THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

DEGREE COURSE

B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

UNDER CBCS

(with effect from 2008-2009)

The Course of Study and the Scheme of Examinations

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
I Year I Semester	I	Language	Paper I		6	3	3	25	75	100
	II	English	Paper I		6	3	3	25	75	100
	III	Core	Paper I	Phycology and Mycology	6	5	3	25	75	100
	III	Core Practical			3	-	-	-	-	-
	III	Allied	Paper I	Zoology I	4	4	3	25	75	100
	III	Allied Practical			3	-	-	-	-	-
	IV			**Environmental Studies**	2	2	3	25	75	100
I Year II Semester	I	Language	Paper II		6	3	3	25	75	100
	II	English	Paper II		6	3	3	25	75	100
	III	Core	Paper II	Bacteriology, Virology, Lichenology, Bryophytes and Plant Diseases	6	4	3	25	75	100
	III	Core Practical	Practical I	Covering Papers I and II	3	4	3	40	60	100
	III	Allied	Paper II	Zoology II	4	4	3	25	75	100
	III	Allied Practical	Practical I	Zoology	3	2	3	20	30	50
	IV			**Value Education**	2	2	2	-	50	50
II Year III Semester	I	Language	Paper III		6	3	3	25	75	100
	II	English	Paper III		6	3	3	25	75	100
	III	Core	Paper III	Pteridophytes, Gymnosperms and Paleobotany	4	4	3	25	75	100

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
	III	Core Practical			2	-	-	-	-	-
	III	Allied	Paper III	Chemistry I	4	4	3	25	75	100
	III	Allied Practical			3	-	-	-	-	-
	IV	Skill Based Subject I		Horticulture I	3	3	3	25	75	100
		Non-Major Elective I		Mushroom cultivation	2	2	3	25	75	100
II Year IV Semester	I	Language	Paper IV		6	3	3	25	75	100
	II	English	Paper IV		6	3	3	25	75	100
	III	Core	Paper IV	Cytology and Plant Anatomy	4	4	3	25	75	100
	III	Core Practical	Practical II	Covering Papers III & IV	2	4	3	40	60	100
	III	Allied	Paper IV	Chemistry II	4	4	3	25	75	100
	III	Allied Practical	Practical II		3	2		20	30	50
	IV	Skill Based Subject II		Horticulture II	3	3	3	25	75	100
		Non-Major Elective II		Biofertilizers	2	2	3	25	75	100
III Year V Semester	III	Core	Paper V	Microbiology and Plant Pathology	6	4	3	25	75	100
	III	Core	Paper VI	Taxonomy of Angiosperms, Embryology and Ethno Botany	6	4	3	25	75	100
	III	Core	Paper VII	Genetics, Plant Breeding, Evolution and Biostatistics	6	6	3	25	75	100
	III	Core Practical		Covering papers V,VI & VII	4	-	-	-	-	-
		Elective I	Paper I	Plant Cell And Tissue Culture I	5	5	3	25	75	100
	IV	Skill Based Subject III		Bio informatics I	3	3	3	25	75	100
III Year VI Semester	III	Core	Paper VIII	Plant Physiology, Plant Bio-Chemistry and Seed Biology	6	5	3	25	75	100

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
	III	Core	Paper IX	Plant Biotechnology, Wood technology and Nanotechnology	6	5	3	25	75	100
	III	Core Practical General	Practical III	Covering papers V,VI, & VII	-	4	3	40	60	100
	III	Core Practical Electronics	Practical IV	Covering papers VIII & IX	5	5	3	40	60	100
		Elective II	Paper II	Plant Cell And Tissue Culture II	5	5	3	25	75	100
		Elective III	Paper III	Microtechnique	5	5	3	25	75	100
	IV	Skill Based Subject IV		Bio informatics II	3	3	3	25	75	100
	V	Extension Activities				1				50
				Total	**180**	**140**				**3700**

THIRUVALLUVAR UNIVERSITY

B.Sc. PLANT BIOLOGY AND BIOTECHNOLOGY

SYLLABUS

UNDER CBCS

(with effect from 2008-2009)

I SEMESTER

PAPER I

PHYCOLOGY AND MYCOLOGY

ALGAE

UNIT-I

Classification and general characters of Algae. (Smith 1958)

Classification, occurrence, distribution, thallus structures. pigmentation, reserve food materials and types of life cycles of Chlorophyceae and charophyceae.

Examples - Oscillatoria and Chlamydomonas.

UNIT-II

Classification, occurrence, distribution, thallus structures. pigmentation, reserve food materials and types of life cycles of Chlorophyceae and charophyceae.

Examples - Oedogonium, Chlorella, Cosmarium, Chara.

UNIT-III

Classification, occurance, distribution, thallus structures. pigmentation, reserve food materials and types of life cycles of Phaeophyceae and Rhodophyceae.

Examples - Diatoms, Sargassum, Gracilaria

Economic importance of Algae. Example : Agar, Diatamaceous earth, spirulina, Pigment producing algae (Ulva)

FUNGI

UNIT-IV

Classification for Fungi - (Alexopolous) General characters - mode of nutrition and occurrence of fungi, Detailed study of structure reproduction and life cycle of Phycomycetes.

Example - *Albugo*.

UNIT-V

Detail study of structure and reproduction and life cycle of Ascomycetes, Basidiomycetes and Deuteromycetes.

Example - *Penicillium, Peziza, Puccinia and Cercospora.*

Economic importance of Fungi, yeast, edible mushrooms.

Books Suggested

1. Fritsch, F.E. 1945. Structure reproduction of the Algae Voll & II, Cambridge University Press, London.
2. Vashishta, B.R. 1990 Botany for degree students, Algae. S. Chand & Co. Ltd., Ram Nagar, New Delhi.
3. Venkateshwaran, V.A. Text book of Algae. Marahi Book depot, Guntur.
4. Webster.j. 1978 Introduction to Fungi, Cambridge University Press, London.
5. Robet Edward Lee.1980 Phycology, Cambridge Unversity Press, London.
6. Vashista. B.R. 1981 Botany for Degree students Fungi. S. Chand & Co. Ltd., Ram Nagar, New Delhi.

ALLIED I

PAPER I

ZOOLOGY I

Objective :

To study the systemic and functional morphology of invertebrates and Chordates.

UNIT-I

Study types including Life histories. Protozoa - Entamoeba, Porifera-Sycon. Coelenterata-Obelia geniculata. Platyhelminthes-Taenia solium

UNIT-II

Annelida-Earthworm, Arthropoda-Prawn, Mollusca-Fresh water mussel, Echinodermata-Sea Star.

UNIT-III

Chordata-Prochordates , General Characters, Morphology of Amphioxus

Vertebrates : Shark.

UNIT-IV

Type Study Frog and Calotes.

UNIT-V

Type Study Pigeon and Rabbit.

Note : In chordata to study only morphology, digestive system, Respiratory system, circulatory system and urinogenital system.

References :

1. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology. Vol. [Chordata] I & II.S. Viswanathan [Printers and Publisher] Pvt. Ltd., Madras, 891p.
2. Kotpal Series, 1988-1992. Rastogi Publication, Meerut.
3. Jordan E.L. and P.S. Verma 1993. Invertebrata Zoology 12th Edition. S. Chand Co. Ltd., New Delhi.

ENVIRONMENTAL STUDIES

(For all UG Degree Courses)

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

II SEMESTER

PAPER II

BACTERIOLOGY, VIROLOGY, LICHENOLOGY, BRYOPHYTES AND PLANT DISEASES

UNIT-I : BACTERIOLOGY

General Characters - Classification (Bergy's Manual of Bacteriology), Shape, Flagellation, Nutrition, Growth, Respiration and Staining behavior of Bacteria. Reproduction in Bacteria, Economical Importance.

UNIT-II : VIROLOGY

General Characters, Chemical Components, Properties, Nomenclature and Classification, Transmission, Structure and Multiplication of TMV and T4 Bacteriophage.

UNIT-III : LICHENOLOGY

Nature, Occurrence, Classification Structure, Vegetative and Sexual Reproduction, Nutrition (With particular reference to fruticose lichen.) Economical importance, Role in Succession and Monitoring Pollutants.

UNIT-IV : BRYOPHYTES

General Characters, Classification of Reimers (1954). Study the Thallus Structure, Reproduction and Life Cycle of the Following Types. (Excluding the development studies) *Marchantia and Polytrichum*.

UNIT-V : PLANT DISEASES

Detailed Study of the following Diseases and Control Measures.

1. Ground nut leaf spot disease.(*Cercospora*)
2. Tobacco Mosaic Disease.
3. Late Blight of Potato.

Books Suggested

1. Dube H.C. (1978), A text Book of Fungi, Bacteria and Viruses, Vikas publishing House, Pvt., Ltd., New Delhi, Bombay, Bangalore, Calcutta, Kanpur.
2. Mishra. A and Agarwal R.P. (1978) Lichens A Preliminary text. Oxford and IBH. 66 janapath, New Delhi 110 001.
3. Parkar. N.S. (1967) An Introduction to embryophyta - Vol I. General Book Dept. Indian University press, Allahabat.
4. Singh R.S. (1978) plant Diseases, Oxford and IBH, 66, Janapath, New Delhi - 110 001,
5. Vashishta. B.R. (1970), Botany for Degree students, Fungi, S. Chand & Co, Ramnagar, New Delhi - 110 055,
6. Vashishta. B.R. (1978), Bryophyta, S.Chand & Co, Ram Nagar, New Delhi - 110 001,
7. Watson E.V. (1964), The structure and Life History of Bryophytes Hutchinson University Press, London.

CORE PRACTICAL I

(Covering Papers I and II)

I. PHYCOLOGY AND MYCOLOGY

1. A detailed study of structure of thallus and reproductive structure of forms given below *Oscillatoria, Chlamydomonas, Oedogonium, Chlorella, Cosmarium, Chara, Diatoms, Sargassum and Gracilaria*.
2. Observation and recognition of materials and organisms given in fungi. *Albugo, Penicillium, Peziza, Puccinia & Cercospora.*

II BACTERIOLOGY, VIROLOGY, LICHENOLOGY, BRYOPHYTES AND PLANT DISEASES

1. General observation of thallus and reproductive structure of fruticose lichen [*Usnea), Marchantia and Polytrichum*
2. Recognition of Pathological specimens and control measures of plant diseases given in Unit V.

ALLIED I

PAPER II

ZOOLOGY II

Objective :

To study the principles of Cell biology, Genetics, Developmental Biology, Physiology, Ecology and Evolution.

UNIT-I

Cell Biology-Structure of animal cell Genetics : Molecular structure of genes - Gene function. Genetic Engineering and its application, sex linked inheritance.

UNIT-II

Embryogenesis - Cleavage and gastrulation of Amphioxus. Human Physiology : Excretion - kidney failure and transplantation.

UNIT-III

Diseases of Circulatory system - Blood Pressure, Heart diseases-Ischemia, Myocardial infarction, Rheumatic heart diseases, Stroke.

UNIT-IV

Pollution - Environmental degradation, methods of sewage treatment, effluents, solid wastes and recycling process - Green house effect - Global warming - Acid Rain.

UNIT-V

Evolution Theories - Lamarkism & Darwinism.

References :

1. Ekambarantha Ayyar, and Ananthakrishnan, T.N. 1993 Outlines of Zoology, vol I & II Viswanathan and co Madras.
2. Sambasiviah I, Kamalakara Rao. A.P. Augustine Chellappa, S [1983] Text Book of Animal Physiology, S. Chand & Co., New Delhi.

3. Verma and Agarwal [1983] Text Book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi [1991] Chordate Embryology S. Chand & Co. New Delhi.
5. Rastogi and Jayaraj [2000] Text Book of Genetics. Rastogi Publications, Meerut.
6. Verma and Agarwal 2000 Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co.

ALLIED PRACTICAL I

ZOOLOGY

MAJOR PRACTICAL

CD*/Model/Chart - Anatomical observation and comment

Cockroach - Digestive and nervous system.

Frog - Digestive and Urino-genital system. Arterial system & Venous system

MINOR PRACTICAL

Slides / Model / Chart - Identification (draw and label)

1. Body setae of Earthworm
2. Mouth parts of mosquito
3. Mouth parts of Honeybee
4. Any one suitable / relevant vertebrate Brain
5. Placoid scale of shark

Spotters

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn [entire], Fresh water mussel, Sea star, T.S. of arm of sea star to show tube feet, shark-entire, Shark [placoid scale] Frog, Calotes Pigeon entire [feather], Rabbit

Sphygnomanometer

* References :

1. Prof. Baskaran, HOD of Zoology
   Iyyanadar Janagiammal College
   Sivakasi, Ph.No. 04562 – 254100
2. WWW.Prodissector.Com.
3. WWW.Sciencelass.Com.
4. WWW.ento.vt.edu.

VALUE EDUCATION
(For all UG Degree Courses)

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe/.org/education.html/

www.clallam:;org/lifestyle/education.html/

www.sun.com/../edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

http://militarlyfinance.umuc.edu/education/edu-network.html/

III SEMESTER

PAPER III

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Pteridophytes:

UNIT-I:

Classification of Pteridophytes (Reimer 1954). Occurrence and distribution, stelar evolution, Homospory and Heterospory, Apogamy and Apospory.

UNIT-II:

Structure and life cycle of the following types (Excluding developmental studies) 1. Lycopodium, 2. Selaginella, 3. Equisetum, and 4. Marselia.

Gymnosperms

UNIT-III:

Distribution of Gymnosperms - general characters - economic importance - classification of Gymnosperms by K.R. Sporne (1965). Detailed study of the following types: 1. Cycas, 2. Gnetum.

Paleobotany

UNIT-IV:

Geological time scale. Radio carbon dating. Fossils and fossilisation. Kinds of fossils: Impressions, Compressions, casts, molds, petrifactions, and coal balls. Importance of the study of palaeobotany.

UNIT-V:

Nomenclalture of fossil plants. Brief study of the following fossils: Lepidodendron, Calamites and Williamsonia.

BOOKS SUGGESTED:

1. Smith, G.M. 1972. Cryptogamic botany Vol. - II Mc Graw Hill, New Delhi.
2. Sporne, K.R. 1976. Morphology of Petridophytes, BI Publications. Pvt. Ltd., New Delhi.
3. Pandey B.P. 1977. A Text book of Botany Bryophyta, Peridophyta and Gymnosperms K.Nath & co. Meeret.
4. Sporne K.R. 1965. Morphology of gymnosperms. B.I. Publications Pvt. Ltd. New Delhi
5. Rashid, A 1976. An Introduction to Pteridophyta Vikas Publishing House Pvt. Ltd., New Delhi
6. Bhatnagar S.P. and A. Moitra 1996. Gymnosperms, New age International publishers (p) Ltd. New Delhi.
7. Margulis. L. and K.V. Sehwatz (2nd ed.) 1988. Five Kingdoms: Anm illustrated Guide to phyla of life on Earth W.H. Freeman & Co. New York.
8. Arnold C.R. 1947. Introduction to Paleobotany. TMH Publishing Co. Ltd., Bombay.
9. Shukla. A and Mishra S.P. 1975. Essentials of Paleobotany. Vikas publishing house Pvt. Ltd. Delhi.
10. Shirpad N. Agashe, 1995. Paleobotany. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
11. Wilson N.Stewart and Gar, W.Rothwell. 2005. Paleobotany and the evolution of plants 2nd Edn., Cambridge University Press, Cambridge, U.K.

ALLIED II

PAPER III

CHEMISTRY I

UNIT - I

1.1 Extraction of Metals Minerals and Ore difference - Minerals of Iron, Aluminum and Copper - Ore Dressing or concentration of Ore - Types of Ore Dressing Froth Floatation and Magnetic separation.

1.2 Refining of Metals - Types of Refining - Electrolytic, Van Arkel and Zone Refining.

1.3 Extraction of Uranium and Thorium.

UNIT - II

2.1 Cyclo-alkanes preparation properties of Cyclo-hexane -- Bayers strain theory.

2.2 Polarization - Inductive effect, mesomeric effect and steric effect - (Acid and Base strength.)

2.3 Stereo isomerism - Types, Causes of optical activity of (lactic acid) and tartaric acid - Racemisation - Resolution - Geometrical isomerism - maleic and fumaric acid.

UNIT - III

3.1 Chemical Kinetics - Distinction between Order and Molecularity - derivation of First order rate equation - half life period of first order reaction - determination of rate constant of hydrolysis of ester

Catalysis - catalyst - auto catalyst - enzyme catalyst - promoters - catalytic poisoning - Active center - Distinction between homogeneous and heterogeneous catalysts - Industrial application of catalysts.

3.3 Photochemistry - Grothus Drapers law, stark einsteines law - quantum yield - photosynthesis, phosphorescence - fluorescence - chemiluminescence's - photosensitization.

UNIT - IV

4.1 VSEPR Theory - Shapes of Simple Molecules BF_3, PCl_5, SF_6 and XeF_6

4.2 Fuels - Calorific value of fuels - Non-conventional fuels - need of Solar energy - Applications - Bio-fuels.

4.3 Osmosis - Osmotic pressure - reverse osmosis - desalination of sea water.

UNIT - V

5.1 Nuclear Chemistry - Definition of Half life period - Group displacement law - Radioactive series. Nuclear Fission and Fusion - Application of nuclear chemistry in Medicine, agriculture, industries - C^{14} dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking. Naphthalene - Preparations, Properties and uses of Naphthalene - Structure of Naphthalene.

5.3 Elements of symmetry - unit cell - crystal lattice - types of cubic lattice - one example for each.

SKILL BASED SUBJECT I

PAPER I

HORTICULTURE I

UNIT- I:

Garden Components - lawn, trees, shrubs, climbers and creepers, flower beds and borders, hedge and edges, paths, rockery, Green House, bonsai.

UNIT-II:

Manures, role, advantages and disadvantages of important types of fertilizers. Time and application of manures and fertilizers. Foliar application of nutrients. Drip irrigation, ornamental types etc.

UNIT-III:

Types and uses of various tools in Horticulture. Their application. Industrial lawn developments, preparing blue - prints etc.

UNIT-IV:

Propagation - cutting, layering and grafting and Indoor garden - potted plants, hanging baskets cut flowers - ikebana, Bouquet.

UNIT-V:

Construction of green houses - site selection - Electricity, water, pond maintance and Airbus Service. Types of covering materials and its Problem.

REFERENCE BOOKS:

1. Bose T.K. & Yadaw, C.P. (1989) commercial flowers, naya prokash Calcutta - India.
2. Bose. T.K. and Mukerijee. D (1987 Gardening in India, Oxford Book house, 66, Janapath, New Delhi-110 001.
3. Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi - India.
4. Edmond. J.B. Senn. T.L. Andrews - F.S. and Halfacre. R.G. (1988) Fundamental of Horticulture, Tata MacGraw - Hill Publishing Company Ltd., New Delhi-110 006.
5. Prasad. S and Kumar U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India-334 003.

NON-MAJOR SUBJECT I

PAPER I

MUSHROOM CULTIVATION

UNIT-I:

History of Mushroom cultivation - economic importance of Mushrooms as food - selection - 'starter' - preparation of spawn - preparation of Compost (outdoor and indoor beds - incubation - Harvesting and marketing.

UNIT-II:

Life cycle of Mushrooms - Identification - edible and poisonous Mushrooms - external factors for growth.

UNIT-III:

Spawn production - grain, powder and granular spawn - mother spawn - planting spawn - preparation of culture (Tissue culture and spore culture), preservation and storage of culture - various media (PDA, malt extract, Wheat extract, compost extract)

UNIT-IV:

Cultivation of **White Button Mushrooms (Agaricus bisporus) and Oyster Mushrooms (Pleurotus spp)** - materials - sterilization - spawning and fruiting - house design for Pleurotus - preservation, canning drying.

UNIT-V:

Control of major diseases of microbes (green moulds, dry bubble, wet bubble, bacterial spot, viral brown disease) - pests (Sciarid flies, phorid flies, beetles) - nematodes (Mycophages)

LITERATURES:

1. Kannaiyan.S and Ramasamy.K, 1980. A Handbook of Edible Mushroom. Today and Tomorrows. Printers and Publishers, New Delhi, 104 p
2. Pathak V.N, Nagendra Yadav and Maneesha Gaur. 1998. Mushroom Production and Processing Technology. Agrobios (India) Jodhpur, 179 p

IV SEMESTER

PAPER IV

CYTOLOGY AND PLANT ANATOMY

UNIT-I:

Plant cell structure and function. Prokariyotic and Eukariotic cell (including Ultra structure). Cell wall, structure and chemistry. Function on cell wall. Cytoplasm, plasma membrane - Structure, Chemistry and function.

Cell Organelles: Structure and origin of the following: Endoplasmic Reticulam, Golgi complex, Lysosomes, Mitochandria, plastids and Ribosomes.

UNIT-II:

Nucleus - Structure and Functions.

Nucleoplasm - Structure and Functions.

Chromosome - structure and Functions.

Euchromatin & heterochromatin, Gaint chromosomes polytene and Lambrush chromosomes, Nucleic acids. Molecular structure and functions of DNA and RNA replications.

Cell inclusions (Non living)

Cell divisions - Mitosis and Meisosis.

ANATOMY

UNIT-III:

Tissues: Classification - structural characteristics and functions of the following tissues. Meristamatic, simple and complex and permanent.

Tissue system - Epidermal and vascular, stomatal types, apical meristem - Theories.

Primary structure of stem and root of Dicotyledons and moncotyledons. Internal structure of leaves of Dicot and monocot.

UNIT-IV:

Secondary structure of stem and root of Dicotyledons. Anamalous secondary growth of stem Dicotyledons of Boerhaavia, Nyctanthus.

Secondary growth in monocotyledons. Dracaena.

UNIT-V:

Origin and structure of secondary xylem and secondary phloem. Annual rings, heart wood and sapwood, periderm, wound healing, leaf Abscission, Vascular cambium, laticifers, nodal anatomy, uni - tri - multi lacunar nodes.

BOOKS SUGGESTED:

CYTOLOGY

1. Turner, P.C. A.G. MC Lennan. A.D. Bates And M.R.H. White. 1998. Instant Notes in Molecular. Biology. Viva Books Pvt. Ltd. Chennai.
2. Verma.P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.
3. Wolfe, S.L. 1993. Molecular and Cellular Biology. Wadsworth Publishing Co, California.

ANATOMY

1. ESAU, Plant Anatomy, 1965 Wiles Eastern, New Delhi.
2. Eams A.J. and Mac Daniel. An Introduction to Plant Anatomy. TMH Edition. Tata MC. Graw Hill Publishing Co.ltd. Bombay - New Delhi.
3. Pande, B.P. 1979. Plant Anatomy. S. Chand & Co, Ram Nagar, New Delhi.

CORE PRACTICAL

CYTOLOGY

Study of structure of plant cell organaells E.M. studies from standard books.

Study of Cell inclusions (non living) cystolyth, crystals, starch grains.

Cytochemical test for starch, sugar and protein.

Study of Mitosis by Squash technique.

ANATOMY

Study of simple & Complex (primary and secondary) tissues (by maceration.)

Study of internal structure of

Young and old stem of dicotyledons.

Young and Old rood of dicotyledons.

Normal stem and root Monocotyledons.

Anomolous stem of dicotyledons - Boerhaavia, Nictanthes.

and Monocotyledons - Dracaena.

Study of Dicot and Monocot leaves.

Study of stomatal types.

Nodal Anatomy (uni - tri - multi lacunar node) Nictaginaceae members.

ALLIED II

PAPER IV

CHEMISTRY II

UNIT - I

1.1 **Co-ordination Chemistry:**

Nomenclature of co-ordination compounds - Werner Theory of Co-ordination Compound - Chelation - Functions and structure of Haemoglobin and Chlorophyll.

1.2 **Industrial Chemistry:**

Fertilizers and manures - Bio-fertilizers- Organic Manures and their importance - Role of NPK in plants - preparation and uses of Urea, Ammonium nitrate, potassium nitrate and super phosphate of lime.

1.3 Contents in Match sticks and match box - Industrial making of safety matches. Preparation and uses of chloroform, DDT, gamhexane and Freon.

UNIT - II

2.1 **Carbohydrates:**

Classification - structure of glucose - Properties and uses of starch - uses of Cellulose Nitrate - Cellulose acetate.

2.2 **Amino Acid and Protein:**

Classification of Amino Acids - preparation and properties of Glycine - Classification of Protein based on Physical properties and biological functions

2.3 Primary and Secondary structures of protein (Elementary Treatment only) composition of RNA and DNA and their biological role. Tanning of leather - alum (aluminum tri chloride tanning - vegetable tanning)

UNIT - III

3.1 **Electro Chemistry:**

Specific and equivalent conductivity - their determination - effect of dilution of conductance.

3.2 Kohlrawsh Law - Determination of dissociation constant of weak Electrolyte using Conductance measurement - Conductometric Titrations

3.3 P^H and determination by indicator method - Buffer solutions - Buffer action - Importance of buffer in the living system - Derivation of Henderson equation.

UNIT - IV

4.1 Paints - Pigments - Components of Paint - Requisites of a good paint. Colour and Dyes - Classification based on constitution and application.

4.2 Vitamins:

Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K - Hormones - Functions of insulin and adrenaline.

4.3 Chromatography - Principles and application of column, paper and thin layer chromatography

UNIT - V

5.1 **Drugs-** Sulpha Drugs - Uses and Mode of action of Sulpha Drugs -- Antibiotics - Uses of Penicillin, Chloramphenicaol, streptomycin. Drug abuse and their

implication alcohol - LSD

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Example and their application. Definition and one example each for analgesics antipyretics, tranquilizers, sedatives, causes for diabetes, cancer and AIDS.

5.3 Electrochemical corrosion and its prevention - fuel cells.

ALLIED PRACTICAL
CHEMISTRY

VOLUMETRIC ANALYSIS

1) Estimation of hydrochloric acid using std. sulphuric acid
2) Estimation of Borax using std sodium carbonate
3) Estimation of sodium hydroxide using std sodium carbonate.
4) Estimation of $FeSO_4$ using std. Mohr salt Solution.
5) Estimation of Oxalic acid using std $FeSO_4$
6) Estimation of FAS using Std oxalic acid
7) Estimation of Fe^{2+} using diphenylamine / N phenyl anthranilic acid as indicator.

ORGANIC ANALYSIS:

Reactions of aldehyde (aromatic), carbhohydrate, carboxylic acid (mono and dicarbox ylic), phenol, aromatic primary amine, amide and diamide. Systematic analysis of organic compounds containing one functional group and characterizationsss by confirmatory tests.

SKILL BASED SUBJECT II

PAPER II

HORTICULTURE II

UNIT-I:

Nature of weed - classification Diversity and distribution. Weed control - husbandry, physical and Herbicidal Control of Weed.

UNIT-II:

Method of Cultivation - types of Digging - Preparation of beds, spacing and Rotation, Organic cultivation - Bio control.

UNIT-III:

Soilless production - sources of minerals, Moisture and plant support. Advantages - Water, Sand and gravel culture. Cultural Problem in soilless Production.

UNIT-IV:

Types of Pots and Containers pot mixtures and potting media for different ornamentals. Brief account of hydrophonics.

UNIT-V:

Plant protection - general account of insecticides and Pesticides, common diseases of fruits and Vegetable crops. (Apple Scab, Blight of Potato.

Note: Visit a Botanical garden under the guidance of teachers is encouraged.

Reference Books

1. Bose T.K. & Yadaw, C.P. (1989) Commercial Flowers, Naya Prokash Calcutta - India.
2. Bose. T.K. and Mukerijee. D (1987 Gardening in India, Oxford Book house, 66, Janapath, New Delhi-110 001.
3. Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi - India.
4. Edmond. J.B. Senn. T.L. Andrews - F.S. and Halfacre. R.G. (1988) Fundamental of Horticulture, Tata Mac Graw - Hill Publishing Company Ltd., New Delhi-110 006.
5. Prasad.S and Kumar.U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India - 334 003.

NON-MAJOR SUBJECT II

PAPER II

BIOFERTILIZERS

UNIT-I:

Sources of organic matter in soil - Humus - Organic and non-organic nutrients in soil - microbes and Agriculture - Importance of Carbon, Nitrogen and Phosphorus cycles.

UNIT-II:

Benefits of Biofertilizers - strain selection - seed pelleting - Inoculant and inoculant carriers - Nitrogen fixing Bacteria (Azotobacter, Beijerinckia, Clostridium, Cyanobacter). Media for Azogobacter, Azospirillum and phosphate solubilizer - New nitrogen fixers - 'nif' genes (Hybrid E.coli.)

UNIT-III:

Role of Blue Green algae as Biofertilizers - Mass cultivation of Cyanobacteria (Aulosira, Anabaena, Cylindrosspermum) - Mass cultivation of Azolla, Azolla - Anabaena complex - Algal inoculants - methods of production (Trough method, Pit method, Field scale,) application.

UNIT-IV:

Algalization and crop yield - contribution of nitrogen by some nodulated legumes - Vermiculture - Earth worms and micro organisms - Microbial enzymes - Bio-processing.

UNIT-V:

Production of Mycorrhizal Biofertilizers (methods of production of VAM as inoculum - Methods of inoculation (Ecto and VAM) - Benefits of Mycorrhiza.

LITERATURES:

1. Moshrafuddin Ahmed and Basumatary, S.K.2006. Applied Microbiology, M.J.P. Publishers, Chennai.
2. Dubey, R.C.2003. A text book of Biotechnology.S. Chand & company, New Delhi.

V SEMESTER

PAPER V

MICROBIOLOGY AND PLANT PATHOLOGY

UNIT-I:

Introduction to microbiology - Scope of microbiology, Characterization of microorganisms, microscopic observations. Wittaker`s five kingdom concept.

UNIT-II:

Genetics of microorganisms- Modification and mutations, transformation, transduction and conjucation. Methods of replication. Methods of isolation of algae , fungi, cyanobacteria from soil and seed. Isolation of yeast from starchy materials. VAM and its isolation from soil.

UNIT-III:

Introduction to phage genetics, fungi, molds, yeasts, Algae, protozoa, and viruses –TMV- Basic classification of each group of microorganisms, Methods of staining microorganisms, (Gram's stain, Acid past) Biocontrol.

UNIT-IV:

History of molecular plant pathology major diseases of cultivated crops and Horticultural crops - Ground nut, (Leaf spot) Chilly (Anthracnose) Banana (Viral, MLO). Cotton wilt, cashew nut leaf spot, genetic basis of epidemics. Host pathogen interactions - disease detection, plant disease management for sustainable agriculture, Rice blast, red rot of sugarcane *Collectrichum falcatum* disease.

UNIT-V:

Microbial products, Antibiotics, enzymes - chitinase, protease, xylanase, laccase and vitamins, microorganisms involved in human diseases, (Skin diseases, respiratory disorders) Biopesticides

PRACTICAL:

1. Morphological and anatomical studies of all plant diseases included in the syllabus.
2. Groundnut diseases, *Alternaria alternata*- Chemical, Biological control with *Trichoderma* sp,
3. Neem extract against known pathogen.
4. Gram staining procedure.

DEMONSTRATION:

1. Preparation of Fungal, Bacterial medium.
2. Isolation and culturing of a fungal pathogen.

BOOK SUGGESTED:

1. Michael J. Pelczar; JR. E.C.S. Chan and Noel R. Krieg. (Ed) Text book of Microbiology Tata Me Graw Hill. Co. New Delhi
2. Vidyasekaran, B.P. 2004. Concise Encyclopedia of Plant Pathology. Viva Book Publishers, New Delhi.

PAPER VI

TAXONOMY OF ANGIOSPERMS, EMBRYOLOGY AND ETHNO BOTANY

TAXONOMY OF ANGIOSPERMS:

UNIT-I:

Principles of Taxonomy, Taxonomy and its importance. Herbarium technique, Botanical survey of India.

Systems of Classification: Outline classification of Bentham & Hooker; Cronquist.

Taxonomic hierarchy (major and minor categories)

Plant Nomenclature - Forms of Scientific names.

Concept of a taxon: A brief reference to citation of author, chemotaxonomy.

UNIT-II:

Detail study of the range of Characters and plants of economical importance in the following families after introduction of important technologies in morphological features:

Annonaceae, Rutaceae, Cucurbitaceae, Asclepiadaceae, Convolvulaceae, Verbenaceae, Euphorbiaceae, Orchidaceae Poaceae and Liliaceae.

EMBRYOLOGY

UNIT-III:

Structure and development of anther, structure of mature pollen and Male gametophyte. Structure and development of ovule. Female gametophyte Monosporic (Polygonum type) Fertilization - Double fertilization - Syngamy - triple fusion - post fertilization changes.

UNIT-IV:

Endosperm types - nuclear, cellular - helobial - Ruminate endosperms, function of endosperms

Development of embryo in Dicot (Capsella) and Monocot (Najas).

A brief account on Polyembryony, parthenocarpy.

ETHNO BOTANY

UNIT-V:

1. Knowledge of Tribal community in relation to medicinal plants.
2. Tribal Medicines - Sources and forms of tribal medicines - Medicinal plants of Tribals with reference to Thuthi - Nayuruvi - Kadukkai - Perandai - Avarai - Kandankathari - Oomathai - Veliparuthi - Asparages - Boerhaavia.

PRACTICAL:

TAXONOMY

1. Study of Inflorescence types and fruit types with suitable example.
2. Description of plants in technical terms.
3. Preparation of keys and use of keys in Identification.
4. A detailed study of the range of Vegetative and floral characters of plants belonging to the families mentioned in the theory part.
5. Submission of 10 herbarium sheet with proper field not book for practical Examination.

Field trips to places within or outside the state for five days for plant collection and also to study the plants in their natural habitats.

EMBRYOLOGY:

1. T.S. anther at various stages of development (permanent slide)
2. Types of ovule (permanent slide)
3. Male gametophyte, Female Gametophyte.
4. Empryosac (permanent slide)
5. Stages in the development of dicot and monocot embryos (slide)

6. Mounting of Dicot embryos (globular, heart shaped stage)
7. Types of endosperm (permanent slide)

ETHNO BOTANY:

Study of Tribal plants included in the syllabus.

REFERENCE BOOKS:

TAXONOMY:

1. Hill AW. 1951 Economic Botany - Mc Graw Hill, New Delhi.
2. Lawrence, G.H.M. 1967, Taxonomy of vascular plants. Oxford IBH Publishing Co. Ltd., New Delhi.
3. Singh, V. and Jain, D.K - Taxonomy of Angiosperms - Rastogi Publications, Meerut.
4. Pandey, B.P. 2007 Botany for Degree Students. S. Chand & Co. New Delhi.
5. Vasishta, P.C. 1974 Taxonomy of Angiosperms. S. Chand & Co., Chennai.

EMBRYOLOGY BOOKS

1. Bhojwani. S.S. and Bhatnagar. S.P. 1978. The embryology of Angiosperms. Vikes Publishing Pvt. Ltd., Delhi.
2. Maheswari P.1971. An introduction to embryology of Angiosperms Tata Mc Graw Hill, Delhi.
3. Swamy B.G.L. and Krishnamurthy K.V. 1950. From flower to fruit. Tata Mc Graw Hill, Hew Delhi.

ETHNO BOTANY

1. Kumarasen.V and Annie Ragland 2004. Taxonomy of Angiosperms - Systematic Botany Economic Botany
2. Ethno Botany - Sara's Publication - Full Reference Kottar, Nagarcoil.

PAPER VII

GENETICS, PLANT BREEDING, EVOLUTION AND BIOSTATISTICS

UNIT-I:

Mendelian and non - mendelian concepts, deviation, non - allelic interactions, complementary, epistasis, polygenic inheritance, linkage, crossing over and chromosome mapping.

UNIT-II:

Genetics of sex, sex linked diseases, hemophilia, colour blindness, chromosome theory on inheritance, extra nuclear inheritance male sterility in corn, population genetics, Hardy - Weinbergs principles, factors affecting.

UNIT-III:

Gene concept, splitgene, exons, intron, cistron, recon, gene regulation, operon concept, control system in lac, (lac operons), gene expression in eukaryotes.

UNIT-IV:

Breeding for crop improvement for paddy, groundnut, polyploidy and its application in plant breeding, hybridization techniques, interspecific, intergeneric. Evolutionary theories of Lamarck, Drawin, De Vries, modern synthetic theory of evolution.

UNIT-V:

Mean, median, mode of standard deviations, standard errors, null hypothesis, chi - square test for goodness of fit.

PRACTICAL

1. Simple problems on dihybrid ratio and interaction of factors.
2. Construction of chromosome maps using three - point test cross data.
3. Simple problems on the application of chi - square method.
4. Hybridization techniques - Emasculation, Bagging (For demonstration only)
5. Induction of polyploidy conditions in plants (For demonstration only).

REFERENCES:

1. Allard, R.W. 1960. Principal of plant breeding. John wileg, NEWYORK. Gupta, P.K. 2000. Genetics. Rastogi publications. Meerut.
2. Rangaswami, R.A. 1995. A. textbook of Agricultural statistics. New Age International publications, Chennai.
3. Sinnott, E.W; L.C. Dunn and T. Dobzhansky 1958. Principle of genetics. McGraw Hill, Newyork.
4. Swaminathan, M.S; P.K. Gupta and V. Singa. 1983. Cytogenetics of crop plants. Macmillan India Pvt. Ltd. New Delhi.
5. Verma, P.S and Agarwal. V.K. 2007. Genetics. S. Chand & Co. Chennai.
6. Winchester, A.M. 1967. Genetics. Oxford & IBH. Calcutta.

ELECTIVE I

PAPER I

PLANT CELL AND TISSUE CULTURE

UNIT-I:

History of plant tissue culture research - Basic principles of plant tissue - callus culture, Meristem culture, Organ culture, Totipotency of cells, differentiation, dedifferentiation and redifferentiation.

UNIT-II:

Methodology - Sterilization (physical and chemical methods), Plant cell culture methods, Culture media, MS and B5, Phytohormones, Medium for micro-propagation, Callus induction

UNIT-III:

Callus subculture maintenance, Metabolic patterns in callus culture, Harvesting and measurements, Morphogenesis in callus culture - Bioreactors.

UNIT-IV:

Endosperm culture -media requirements, morphogenetic potential - application - Embryo culture - culture requirements - applications embryo rescue technique

UNIT-V:

Tissue culture and crop improvement - Agrobacterium mediated gene transfer technology - microinjection - particle bombardment

REFERENCES BOOKS:

1. Brown C. W and Thorpe T. A 1984 Cell culture and Somatic Cell Genetics of plants, Academic Press Orlando
2. Chu, C 1978 Plant Tissue Culture, Peking Science Press, Peking
3. Gamborg O. L and Phillips. G.G. 1975 Plant Cell, Tissue culture and Organ culture Fundamental Methods. Narosa Publishing House, New Delhi

4. Narayanaswamy, S 1994. Plant Cell and Tissue, Tata –Mc Graw Hill Publishing Co., Ltd., New Delhi.
5. Reinert J and Bajaj Y. B. S 1977 (Ed) Applied and Fundamental Aspects of Plant cell, Tissue and Organ culture , Springer Verlag, Berlin Ronald Press, New York.

PRACTICALS:

1. Methods of sterilization - chemical and physical (Demonstration Experiment)
2. Preparation of different nutritive media for PTC - (Demonstration Experiment)
3. Determination of pH of the media (Individual Experiment)
4. callus culture - (Demonstration Experiment)
5. Protocol for Pollen culture - (Demonstration Experiment)

SKILL BASED SUBJECT III

PAPER III

BIOINFORMATICS I

UNIT-I:

History of Bioinformatics. Bioinformation and molecular biology, molecular modelling, software tools, structural Bioinformatic.

UNIT-II:

Computer application in Bioinformation Types, programing languages, Domain naming system.

UNIT-III:

DNA and RNA sequencing, - methods, chemical degradation sequencing,Chain terminators, PCR - LMPCR, Transcript mapping techniques.

UNIT-IV:

Genome sequencing, SAGE, cDNA Library, Genomic library.

UNIT-V:

Sequencing proteins, Techniques for determination of Genes and protein structures, X-ray crystallography, Diffraction analysis, NMR spectroscopy.

VI SEMESTER

PAPER VIII

PLANT PHYSIOLOGY, BIOCHEMISTRY, ENVIRONMENTAL BIOLOGY, PHYTOGEOGRAPHY

PLANT PHYSIOLOGY

UNIT-I:

Water uptake, Osmosis, Translocation of water, ascent of sap, transpiration, stomatal physiology factors, water stress and its signification. Translocation in phloem.

Mineral nutrition - macro and micronutrients and deficiency symptoms. Growth - measurement of growth, growth curve, PGR, auxins, gibberellins, cytokinins, ethylene. Growth regulation, application of hormones in agriculture.

Photoperiodism, vernalization, phytochrome and biological clock.

UNIT-II:

Photosynthesis - Radiant energy - structure of Photosynthetic pigments, Absorption spectrum, Action spectrum - Red Drop Phenomena Enhancement effect. Z pigment system - Cyclic and Non - cyclic photophosphorylation - C3 + C4 pathways - factors - photorespiration.

PRACTICAL:

1. Determination of solute potential by plasmolytic method.
2. Effect of Chemicals, Temperature on membrane permeability, colorimetric determination.
3. Study of relative rates of transpiration of different plants.
4. Separation of pigments by paper chromatography.
5. Study the rate of photosynthesis under different light intensities.
6. Paper Chromatography for separation of known and unknown aminoacids maximum two aminoacids.

DEMONSTRATION EXPERIMENTS:

1. Induction of roots in leaves by auxins.
2. Effect of auxins of etiolated stems
3. Preparation of standard graph for Potassium dichromate by using colori metric method.

PLANT BIOCHEMISTRY:

UNIT-III:

Brief account of organic chemistry - Properties, Structure and Classification of Carbohydrates, Lipids and Proteins.

Enzymes - Properties: Nomenclature and classification as per ECIUB (Enzyme commission of the international Union Biochemistry) - Cofactor - Co - enzymes and mode of action - factors.

UNIT-IV:

Respiration - Aerobic, Anaerobic: Glycolysis - Kreb's cycle - Oxidation - Reduction potential - ATP synthesis - respiratory, bioenergetics - factors affecting respiration.

Nitrogen metabolism: Role of Nitrogen and sources, Conversion of nitrate to ammonia - assimilation of ammonia. Molecular nitrogen, mechanism of biological nitrogen fixation..

PRACTICAL:

1. Test for starch, amino acid and protein.
2. Estimation of carbohydrate by anthrone reagent (Colorimetric method).
3. Estimation of amino acids by rinhydrin method (Colorimetry).

DEMONSTRATION EXPERIMENT:

1. Hydrolysis of starch by amylase.
2. Activity of catalase.
3. Thinlayer Chromatography

REFERENCE BOOKS:

PLANT PHYSIOLOGY, BIOCHEMISTRY:

1. Bidwell .R.G.S. 1974. Plant Physiology. Macmillan. Publication Co. Newyork.
2. Ting. I.P. 1982 Plant Physiology. Addison Wesley Publication Co. Philippines.
3. Conn. E.E.; P.K. Stumps; G. Brueming and Doi. R.G. 1987. Outlines of Biochemistry. John wiley & Co. Newyork.

ENVIRONMENTAL BIOLOGY & PHYTOGEOGRAPHY

UNIT-V:

Importance of study of Ecology, Marphological and anatomical features of Mesophytes, Hydrophytes, Xerophytes and Halophytes.

Principles of Phytogeography, Phytogeographical regions of India. Vegetational types in Tamilnadu. Detailed study of the vegetation types - Evergreen, deciduous, scrub jungle and mangrove forest.

PRACTICAL:

1. Study of the morphological and anatomical features of Hydrophyes, Mesophytes, Xerophytes and Halophytes.
2. Map of Phytogeographical regions of India.
3. Effects of effluents containing heavy metals of germinating groundnut and paddy seeds.

BOOKS SUGGESTED:

1. Sharma, P.E. 1993 Environmental Biology and Toxicology. Rastogi & Co. Meeret.
2. Autlay Mackenzie, Andy S. Ball and Sonia. R. Virdee. 1999. Instant notes in Ecology. Viva books Pvt. Ltd. Chennai.
3. Vashista, P.C. 1979. Plant Ecology 2nd Edn. Visha Publications, Delhi.
4. Ambasht, R.S. 1976. Text book of plant Ecology. 4th Edn. Students Friends & Co. Varanasi.
5. Gleason H.A. and Arthur Cronquist, 1964. The Natural Geography of Plants. Columbia University Press. New York & London.
6. Duffous. J.H. 1980. - Environmental Toxicology. Edward Arnold Publication, London.
7. Shukla, R. S and Chandel, P. S. 2007. A text book of Plant Ecology. S. Chand & Co. New Delhi.

PAPER IX

PLANT BIOTECHNOLOGY, WOOD TECHNOLOGY, NANOTECHNOLOGY AND TOXICOLOGY

BIOTECHNOLOGY

UNIT-I:

Biotechnology - history, Isolation and cultivation of economically important microbes (scenedesmus, Aspergillus) culture and purification of single cell protein (scenedesmus, spirulina), mushroom cultivation. Algal biomass production and maintenance.

UNIT-II:

Jatropha biotechnology, (cultivation and biodiesel Extraction methods) production of primary and secondary metabolites by microbes. (Ethanol by yeast, citric acid by Aspergillus niger, penicillin) Bio fertilizers.

Plant genome organization - chloroplast genome - nucleus encoded genes - Agrobacterium rhizogenus mechanism of T - DNA synthesis, edible vaccines, Transgenic plants, BT - cotton, BT - tomato, bioethies.

WOOD TECHNOLOGY

UNIT-III:

Wood technology - Fundamentals of wood, water relationships, product processing, Quality drying method, preservation, wood adhesive technology chemical modification of wood, paper and pulp industry.

NANOTECHNOLOGY

UNIT-IV:

Introduction of Biocompatible inorganic devices, microfluids meets nano; Lab on a chip devices and their potential for nano biotechnology, protein based nano structure, DNA based nano structure.

TOXICOLOGY

UNIT-V:

1. Environmental toxicants - classification - occurrence - source - effect on plants.
2. Heavy metal toxicity - lead and chromium - bioaccumulation.
3. Atmospheric toxicants - carbon monoxide, sulphur oxides.
4. Pollution indicators - Definition of indicators plants, Algae, Angiosperms.
5. Toxins of biological origin - botulins, Afflotoxins.

PRACTICAL:

1. Isolation of chlorophyll pigment.
2. Wood strength analysis.
3. Efforts of Effluents containing heavy metals on germinating groundnut and paddy seeds.
4. Culturing of fresh water algae.
5. Mushroom cultivation.

BOOKS/REFERENCES SUGGESTED:

1. Dubey. R.C. 2006. A text book of Biotechnology. S. Chand & Co. New Delhi - 110055
2. Pareek, L.K. and Swarnkar, P.L. (Ed) 1999. Trends in plant Tissue culture and Biotechnology. Agro Botanical publishers (I), Bikaner - 334003.
3. Satish Lele - 2006. Biodieseal and Jatropha Plantation. Agrobios (I), Jodhpur - 342 002.

Wood Technology Reference:

1. Anatomy of Wood: Its Diversity & Variability by K.Wilson & d.J.B. White Published by stobart Davies.
2. Wood Handbook: Wood as an Engineering Material by USDA Forest Products Laboratory Algrove Publishing: 2002 hardcover, 464 PP, Available from Algrove Publishing (1 - 800 - 871 - 8158) ISBN 1 - 894572 - 54 - 8).

NANOTECHNOLOGY Reference:

1. Nanobiotechnology in Molecular diagnostics current techniques and applications. By K.K. Jain. Horizon bioscience publishers # 32 Hewittslane, Wymondham, Norflok NR 180JA. U.K.
2. Nanotechnology Environmental Implications and solutions by Louis Theodore and Robert G. Kunz. A john Wiley & sons inc # 111, River street, Hoboken, JNO7030(201) 748 - 6011, Fax (201) 748 - 6008.
3. Ratner, Nanotechnology: A gentle introduction to the next big idea. TamilNadu Book House, Chennai.

TOXICOLOGY REFERENCE:

1. Sharma, P.E. 1993 Environmental biology and Toxicology, Rastogi & Co.Meeret.
2. Duffous. J.H. 1980. – Environmental Toxicology, Edward Arnold Publication, London.

ELECTIVE II

PAPER II

PLANT CELL AND TISSUE CULTURE

UNIT-I:

Protoplast isolation and purification and culture, Media (F5 - medium Frearson et al 1973 Nagata and Takeba 1971, Modified B5 medium), Methods of isolation (enzymatic isolation), isolation from leaves, shoot and root apex, root storage organs, Pollen grain etc, Protoplast fusion.

UNIT-II:

Organ culture, shoot tip culture, apical Meristem culture, embryo culture, ovary culture, ovule culture.

UNIT-III:

History on the development of synthetic seeds - Limitation of synthetic seeds, Production of synthetic seeds, artificial seeds, uses of artificial seeds (Commercial production and uses)

UNIT-IV:

History of transgenic plants, Agrobacterium tumifaciens genetic aspects - Methodology - Vectors - kinds - mechanism of action - transformation in plants.

UNIT-V:

Tissue culture and its uses in plant pathology - Engineered resistance against pest and insect, herbicide resistance and disease resistance

REFERENCE BOOKS:

1. Evans D. A, Sharp W. A, Amirato, P. V., Yamada, Y 1983 Ed. Hand Book of Plant Cell Culture, Macmillan, New York
2. Street, H. E. 1977 Plant Tissue and Cell Culture - Botanical Monograph, Blackwell Scientific Publications

3. Thorpe T. A. 1981 (Ed) Plant Tissue Culture - Methods and Applications in Agriculture, Academic Press, London
4. Gamborg O. L and Phillips G.G. 1975 Plant Cell, Tissue culture and Organ culture Fundamental Methods. Narosa Publishing House, New Delhi
5. Narayanaswamy, S 1994. Plant Cell and Tissue, Tata –Mc Graw Hill Publishing Co., Ltd., New Delhi.

PRACTICAL'S:

1. Composition of MS B5 and F5 media(demonstration experiment)
2. Protoplasm isolation from leaves (individual experiment)
3. Protocol for Organ culture (demonstration experiment)
4. Synthetic and artificial seeds (demonstration experiment)
5. Protocol for isolation of Vectors (demonstration experiment)

ELECTIVE III

PAPER III

MICROTECHNIQUE SYLLABUS

UNIT-I:

Light Microscopy - History - Optical Principles - uses and care of Microscopes - A brief survey of types of microscopes including Transmission Electron Microscope (TEM) and Scanning electron Microscope (SEM).

UNIT-II:

Microphotogrphy - Principles - Working Mechanism. Camera lucida - Working principles and uses. Micrometry - Stage and ocular micrometer - method of measurement - uses.

UNIT-III:

Microtechnical Process - Principles - Techniques - Killing, Fixation and Fixatives. Stains - types - staining procedures.

UNIT-IV:

Microscopic preparations - Temporary, Semi - Permanent and Permanent, Special techniques - Whole mount - Smear - Squash - Maceration.

UNIT-V:

Microtomes - Rotary Microtome - Rocking Microtome - Sledge microtome Types of Microtomes and their uses.

Sectioning of Bryophytes, Pteridophytes, Gymnosperm & Angiosperm.

REFERENCE BOOKS:

1. Alan peacock H.1966 Elementary Microtechnique Edward Arnold (Pub) Ltd.
2. Duddington - C.L. 1960 Practical Microscopy, Pitinan.
3. Cray P.Hand Book of Basic Microtechnique. Mac - Graw Hill, New Delhi.
4. Johnson D.A. 1940 Plant Microtechnique. Mac - Graw Hill, New Delhi.
5. MC Clung, C.L.1961, Hand book of Microscopical Technique.
6. Patki L.R.1992 An Introduction to Microtechnique S.Chand & Company, New Delhi.
7. Prasad & Prasad 2000 Emkay Replications, Delhi.
8. Puru's M.J.et al 1966 Laboratory Techniques in Botany Butter Worths.

SKILL BASED SUBJECT IV

PAPER IV

BIOINFORMATICS II

UNIT-I:

Classification of protein based on 3D structure, conceptual models of protein structure, Globular protein, Integral membrane protein Evolution of protein structure and function.

UNIT-II:

Archives, Protein sequence Database, SWISS - PORT, PIR - PSD, Gen Bank, Nucleotide sequence Database (EMBL) Genome and organism specific resources.

UNIT-III:

Sequence similar searches, sequence alignment, Algorithms, Amino acid substitution matrices, FASTA, BLAST.

UNIT-IV:

Application of programme in Bioinformatics. (Java), Bioinformmatic projects, Basic information on Biojava, Biopearl, TRRD (GR - TRRD, HG - TRRD).

UNIT-V:

Human genome project, microbial genome project, phylogenetic relationship, phylogenetic trees, Bioinformation in Discovery of Drugs, Pharma information, Gene Therapy.

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