

DEPARTMENT OF BOTANY
NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
(AUTONOMOUS)
POLLACHI – 642 001

SYLLABUS
FOR
B.Sc., BOTANY
AND
ALLIED ZOOLOGY

&

SCHEME OF EXAMINATION
(FOR B.Sc., BOTANY)

REVISED ON THE BOARD OF STUDIES
HELD ON MARCH 2015

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI.

DEPARTMENT OF BOTANY

B.Sc., BOTANY

SCHEME OF EXAMINATION (FOR I -VI SEMESTERS)

(FOR CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2015-2016 BATCH AND ONWARDS)

(CBCS for under graduate programmes with language for 4 semesters)

Part No	Course Code	Course title	Lecture+ Tutorial/ Practical Hours/ week	Duration of Exam Hrs	Max. Marks			Credit Point
					Internal	End-of-Semester	Total	
	Semester I							
I	15UTL101	Tamil/Hindi Paper - I	6	3	25	75	100	3
II	15UEN101	English Paper – I	5	3	25	75	100	3
III	15UBY101	Major Paper I- Plant Diversity I (Phycology, Mycology and Bryology)	9	3	25	75	100	4
	15UZY1A1	Allied - Paper I Zoology	7	3	25	75	100	3
IV	15UHR101	Human Rights	1	2	-	50	50	2
	15HEC101	Human Excellence - Personal values & SKY yoga practice- I	2	2	25	25	50	1
V		Extension Activities (NSS, NCC, Sports & Games)						
	Semester II							
I	15UTL202	Tamil/ Hindi Paper - II	6	3	25	75	100	3
II	15UEN202	English Paper – II	5	3	25	75	100	3
III	15UBY202	Major Paper II - Plant Diversity II (Pteridophytes Gymnosperms, Palaeobotany & Evolution)	6	3	25	75	100	4
	15UBY203	Major Practical I – Paper III (Plant diversity I & II)	2	3	40	60	100	4
	15UZY2A2	Allied - Paper II Zoology	7	3	25	75	100	3
	15UZY2A3	Allied - Paper III Practical	2	3	40	60	100	4
IV	15EVS201	Environmental Studies	2	2	-	50	50	2
	15HEC202	Human Excellence - Family values & SKY yoga practice- II	2	2	25	25	50	1
V		Extension Activities (NSS, NCC, Sports & Games)						
	Semester III							
I	15UTL303	Tamil/ Hindi Paper - III	5	3	25	75	100	3
II	15UEN303	English Paper – III	6	3	25	75	100	3
III	15UBY304	Major Paper IV- Developmental Botany of flowering plants	9	3	25	75	100	4
	15UCY3A4	Allied Paper IV - Chemistry	8	3	25	75	100	3

IV	15UBY3N1/ 15UBY3N2	Skill based subjects (Non major electives)- Paper 3/ 4 Landscape designing/ Herbal cosmetics *Basic Tamil paper I	1	2	-	50	50	2	
	15HEC303	Human Excellence - Professional values & SKY yoga practice- III	2	2	25	25	50	1	
V		Extension Activities (NSS, NCC, Sports & Games)							
	Semester IV								
I	15UTL404	Tamil/ Hindi Paper - IV	5	3	25	75	100	3	
II	15UEN404	English Paper – IV	6	3	25	75	100	3	
III	15UBY405	Major Paper V – Cell Biology, Biochemistry and Biophysics	6	3	25	75	100	4	
	15UBY406	Major Practical II - Paper VI (Developmental Botany & Cell Biology, Biochemistry and Biophysics)	2	3	40	60	100	4	
	15UCY3A5	Allied - Paper V- Chemistry	6	3	25	75	100	3	
	15UCY3A6	Allied paper VI – Chemistry Practical	2	3	40	60	100	4	
IV	15UBY4N3/ 15UBY4N4	Skill based subjects (Non major electives)- Paper 3/ 4 (Remote sensing and natural resource management/ Bioinformatics) *Basic Tamil paper II	1	2	-	50	50	2	
	15HEC404	Human Excellence – Social values & SKY yoga practice- IV	2	2	25	25	50	1	
V	15UNC401/ 15UNS402/ 15USG403	Extension Activities						50	1
	Semester V								
III	15UBY507	Major Paper – VII - Taxonomy of Angiosperms and Herbal Botany	6	3	25	75	100	4	
	15UBY508	Major Paper VIII - Genetics	5	3	25	75	100	4	
	15UBY509	Major Paper IX – Horticulture and Plant breeding	5	3	25	75	100	4	
	15UBY510	Major Paper X – Genetic Engineering	5	3	25	75	100	4	
	15UBY511	Elective -I Mathematics for Biologists	5	3	25	75	100	5	
IV	15UBY5S1/ 15UBY5S2	Skill based subjects (Major electives)- Paper 1 / 4	1	2	-	50	50	2	

		Microscopic techniques/ Mushroom cultivation						
		General Knowledge & General Awareness (SBE)	SS	2	-	50	50	2
	15HEC505	Human Excellence - National values & SKY yoga practice- V	2	2	25	25	50	1
	Semester VI							
III	15UBY612	Major Paper XII – Plant Physiology	6	3	25	75	100	4
	15UBY613	Major Paper XIII – Microbiology and Plant pathology	5	3	25	75	100	4
	15UBY614	Major Paper XIV - Plant Biotechnology	5	3	25	75	100	4
	15UBY615	Elective II – Bioinformatics	5	3	25	75	100	5
	15UBY616	Elective – III – Habitat Ecology	5	3	25	75	100	5
	15UBY617	Major Practical III – Paper XV (for V Sem theory papers)	2	3	40	60	100	4
	15UBY618	Major Practical IV (for VI Sem theory papers)	2	3	40	60	100	4
IV	15UBY6S3 15UBY6S4	Skill based subjects (Major electives)- Paper 2/ 4 Herbal Botany/ Biofarming	1	2	-	50	50	2
	15HEC606	Human Excellence - Global values & SKY yoga practice- VI	2		25	25	50	1
		**Grand total					3900	140

* The credits given are applicable only to the students who opt for BasicTamil paper and the credits for Human Excellence papers cannot be given to them.

**Grand total should be equal/below 3950 (For UG Programmes); 2550 (For PG Programmes)

SS – Self study, SBE – Skill Based Elective

General Question Pattern

Max. Marks:100	Internal : 25	External : 75	
Section	Pattern	Mark	Total
Part A	One word question/multiple choice/true/false (10 Questions)	10X1	10
Part B	Either (or) choice (5 Questions)	5X5	25
Part C	Either (or) choice (5 Questions)	5X8	40
		Total :	75

Question Pattern for EVS & SBE papers

Max. Marks:50		External : 50	
Section	Pattern	Mark	Total
Part A	Short answer/multiple choice (10 Questions)	10X1	10
Part B	Open choice (5 out of 8 Questions)	5X8	40
		Total :	50

- GK & Communicative English and General Awareness papers include 60% objective type of questions and 40% descriptive type of questions
- The marks and credits for Extension activities are given by the concerned department

SYLLABUS

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY101 Title : PLANT DIVERSITY I (PHYCOLOGY, MYCOLOGY & BRYOLOGY)		Semester: 1
Hrs/Week :	5	Credit: 4
Objectives	To know various forms of diversity in Algae, Fungi and Bryophytes To understand the morphology, structure, reproduction of Lichens. To learn the structure, reproduction and life cycle of the selected forms.	

Unit	Content	Hrs
Unit I	General characters of algae - Classification of algae (Fritsch) – Distribution, structure, reproduction and life cycle of the following: Cyanophyceae (<i>Oscillatoria</i>), Chlorophyceae (<i>Oedogonium</i>) and Phaeophyceae (<i>Sargassum</i>).	13
Unit II	Distribution, structure, reproduction and life cycle of the following: Rhodophyceae (<i>Polysiphonia</i>) and Bacillariophyceae (<i>Cyclotella</i> & <i>Pinnularia</i>) - Economic importance of algae.	13
Unit III	General characters of Fungi - Mode of nutrition - Classification of Fungi (Alexopoulos, 1972) - Economic Importance of Fungi - Structure, reproduction and life cycle of Zygomycetes- <i>Mucor</i> , Ascomycetes - Yeasts and <i>Peziza</i> .	13
Unit IV	Structure, reproduction and life cycle of Basidiomycetes - <i>Puccinia</i> and <i>Agaricus</i> . Lichens: Occurrence, Morphology, structure, Reproduction and Economic importance.	13
Unit V	General characters and classification of Bryophytes (Reimers), Distribution, structure development and reproduction of <i>Riccia</i> , <i>Anthoceros</i> and <i>Pogonatum</i> .	13

Text Books:

1. Smith, G.M., 1971. Cryptogamic Botany Vol. I Algae & Fungi. Tata Mc Graw Hill Publishing Co., New Delhi.
2. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata Mc Graw Hill Publishing Co., New Delhi.
3. Sharma O.P. 1992. Text book of Thallophytes. Mc Graw Hill Publishing Co., New Delhi.

Reference Books:

1. Sharma P. D. 1991. The Fungi, Rastogi & Co., Meerut
2. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. I & II, New central book agency, Calcutta.

3. Dube H. C. 1990. An introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.
4. Puri, P. 1980. Bryophyta. Atma Ram & Sons, Delhi

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Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Zoology	Effective from the Year: 2015
Subject Code : 15UBY1A1 Title : ANCILLARY BOTANY PAPER - I (PLANT DIVERSITY, ANATOMY, EMBRYOLOGY AND PLANT PATHOLOGY)		Semester: 1
Hrs/Week :	6	Credit: 3
Objectives	To appreciate the diversity in lower plants To understand the anatomy of angiosperms To know the embryo development and fertilization in higher plants To teach important plant diseases, causal organisms and control.	

Unit	Content	Hrs
Unit I	Structure, life history and economic importance of the following types: Algae: <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi: <i>Penicillium</i> and <i>Agaricus</i> , Lichens.	16
Unit II	A brief account of the structure, reproduction and life cycle of the following genera (excluding development of sex organs): Bryophyte: <i>Riccia</i> , Pteridophyte: <i>Lycopodium</i> and Gymnosperm: <i>Cycas</i> .	16
Unit III	Simple tissues – parenchyma, collenchyma and sclerenchyma - complex tissues – xylem and phloem - cambium – primary structure and secondary structure of dicot stem.	15
Unit IV	Anther structure – ovule structure – 8-nucleate embryo sac – double fertilization – endosperm (nuclear and cellular) – structure of dicot and monocot embryos (development excluded) – parthenocarpy.	15
Unit V	Study of plant diseases - viral disease (TMV) - bacterial disease (citrus canker) - fungal disease (red rot of sugarcane) – plant disease control – physical, chemical and biological methods.	15

Text Books:

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Susil Kumar Mukerjee, 1984. College botany, Vol.III. New Central Book agency, Calcutta.
3. Jain, V.K., 1974. Fundamentals of plant physiology, 6th Edn., S. Chand & Company Ltd., New Delhi.

Reference Books:

1. George, H.M., Lawrence, 1958. Taxonomy of vascular plants. The Macmillan company, Newyork.
2. Pandey, B.P. 1997. Economic botany, C. Chand & Company Ltd., New Delhi.

3. Salisbury, F.B. and Rose, 1986. Plant physiology, 3rd Edn, C.B.S. Publishers, New Delhi.
4. Kumar, N., Abdul Khader, JBM., M.D. Rangaswami, P. and I. Irullappan, 1993. Introduction to species, Plantations crops, Medicinal and aromatic plants, Rajalakshmi publication, Nagercoil, Tamilnadu, India.
5. Wallils, T.E., 1985. Text book of pharmacognosy, 5th Edn. CBS publishers & distributors, Delhi.
6. Kumaresan, V., 1998. Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Ignacimuthu, S., 1996. Applied Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.

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Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY202 Title: PLANT DIVERSITY II (PTERIDOPHYTES, GYMNOSPERMS, PALAEOBOTANY & EVOLUTION)		Semester: 2
Hrs/Week :	5	Credit: 4
Objectives	To acquire knowledge about Evolution, Origin of life and Paleobotany To teach selected forms of Pteridophytes and Gymnosperms	
Unit	Content	Hrs
Unit I	General characters and classification of Pteridophytes (Reimers) - stelar evolution - heterospory and origin of seed habit - structure and reproduction of Psilotopsida (<i>Psilotum</i>) and Lycopsidea (<i>Lycopodium</i> & <i>Selaginella</i>).	13
Unit II	Structure and reproduction of Sphenopsida (<i>Equisetum</i>) and Pteropsida (<i>Adiantum</i> & <i>Marsilea</i>).	13
Unit III	General characters and classification of Gymnosperms (Sporne, 1965) - structure development and reproduction of <i>Cycas</i> and <i>Gnetum</i> .	13
Unit IV	Geological time scale - fossilisation and kinds of fossils - study of <i>Rhynia</i> , <i>Lepidodendron</i> , <i>Lepidocarpon</i> and <i>Williamsonia</i>	13
Unit V	Introduction to evolution – origin of life – theories of evolution – Lamarck, Darwin and Hugo De Vries – Wisemann theory	13

Text Books :

1. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata Mc Graw Hill Publishing Co., New Delhi.
2. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. II, New central book agency, Calcutta.
3. Sporne K.R. 1991. The morphology of Gymnosperms. B.I. Publications Pvt. Bombay Calcutta, Delhi.

Reference Books:

1. Sharma O.P. 1992. Text book of Pteridophyta, Macmillan India Ltd., New Delhi.
2. Wilson, N.S. and Rothwell, G.W. 1993. Palaeobotany and the evolution of plants (2nd edition), Cambridge University Press, UK.
3. Gifford, E. M. and Foster, A.S. 1989. Morphology and evolution of vascular plants. W.H. Freeman & Co., Newyork.

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Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY203 Title : MAJOR PRACTICAL - I (PLANT DIVERSITY I , II)		Semester: 2
Hrs/Week :	2	Credit: 4
Objectives	To understand the plant diversity, thallus construction of selected forms To learn about the fossilized plant forms and Plant evolution.	

Unit	Content	Hrs
Unit I	A detailed study of thallus organization and reproductive structures of the following forms: Algae – <i>Oscillatoria</i> , <i>Oedogonium</i> , <i>Sargassum</i> , <i>Polysiphonia</i> , <i>Cyclotella</i> and <i>Pinnularia</i> . Fungi - <i>Mucor</i> , <i>Yeasts</i> , <i>Peziza</i> , <i>Puccinia</i> and <i>Agaricus</i> . Lichen – <i>Usnea</i> .	5
Unit II	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Bryophytes - <i>Riccia</i> , <i>Anthoceros</i> and <i>Pogonatum</i>	5
Unit III	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Pteridophytes - <i>Psilotum</i> , <i>Lycopodium</i> , <i>Selaginella</i> , <i>Adiantum</i> and <i>Marsilea</i> .	5
Unit IV	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Gymnosperms - <i>Cycas</i> and <i>Gnetum</i> .	6
Unit V	A detailed study of the following fossil genera <i>Rhynia</i> , <i>Lepidodendron</i> , <i>Lepidocarpon</i> and <i>Williamsonia</i> from fossil specimen/parts or slides.	6

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Department	Botany	
Course	B.Sc., Zoology	Effective from the Year: 2015
Subject Code : 15UBY2A2 Title : ANCILLARY BOTANY - II - (TAXONOMY OF ANGIOSPERMS, PHYSIOLOGY, HORTICULTURE, MEDICINAL BOTANY AND PLANT BIOTECHNOLOGY)		Semester: 2
Hrs/Week :	6	Credit: 3
Objectives	To study the taxonomic characters of selected angiosperms To understand the plant physiology and plant growth To know the basic techniques in Horticulture To learn selected medicinal plants and its importance To understand the applications of plant biotechnology	

Unit	Content	Hrs
Unit I	Vegetative and floral characters and Economic importance of Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.	16
Unit II	Photosynthesis – A brief account of light and dark reactions with reference to C3 plants – respiration – glycolysis, krebs cycle, oxidative phosphorylation – growth regulators – auxins, gibberellic acid and ABA.	16
Unit III	Horticulture: Seed propagation- asexual propagation and its advantages – cutting, layering, grafting and budding – hydroponics – bonsai.	15
Unit IV	Pharmacognosy – definition and history – drugs obtained from algae (<i>Spirulina</i>), fungi (<i>Penicillium</i>), gymnosperms (<i>Ginkgo</i>) and angiosperms (<i>Rauwolfia serpentina</i> and <i>Phyllanthus amarus</i>) – nutraceuticals.	15
Unit V	Plant Biotechnology – Scope and applications in medicine, agriculture and industries.	15

Text Books:

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Bhojwani, S.S. and Bhatnagar, S.P., 2009. The embryology of angiosperms, Vikas publishing house pvt Ltd., New Delhi.
3. Pandey, B.P., 1987. Plant anatomy, 4th Edn., S. Chand & Company, New Delhi.

Reference Books:

1. Gilbert, M. Smith, 1972. Cryptogamic botany: Algae and Fungi, Vol I. 2nd Edn. Tata McGraw Hill Publishing Ltd., New Delhi.
2. Krishnamoorthy, K.V. and K.N. Rao, 1984. Angiosperms, Viswanathan printers pvt Ltd., Chennai.

3. Hirendra Chandra Gangulee and Ashok Kumar Kar, 1970. College Botany Vol II. New Central Book Agency, Calcutta.
4. Katherine Esau, 1953. Plant anatomy, 2nd Edn, Wiley Eastern pvt. Ltd., New Delhi.
5. Vashishta, P.C., 1997. Botany for degree students – Pteridophytes Part IV, S. Chand & Company Ltd., New Delhi.
6. Reinert J. and Bajaj, Y.P.S., 1988. Applied and Fundamental aspects of Plant cell and tissue organ culture, Narosa Publishing house, New Delhi.

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Department	Botany	
Course	B.Sc., Zoology	Effective from the Year: 2015
Subject Code :	15UBY2A3	Semester: 2
Title	: ANCILLARY BOTANY PRACTICAL	
Hrs/Week :	2	Credit: 4
Objectives	To know the diversity, morphology, anatomy and reproductive structures of selected lower plants and higher plants. To impart the basic plant breeding, horticultural techniques and plant diseases. To introduce important medicinal plants and principles of plant biotechnology.	

Unit	Content	Hrs
Unit I	Plant Biodiversity Algae- <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi- <i>Penicillium</i> and <i>Agaricus</i> , Lichens - <i>Usnea</i> , Bryophyte - <i>Riccia</i> , Pteridophyte - <i>Lycopodium</i> and Gymnosperm - <i>Cycas</i> , Symptoms and causal organisms and control measures of TMV, citrus canker and red rot of sugarcane.	6
Unit II	Plant Anatomy and Embryology Parenchyma, collenchyma, sclerenchyma, xylem and phloem. Primary structure of dicot stem (<i>Tridax</i>), secondary structure of dicot stems (<i>Tridax</i> and <i>Polyalthia</i>). Permanent slides - structure of anther, ovule, embryo sac and embryo.	6
Unit III	Taxonomy of Angiosperms A detailed study of the following families: Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.	5
Unit IV	Plant Physiology (Demonstration) Photosynthesis - test tube and funnel experiment and light screen experiment Respiration – Ganong’s respiroscope (aerobic) and Kuhns fermentation (anaerobic). Horticulture: Charts on cutting, layering and grafting.	5
Unit V	Medicinal Botany & Plant Biotechnology Study of following medicinal plants: <i>Spirulina</i> , <i>Penicillium</i> , <i>Ginkgo</i> , <i>Rauwolfia serpentina</i> and <i>Phyllanthus amarus</i> . Plant biotechnology charts.	5

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Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY304 Title : DEVELOPMENTAL BOTANY OF FLOWERING PLANTS	Semester: 3	
Hrs/Week :	5	Credit: 4
Objectives	To acquire knowledge about the entire plant growth and development. To know various anatomical features of flowering plants To understand the important events in embryo development and fertilization.	

Unit	Content	Hrs
Unit I	Plant body – fundamental parts – cell types and tissues – meristematic, simple and complex permanent tissues – mitosis - differentiation – dedifferentiation – redifferentiation.	13
Unit II	Shoot system: Shoot apical meristem – theories– cambium and its functions – types of vascular bundles – primary structure of monocot and dicot stems – normal secondary growth in dicot stem – anomalous secondary growth in dicot stem (<i>Boerhaavia</i>) and monocot stem (<i>Dracaena</i>) - wood structure (sap wood & heartwood) – dendrochronology.	13
Unit III	Leaf - origin and development – epidermal tissues – stomatal types – internal structure of monocot (Grass) and dicot (<i>Tridax</i>) leaves. Anatomy of hydrophytic leaf (<i>Hydrilla</i>) and xerophytic leaf (<i>Casuarina</i>).	13
Unit IV	Root apical meristem – theories - primary structure of monocot and dicot roots – secondary growth in dicot root- anomalous sec. growth in dicot root (<i>Achyranthes</i>) – structural modifications in root for storage, respiration and microbial interaction.	13
Unit V	Flower - structure and development - microsporangium and microsporogenesis - megasporangium and megasporogenesis (<i>Polygonum</i> type) – ovules - pollination – double fertilization – types of endosperm - dicot (<i>Capsella</i>) and monocot (<i>Najas</i>) embryos – polyembryony - formation of seed – fruit – parthenocarpy.	13

Text Books:

1. Bhojwani S.S. and Bhatnagar, S.P., 2000. The embryology of angiosperms. 4th edition, Vikas printing houses, New Delhi.
2. Esau K. 1977. Anatomy of seed plants. 2nd edition. John Wiley & Sons, New York.
3. Vashista P.C., 1997. Plant Anatomy, S. Chand & Co., New Delhi.

Reference Books:

1. Fahn A., 1974. Plant Anatomy, 2nd edition. Pergamon Press, Oxford.
2. Pandey B.P., 1985. Plant Anatomy, S and Chand & Co., New Delhi.
3. Maheswari P., 1971. An introduction to embryology of angiosperms. Tata Mc Graw Hill Publishing Co., New Delhi.
4. Swamy B.G.L. and Krishnamurthy, K.V., From flower to fruit, Tata Mc Graw Hill Publishing Co., New Delhi.

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Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY3N1 Title : SKILL BASED ELECTIVE (NON MAJOR): LANDSCAPE DESIGNING		Semester: 3
Hrs/Week :	1	Credit: 2
Objectives	To introduce the scope and essential elements of landscape. To learn various garden structures.	

Unit	Content	Hrs
Unit I	Landscape designing – principles and categories of landscaping - Important ornamental plants – habit and types.	3
Unit II	Gardening – indoor garden: hanging baskets and terrarium – layout and importance of kitchen garden – public garden and its components.	3
Unit III	Lawn: layout – preparation of land – propagation – irrigation – weeding – after care. Glass house: applications and advantages.	2
Unit IV	Garden features – miniature garden – xeriscaping – orchidarium – terrarium - rockery – water garden – topiary.	2
Unit V	Bonsai: types of plants – dwarfing technique – pest and diseases- Flower arrangement - cut flowers.	2

Text Books:

1. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
2. Mani Bhusan Rao, 1964. Text book of Horticulture. Macmillan India Ltd., Newdelhi.
3. Pratibha trivedi, 1996. Home Gardening. Indial Council of Agricultural Research, New Delhi.

Reference Books:

1. George Acquaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
2. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.
3. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

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Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY3N2 Title : SKILL BASED ELECTIVE (NON MAJOR) – HERBAL COSMETICS		Semester: 3
Hrs/Week :	1	Credit: 2
Objectives	To understand the role of herbs as a source of natural and safe cosmetics.	

Unit	Content	Hrs
Unit I	Herbal cosmetics – introduction – principles – definition – history – need – advantages- disadvantages.	3
Unit II	Manicure and pedicure – history – definition – techniques – benefits.	3
Unit III	SPA – origin and history –ayurvedic spa – aromatherapy – special spa treatments.	2
Unit IV	Herbal skin and hair care – tools – ingredients – recipes.	2
Unit V	Herbal cosmetics – home recipes – herbal shampoo – herbal tonic – face glow – dark circle remover – facial hair control – herbal tooth powder.	2

Text Books:

1. Babu,S.S., 2000. Herbal cosmetics - Pushkal publishers, Mumbai.
2. Asha ram, 2002. Herbal Indian perfumes and cosmetics, Sri satguru publications, New Delhi, India

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Dr. A. Logamadevi	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code :	15UBY405	Semester: 4
Title	: CELL BIOLOGY, BIOCHEMISTRY AND BIOPHYSICS	
Hrs/Week :	5	Credit: 4
Objectives	To learn the ultrastructure of prokaryotic, eukaryotic cells and organelles To know the biochemical molecules of life To understand the biophysical laws governing universe	

Unit	Content	Hrs
Unit I	Cell Biology: Ultrastructure of prokaryotic and eukaryotic cells – cell wall - plasma membrane - chloroplast - mitochondria – endoplasmic reticulum - ribosomes - dictyosomes - nucleus - nucleolus – chromosomes.	13
Unit II	Biochemistry: Biomolecules – structure and functions of carbohydrates (monosaccharides and polysaccharides), proteins and lipids.	13
Unit III	Nucleic acids (DNA and RNA) - enzymes – nomenclature and properties – classification – mode of action and functions of enzymes	13
Unit IV	Biophysics: Chemical bonds (covalent, noncovalent and ionic) van der waal's forces - laws of thermodynamics - redox potential - redox couple - energy states of atom - spin property of electrons – Pauli's exclusion principle - absorption spectrum in molecules.	13
Unit V	Biophysical phenomena: pH - centrifugation – chromatography – electrophoresis – Optical techniques: colorimetry – spectrophotometry – spectroscopy	13

Text Books:

1. Verma P.S. and Agarwal, 2001. Cell biology. S. Chand & Company, New Delhi, India.
2. Jain J.L., 1999. Fundamentals of Biochemistry, S. Chand & Company, New Delhi, India.
3. Subramanian P., 2005. Biophysics: Principles and techniques, MJP Publishers, Chennai.

Reference Books:

1. De Robertis E.D.P., and De Robertis, E.M.F., 1995. Cell and molecular biology, 8th edn. BI. Waverly Pvt. Ltd., New Delhi.
2. Alberts B., Bray, D., Lewis, J. Raff, M. Roberts, K. and Watson, J.D., 1998. Molecular biology the cell. 2nd edn., Garland Pub. Inc., New Delhi.
3. Conn E.E., Stumps, G., Bruening and Doi, R.G., 1987. Outlines of biochemistry, John Wiley & Co., New York.

4. Jayaraman J., 1988. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
5. Lee P.J. and Leegood, R.C., 1999. Plant biochemistry and molecular biology. John Wiley & Sons, Chichester, England.
6. Voet and Voet, 1995. Principles of biochemistry, WCB Publishers, London

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Dr. K. Rajalakshmi	Dr. R.Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY406 Title: MAJOR PRACTICAL – II (DEVELOPMENTAL BOTANY OF FLOWERING PLANTS & CELL BIOLOGY, BIOCHEMISTRY AND BIOPHYSICS)		Semester: 4
Hrs/Week :	2	Credit: 4
Objectives	To learn various anatomical features of higher plants To know the structure and development of anther, ovary, embryo To know the experiments using principles of basic biochemistry and biophysics	

Unit	Content	Hrs
Unit I	Developmental Botany: Plant parts, cell - tissue types - mitosis Stem: shoot apex, primary structure of dicot stem (<i>Tridax</i> and <i>Cucurbita</i>), monocot stem (<i>Sorghum</i>) - normal secondary thickening in a dicot stem (<i>Thespesia</i>) - anomalous secondary thickening in <i>Boerhaavia</i> and <i>Dracaena</i> stems. Leaf: stomatal types, dicot (<i>Nerium</i>) and monocot (Grass). Root: root apex, primary structure of dicot root (<i>Dolichos</i>), monocot root (<i>Canna</i>) - normal secondary thickening in and dicot root (Castor). Anomalous secondary thickening in <i>Achyranthes</i> root	6
Unit II	Embryology: Flower: Permanent slides on structure of anther, ovule, embryosac and endosperm (coconut and areca endosperm) - embryo dissection (<i>Tridax</i> and <i>Waltheria</i>), Pollinium dissection (<i>Calotropis</i>).	6
Unit III	Cell biology: Charts of prokaryotic & eukaryotic cell and cell organelles, DNA, RNA models.	5
Unit IV	Biochemistry: Complementary colours, Absorption spectrum & Chlorophyll estimation, Verification of Beer's law, Standard graph preparation & estimation of carbohydrate using spectrophotometer, Estimation of sugar using Benedicts reagent, Estimation of protein (by Lowry method).	5
Unit V	Biophysics (Experiments & Demonstrations) Centrifuge, Separation of cell organelles using centrifuge, pH meter, estimation of pH in soil and water samples using pH meter, preparation of buffers, colorimeter, spectrophotometer, electrophoresis.	5

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Dr. K. Rajalakshmi	Dr. R.Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY4N3 Title : SKILL BASED ELECTIVE (NON MAJOR) – REMOTE SENSING AND NATURAL RESOURCE MANAGEMENT		Semester: 4
Hrs/Week :	1	Credit: 2
Objectives	To study the basic principles of remote sensing techniques and the application of the same to manage the natural resources.	

Unit	Content	Hrs
Unit I	Natural resources – Terrestrial and aquatic (Forest and marine resources) – Biodiversity – Concept – Conservation strategies (in situ and ex situ) – Biosphere reserves – National Parks and Wildlife sanctuaries – Botanical garden – IUCN species status.	3
Unit II	Remote sensing – Concept, platforms for remote sensing, satellites, sensors and satellite data products – Interpretation of remotely sensed data-Visual interpretation and digital analysis.	3
Unit III	Remote sensing and vegetation studies – Forest mapping-Land cover classification and change detection studies.	2
Unit IV	Remote sensing for marine resource management – Coastal vegetation surveys – Marine pollution monitoring.	2
Unit V	Recent trends in remote sensing techniques – Role of GIS (Geographical Information System) and GPS (Global Positioning System) – National and International Agencies and their achievements.	2

Text Books:

1. Thomas Eugene Avery and Graydon Lennis Berlin, 1992. Fundamentals of Remote sensing and Airphoto Interpretation.
2. Agrawal K. C., 1996. Biological diversity, Agro Botanical Publishers, New Delhi.

Reference Books:

1. Solbris, Van Embden and Van dordt., 1994. Biodiversity and global changes. CAB International, International Union of Biological Sciences, Wallingford.

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Dr. K. Rajalakshmi	Dr. R. Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY4N4 Title : SKILL BASED ELECTIVE (NON MAJOR) - BIOINFORMATICS		Semester: 4
Hrs/Week :	1	Credit: 2
Objectives	To introduce classical bioinformatics theory to students To focus computer science techniques used in biological studies	

Unit	Content	Hrs
Unit I	Life - origin and evolution – biomolecules – book of life - genetic code – human genome – genomics and proteomics.	3
Unit II	Introduction to bioinformatics – biological databases and searching tools – virtual library – servers for bioinformatics – IT tools for bioinformatics.	3
Unit III	Genetic algorithm – sequence analysis – alignment and similarity search-pattern recognition – structure prediction.	2
Unit IV	Gene finding – protein prediction – tools and databases for biomolecular visualization – drug designing.	2
Unit V	Phylogenetic analysis – tools and databases for phylogenetic tree construction – homology – orthology – paralogy – analogy.	2

Text Books:

1. Lesk A. M. 2002, Introduction to Bioinformatics, Oxford University Press, Oxford.
2. Parthasarathy S., 2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002. Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

Reference Books:

1. Chakraborty C., 2004. Bioinformatics Approaches and Application. Chawla offset printers – Delhi.
2. Westhead D.R., J. Parish and R. M. Twyman, 2003. Bioinformatics (instant notes) Viva books private limited – New Delhi.
3. Khan I.A., and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz Publications.

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Dr. R.Kannan	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY507 Title : TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY		Semester: 5
Hrs/Week :	5	Credit: 4
Objectives	To learn nomenclature systems and to identify the plants To introduce modern trends in taxonomy To know the economic uses of plants	

Unit	Content	Hrs
Unit I	Introduction to plant taxonomy-principles-morphology and technical terms used in taxonomy (root, stem, leaf, inflorescence, flowers and fruits) – Systems of classification – natural (Bentham & Hooker) and phylogenetic (Engler & Prantl) - merits and demerits	13
Unit II	Botanical nomenclature - ICBN (ICN) – typification - author citation - valid publication - herbarium techniques – floras - Botanical survey of India (BSI) and its function. Modern trends in taxonomy - digital taxonomy - online herbaria - (Royal botanical garden).	13
Unit III	Detailed study of the range of characters and economic importance of the families: Polypetalae: Anonaceae, Capparidaceae, Rutaceae, Anacardiaceae, *Fabaceae, Cucurbitaceae and Apiaceae. Gamopetalae: Rubiaceae, Apocynaceae, Asteraceae,	13
Unit IV	Detailed study of the range of characters and economic importance of the families: Gamopetalae: *Asclepiadaceae, Scrophulariaceae, Acanthaceae, and *Lamiaceae. Monochlamydeae: Amaranthaceae, Euphorbiaceae, Monocots: *Orchidaceae, Cannaceae, *Liliaceae, Arecaceae, and Poaceae. <i>*Pollination mechanisms to be included.</i>	13
Unit V	Economic Botany: Distribution methods of cultivation, extraction, industrial processing and morphology of useful parts of fiber yielding plants, oil yielding plants, Pulses, cereals and spices & condiments.	13

Text Books:

1. Chopra G.L., 2004 Angiosperm (Systematics and life cycles), Pradeep publications. Jalandhar.
2. Pandey B.P., 1997. Taxonomy of angiosperms. Chand and Co. Ltd. New Delhi.
3. Pandey B.P., 1980. Economic Botany, Chand and Co. Ltd. New Delhi.

Reference books:

1. Sharma O.P., 1993. Plant taxonomy, Tata Mc Graw-Hill Education,
2. Vasishta P.C., 1994. Taxonomy on angiosperms. S. Chand & Co., New Delhi
3. Gamble J.S. 1967. Flora of Madras, Vol. I, II & III. Govt. of India.
4. Jeffrey C., 1976. An introduction to plant taxonomy. Allied publication.
5. Lawrence .G.H.M., 1964. An introduction to plant taxonomy, Central Book dept., Allahabad.
6. Porter C.L., 1969. Taxonomy of flowering plants. Eurassia Publication House, New Delhi.
7. Rendle A.B., 1980. The classification of flowering plants (Vol. 1& 2), Vikas students Edn.

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Dr. M. Latha Isabel	Dr. R.Kannan		
Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY508 Title : GENETICS		Semester: 5
Hrs/Week :	5	Credit: 4
Objectives	To learn the principles and theories of inheritance To know the concepts of classical and modern genetics	

Unit	Content	Hrs
Unit I	Introduction to Genetics - Mendelian inheritance- Mendel and his experiments with pea plant – Mendel's laws - law of dominance – incomplete dominance – law of segregation - law of independent assortment – Monohybrid cross - dihybrid cross - back and test crosses.	13
Unit II	Non-Mendelian inheritance - interaction of genes –complementary genes – supplementary genes – duplicate genes - inhibitory genes – polygenic inheritance – multiple alleles and blood groups in man.	13
Unit III	Meiosis - crossing over – chromosome maps – linkage – sex linkage – types of sex linkage – sex linked inheritance – cytoplasmic inheritance – chloroplast and mitochondrial inheritance - sex determination – chromosomal – genic balance – hormonal and environmental sex determination.	13
Unit IV	Chemical basis of heredity - DNA as genetic material (Mc Cleod and Mc Carty experiments) - RNA as genetic material (Fraenkel-Conrat experiment) – concept of gene - genetic code - features and properties – prokaryotic (lac operon) and eukaryotic gene expression and regulation	13
Unit V	Mutations - causes of mutation - mutagenic agents – gene mutation - DNA repair mechanisms (photo reactivation, excision and recombinational) - chromosomal aberrations - ploidy - significance of polyploidy	13

Text Books:

1. Sinnot, Dunn and Dobshansky, Principles of Genetics. McGraw Hill Pub.
2. Verma P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
3. Chawala H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.

Reference Books:

1. Verma P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi.
2. Goodenough V., 1992. Genetics, Saunders College publishing.
3. Kenny *et al.*, Gene regulation and its expression. Plenum press.

4. Lawin, Molecular basis of gene expression. Wiley & Sons.
5. Lewin B. 2002. Genes VII. Oxford University Press, Oxford.
6. Snustad D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc.,
7. Strickberger M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company. USA.
8. Watson J.D. *et al.*, Molecular Biology of the gene. The Benjamin/Cummings.

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Dr. R. Kannan	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY509	Semester: 5	
Title : HERBAL BOTANY		
Hrs/Week :	5	Credit: 4
Objectives	- To know the value of traditional medicines - To know the secondary metabolites and therapeutic potentials of plants - To learn to prepare herbal formulations	

Unit	Content	Hrs
Unit I	A general survey of traditional system of medicine - siddha - ayurveda - unani - pharmacognosy - pharmacology- bioactive compounds - nutraceuticals.	13
Unit II	General account of medicinal uses of bacteria (<i>Actinomycetes</i>), algae (<i>Chlorella</i> and <i>Spirulina</i>), fungi (<i>Claviceps purpurea</i> and <i>Penicillium</i>), Pteridophytes (<i>Lycopodium</i>) and gymnosperms (<i>Ginkgo</i> , <i>Pinus</i> and <i>Ephedra</i>).	13
Unit III	Distinguishing features, phytochemistry and medicinal properties of the following plants. Whole plant - <i>Eclipta alba</i> and <i>Phyllanthus amarus</i> , Roots- <i>Withania somnifera</i> and <i>Rauwolfia serpentina</i> , Leaves - <i>Adhathoda vasica</i> and <i>Ocimum sanctum</i> , Rhizome - <i>Curcuma longa</i> , <i>C. aromatica</i> and <i>Zingiber officinale</i> .	13
Unit IV	Distinguishing features, phytochemistry and medicinal properties of the following plants. Bark - <i>Cinchona</i> and <i>Cinnomomum zeylanicum</i> , Flowers - <i>Syzigium aromaticum</i> and <i>Hibiscus rosasinensis</i> , Fruits - <i>Embllica officinalis</i> and <i>Terminalia chebula</i> , Seeds - <i>Myristica fragrans</i> and <i>Helianthus annus</i>	13
Unit V	History, classification, properties, distribution in nature, extraction, biosynthesis, biological role and applications of alkaloids and glycosides. Herbal formulations - Poultices and compresses - cultivation, harvesting and marketing of <i>Gloriosa superba</i> , <i>Vinca rosea</i> and <i>Aloe vera</i> . Ethno botany and conservation of medicinal plants.	13

Text Books:

1. Wallis T.E., 1985. Text book of Pharmacognosy, 5th edition, CBE publishers and distributors, New Delhi.
2. Ali M., 1997. Text book of Pharmacognosy, CBS publishers and distributors, New Delhi.
3. Kumar N.C., (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi.

Reference Books:

1. Gokhale S.B., Kokate C.K., Purohit A.P. 1982. Nirali Prakasham Publisher, Pune.
2. Kirtikar and Basu, 1980. Indian medicinal plants Vol. IV, Panni press, Allahabad.
3. Harborne J.B., 1998. Phytochemical methods – A guide to modern technique of plant analysis, 3rd edn., Chapman & Hall, UK.
4. Wijeskera R.O.B., 1991. The medicinal plant industry, CRC press, Boston, London.

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Dr. A. Logamadevi	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY510	Title : GENETIC ENGINEERING	
Semester: 5		
Hrs/Week :	5	Credit: 4
Objectives	To study the basic principles of Genetic engineering To learn the tools and techniques in Genetic engineering	

Unit	Content	Hrs
Unit I	Scope and history of genetic engineering - molecular tools in genetic engineering: restriction endonucleases, ligases, phosphatases, methylases, and kinases.	13
Unit II	Host cells - vectors- nomenclature - properties of good vector – types of vectors – plasmid (T _i , PBR ₃₂₂ & pUC18), bacteriophage (λ phage) - artificial chromosome vectors (BAC & YAC) - transposable elements.	13
Unit III	Gene transfer methods: CaPO ₄ and liposome mediated – direct transfer (transformation, transduction, electroporation and microinjection)– construction of genomic and cDNA libraries – amplification of DNA - polymerase chain reaction (PCR)	13
Unit IV	Selection and screening of rDNA – DNA hybridization – DNA probes - blotting techniques (southern, northern and western blots) - molecular markers (RAPD, RFLP and SNPs).	13
Unit V	Applications of genetic engineering in Biotechnology- DNA Finger printing technique and its applications – DNA barcoding – Biochip- DNA vaccine - recombinant DNA safety guidelines.	13

Text Books:

1. Dubey R.C., 1995. A text book on Biotechnology (2nd Ed), S. Chand & Company Ltd., New Delhi.
2. Gupta P. K., 2001. Elements of Biotechnology, Rastogi Publications. Meerut.
3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.

Reference Books:

1. Brown T.A., 1995. Gene Cloning- an introduction. Chapman and Hall Publications (3rd Ed). New York.
2. Desmond S.T. Nicholl, 2004. An Introduction to Genetic Engineering (2nd Ed). Cambridge University Press.
3. Freifelder D., 1994. Molecular Biology, Narosa Pub. Inc., Boston, London.
4. Freifelder D., 1998. Microbial Genetics. Jones and Barlette Pub. Inc., Boston

5. Glick B.R. and Pastumak, J.J., 1998. Molecular Biotechnology – Principles and application of recombinant DNA (2nd Ed) ASM Press, Washington.
6. Glover D.M., 1980. Genetic Engineering, Cloning DNA, Chapman and Hall, New York.
7. Nicholl Desmond S.T., 2002. An Introduction to Genetic Engineering (Second Edition), Cambridge University Press.
8. Old R.W. and Primrose S.B., 1993. Principles of Gene manipulation an introduction to Genetic engineering, Blackwell Scientific Publications.
9. Primrose S.B. and Twyman R.M., 2008. Gene Manipulation. Blackwell Pub. USA.

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Dr. K. Rajalakshmi	Dr. R.Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY511	Title : ELECTIVE I - MATHEMATICS FOR BIOLOGISTS	
Semester: 5		
Hrs/Week :	5	Credit: 5
Objectives	To acquire basic knowledge in mathematics To teach tools and techniques in Biostatistics To introduce the application of computers in Biostatistics	

Unit	Content	Hrs
Unit I	Maths in Biology – manipulating numbers – units and conversion – molarities and dilutions – areas and volumes – exponents and logs.	13
Unit II	Matrices – types - addition – subtraction - multiplication – determinants – inverse matrix – solving a system of linear equations.	13
Unit III	Biostatistics – introduction - techniques: <i>Frequency distribution</i> - collection, analysis and graphical representation of data - measures of central tendency: mean, median and mode - measures of dispersion: range, standard deviation, coefficient of variation and correlation.	13
Unit IV	<i>Theoretical distribution</i> – binomial, poisson and normal distribution - <i>Test of significance</i> - Chi-square test – test for goodness of fit (2x2 contingency table, yate's correction to be omitted) - Student 't' test – ANOVA (one way classification).	13
Unit V	Softwares for biostatistics – MS Office - Word & Powerpoint - Excel: spreadsheet – formula bar - standard deviation – correlation – t- test – Chi square test – ANOVA (one way) – charts.	13

Note: Special instruction to question setters: In either or type of questions in sections B and C, one must be a problem and the other will be a question for descriptive answer.

Text Books:

1. Alexis Leona and Mathews Leon, 1999. Introduction to computers. Leon Tech World, Chennai.
2. Cann Alan J., 2003. Maths from scratch for Biologists. John Wiley & Sons Ltd., Chichester, England.
3. Gurumani, N., 2005. An introduction to Biostatistics. MJP Publishers, Chennai.

Reference Books:

1. Manicavachagom Pillay, T.K., T. Natarajan and K.S. Ganapathy, 2006. Algebra Vol.II. S. Viswanathan (printers & publishers) Pvt Ltd., Chennai.
2. Prasad, S., 2001. Elements of Biostatistics. Rastogi publications, Meerut.
3. Edward Batschlet, 1973. Introduction to mathematics for life sciences. Springer Verlag, New York.

4. Pranab Kumar Banerjee, 2004. Introduction to Biostatistics. S. Chand & Company Ltd., New Delhi.
5. Schwartz J.T., 1961. Introduction to matrices and vectors. McGraw Hill Book Company, INC., New York.
6. Simons S., 1964. Vector analysis for mathematicians, scientists and engineers. Pergamon press, The Macmillan Company, New York.

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Dr. R. Kannan	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code :	15UBY5S1	Semester: 5
Title :	SKILL BASED ELECTIVE (MAJOR) – MICROSCOPIC TECHNIQUES	
Hrs/Week :	1	Credit: 2
Objectives	To study the principles and applications of microscopy and microtomy	

Unit	Content	Hrs
Unit I	Microscopy – optical principles – light sources – eye piece and lenses – condenser – ergonomics.	3
Unit II	Working principles and types of microscopes – compound – dark field – SEM – TEM.	3
Unit III	Microscopic techniques – sample preparation – sectioning – fixation – staining – slide preparation – smear – squash – maceration – whole mount.	2
Unit IV	Micrometry- ocular and stage –microscopic drawings, camera lucida, microtome- types and working principles	2
Unit V	Photo micrographic techniques – microphotography – photographic processing – developing – printing – computerized microscopy.	2

Text Books:

1. Johanson D.A., 1940. Plant Microtechnique Tata Mc Graw Hill, New York.
2. Sase john E., 1964. Botanical Microtechnique - Oxford & IBH.
3. Gray P., 1964. Hand book of Basic Microtechniques – Mc Graw hill, New York.

Reference Books:

1. Alan Peacock H., 1966. Elementary Microtechnique, Edward Arnold publishers Ltd.UK
2. Prescott L.M., J.P. Harley and C.A. Klein, 2003. Microbiology, 5thEdition McGraw Hill Publishing Company Limited. New York.
3. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2004. Microbiology. 5th Edition. Tata McGraw-Hill Publishing Company. New Delhi

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Dr. A. Logamadevi	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY5S2 Title : SKILL BASED ELECTIVE (MAJOR) MUSHROOM CULTIVATION		Semester: 5
Hrs/Week :	1	Credit: 2
Objectives	To understand and acquire knowledge on the importance of edible mushrooms and its cultivation methods.	

Unit	Content	Hrs
Unit I	Introduction mushroom cultivation: General characters, classification and structure of mushrooms – Identification of mushrooms.	2
Unit II	Uses of mushroom: Nutritive and food value, Medicinal value – Poisonous mushroom.	2
Unit III	Mushroom culture techniques: spawn preparation - medium preparation -spawn running - incubation. Cultivation methods.	3
Unit IV	Post harvest operations: Harvesting – storage and preservation – spoilage of mushrooms - packing – marketing.	3
Unit V	Mushroom recipes: Mushroom soup, sandwich, gravy, omelette, mushroom chilly, manchurian and briyani.	2

Text Books:

1. Nita bahl, 1988. Hand book of mushrooms, Vol. II, IBH publishers.
2. Kannian, 1980. Text book of Mushroom, Today and Tomorrow publishers, Chennai.

Reference Books:

1. Pathak V.N., Yadav N. and Gour M., 2000. Mushroom production and processing technology, Agrobios (India) Ltd.
2. Chang S.T. and N.A. Hayer, 2002. The biology and cultivation of edible mushrooms.
3. Reeti Singh and U.C. Singh, 2005. Modern Mushroom cultivation, Agrobios (India) Ltd.

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Dr. E. Neelamathi	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY612 Title : PLANT PHYSIOLOGY		Semester: 6
Hrs/Week :	5	Credit: 4
Objectives	To know the cellular functions of plants To understand the physiological functions of plants	

Unit	Content	Hrs
Unit I	Water relations - osmosis - absorption of water - water potential and its components - active and passive absorption of water - mineral nutrition - mechanism of ion uptake - role of elements and their deficiency symptoms.	13
Unit II	Transpiration - its kinds, significance and factors - stomatal mechanisms - theories of ascent of sap - translocation of food - photosynthesis - light and dark reactions C_3 - C_4 - CAM pathways - photorespiration.	13
Unit III	Respiration - aerobic and anaerobic - glycolysis - Krebs' cycle - electron transport system (ETS). Nitrogen metabolism - nitrogen cycle - biological nitrogen fixation - symbiotic and asymbiotic. Protein synthesis - Role of nucleic acids.	13
Unit IV	Plant growth and development - growth regulators - auxins, gibberellins, kinetins, ethylene and ABA. Physiology of flowering - photoperiodism - senescence - abscission - Programmed Cell Death (PCD).	13
Unit V	Stress physiology: drought resistance - salt resistance - cold resistance. Plant movements: movements of locomotion - movements of curvature - movements of hygroscopy - seed dormancy.	13

Text Books:

1. Verma 1984. Plant physiology. Allied publishers, New Delhi.
2. Jain V.K., 2008. Fundamentals of Plant Physiology. S. Chand & Company Ltd., Ram Nagar, New Delhi.

Reference Books:

1. Bidwell R.G.S., 1982. Plant physiology. Collier Mac Million International edn.
2. Devlin R.M., 1969. Plant Physiology. CBS Publishers & Distributors.
3. Salisbury Frank and L.W. Ross, 1986. Plant physiology. CBS Publishers
4. Srivastava, 1982. Plant physiology, CBS Publishers & Distributors.

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Dr. M. Latha Isabel	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code :	15UBY613	Semester: 6
Title	: MICROBIOLOGY AND PLANT PATHOLOGY	
Hrs/Week :	5	Credit: 4
Objectives	To know the microbial biodiversity To learn the techniques in bacteriology and immunology To know plant diseases and its control	

Unit	Content	Hrs
Unit I	Bacteriology: Bacteria - morphology and ultra structure – major features – nutritional types – bacterial respiration - growth and reproduction – economic importance - culture media and techniques (spread plate, pour plate and streak plate).	13
Unit II	Virology: Virus – characteristics - ultra structure, shape, classification (bacterial, plant and animal viruses) - transmission and reproduction (HIV, Rabies & T4 Phage).	13
Unit III	Immunology: host microbe interaction – immunity and immune system - antigen, antibody and vaccines - antibiotics - source and mode of action of penicillin and streptomycin - control of microorganisms - chemotherapy.	13
Unit IV	Food and water microbiology: microbial flora of fresh food - food spoilage and poisoning (botulism) - food preservation- microbial flora of milk - pasteurization and dairy products - cheese production- production of ethanol, vinegar and citric acid. Microbiology of water - detection of coliforms - MPN and MFT.	13
Unit V	Plant pathology: Introduction - brief history - classification of plant diseases - Koch's postulate - symptoms, causal organism and control measures of bacterial (citrus canker), fungal (tikka disease of ground nut, paddy blast, and red rot of sugarcane) and viral (TMV) diseases – biocontrol - biopesticides.	13

Text Books:

1. Dubey R.C. and D.K. Maheswari, 2010. A Text book of Microbiology 3rd Edition, S. Chand and Company, New Delhi.
2. Modi H.A., 1996. Elementary Microbiology. Vol.2, AKTA Prakashan Nadiad. Gujarat
3. Powar C.B. and H.F. Dagainawala, 2008 .General Microbiology. Volume: II. Himalaya Publishing House.
4. Singh R.P. 2007. General Microbiology. Kalyani Publishers, New Delhi.
5. Frobisher H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. 2005. Fundamentals of Microbiology, Saunder and Company, London

Reference Books:

1. Pelczar J.R., R.D. Reid and E.C.S. Chan, 1983. Microbiology (4th ed.) Tata Mc Graw Hill Publishing Company Pvt. Ltd., New Delhi.
2. Atlas R.M., 1996. Principles of Microbiology. W. C. Brown Publishers
3. Prescott L.M., J.P. Harley and C.A. Klein, 2003. Microbiology, 5th Edition Mc Graw Hill Publishing Company Limited. New York.
4. Salle A.J., 2007. Fundamental Principles of Bacteriology. 7th Edition, Envins Press New York
5. Jayaraman J., 2006. Laboratory Manual in Biochemistry, 1st Edition, New Age International P Ltd, Publishers New Delhi
6. Stanier R.Y., J.L. Ingraham, M.L. Wheelis and P.R. Painter, 2007. General Microbiology, Macmillan Press Ltd., London.

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY614	Title : PLANT BIOTECHNOLOGY	
Semester: 6		
Hrs/Week :	5	Credit: 4
Objectives	To acquire knowledge on plant tissue culture To study the role of Biotechnology in food, agriculture and pharmaceutical industries.	

Unit	Content	Hrs
Unit I	Introduction to plant tissue culture – concept of totipotency and pluripotency - sterilization techniques – solid & liquid medium (MS medium, Whites medium) – callus and cell suspension culture.	13
Unit II	Micropropagation – stages of micropropagation – applications - meristem culture – somatic embryogenesis – principle and applications of somaclonal variation, synthetic seeds & cryopreservation.	13
Unit III	Embryo rescue - embryo culture – haploid production – anther culture – pollen culture – protoplast isolation, fusion and culture – somatic hybridization – cybrids.	13
Unit IV	Genetic engineering in plants: Mechanism of T-DNA transfer – <i>Agrobacterium</i> mediated gene transfer – selectable markers – marker assisted gene transfer.	13
Unit V	Production of transgenic plants – disease resistant (Bt gene) – herbicide resistant (round up soya) – golden rice (β carotene gene) – <i>Flavr savr</i> tomato – plantibodies – Intellectual Property Rights (IPR).	13

Text Books:

1. Chawla H.S., 2000. Introduction to Plant Biotechnology, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
2. Ramawat K.G., 2001. Plant Biotechnology, S. Chand & Company Ltd, New Delhi.
3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.

Reference Books:

1. Street H.E., 1977. Plant tissue culture, Blackwell Scientific Publications, London.
2. Trigiano R.N. and Gray D.J., 1996. Plant tissue culture – concepts and laboratory exercises. CRC Press, Newyork.
3. Ignacimuthu S., 1996. Applied Plant Biotechnology, TataMcGraw Hill Publishing Company Ltd, New Delhi.

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Dr. K. Rajalakshmi	Dr. R.Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY615	Title : ELECTIVE – II - BIOINFORMATICS	
Semester: 6		
Hrs/Week :	5	Credit: 5
Objectives	To introduce classical bioinformatics theory to students To focus computer science techniques used in biological studies	

Unit	Content	Hrs
Unit I	Introduction to computers - components of computers – input devices – output devices - storage devices - operating system - DOS/WINDOWS/LINUX - computer languages - machine language – assembly language - high level languages - translators – compilers.	13
Unit II	Computer languages for bioinformatics - HTML – structure – tags – formatting – hyperlink – graphics; C language – history – features of C – structure of C program – character set – key words – data types – constants, variables – statements – functions.	13
Unit III	Introduction to internet - data communication concept – LAN / WAN / WWW – e-mail & FTP - Bioinformatics - definition - biological database (generalized & specialized) - nucleic acid database - protein database - genome database - bibliographic resources and literature database - bioinformatics servers.	13
Unit IV	Searching techniques – ENTREZ - sequence analysis tools - sequence alignment - pairwise alignment (BLAST) – multiple sequence alignment (CLUSTAL X) - phylogenetic analysis – tree building and tree analysis.	13
Unit V	Protein prediction - primary structure prediction - secondary structure prediction – bio molecular visualization (RASMOL) – drug discovery - target and lead discovery - Computer Aided Drug designing (CAD).	13

Text Books:

1. Lesk A.M., 2002, Introduction to Bioinformatics, Oxford University Press, Oxford.
2. Parthasarathy S., 2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002 Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

Reference Books:

1. Chakraborty C., 2004, Bioinformatics Approaches and Application. Chawla offset printers – Delhi.

2. Westhead D.R., J. Parish and R.M. Twyman, 2003. Bioinformatics (instant notes)
Viva books private limited – New Delhi.
3. Khan I.A. and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz
Publications.

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Dr. R.Kannan	Dr. R.Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY616 Title : ELECTIVE III- HABITAT ECOLOGY	Semester: 6	
Hrs/Week :	5	Credit: 5
Objectives	To know the uniqueness of the varying habitats in the biosphere To acquire the knowledge about the structure and functions of different ecosystems To learn the techniques for environmental assessment and ecological dynamics.	

Unit	Content	Hrs
Unit I	Introduction to habitat ecology: historical, ecological & evolutionary perspectives - habitat concepts (edge, ecotones, interspersions and juxtaposition) - units of vegetation – succession.	13
Unit II	Ecology of major habitats: forest (tropical rain forest, deciduous and coniferous) – scrub jungle and deserts (hot, dry and cold deserts) – grasslands (temperate and tropical).	13
Unit III	Ecology of major habitats: aquatic (fresh water - lentic & lotic) – marine (coasts, estuaries, phytoplankton and phytobenthos, mangroves and coral reefs.) – tundra (arctic and alpine).	13
Unit IV	Physical and anthropogenic factors influencing habitats - habitat degradation and fragmentation - Environmental Impact Assessment (EIA) - environmental audits - Environmental Legislations and Regulations.	13
Unit V	Inventory of unique habitats and their distribution - Remote Sensing (RS) and Geographical Information System (GIS) - principles and applications of remote sensing techniques - cover classification and mapping - use and values of GIS approaches to habitat ecology.	13

Text Books:

1. Odum E.P.(ed), 1971. Fundamentals of Ecology, W.B. Saunders Company, Philadelphia.
2. Sharma P.D., 1997. Ecology and Environment, Rastogi Publications, Meerut.
3. Dash M.C., 1993. Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.
4. Agarwal K.C., 1989. Environmental Biology, Agro Botanical Publishers (India), Delhi.
5. Ananthakrishnan T.N., 1987. Bioresources Ecology, Oxford and IBH, New Delhi.
6. Kormondy E.J., 1999. Concepts of Ecology, Prentice Hall, New Delhi.

Reference Books:

1. Leonard Ortolano, 1997. Environmental Regulation and impact Assessment. John Wiley & Sons, Inc.

2. Cadogan A. and G. Best, 1992. Environment and Ecology, Nelson Blackie, Glasgow.
3. Lenihan J. and W.W. Fletcher, 1977. Environment and Man, Vol IV. The Chemical Environment, Blackie, London.
4. Pandian T.J., 2000. Biodiversity: Status and Endeavours of India, UNESCO sponsored international workshop on Biodiversity, Ghent University, Belgium, pp. 3-6
5. Subrahmanyam N.S., and Sambamurthy, A.V.S., 2001. Ecology, Narosa Publishing House, New Delhi.

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Dr. R.Kannan	Dr. R.Kannan		

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY617 Title : MAJOR PRACTICAL - III (for V sem theory papers)		Semester: 6
Hrs/Week :	2	Credit: 4
Objectives	To learn the plant systematics and herbarium techniques To study the physiological processes in the plant system To acquire practical knowledge on plant tissue culture and genetic engineering	

Unit	Content	Hrs
Unit I	Taxonomy of Angiosperms and Economic Botany Detailed study, description of floral parts of the plant families included in theory paper. Field trip, collection of plants and submission of herbarium 20 sheets. Economic importance of fibre yielding plants, oil yielding plants, pulses, cereals, spices and condiments.	6
Unit II	Herbal Botany Identification of morphology, phytochemistry and medicinal uses of plants included in the theory. Submission of five herbarium sheets of medicinal plants. Demonstration: Herbal formulations. Genetics - Solving problems on mendelian inheritance and interaction of genes. - Charts and diagrams from genetics. Genetic Engineering Charts/spotters on Genetic Engineering	5
Unit III	Mathematics for Biologists: Simple problems on - manipulating numbers - units and conversion - molarities and dilutions - areas and volumes - exponents and logs - matrices and determinants.	5
Unit IV	Bio- Statistics: - Collection, analysis and graphical representation of data - measures of central tendency - mean, median and mode - measures of dispersion: range, standard deviation, coefficient of variation correlation - Test of significance - Chi-square test and Student 't' test.	5

Unit V	Application of software in Biostatistics: • Simple exercises in MS- Word • Presentation in MS-Powerpoint • Statistical calculations and chart preparation in MS-Excel • Creation of database in MS-Access.	5
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Dr. M. Latha Isabel	Dr. R.Kannan		
Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY618 Title : MAJOR PRACTICAL - IV(For VI sem theory papers)		Semester: 6
Hrs/Week :	2	Credit: 4
Objectives	To acquire basic knowledge in mathematics & biostatistics To create programs for bioinformatics To understand bioinformatics tools	

Unit	Content	Hrs
Unit I	Plant physiology Individual experiments: 1. Estimation of water potential (DPD) by liquid immersion method and plasmolytic method. 2. Determination of stomatal frequency and index. 3. Determination of rate of transpiration - Cobalt chloride, Ganongs potometer. 4. Determination of rate of photosynthesis under different CO₂ concentrations & different light intensities using wilms bubble 5. Peroxidase activity in potato and amylase activity in rice. 6. Lipid estimation by gravimetric method. 7. Pigment separation using TLC and paper chromatography.	6
Unit II	Plant physiology demonstration experiments: 1. Effect of environmental factors on the rate of transpiration using Ganong's potometer. 2. Light screen experiment 3. Soil nitrification 4. Determination of respiratory quotient 5. Essentiality of mineral elements on plant growth – Hydroponics	5
Unit III	Plant Biotechnology Charts/spotters on Plant biotechnology and transgenic plants Demonstration 1. Media for plant tissue culture 2. Callus induction 3. Regeneration of plantlet Microbiology Demonstrations: 1. Culture media preparation 2. Pure culture techniques (streak plate, pour plate and spread	5

	plate) 3. Methylene Blue Reductase Test 4. Instrumentation and sterilization techniques Individual experiments 1. Smear preparation 2. Simple staining 3. Differential staining 4. Hanging drop experiment 5. Pure culture techniques Charts: Ultra structures of Bacterium, HIV, Rabies, T4 phage, Antigen and Antibody. Pasteurization process Plant pathology Specimens/charts/ of diseases: Citrus canker, Red rot of sugar cane, Tikka disease of ground nut Paddy blast and TMV	
Unit IV	Bioinformatics: 1. Programming using HTML 2. Designing and editing of web page, 1. Writing programs using C. 2. Searching and retrieval of biological database. 3. Bibliographic searching using ENTREZ 4. Sequence alignment 5. Gene finding 6. Protein prediction 7. Molecular visualization	5
Unit V	Habitat Ecology 1. Vegetation study by Quadrat and Line transect method 2. Estimation of plant biomass 3. Determination of dissolved oxygen 4. Estimation of CO ₂ in selected water samples 5. Determination of Total Dissolved Solids 6. Spotters and charts on Habitat ecology.	5

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Dr. R. Kannan	Dr. R. Kannan		
Dr. E. Neelamathi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBYS6S3		Semester: 6
Title : SKILL BASED ELECTIVE (MAJOR): BIOFARMING		
Hrs/Week :	1	Credit: 2
Objectives	To learn the concept and simple techniques in organic farming	

Unit	Content	Hrs
Unit I	Biofarming – organic farming – introduction – concept – conventional Vs organic farming	3
Unit II	Organic manuring – farmyard manure – green manure – <i>panchakavya</i> - fish tonic – horn manure – composting – vermicomposting.	3
Unit III	Water and weed management practices – mulching – dry mulching, green mulching, live mulching – stone mulching.	2
Unit IV	Integrated plant protection management – biofence – companion plants – herbal pest repellants- neem formulations – bacterial and fungal biopesticides.	2
Unit V	Organic crops certification – requirements – procedure – validity – labeling- organic crops marketing.	2

Text books:

1. Pawar R.K., 2009. Organic farming for Sustainable Horticulture. Oxford Book Company, India.
2. Arun K. Sharma, 2004. Biofertilizers for Sustainable Agriculture. Agrobios India Ltd, Jodhpur.

Reference Books:

1. Arun K. Sharma, 2004. A Handbook of Organic farming. Agrobios India Ltd, Jodhpur.
2. Dahama A.K., 2009. Organic farming for Sustainable Agriculture. Agrobios India Ltd, Jodhpur

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Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2015
Subject Code : 15UBY6S4 Title : SKILL BASED ELECTIVE (MAJOR) – HORTICULTURE AND PLANT BREEDING		Semester: 6
Hrs/Week :	1	Credit: 2
Objectives	To study the basic principles of horticulture To learn the techniques of plant propagation To know the methods and practices in plant breeding	

Unit	Content	Hrs
Unit I	Scope – methods of vegetative propagation – cutting – layering – grafting – manures – fertilizers – irrigation.	3
Unit II	Gardening – important ornamentals – habits and types – types of garden – kitchen garden – public garden – garden components – lawn – glass house – rockery – water garden - topiary.	3
Unit III	Production technology – plant protection measures for horticultural crops – cultivation of vegetables (Brinjal) – flowers (Jasmine).	2
Unit IV	Commercial horticulture – papain – bonsai – flower arrangement – cut flowers – preservation of fruits and vegetables.	2
Unit V	Plant breeding – objectives – plant selection – plant introduction – hybridization – achievements in crop breeding – sugarcane.	2

Text Books:

1. Mani Bhusan Rao, 1964. Text book of Horticulture. Macmillan India Ltd., Newdelhi.
2. Sharon Pastor *et al.*, 2010. Basics of Horticulture, Oxford Book Company, Jaipur.
3. Singh P., 1996. Plant Breeding. Kalyani publishers, NewDelhi.

Reference Books:

1. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
2. George Acquaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
3. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.
4. Shukla R.S. and P.S. Chandal, 1998. Cytogenetics Evolution and Plant Breeding. Chand & Company Ltd. NewDelhi.
5. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

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