Local medicinal plants – Useful parts – chemical constituents - medicinal uses- Medicinal plant drugs.

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Unit – V

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Subject Code : Ph.D-MB Credit: 4
Title of the Paper : Medical Botany
Research Scholar : R.Kalpana Devi
Reference No : 34381/Ph.D.K1/Botany/FT/Oct 2014/DT:24.03.2015
Research Advisor : Dr.S.VASANTHA

UNIT I

Ethnobotany, its scope, interdisciplinary approaches. Ethnic groups of India: major and minor tribes, conservation practices of biodiversity. World centers of Ethnobotany with special reference to India. Plants as sources of drugs, pharmaceuticals and pharmaceutical aids. Ethnomedicobotany: Basic approaches to study traditional knowledge on herbal medicine, Collection methods of ethnomedicobotanical data: Field methods and scrutiny of Herbarium specimen, collection of materials for voucher specimen and phytochemical screening; application of ethnomedicobotany.

UNIT II

Role of Ethnobotany in national priorities, health care and development of cottage industries in India. History and principles of ayurveda, Homeopathy, Allopathy, Unani and Siddha system of medicines. A general idea of active principles of plants and plant parts their extraction and preparation of medicines in different systems.

UNIT-III

Pharmacognosy - Aim and scope; branches of Pharmacognosy and phytochemicals Pharmacognosy of drugs derived from alkaloids, glycosides, volatile oils, lipids, gums resins, tannins and saponins. Drugs of botanical origin: Structure, physical properties biosynthesis and chemistry of secondary metabolites: phenols, phenolic glycoside saponins, steroids, alkaloids, vitamins and harmones and natural antibiotics. Methods f screening natural sources for bioactive principles.

Ph.D. Course Work

Credit: 4

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Research Scholar	: B.BHAVANI
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A. Panneerselvam 22/9/2018

Dr. A. PANNEERSELVAM, M.Sc., M.Phil., B.Ed., Ph.D.

S. Vasantha

Dr. S. VASANTHA, M

Ph.D. Course Work

Credit: 4

Subject Code	: **Ph.D-MBP**
Title of the Paper	: **Medical Botany and Pharmacognosy**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
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Ph.D. Course Work

Credit: 4

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S. Vasantha 25/6/16

25/6/16

A. Sathish 25/6/16

Ph.D. Course Work

Credit: 5

Subject Code	: **Ph.D-EB**
Title of the Paper	: **Environmental Biotechnology**
Research Scholar	: **R. SATHISH KUMAR**
Reference No	: **7852/Ph.D.K1/Botany/Full Time/April 2016/Date: 11/05/2016**
Research Advisor	: **Dr.S.VASANTHA**

Unit I

Environmental degradation – Pollution: Industrial pollution, oil pollution and Biomagnifications. Waste land formation: Abandoned mine lands, ravines, deforestation, shifting cultivation, Impact of Dams, Loss of soil fertility. Global environmental changes. Global warming, Green house effect, Climatic Changes, acid rain and ozone depletion - Population dynamics – Reduction of biodiversity and Web Interaction, Radiation pollution.

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