POOMPUHAR COLLEGE (AUTONOMOUS) Of the Tamilnadu HR & CE Admn., Dept. (Accredited B⁺ By NAAC) MELAIYUR - 609 107



Plant Biology & Plant Biotechnology

DEPARTMENT OF BOTANY (Plant Biology & Plant Biotechnology) 2016 – 2017

DEPARTMENT OF BOTANY

POOMPUHAR COLLEGE (AUTONOMOUS) MELAIYUR

Modified Syllabus (With Applicable for 2016 – 2017 Onwards)

COURSE STRUCTURE FOR UG COURSE - 2016 – 2017

Plant Biology and Plant Biotechnology

Semester	Subject	Hours	Credit	Exam	Marks		
	U				Intn	Extn	Total
	Tamil 1	6	3	3	25	75	100
	English 2	6	3	3	25	75	100
	First Allied 1	5	3	3	25	75	100
	(Zoology)						
	First Allied Prac1	3	-	-	-	-	-
Ι	Core course 1 (Algae, Fungi and Lichen)	5	5	3	25	75	100
	Core course- 2	3	-	-	-	-	-
	practical1						
	Value education	2	2	3	25	75	100
		30	17				
	Tamil- 2	6	3	3	25	75	100
	English -2	6	3	3	25	75	100
	First Allied-	3	4	3	40	60	100
	Practical 1						
	First Allied -3	5	3	3	25	75	100
Π	Core course -2	3	5	3	40	60	100
	Practical -1						
	Environmental	2	2	3	25	75	100
	studies						
	Core course-3	_	_				100
	(Bacteria, Virus & Plant pathology)	5	5	3	25	15	100
	1 007	30	25				
	Tamil – 3	6	3	3	25	75	100
	English – 3	6	3	3	25	75	100
	Core Course -4	5	5	3	25	75	100
	(Bryophyta, Pteridophyta,						
III	palaeobotanv)						
	Core course -5	3	*	*	*	*	*
	practical – 2						

	Allied course -4	5	3	3	25	75	100
	Allied Dreatical 5	2	*	*	*	*	*
	Chemistry	3		-			
	NME-1	2	2	3	25	75	100
		30	16				
	Tamil- 4	6	3	3	25	75	100
	English – 4	6	3	3	25	75	100
	Allied Chemistry	2	4	3	40	60	100
	practical- 5						
	Second Allied	5	3	3	25	75	100
13.7	Chemistry- 6						
IV	NME-2	2	2	3	25	75	100
	Core course- 5 Practical2	2	5	3	40	60	100
	SBE 1	2	2	3	25	75	100
	(Bio fertilizer &						
	Mushroom						
	cultivation)	E	5	2	25	75	100
	Core course- 6	5	5	3	25	15	100
	(Anatomy and						
	Embryology)	20	27				
		30	27				
			- I	•			
	Care Course 7	5	5	2	25	75	100
	Core Course-7	5	5	3	25	75	100
	Core Course-7 (Plant systematic & Economic botany)	5	5	3	25	75	100
	Core Course-7 (Plant systematic & Economic botany)	5	5	3	25	75	100
	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular	5	5	3	25 25 25	75 75	100 100
	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology)	5	5	3	25 25	75 75	100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9	5	5	3	25 25	75	100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology)	5 5 5	5 5 5	3 3 3	25 25 25	75 75 75	100 100 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology)	5 5 5	5 5 5	3 3 3	25 25 25	75 75 75	100 100 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10	5 5 5 3	5 5 5 *	3 3 3 *	25 25 25 *	75 75 75 *	100 100 100 *
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3	5 5 5 3	5 5 5 *	3 3 3 *	25 25 25 *	75 75 75 *	100 100 100 *
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11	5 5 5 3 3	5 5 5 *	3 3 * *	25 25 25 *	75 75 75 *	100 100 100 * *
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4	5 5 5 3 3	5 5 5 *	3 3 3 *	25 25 25 *	75 75 75 *	100 100 100 * *
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1	5 5 5 3 3 5	5 5 5 * 4	3 3 3 * *	25 25 25 * * 25	75 75 75 * * 75	100 100 100 * * 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics &	5 5 5 3 3 5	5 5 5 * * 4	3 3 * * 3	25 25 25 * * 25	75 75 75 * * 75	100 100 100 * * 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer	5 5 5 3 3 5	5 5 5 * *	3 3 * * 3	25 25 25 * * 25	75 75 75 * * 75	100 100 100 * * 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer Application)	5 5 3 3 5	5 5 * * 4	3 3 * * 3	25 25 25 * * 25	75 75 75 * * 75	100 100 100 * * 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer Application) SBE -2	5 5 3 3 5 2	5 5 5 * 4 2	3 3 * * 3 3	25 25 25 * * 25 25 25	75 75 75 * * 75 75	100 100 100 * * 100 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer Application) SBE -2 Horticulture & Core -10	5 5 3 3 5 2	5 5 5 * 4 2	3 3 * * 3 3	25 25 25 * * 25 25 25	75 75 75 * * 75 75	100 100 100 * * 100 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer Application) SBE -2 Horticulture & Garden Designing	5 5 3 3 5 2	5 5 5 * 4 2	3 3 * * 3 3	25 25 25 * * 25 25 25 25	75 75 75 * * 75 75 75	100 100 100 * * 100 100
V	Core Course-7 (Plant systematic & Economic botany) Core Course- 8 (Cell and molecular biology) Core- 9 (Plant biotechnology) Core -10 Practical -3 Core -11 Practical - 4 MBE -1 (Bio statistics & Computer Application) SBE -2 Horticulture & Garden Designing SBE -3 Herbal	5 5 3 3 5 2 2	5 5 5 * 4 2 2	3 3 * * 3 3 3	25 25 25 * * 25 25 25	75 75 75 * * 75 75 75	100 100 * * 100 * 100 100

	Core -10	3	5	3	40	60	100
	Practical -3						
	Core -11	3	5	3	40	60	100
	Practical - 4						
VI	Core -12	6	5	3	25	75	100
	(Plant Physiology)						
	Core -13	5	5	3	25	75	100
	(Plant ecology &						
	Phytogeography)						
	MBE -2	5	4	3	25	75	100
	Medical Botany						
	MBE-3	5	5	3	25	75	100
	Bio Instrumentation						
	& Biotechniques						
	Soft skills	2	2	3	25	75	100
	Development						
	Gender studies	1	1	3	25	75	100
	Ext. work	-	1				
		30	33				
	Total	180	140				3900

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate Passing minimum is prescribed for Internal and external Marks The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks) The passing for University for University Examinations shall be 40% out of 75 Marks (i.e. 30 marks)

POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR COURSE STRUCTURE FOR ALL UG DEGREE COURSES

(Applicable to the candidates admitted from the academic year 2016 – 2017 onwards)

PART	NAME OF THE PAPERS	NUMBER OF PAPERS	CREDITS
Ι	TAMIL	04	12
II	ENGLISH	04	12
	CORE (INCLUDING OPTIONAL)	16	78
III	FIRST ALLIED	03	10
	SECOND ALLIED	03	10
	NON-MAJOR ELECTIVE	02	04
	SKILL BASED ELECTIVE	03	06
IV	VALUE EDUCATION	01	02
	ENVIRONMENTAL STUDIES	01	02
	SOFT SKILLS DEVELOPMENT	01	02
	GENDER STUDIES	01	01
V	EXTENSION ACTIVITIES		01
	TOTAL	39	140

Head of the Department

Principal

OUTCOME BASED EDUCATION

Under Graduate – Science

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical & Scientific Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints. Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO5: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

CORE COURSE -1

ALGAE, FUNGI & LICHENS

COURSE OBJECTIVES

- 1. To provide a comprehensive knowledge on the biology of algae.
- 2. To provide a basis for better understanding of the evolution higher of plants.
- 3. To understand reproductive biology, ecology of plants by studying the simpler systems in algae.
- 4. To understand the role of algae in ecosystems as primary producers of nutrition.
 - 5. To understand importance of algae to animals and humans.

UNIT-I: ALGAE

- Fritsch classification of algae, General characters of algae
- Life cycle patterns in algae
- Economics importance of algae.

UNIT-II: Morphology, structure, reproduction and life cycle of the following algae

- Nostoc
- Volvox
- Cladophora
- Caulerpa
- Sargassum and
- Polysiphonia

UNIT-III: FUNGI

General characters of fungi

- Classification of fungi (Ainsworth 1973)
- Hyphal forms and mode of nutrition in fungi
- Economics importance of fungi

UNIT-IV:

Structure and Reproduction of the following

- Albugo
- Schharomyces
- Peziza
- Puccinia and
- Agaricus

UNIT-V:

General features of lichens Types of lichens Structrue and reproduction of *Usnea*

REFERENCE:

ALGAE

Fritch F.E., (1935), The structure & Reproduction of Algae, Cambridge University
Press, Cambridge, U.K. Vol. I and II
Smith.G.M. (1955): Cryptogamic Botany Vol. I (Algae, Fungi & Lichens) McGraw- Hill
Book Co., New York
Pandey, B.B., (1993), A Text Book of Botany – Algae, S. Chand & Co. (P) Ltd, New
Delhi.

Vashista, B.R. (1993): Botany for Degree students – Algae, S. Chand & Co., New Delhi. Kumar, H.D., (1999), Introductiory Phycology, Affiliated East West Press (P) Ltd., New Delhi.

Landecker, (1972), Fundamentals of the Fungi, Prentice Hall, Inc., New Jersey, U.S.A Vashista, B.R. (1982): Botany for Degree students – Fungi, S. Chand & Co., New Delhi. Hudson,H.J., (1986), Fungal Biology, ELBS/Edward Arnold-London-Bold, H.C., Bold, H.C., Alexopoulos, C.J., Delavoryas, T., (1996), Morphology of plants & Fungi Harper & Row, Publishers, New York.

Smith.G.M. (1955): Cryptogamic Botany Vol. I (Algae, Fungi & Lichens) McGraw- Hill Book Co., New York.

Misra, A, and Agarwal, R.P., (1970). Lichens, A Preliminary text, Oxford & IBH Publishing Co.

CORE COURSE – 3

Bacteria, Virus and Plant pathology

COURSE OBJECTIVES

- 1. To describe the common characteristics of fungi as being heterotrophic, unicellular/multicellular.
- 2. To understand the biology of fungi and to discuss the importance of fungi in various ecological roles.
- 3. To understand lichen structure, function, identification, and ecology; comprehend the events of symbiosis and lichenization and to demonstrate the use of lichens as bioindicator species.
- 4. To identify the main groups of plant pathogens, their symptoms.
- 5. To understand the various types of plant diseases.

UNIT – I BACTERIA

General characters of Bacteria

Morphological of Bacteria

Different types and flagellation in Bacteria

Ultra-structure of Escherichea Coli cell

Methods of reproduction in bacteria

UNIT-II

Endospore in bacteria: structure, formation and significance

Staining methods of bacteria (Simple & differential)

Rhizobium root nodule formation and nitrogen fixation by bacteria

Harmful and beneficial roles of bacteria

UNIT-III VIRUS

General characters and reproduction of Virus

Structure of Tobacco Mosic Virus (TMV) and T4 bacteriophage

Lytic and lysogenic cycle

UNIT-III PLANT PATHOLOGY

Types of plant diseases and their causal organism and control measures

Bacterial disease: Citrus canker

Viral disease : Bunchy top of Banana

UNIT-V

Causative organism, symptoms and control measures of following fungal diseases:

- Blast disease of paddy
- Red rot of sugarcane
- Tikka disease of ground nut

Text Books

- 1. Pandey, B.P. 1997. College Botany. Vol. I Fungi & Pathology.
- 2. Mehrotra, R.S and Aneja, K.R. 2003. An introduction to mycology. New age International (P) Ltd, Publishers, New Delhi.
- 3. Poonam Singh and Ashok Pandey. 2009. Biotechnology for agro-Industrial residues utilization. Springer.
- 4. Satyanarayana T and Johri B.N. 2005. Microbial diversity, Current Perspectives and Potential Applications, IK International.
- 5. Nair, L.N. 2007. Topics in Mycology and Pathology, New Central Book agency, Kolkata.
- 6. Sharma, P.D. 2011. Plant Pathology, Rastogi Publication, Meerut, India.

Reference Books

- 1. 1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. 1996. Introductory Mycology. 4th edition. John Wiley & Sons (Asia) Singapore.
- 2. Webster, J and Weber, R. 2007. Introduction to Fungi. 3rd edition. Cambridge University Press, Cambridge.
- 3. Sharma, O.P. 2011. Fungi and allied microbes The McGraw –Hill companies, New Delhi.
- 4. Burnett, J.H. 1971. The fundamentals of Mycology. ELBS Publication, London.
- 5. Bessey, E.A. 1979. Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
- 6. Dharani Dhar Awasthi. 2000. A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi.
- 7. Pelzer, M.J., Chan, E.C.S and Krieg, N.R. 1983. Microbiology, Tata MaGraw Hill Publishing House, New Delhi.
- 8. Pandey, P.B. 2014. College Botany- 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi.
- 9. Mishra, A. and Agarwal, R.P. 1978. Lichens A Preliminary Text. Oxford and IBH.

CORE COURSE – 2 PRACTICAL - 1

Algae, Fungi, Lichens, Bacteria, Virus and Plant pathology

Semester- II

Subject code:

Manual Experiments

Handling of laboratory equipment's

Identification of alga from algal mixture using microscope

Internal structure of Sargassum leaf and stipe

Microscopic preparation of Albugo infectedleaf, Peziza and Puccinia spores

Gram's staining of bacteria

Hanging drop preparation of bacteria

Preparation of sterile media

Bunchy top of banana

Soptters

Microscopic slides and specimens related to the genera in the core course 1 and 3

CORE COURSE – 4

BRYOPHYTA, PTERIDOPHYTA, GYMNOSPERMS AND PALAEOBOTANY

UNIT –I: BROPHYTA

Classification of Bryophytes (Smith) Range of thallus structure in Bryophytes Reproduction in Bryophytes Ecology of Bryophytes

UNIT – II:

Detailed study of the following

Marchantia

Porella,

Anthoceros and

Funaria

UNIT - III: PTERIDOPHYTA

Classification of Pteridophytes (Reimer)

Structure, reproduction and life cycle of Psilotum, Lycopodium, Selaginella,

Equisetum, Adiantum and Marsilea

Stelar types and their evolution in Pteridophytes

Heterospory and Origen of seed habit

UNIT – IV: GYMNOSPERMS

Clasification (Smith)

Structure and Reproduction of Cycas, Pinus and Gnetum

Economic importance of Gymnosperms

UNIT - V: PALAEOBOTANY

General account of the following

Geological time scale

Fossils and methods of fossilization

Detailed account of the following genera

Rhynia, Lepidodendron, Lepidocarpon

REFERENCE:

Cavers, Frank (1963): The inter-relationship. Bryophytes New Phytologist, Indian Reprint.

Smith.G.M. (1955): Cryptogamic Botany Vol.II (2nd Edition) (Bryophtes, Pteridophytes) Tata McGraw hill Publishing Co., New Delhi.

Vashista, B.R. (1983): Botany for Degree students a – Abryophytes S. Chand & Co., New Delhi – 392pp,

Chopra, R. N. & Kumara, P.K. (1988): Biology of bryophytes – Wiley Eastern Ltd., New Delhi.

Rashid, A (1998): An Introduction to Bryophytes – Vikas Publishing House (P) Ltd., New Delhi 298pp,

Eames, A.J. (1963): Morphology of Vascular plants (Lower Groups) Tata McGraw Hill, Bierhorst, D.WE. (1971): Morphology of Vascular plants Tata McGraw Hill,

Sundara Rajan, S. (1994): Introduction to Pteridophyta – New Age International

Publishers Ltd., Wiley eastern Ltd., 318pp., Seward, A.C (1959) Plant Life Through the Ages Hafner Publishing Co., N.Y. 442 & 446pp.,

Misra, S. P., (1975): Essentials of Palaeobotany - Vikas Publishing House (P) Ltd., New Delhi 383pp,

Venkatachala, B.S., Shukla, M. & Sharma, M (1992): Plant Fossils – a Link with the past (A Birbal Sahni Birth Centenary Tribute) –Birbal Sahni Institute of poalaeobotany, Lucknow, India.

Sporne, K. R. 1962. Morphology of Gymnosperms Hutchinston University Library

Dutta, S. C. 1979. An Introduction to Gymnosperms Bishen Singh & Mehidra pal Singh Publishers, Dehradun.

CORE COURSE – 6 ANATOMY AND EMBRYOLOGY

UNIT –I

Plant tissue – Classification, Simple and Complex tissues – Meristems – Classification, Distribution and theories (Apical cell theory, Histogen theory and Tunica Carpus theory) – Epidermal, Ground and Vascular tissue systems.

UNIT – II

Secretory tissues: (glands, Glandular hairs, nectaries and hyadothodes)

Structure of stomatal complex and stomatal types

Primary structure of dicot and monocot stem, root and leaf

UNIT – III

Secondary thickening: Dicot stem and Root, Annual rings, Heart wood and Sap wood, Periderm formation.

Anamalous Secondary thickening of *Boerhaavia*, *Bignonia*, *Nyctanthes* and *Dracena*

UNIT - IV

Microsporangium: Structure, microsporogenesis and development of male gametophytes

Megasporangium: Structure, Types of Ovules and megasporogenesis – Detailed study of monosporic (*polygonum* type) Bisporic (*Allium* type) and Tetrasporic

(Peperomia type) Embryo sac

Double Fertilization and its significance.

UNIT –V

Endosperm: Nuclear, Cellular& Helobial endosperms, Ruminate endosperms and Haustoria

Embryo: Development of Dicot embryo (Capsella bursapastoria) – Monocot embryo (*Luzula forsteri*) Polyembryony and apomixis

REFERENCE:

Ganguly & Dutta, College Botany Vol – II

Pandey B.P.1972, Plant anatomy, S Chand & Co. New Delhi

John Jothi Prakash, E. Plant anatomy, Emkay Publications New Delhi

Pandey B.P. Embryology of Angiosperms

Dwividi, J.N. 1986, Embryology of Angiosperms, Rastogi & Co., Meerut

Maheshwari P. 1974, An Introduction to Embryology of angiosperms Mc Graw Hill Co., New York.

Sporne, K.R. 1962. Morphology of Gymnospers Hutchinson University LibraryDutta, S.C. 1979. An Introduction to Gymnosperms Bishen Singh & Mehidra PalSingh Publishers, Dehradun.

Esau. K. 1974. Anatomy of seed plants John Wiley & sons New Delhi

Fhan, A. 1988. Plant Anatomy, Pergamon press, Oxford U.K.

Bhojwani S.S. & BhatanagalS.P. 2000. The embryology of Angiosperms (4th Revised Ed.,) – Vikas Pub., House, New Delhi.

CORE COURSE - 5

PRACTICAL – 2

Bryophyta, Pteridophyta, Gymnosperms, Palaeobotany, Anatomy & Embryology

Semester- IV

Subject code:

Manual Experiments

Internal structure of *Funaria* stem

Internal structure of Adiantum stem

Internal structure of *Lycopodium* stem

Internal structure of *Selaginella* stem

Internal structure of *Cycas* coralloid root

Internal structure of Cycas leaf

Internal structure of monocot & dicot stem

Internal structure of anomalous secondary thickening of *Boerhaavia*, *Nyctanthus*

and Dracena

Structure of pollen grains using whole mounts Hibiscus

Isolation and mounting of embryo

Spotters:

Microscopic slides and specimens related to the genera in the core course 4 & 6

SKILL BASED ELECTIVE -I

HORTICULTURE AND GARDEN DESIGNING

UNIT -I

Horticulture: Importance and scope of Horticulture, Classification of Horticultural crops – fruits, vegetable crops, climate, soil, water, and nutrition needs of horticultural crops.

UNIT – II

Plant propagation methods: cutting, layering, crafting, budding, stock-seion relationship, use of plant regulators in horticulture.

UNIT – III

Garden designs: Types of gardens- formal, informal and kitchen garden, units of garden, hedge, border, popiary arches and lawn maintenance.

UNIT - IV

Floriculture, cultivation of commercial flowers – rose and jasmines. Cultivation of important fruit tress – Mangoes and Banana.

$\mathbf{UNIT} - \mathbf{V}$

Green house, Indoor gardening – Bonsai – Flower arrangements – Nursery management and maintenance.

References:

Bose, T.K. & Mukherjee, D. (1972). Gardening in India Oxford & IBH Publishing Co., Kolkatta, New Delhi – 385pp,

Sandhu, M.K. (1989). Plant propagation – Wiley Eastern Ltd., New Delhi, Bangalore, Pune-287pp,

Kumar, N. (1997). Introduction to Horticulture. Rajalakshmi Publications, Nagercoil, India.

Manigush S.K. (1999). Horticulture. Wiley Eastern Ltd., New Delhi, Bangalore, 321pp,

SKILL BASED ELECTIVE -II BIOFERTILIZER and MUSHROOM CULTIVATION

UNIT –I

Biofertilizer – Definition, Kinds of microbes as biofertilizers, Rhizobium-legume Symbiotic association – Mass cultivation and carrier materials.

UNIT –II

Cultural methods of Azospirillum, Azatobacter, Azolla and Anabaena, carrier materials.

UNIT –III

Mycorrhiza – VAM association, types, isolation and inoculum production.

$\mathbf{UNIT}-\mathbf{IV}$

Edible and Poisonous mushrooms, nutritive value of mushrooms, structure of edible mushrooms, Pleurotus and Agaricus (Fruting body)

$\mathbf{UNIT} - \mathbf{V}$

Mushroom cultivation: Spawn, mother spawn production, spawn multiplication, Requirements of mushroom cultivation (Polythene bags, paddy straw substrates, spawn running room, cropping room) – Preparation of paddy straw ,cylindrical beds, spawn running, cropping and harvesting.

References:

CORE COURSE - 7

PLANT SYSTEMATIC AND ECONOMIC BOTANY

SEMASTER-V

Subject code:

UNIT – I

Morphology of root, Stem and Leaves & their modification, phyllotaxy, venation. **Inflorescence:** racemose, cymose, mixed and special types. Descriptive terminology of flower and floral parts.

Fruit: simple, fleshy, dry dehiscent and dry indehiscent, aggregate and multiple fruits.

UNIT –II

Binomial nomenclature, Citation of Authors. System of classification - Bentham & Hooker and Engler & Prantl. Merits and Demerits of their systems. Herbarium Preparation and role of herbarium in plant taxonomy

UNIT – III

A detailed study of the following families and their Economic Importance Annonaceae, Capparidaceae, Tiliaceae, Rutaceae, and Cucurbitaceae.

UNIT –IV

Asteraceae, Apocyanaceae, Convolvulaceae, Acanthaceae, Euphorbiaceae and Poaceae.

$\mathbf{UNIT} - \mathbf{V}$

Economic Botany: - A brief study of the following:

Cereales (Oryza, Eleusine), Pulses (Phaseolus), Edible oil (Seasamum), Sugar (Saccharum), Fibers (Gossypium, Crotolaria), Medicinal Plants (Ocimum, Phyllanthus and Solanum), Forest Products–Timber (Teak) Tannins, Gums, Resins and Turpentine.

References

Lawrence, G.H.M. (1953). Taxonomy of vascular plants. Oxford &IBH Publishers, New Delhi, Calcutta. 823pp.

Mitra, J.N. (1964). An Introduction to plant Taxonomy J.A. Churchill, London-142pp.Naik,V.K. (1996)

SKILL BASED ELECTIVE -III

HERBAL MEDICINE (Taxonomy and Cultivation of Medicinal Plants)

UNIT – I

Introduction to medicinally important plant parts: Fruits, Leaves, Stem and its modifications (Under ground and Aerial), Roots.

UNIT – II

Plant Identification – Elementary knowledge of Binomial nomenclature – Outline of Benthem and Hooker classification – Herbarium techniques.

$\mathbf{UNIT} - \mathbf{III}$

Study of some medicinally important families with reference to systematic position, Diagnostic features and medicinal uses only: Meliaceae, Myrtaceae, Apiaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Zingiberaceae, Musaceae and Poaceae.

UNIT – IV

Cultivation methods – crop protection – Harvesting – Storage and Protection – Marketing and cultivation – Export of medicinally important (General Aspects).

$\mathbf{UNIT} - \mathbf{V}$

Endangered Plants – Conservation: Exsitu and insitu methods – Importance of Red Data book (IUCN) – Patening and IPR.

References

Gokhale, S.S. C.K. Kokate and A.P. Purohit, Pharmacognosy. Nirali Prakashan . Pune .1994.

Tyagi, Dinesh Kumar, Pharma forestry. Field Guide to Medicinal plants. Atlantic Publishers and Distibutors, New Delhi. 2005.

Faroogi, A.A., and B.S. Sreeramu, Cultivation of medicinal and Aromatic crops. University Press (India) nPvt. Ltd., Hyderabad, 2004.

CORE COURSE – 8 CELL AND MOLECULAR BIOLOGY

Unit I

Structure of Prokaryotic and Eukaryotic cells – Ultra structure of cell organelles – Plastids, Mitochondria, Golgi body, ER microbodies – peroximes and glyoximes – Lysosome – Ultra structure and functions of plasma membrane.

Unit II

Nucleus – Nucleolus – Structure of euchromatin and heterochromatin; Special types of chromosomes – Lamp brush chromosome and polytene chromosome; mitosis and meiosis.

Unit III

Genetic material – Properties and replication of genetic material – Structure – Hershey & Chase experiment. Organization of DNA sequences – Satellite DNA, repetitive DNA sequences.

Unit IV

Bacterial genome: Transcription and its control in prokaryotes, initiation, elongation and termination. DNA supercoiling (positive and negative), gene regulation in Prokaryotes & Eukaryotes.

Unit V

Chloroplast and Mitochondrial genome – Semi autonomous organization, Receptors, Signal transduction pathway, Phosphorylation and PCD- Programmed cell data

Practical for Cell and Molecular Biology

- 1. Observation of plant cells in the onion peeling and Theo leaf
- 2. Non-living inclusions: Raphides. Cystolith and Starch grains
- 3. Cell division: Mitosis and Meiosis Squash technique in onion root tips and Tradescantia / Rheo flower bud respectively.
- 4. Isolation of cell organelles through differential centrifugation
- 5. Photographs: Ultra Structure

REFERENCE:

- Sharma N.S. 2005, Molecular Cell Biology, International Book distributors, Dehradun.
- 2. Verma P.S and Agarwal V.K. 1986, Cell Biology and Molecular Biology (Cytology) S.Chand and Company, New Delhi.
- Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation, Blackwell Science, London.
- 4. Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.
- Lea, P.J. and Leegood R.C. 1999, Plant Biochemistry and Molecular Biology, John Wiley and sons, London.
- 6. Power C.B. 1984, Cell Biology, Himalaya Publishing Co. Mumbai.
- 7. **De Robertis and De Robertis, 1998,** Cell and Molecular Biology, K.M.Verghese and Company.

CORE COURSE –9 PLANT BIOTECHNOLOGY

Unit I

Scope and importance of plant biotechnology –Application of biotechnology in industry, agriculture and medicine, future impacts of biotechnology.

Unit II - Genetic Engineering

Aims – Techniques – Restriction enzymes (Endonucleases and ligases) – Gene cloning vectors – Plasmid; isolation of plasmids – Transformation Role of Agrobacterium in genetic engineering.

Unit III – Immuno Technology and Enzyme Engineering

Immunoglobulins - Types and structures – Hybridoma technology (Monoclonal antibodies) – Genetic engineering for vaccine production.

Unit IV – Tissue Culture

Techniques: Explants, Sterilization, preparation of M.S.medium; Induction of callus. Application of tissues culture technology in agriculture. Protoplast isolation, Micropropagation Somatic hybridization and Synthetic seeds.

Unit V – Application of Biotechnology

- a) Single cell protein Spirulina
- b) Mycoprotein Yeast
- c) Hydrogen production Cyanobacteria
- d) Biogas Water hyacinth and Salvinia

Reference:

- 1. Dubey. R.C.a (1996) Text Book of Biotechnology
- 2. Gupta P.K. Biotechnology
- 3. Bilgrami. K.S. (1992) Introduction to Biotechnology
- 4. Pandey, A.K. CBA Publishers, New Delhi
- 5. Kalyankumar D.e. (1992) Plant tissue culture, New Central Book Agency, Calcutta

MAJOR BASED ELECTIVE I

BIOSTATISTICS AND COMPUTER APPLICATIONS

Unit – 1 Biostatistics;

Definition: Data – types, collection, classification, tabulation and interpretation. Frequency distribution – discrete and continuous. Presentation of Data – Diagrams and graphs

Unit – II

Measures of Central tendency – mean, median mode .standard deviation and standard error .Skewness and Kurtosis.

Unit – II

Test of significance – Chi-square test, t- test and 'F' test (one way ANOVA)

Unit-IV

Introduction to computers. Hardware components- input and output devices, Memory devices Mass storage devices – hard disk, floppy, CD – ROM, data storage, pen drives. Important biological software.

Unit – V

MS office – Word, Excel, and Power point – features and importance. Simple mathematical functions using excl. Basis of e-mail and internet. Basics of Bioinformatics.

REFRENCES

N.Gurumani, 2004. An Introduction to Biostatistics, MJP publishers, Chennai Bhanu Pratap.2004. Computer fundamentals I Ed. Cyber tech publications, New Delhi.

Leon and Leon. 2000 Fundamentals of Information Technology. Himalaya Publishing House, New Delhi.

Gupta, S.C.1928. Fundamentals of Statistics Himalaya Publishing Co., New Delhi

Bahl R. 2001. Exploring Microsoft office XP I Ed Cyber Tech Publications, New Delhi.

Mansified R. 1994. A compact guide to Microsoft Office and Applications. Tata McGraw Hill Publishing Co., New Delhi.

MAJOR BASED ELECTIVE I

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Gupta, S.C.1928. Fundamentals of Statistics Himalaya Publishing Co., New Delhi

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Mansified R. 1994. A compact guide to Microsoft Office and Applications. Tata McGraw Hill Publishing Co., New Delhi.

CORE COURSE - 11

PLANT PHYSIOLOGY

Unit – I

Water relation: significance – osmatic and non-osmatic uptake of water. Ascent of sap-cohesion theory: root pressure, transpiration, physiology of stomatal. Action, Translocation of solutes and assimilates.

Unit – II

Mass flow – Membrane permeability mineral uptake: Passive and active. Role of major and minor elements, mineral deficiency symptoms.

Unit – III

Photosyntheis: Absorption spectrum, Action spectrum, role of pigments enhancement effect, Photosystems I & II, Photosynthetic electron transport, Photophosphorylation, carbon Assimilation: Calvin cycle Hatch & Salck pathway.

Unit – IV

Respiration: Respiratory substrates – Aerobic and anaerobic – Glycolysis – Kreb's cycle and oxidative phosphorylation.

Unit – V

Plant Growth hormones: auxins, kinins, gibberellins, abscissic acid and their function. Role of hormones in flowering, senescence and abscission – Photoperiodism, phytochrome – Vernalization and seed dormancy.

REFERENCES:

- 1. Steward. F.C. (1964) : Plants at work (A summary of Plant Physiology) Addison-wesley Publishing Co., Inc., Reading, Massachusetts, Palo alto, London.
- 2. Verma, V. (2001) : A Text Book of Plant Physiology Emkay Publications, New Delhi
- 3. Plummer, D.T (1988) : An Introduction to Practical Biochemistry (3rd Edition) Tata McGraw Hill Publishing Co., Ltd., New Delhi
- 4. Jain, J.L (1998) : Fundementals of Biochemistry S.Chand & Co., New Delhi
- 5. Salil Bose, S.(1982) : Elementary Biophysics, Vijaya Printers, Madurai

CORE COURSE -11 PLANT ECOLOGY AND PHYTOGEOGRAPHY

Unit – I

General Ecology – Plant environment – Climatic, edaphic and Biotic factors – Ecological classification of plants – hydrophytes, mesophytes and xerophytes – morphological and anatomical adaptations.

Unit – II

Ecosystem concept – components abiotic, autotrophic producers & heterotrophic consumers, biomass, ecological pyramids, Productivity – primary, secondary & gross; food chain – food web & energy flow – pond ecosystem.

Unit – III

Concept of Antecology and Synecology. Vegetation – Units of vegetation – formation, association, consociation, society – Development of vegetation: Migration – ecesis, colonization, Methods of study of vegetation (Quadrate & Transect). Plant Succession – Hydrosere & Xerosere.

Unit – IV

Applied Ecology – Pollution and its control

Atmospheric pollution – air – pollution – particulate matter

Chemicals, Acid rain, Radiation pollution, Noise pollution, Thermal pollution.

Soil pollution: Industrial effluents, agricultural pollution, plant residues, insecticides, pesticides, fungicides, herbicides.

Water pollution – Industrial effluents (Water soluble metals – liquid effluents oil)

Unit – V

Phytogeography: Approaches to Phytogeography – Climate of India & its climatic zones, Botanical regions of India – Vegetational types of Tamilnadu: Evergreen, deciduous, scrub & Mangrove, Continuous and discontinuous distribution. Endermism, continental drift theory and age and area theory.

REFERENCES:

- 1. Puri, G.S. (1960): Indian Forest Ecology (Vol. I & II) Oxford Book Co., New Delhi & Calcutta
- Kormandy, E.J. (1978) : Concepts of Ecology (2nd Edition) Prentice Hall of India (P) Ltd., New Delhi
- 3. Verma, P.S. & Agarwal, V.K (1999): Concept of Ecology (Environmentalology) S.Chand & Co., New Delhi 264 pp.,
- Newman, E.I. (2000) : Applied Ecology Blackwell Scientific Publisher, U.K 28 pp.,
- 5. Sharma, P.D (2000) : Ecology & Environment

MAJOR BASED ELECTIVE - II

BIOINSTRUMENTATION AND BIOTECHIQUES

Objectives

- 1. To provide an understanding of biological techniques.
- 2. To enable the students to understand the principle and applications of various instruments used in biological research.

UNIT I

Microscopy – Principle and applications – Light, Bright field, Fluorescent, and Electron (TEM & SEM).

Brief account on histochemistry and staining procedures, preparation of whole mounts.

UNIT II

Preparation of laboratory solutions and reagents – Buffers, Molar, Molal, Normal and percentage solutions, ppm.

Units used in calculations – ratios and dilutions.

Photometric calculation and titrimetric analysis.

UNIT III

Principle and application of

pH metry, colorimetry and spectrophotometry (Visible and UV)

Sterilization procedures - physical and chemical methods -

Working principle and use of autoclave and hot air ovens.

UNIT IV

Chromatography Principle and applications

Separation techniques: paper, TLC and Column

Centrifugation – Differential and Ultra.

UNIT V

Gel Electrophoresis – Principle and applications of AGE and PAGE.

Blotting techniques - Southern and Northern

PCR and use of Primers.

Biosensors and biological markers – definition and applications.

TEXT BOOKS

1. Jayaraman, J 2002. Laboratory manual in biochemistry. Wiley Eastern Ltd., New Delhi.

2. Jain. L, 2003, Fundamentals of Biochemistry. S.Chand & Co New Delhi.

3. Veerakumari, L. 2006, Bio instrumentation. MJP Publishers, Chennai.

4. Gurumani. N. 2006, Research methodology. MJP Publishers Chennai.

REFERENCE BOOKS

 Keith Wilson and John Walker. 1996. Biochemical methods. Cambridg University. Press, London.

2. Plummerm,D.T. 2000. Practical Biochemisty. Tata McGraw Hill Publishing Co., Ltd.,

3. Donald Alexander Johansen. 1967. Plant Microtechnique.II Ed. Tata McGraw Hill Publishing Co., Ltd., New Delhi.

4. Krishnamoorthy,K.V. 1988. Histochemistry, S. Viswanathan (Printers and Publishers) Private Ltd.

MAJOR BASED ELECTIVE - III

MEDICAL BOTANY

- UNIT : I History and scope Definition of common Medical terms Systems of medicine – Ayurveda, Siddha and Unani. Cultivation – harvesting – processing – storage, marketing and utilization of medicinal plants (General)
- **UNIT : II** Systematic description, cultivation, chemical constituents and medicinal uses of the following medicinal plants *Ocimum sanctum, Eucalyptus globules, Azadirachta indica, Allium cepa, Allium sativum, Aloe vera and Murraya koenighi.*
- UNIT : III Ethno medico Botany Folklore medicine Folk medicines methods of preparations – administration. (Internal and External) – Adjustments – Diet – Toxicity – Antidotes.
- **UNIT : IV** Pharmacognosy classification of drugs Chemistry of drugs Zingiber officinale, Alstonia scholaris, Camellia chinensis, Chrysanthemum cinerarifolium and Myristica fragrans Myristicaceae.
- **UNIT : V** Phytochemistry Active Principles, methods of their testing Identification and utilization of the following medicinal plants.
 - *Ricinus communis* (Laxatives) Euphorbiaceae.
 - Digitalis purpurea (Cardiotonics) Scrophulariaceae
 - Datura metal (Drugs acting on nervous system) Solanaceae.
 - Rauwolfia serpentina (Antihypertensives) Apocynaceae
 - Vitex negundo (Antirheumatics) Verbinaceae
 - ٠

REFERENCE:

- 1. Hand Book of medicinal plants S.K. Bhattacharjee Pointer Publication, Jaipur.
- 2. Medicinal herbs in Indian life Vivekananda Kendra Patica 16(1)1987.
- 3. An introduction to Medical Botany N.C.Kumar Emkay Publications, Delhi.
- 4. Medicinal and Aromatic plants in Asia, Breeding and Improvement, ED. by Naranga Chanchalow and Han V.Henle.Oxford and IBH Publications Co. Pt Limited, New Delhi.

B.Sc., Zoology

Ist Year – I Semester

Allied Botany Paper – I

PLANT DIVERSITY

Objectives :

- 1.To enable the students to have a comprehensive knowledge of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms.
- 2.To enable the students to understand the economic importance of these forms

Note: Development of reproductive structures need not to dealt.

Unit - I Alage

General characters of Alage – Brief account Structure and Life cycle of the following Chlorophyceae – *Oedogonium* Cyanophyceae – *Nostoc* Phaeophyceae – *Sargassum* Economic Importance of Alage

Unit –II Fungi

General characters of Fungi and Lichens – Brief account Structure and Life history of the following Ascomycetes – *Peziza* Basidiomycetes – *Puccinia* Oomycetes – *Albugo* Lichens – *Usnea* Economic Important of Fungi

Unit - III Bryophytes

General characters of Bryophytes – Brief account Structure and Life history of Anthoceros Economic Importance of Bryophytes

Unit –IV Pteridophytes

General characters of Pteridophytes – Brief account Structure and Life history of Adiantum Economic Importance of Pteridophytes

Unit – V Gymnosperms

General characters of Gymnosperms – Brief account Structure and Life history of Cycas Economic Importance of Gymnosperms

Text and Reference books:

- 1. Gangulee and Kar. 1998. College Botany Vol. II, Books and Allied (P) Ltd. Calcutta.
- 2. Pandly, B.P. 1976 College Botany Vol. I & II S.Chand & Co Company Ltd., Reprint 2004
- 3. Pandey B.P 1973, An Introduction to Gymnosperms. I Edn. Naveen press, Meerut.
- 4. Sharma, O.P.1998. Text book of algae- seventh reprint. Tata mc. Graw Hill Publishing company Ltd., New Delhi.

5. Sharma,O.P. 1989. Text book of fungi, Tata Mc Graw – Hill Publicshing company

Ltd., New Delhi.

B.Sc., Zoology

Ist Year – II Semester

Allied Botany Paper – II

STRUCTURAL AND FUNCTIONAL BOTANY

(Taxonomy, Anatomy, Embryology, Plant physiology, Genetics and Horticulture)

Objectives:

1. To enable the students to identify the flowering plants up to the family level.

2. To learn the significance of developmental botany anatomy and embryology of angiosperms.

Unit –I Taxonomy

Study of the following families Annonaceae Rubiaceae Euphorbiaceae Solanaceae Poaceae

Unit – II Anatomy and Embryology

Types of tissue Meristems Anamalous secondary growth in *Nyctanthes* Structure of mature ovule and Anther Development of dicot embryo

Unit –III Plant physiology

Absorption of Minerals Photosynthesis (Calvin cycle) Respiration (Glycolysis)

Unit – IV Genetics

Gene – definition, structure Operon concept Genetic engineering – tools, plasmids – restriction enzymes Steps in Gene cloning

Unit – V Horticulture

Horticulture, scope and importance Propagation Methods: Cutting Layering Air Layering and Grafting techniques.

Text and Reference Books

- 1. Sharma, O.P., 2006. Text book of Taxonomy. Tata McGraw Hill Puplishing Company Ltd., New Delhi.
- 2. Guruchaaran Singh 2007. Plant systamatics Oxford & IBH puplishing Co. Pvt. Ltd.,
- 3. B.P.Pandey. 2007. Plant Anatomy. S.Chand & Company Ltd., New Delhi, Reprint.
- 4. Fahn. A. 1987. Plant Anatomy. Pergamon Press, New York.
- 5. V.K. Jain, 1992. Text Book of Plant Physiology. S.Chand & Company Ltd., New Delhi.
- 6. Verma, S.K., 2002. Text Book of Plant Physiology. S.Chand & Company Ltd., New Delhi.
- 7. D.C. Dubey, 1993. Text book of Biotechnology. S.Chand & Company Ltd., New Delhi.
- 8. Sandya Mitra, 2001. Genetic Engineering. Mac millan Puplishers, New Delhi
- 9. Hartman and Kester. 1989. Plant propagation principles and practices 4th Edn. Prentice Hall. Of India. New Delhi.
- 10. N. Kumar, 1986. Introduction to Horticulture TNAU Coimbatore.
- 11. Dutta A.C. College Botany, Vol I & II