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)

2019 – 2020

DEPARTMENT OF BOTANY

POOMPUHAR COLLEGE (AUTONOMOUS) MELAIYUR

Modified Syllabus (With Applicable for 2019 – 2020 Onwards) COURSE STRUCTURE

FOR UG COURSE - 2019 – 2020

Plant Biology and Plant Biotechnology

Semester	Subject	Hours	Credit	Exam	Marks		Total
					Intn.	Extn.	
I	Tamil 1	6	3	3	25	75	100
	English 2	6	3	3	25	75	100
	First Allied 1 (Zoology)	5	4	3	25	75	100
	First Allied Prac.-1	3	-	-	-	-	-
	Core course 1 (Algae, Fungi and Lichen)	5	5	3	25	75	100
	Core course- 2 practical.-1	3	-	-	-	-	-
	Value education	2	2	3	25	75	100
		30	17				
II	Tamil- 2	6	3	3	25	75	100
	English -2	6	3	3	25	75	100
	First Allied- Practical 1	3	4	3	40	60	100
	First Allied -3	5	3	3	25	75	100
	Core course -2 Practical -1	3	5	3	40	60	100
	Environmental studies	2	2	3	25	75	100
	Core course-3 (Bacteria, Virus & Plant pathology)	5	5	3	25	75	100
		30	25				
III	Tamil – 3	6	3	3	25	75	100
	English – 3	6	3	3	25	75	100
	Core Course -4 (Bryophyta, Pteridophyta, Gymnosperms and palaeobotany)	5	5	3	25	75	100
	Core course -5 practical – 2	3	*	*	*	*	*

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

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

POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR

COURSE STRUCTURE FOR ALL UG DEGREE COURSES

(Applicable to the candidates admitted from the academic year 2019 – 2020 onwards)

PART	NAME OF THE PAPERS	NUMBER OF PAPERS	CREDITS
I	TAMIL	04	12
II	ENGLISH	04	12
III	CORE (INCLUDING OPTIONAL)	16	78
	FIRST ALLIED	03	10
	SECOND ALLIED	03	10
IV	NON-MAJOR ELECTIVE	02	04
	SKILL BASED ELECTIVE	03	06
	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**

PROGRAMME OUTCOMES (POs):

Students upon the completion of B.Sc., Degree Programme will be able to

PO – 1 :

Reflect upon green initiatives and take responsible steps to build a sustainable environment.

PO – 2 :

Make success in competitive examinations in science and achieve a rewarding career.

PO – 3 :

Apply the acquired scientific knowledge to face day to day necessities

PO – 4 :

Pertain skills in science and apply in life and entrepreneur action plans

PO – 5 :

Enhance their capacity to obtain employment and higher studies in science

PROGRAMME SPECIFIC OUTCOMES (PSOs):

The specific objectives of B.Sc., Botany Programme are to

PSO – 1 : Imporance of Plants to other life forms

Enrich the knowledge on diversity, life patterns of plants and their importance to other life forms.

PSO – 2 : Career Development

Utilize the theoretic and practical knowledge of Botany in achieving a successful career.

PSO – 3 : Entrepreneurship

Impart the knowledge obtained from the programme to develop their entrepreneurship skills in self supported or funded business /giving consultancy

PSO – 4 : Communication

Communicate appropriately and effectively in botanical science and also interact productively with people from diverse background

PSO – 5 : Research and Higher Studies

Impart the basic laboratory experiments and hands on training perceived will pave way to advanced research and higher studies

DEGREE OF BACHELOR OF SCIENCE IN BOTANY

1. Eligibility for Admission

A candidate who has passed Higher Secondary Examination in Academic or vocational stream with Botany under higher secondary board of examination, Tamil Nadu or an examination accepted as Equivalent there to by the syndicate subject to such conditions as may be prescribed there to are permitted to appear and qualify for the B.Sc degree examination of this university after a course of study of three academic years.

2. **Duration of the Course**

The course for the degree of Bachelor of Science shall consist of three academic years divided into six semesters.

3. Medium of Instruction: English

4. Pass Mark Particulars

THEORY

Particular	Maximum marks	Passing minimum (CIA) 40% Marks
University Semester Examination (ESE)	75	30
Continuous Internal Assessment (CIA)	25	10

Classification of Internal Assessment Structure

Particulars	Marks
Average of Best two from III Internal Examinations	**15**
Average of 2 Assignments & 1 Seminar Marks	**5**
Attendance	**5**
Total	**25**

PRACTICAL

Particular	Maximum marks	Passing minimum (CIA) 40% Marks
University Semester Examination (ESE)	75	30
Continuous Internal Assessment (CIA)	25	10

First Year **CORE COURSE –1** **Semester- I**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M1	ALGAE, FUNGI & LICHENS		5	-		-	5	5	25	75	100

	Learning Objectives
1	Understand the variations in the features of plant groups Algae, Fungi and Lichens
2	Extend their knowledge on distribution and life cycle of these plant groups.
3	Find the significance of these plant groups to human welfare
4	Develop interest in the study of fungal pathogens
5.	Understand the variations in the features of plant Algae, Fungi and Lichens

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 U*snea*

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Relate to the structural organization, reproduction and significance of algae fungi and lichen.	K3
CO 2	Demonstrate knowledge in understanding the various life cycle patterns and the fundamental concepts in algal, fungal and Lichen growth	K4
CO 3	Explain the benefits of various algal technologies on the	K4

	ecosystem	
CO 4	Compare and contrast the thallus organization and modes of reproduction in algae fungi and lichen.	K3
CO 5	Determine the emerging areas of Algal Biotechnology for identifying commercial potentials of algal products and their uses.	K4

REFERENCE:

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.

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	3	2	3	3
CO3	2	3	3	2	2
CO4	2	2	3	3	2
CO5	3	2	3	2	3

First Year **CORE COURSE – 3** **Semester - II**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M3	BACTERIA, VIRUSES AND PLANT PATHOLOGY		5	-		-	5	5	25	75	100

	Learning Objectives
1	Recognize the general characteristics of microbes and disease symptoms.
2	Develop an understanding of microbes and appreciate their adaptive strategies based on structural organization
3	Identify the common plant diseases, according to geographical locations and device control measures
4	Enable to learn various cell structures and functions of prokaryotes and eukaryotes and understand the salient features and functions of cellular organelles.
5.	Determine the economic importance of bacteria and virus

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, Algae, Fungi and Lichens 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
- **Course Outcomes: Students will be able to:**

CO No.	CO Statement	Knowledge level
CO 1	Recognize the general characteristics of microbes and disease symptoms.	K4
CO 2	Develop an understanding of microbes and appreciate their adaptive strategies based on structural organization	K3
CO 3	Identify the common plant diseases, according to geographical locations and device control measures	K4
CO 4	Enable to learn various diseases and control measures.	K3
CO 5	Determine the economic importance of bacteria and virus	K4

REFERENCE:

Sistrom, W.R., (1962), Microbial life. Holt, Rinchart Winson

Biswas,S.B., and Biswas, A., (1976), An introduction to virus, Vikas publishing House Pvt. Ltd.

Pelzer, J, Chan,E.S., and Kriez,R., (1998), Microbology, Tata McGraw and Hill New Delhi.

Dube., H.C., (1978), Atext of fungi, bacteria and viruses, Vikas Publishing house (P) Ltd.,

Rangaswami, G. & Bhagyaraj, D. J., (1993), Agricultural Microbiology – Prentice Hall of India (P) Ltd., New Delhi.

Bilgrami, K.S. and H.C. Dube, (1990). AText Book of Plant Pathology, Vikas Publishing house (P) Ltd., New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

First Year **CORE COURSE – 2** **Semester - II**

PRACTICAL - 1

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M2P	ALGAE, FUNGI, LICHENS, BACTERIA, VIRUSES AND PLANT PATHOLOGY		5	-		-	5	3	25	75	100

	Learning Objectives
1.	To develop skills to identify algae based on habitat, thallus structure and the internal organization.
2.	To understand importance of algae, to animals and humans.
3.	To identify microalgae in a mixture.
4.	Enable to learn various cell structures and functions of prokaryotes and eukaryotes and understand the salient features and functions of cellular organelles.
5.	Determine the economic importance of bacteria and virus

Course Objectives

1. To develop skills to identify algae based on habitat, thallus structure and the internal organization.
2. To identify microalgae in a mixture.
3. To develop skills to prepare the micro slides of algae,
4. To study the economic importance of few species.
5. To understand importance of algae, to animals and humans.
6. **Course Outcomes: Students will be able to:**

CO No.	CO Statement	Knowledge level
CO 1	Identify microbes, fungi and lichens using key identifying characters	K4
CO 2	Develop practical skills for culturing and cultivation of fungi.	K3
CO 3	Identify and select suitable control measures for the common plant diseases	K4
CO 4	Analyze the characteristics of microbes, fungi and plant pathogens	K3
CO 5	Analyze the characteristics of microbes, fungi and plant pathogens.	K4

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	3	2
CO2	2	3	2	2	3
CO3	2	2	3	2	3
CO4	2	3	3	2	2
CO5	2	2	3	2	3

Second Year **CORE COURSE – 4** **Semester - III**

Course Code	Title of the Course	Categor y	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M4	BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY		5	-		-	5	5	25	75	100

	Learning Objectives
1	To understand the general characteristics of bryophytes, pteridophytes, gymnosperms and palaeobotany.
2	Identify the common plants, according to geographical locations.
3	Develop knowledge about thallus structure and cell variation.
4	Enable to learn various salient features and functions of pteridophytes.
5.	Develop critical understanding on fossil evidence.

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recognize the general characteristics of bryophytes, pteridophytes, gymnosperms and palaeobotany.	K3
CO 2	Develop an understanding of thallophytes and appreciate their adaptive strategies based on structural organization	K3

CO 3	Identify the common plants, according to geographical locations.	K4
CO 4	Analyze the emerging trends in fungal biotechnology with special reference to agricultural and pharmaceutical applications.	K4

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.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Second Year **CORE COURSE – 6** **Semester - IV**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M6	ANATOMY AND EMBRYOLOGY		5	-		-	5	5	25	75	100

	Learning Objectives
1	Learn the importance of plant anatomy in plant production systems.
2	Develop an understanding of appreciate their adaptive strategies based on structural organization
3	Identify the Anamalous Secondary thickenings
4	Enable to learn various salient features micro and mega sporangium.
5.	Develop critical understanding on embryo and endosperm

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recognize the general characteristics of bryophytes, pteridophytes, gymnosperms and palaeobotany.	K4

CO 2	Develop an understanding of appreciate their adaptive strategies	K3
CO 3	Identify the Anamalous Secondary thickenings	K3
CO 4	Enable to learn various salient features micro and mega sporangium.	K4
CO 5	Relate the behavior of embryo. Analyse the different types of endosperm	K3

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 Library

Dutta, S.C. 1979. An Introduction to Gymnosperms Bishen Singh & Mehidra Pal Singh 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 (4^{th} Revised Ed.,) – Vikas Pub., House, New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	3	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Second Year **CORE COURSE – 5** **Semester - IV**

PRACTICAL – 2

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M5P	BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS PALAEOBOTANY ANATOMY AND EMBRYOLOGY		5	-		-	5	2	25	75	100

	Learning Objectives
1.	To develop skills to identify plant tissue
2.	To understand importance of simple and complex tissue.
3.	To identify Anomalous secondary thickenings.
4.	Enable to learn various cell structures and functions
5.	Determine the whole mounts and Isolation and Mounting of Embryo

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Identify skills to identify plant tissue	K4
CO 2	Develop practical skills for simple and complex tissue.	K3
CO 3	Identify and select Anomalous secondary thickenings	K4
CO 4	Analyze the various cell structures and functions	K3
CO 5	Analyze the whole mounts and Isolation and Mounting	K4

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	3	3
CO2	2	3	2	2	3
CO3	2	2	3	2	3
CO4	2	3	3	2	2
CO5	3	2	3	2	3

Second Year **SBE– I** **Semester-IV**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13SBE -1	HORTICULTURE AND GARDEN DESIGNING		5	-		-	2	2	25	75	100

	Learning Objectives
1	Learn the importance of Horticulture
2	Develop an understanding of propagation technique
3	Develop practical skills of Layering, Grafting, Budding technique
4	Enable to learn various types of garden making.
5.	Develop critical understanding on Common diseases in Garden Plants and its control

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.

UNIT – V

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recognize the importance of Horticulture	K3
CO 2	Develop an understanding of propagation technique	K3
CO 3	learn various types of garden making	K4
CO 4	Develop critical understanding on Common diseases in Garden Plants and its control	K4

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,

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	3	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Third Year **CORE COURSE – 7** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M7	PLANT SYSTAMATIC & ECONOMIC BOTANY		5	-		-	5	5	25	75	100

	Learning Objectives
1	Establish their knowledge on different morphological features of flowering plants.
2	Understand different systems of classification of Angiosperm Plants
3	Comprehend the importance of Plant Nomenclature
4	Improve their skills to identify important flowering plants in around their location
5.	Learn the economic values of the flowering plants

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.

UNIT – 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.

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recognize the importance of plant morphology systems.	K3
CO 2	Develop an understanding of Binomial Nomenclature	K3
CO 3	common plant families and their Economic importance	K4
CO 4	Herbarium Preparation and role of herbarium in plant taxonomy	K4
CO 5	Develop critical understanding on Medicinal Plants	K3

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Third Year **CORE COURSE – 8** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M8	CELL AND MOLECULAR BIOLOGY		5	-		-	5	5	25	75	100

	Learning Objectives
1	To learn the basic structure of cell and cell organelles
2	To understand different stages of cell division
3	To figure out the structure and organization of DNA
4	To improve the knowledge of Genetics and Molecular basis of life
5.	To learn the basic structure of cell and cell organelles

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recognize the general characteristics and importance of Structure of Prokaryotic and Eukaryotic cells	K3
CO 2	Develop an understanding of Nucleus and cell division organization	K3
CO 3	Develop ba skill about Mendelian concepts	K4

CO 4	Analyze the emerging trends in Enable to learn Mapping of genes on the chromosomes	K4
CO 5	Develop critical understanding on Sex determination	K3

REFERENCE:

Sharma N.S. 2005, Molecular Cell Biology, International Book distributors, Dehradun.

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.

Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.

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De Robertis and De Robertis, 1998, Cell and Molecular Biology, K.M.Verghese and Company.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	3	2	3	3
CO3	3	2	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	2	3

Third Year **CORE COURSE – 9** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M9	**GENETICS & EVOLUTION**		5	-		-	5	5	25	75	100

	Learning Objectives
1	To understand the basics of Mendel's genetic ratios
2	To learn the genetic recombination and its effects
3	To learn the significance of plant genetic recombination
4	To comprehend the evolution and equilibrium concepts
5.	To understand the basics of Mendel's genetic ratios

Unit I

Genetics – Monohybrid and Dihybrid Ratios (mendel's Laws). Deviation from menelian ratio: Incomplete dominance (Mono and Dihybrid), lethal factor, complementary factor and epistasis (dominant), Multiple factor Hypothesis, multiple alleles – Blood groups.

Unit II

Linkage, crossing over, recombination, cytological proof of crossing over, mapping of genes on the chromosomes, sex linkage – Drosophila (eye colour) and humans (colour blindness), cytoplasmic inheritance.

Unit III

Sex determination in Drosophila, humans and plants – changes in chromosome structure, number and behavior, their genetic effects, polyploidy, types.

Unit IV

Biochemical genetics of Neurospora, Gene action. Gene units-cistron, recon, Muton, codon and operon. Gene mutation, physical and chemical and chemical mutagens. Mutation rate – its role in Evolution.

Unit V

Evolution – Evolutionary concepts in explaining the diversity of life. Theories of Lamarck, Charles Darwin and the modern synthetic theories.

COURSE OUTCOMES (Cos)	
On successful completion of the course students can	
CO1	Have a thorough understanding Mendelian Genetics and expression of alleles
CO2	Describe the recombination of eukaryotic genome and diseases linked with sex

	chromosomes
CO3	Attain knowledge on determination of sex and abnormalities of chromosomes
CO4	Depict and explain plasmids and recombination phenomenon
CO5	Describe population genetics and the process of evolution

REFERENCES

Sinnott, E.W., L.C.Dunn & J.Dobshansky (1958) :Principles of Genetics (5th Edition) McGraw Hill Publishing Co., N.Y. Toronto,London – 459 pp.,

Hexter, W. & H.T. Yost (Jr) (1977) : The Science of Genetics Prentice Hall of India (P) Ltd, New Delhi – 596 pp.,

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Winter, P.C., Hickey, G.I. & Fletcher, H.L (1999) : Instant Notes in Genetics Books (P) Ltd.,, New Delhi, Mumbai, Chennai – 342 pp.,

Agarwal., V.K (2000): Simplified course in Genetics (B.Sc., Zoology), S.Chand & Co., New Delhi – 168 pp.,

Verma, P.S., & V.K. Agarwal (1999): Concepts of Evolution S.Chand & Co., New Delhi– 148

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	3	2	3	3
CO3	3	2	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	2	3

Third Year **MBE -1** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13MBE-1	BIOMETRICS AND COMPUTER APPLICATIONS		5	-		-	4	5	25	75	100

	Learning Objectives
1	To know basic statistical analysis
2	To perform preparation table and graphs which are helpful in research studies
3	To know the principles and application of Instruments used in the field of Biology
4	To understand the concepts of Photobiology
5.	To know basic statistical analysis

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.

COURSE OUTCOMES (Cos)	
On successful completion of the course students can	
CO1	Have a thorough understanding Mendelian Genetics and expression of alleles
CO2	Describe the recombination of eukaryotic genome and diseases linked with sex chromosomes

CO3	Attain knowledge on determination of sex and abnormalities of chromosomes
CO4	Depict and explain plasmids and recombination phenomenon
CO5	Describe population genetics and the process of evolution

REFRENCES

N.Gurumani, 2004. An Introduction to Biostatistics, MJP publishers, Chennai

Bhanu Pratap.2004. Computer fundamentals I Ed. Cyber tech publications, New Delhi.

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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.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	3	2	3	3
CO3	3	2	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	2	3

Second Year **SBE– II** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13SBE -2	BIOFERTILIZER AND MUSHROOMCULTIVATION		4	-		-	2	2	25	75	100

	Learning Objectives
1	Learn the importance of Biofertilizer.
2	Develop an understanding of Symbiotic association – Mass cultivation
3	Enrich knowledge about culture technique
4	Enable to learn various salient features edible mushrooms
5.	Develop critical understanding on mushroom cultivation

UNIT –I

Biofertilizer – Definition, Kinds of microbes as biofertilizers, Rhizobium-legume Symbiotic assotiation – 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.

UNIT – IV

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

UNIT – 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.

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recall various types and categories of mushroom	K3
CO 2	Explain about various types mushroom industry.	K3
CO 3	Apply techniques studied for cultivation of various types of mushroom.	K4
CO 4	Understanding of Symbiotic association – Mass cultivation applications.	K4
CO 5	Analyze and decipher the environmental factors and economic value associated with mushroom cultivation	K3

References:

1. Sharma, A.K., 2003. Biofertilizers for sustainable agriculture, Agrobios.

2. NIIR Board, 2004. The complete Technology book on Biofertilizer and Organic Farming, National Institute of Industrial Research.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	3	2	3	3
CO3	3	2	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	2	3

Third Year **SBE -3** **Semester - V**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13SBE-3	**BIOINSTRUMENTATION AND BIOTECHIQUES**		4	-		-	2	2	25	75	100

	Learning Objectives
1	To provide an understanding of biological techniques.
2	To perform preparation table and graphs which are helpful in research studies
3	To know the principles and application of Instruments used in the field of Biology
4	To understand the concepts of Microscopes
5.	to understand the principle and applications of various instruments

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.

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	To provide an understanding of biological techniques.	K3
CO 2	To perform preparation table and graphs which are helpful in research studies	K3

CO 3	To know the principles and application of Instruments used in the field of Biology	K4
CO 4	To understand the concepts of Microscopes	K4
CO 5	to understand the principle and applications of various instruments	K3

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

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

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

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

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	3	2	2	3	3
CO3	3	2	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	2	3

Third Year **CORE COURSE – 12** **Semester- VI**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M12	**Plant physiology, Biochemistry and Biophysics**		5	-		-	5	6	25	75	100

	Learning Objectives
1	Learn the importance of Transpiration
2	Develop an understanding of Photosystems
3	The common uses and role of hormones
4	Enable to learn various Properties and classification of enzymes
5.	Develop critical understanding on Biological effect of Ionizing radiations

Unit – I

Water relation: significance – osmotic and non-osmotic uptake of water. Ascent of sap-cohesion theory: Root pressure, Transpiration, physiology of stomatal. Movement, Translocation of Solutes and Assimilates.

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

Unit – II

Photosynthesis: Absorption Spectrum, Action Spectrum, Role of Photosynthetic pigments, Enhancement effect, Photosystems I & II, Photosynthetic Electron Transport, Photophosphorylation, carbon Assimilation: C3 & C4 cycle pathway.

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

Unit – III

Plant Growth Hormones: Auxins, Kinitins, Gibberellins, Abscissic acid and their function. Role of hormones in Flowering, Senescence and Abscission – Photoperiodism, phytochrome – Vernalization and Seed dormancy.

Unit – IV

Biochemistry – Enzymes: Nature, Properties and classification. Mechanism of Enzyme action – Factors affecting Enzyme action, Substrate concentration – inhibitors, cofactors. Structure and functions of carbohydrates, lipids and proteins. A brief account of Alkaloids, Flavonoids, Terpenoids and Anthocymins.

Unit – V

Biophysics – Physical forces and Chemical bonds, Basic properties of light diffraction – Biological effect of Ionizing radiations – Laws of Thermodynamics and entropy – Gibb's free energy.

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Learn the importance of Transpiration	K3
CO 2	Develop an understanding of Photosystems	K3
CO 3	The common uses and role of hormones	K4

CO 4	Enable to learn various Properties and classification of enzymes	K4
CO 5	Develop critical understanding on Biological effect of Ionizing radiations	K3

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
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4. Jain, J.L(1998) : Fundamentals of Biochemistry S.Chand & Co., New Delhi
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2. Jain, J.L (1998) Fundamentals of Biochemistry. S.Chand & Co., New Delhi
3. Salil Bose, S. (1982) : Elementary Biophysics, Vijaya Printers, Madurai

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Third Year **CORE COURSE – 13** **Semester- VI**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13M13	**PLANT ECOLOGY AND PHYTOGEOGRAPHY**		5	-		-	5	5	25	75	100

	Learning Objectives
1	Learn the importance of Morphological and Anatomical adaptations
2	Develop an understanding of ecosystem concept
3	To understand the Concept of Autecology and Synecology
4	Enable to learn various pollution and its control
5.	Develop critical understanding on Approaches to 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 & Tertiary; Food chain – Food web & Energy flow – Pond Ecosystem.

Unit – III

Concept of Autecology and Synecology. Vegetation – Units of Vegetation – formation, association, consociation, society – Development of Vegetation: Migration – Ecesis, Colonization, Methods of study of Vegetation (Quadrate & Transect). Plant Succesion – 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.

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Learn the importance of Morphological and Anatomical adaptations	K3

CO 2	Develop an understanding of ecosystem concept	K3
CO 3	To understand the Concept of Autecology and Synecology	K4
CO 4	Enable to learn various pollution and its control	K4
CO 5	Develop critical understanding on Approaches to Phytogeography	K3

REFERENCES:

1. Puri, G.S. (1960) : Indian Forest Ecology (Vol. I & II) Oxford Book Co., New Delhi & Calcutta
2. Kormandy, E.J. (1978) : Concepts of Ecology (2nd Edition) Prentice Hall of India (P) Ltd., New Delhi
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4. Newman, E.I. (2000) : Applied Ecology. Blackwell Scientific Publisher, U.K – 328 pp.,
5. Sharma, P.D (2000) : Ecology & Environment

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Third Year **MBE – II** **Semester- VI**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13MBE 2	MEDICAL BOTANY		5	-		-	5	4	25	75	100

	Learning Objectives
1	Learn the importance of cultivation – harvesting of medicinal plants
2	Develop an understanding of chemical constituents and medicinal
3	To get a knowledge about ethno medicinal Botany
4	Enable to learn various salient features of classification of drugs
5.	Develop critical understanding on active principles in plants

UNIT : I History and scope – Definition of common Medical terms – Systems of medicine – Ayurveda, Siddha, Homeopathy 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 koenghii.*

UNIT : III Ethno medicinal 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*.

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

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Learn the importance of cultivation – harvesting of medicinal plants	K3
CO 2	Develop an understanding of chemical constituents and medicinal	K3
CO 3	To get a knowledge about ethno medicinal Botany	K4

CO 4	Enable to learn various salient features of classification of drugs	K4
CO 5	Develop critical understanding on active principles in plants	K3

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3

Third Year **MBE – III** **Semester- VI**

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
19:13MBE3	PLANT BIOTECHNOLOGY		5	-		-	5	5	25	75	100

	Learning Objectives
1	Learn the importance of Future impacts of Biotechnology.
2	Develop an understanding of Role of genetic engineering
3	Enrich knowledge about Immunoglobulins
4	Enable to learn various tissues culture technology in Agriculture
5.	Develop critical understanding on mushroom cultivation

Unit I

Scope and importance of Plant biotechnology – Application of Biotechnology in Industry, Agriculture and Medicine, Future impacts of Biotechnology.

Unit II

Genetic engineering – Basic steps involved in Genetic engineering - Restriction enzymes (Endonucleases and ligases) – Gene cloning Vectors; Plasmid, Cosmids and Bacteriophage. Role of *Agrobacterium* in genetic engineering.

Unit III

Immunoglobulins – Types and structures – Hybridoma technology (Production of Monoclonal antibodies) – Genetic engineering for vaccine production (Transgenic plants).

Unit IV – Plant Tissue Culture

Techniques: Explants, Methods of Sterilization, Media - 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

Single cell protein – *Spirulina,* Mycoprotein – Yeast, Hydrogen production – Cyanobacteria, Biogas – Water hyacinth and *Salvinia,* Mushroom cultivation – *Agaricus and* Humulin – *E.coli*

Course Outcomes: Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Learn the importance of Future impacts of Biotechnology.	K3
CO 2	Develop an understanding of Role of genetic engineering	K3
CO 3	Enrich knowledge about Immunoglobulins	K4
CO 4	Enable to learn various tissues culture technology in Agriculture	K4
CO 5	Develop critical understanding on mushroom cultivation	K3

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

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	2	2	3	3
CO3	2	3	3	2	2
CO4	2	2	2	3	2
CO5	3	2	3	2	3