A.V.C.COLLEGE (AUTONOMOUS)

Nationally Reaccredited with "A" Grade by NAAC (3rd Cycle – CGPA=3.34/4.0)
Recognized by UGC as "College with Potential for Excellence – Phase I &II"
Ranked 43rd at National level by MHRD through NIRF-2017.

(Affiliated to Bharathidasan University, Tiruchirappalli)

MANNAMPANDAL - 609 305, MAYILADUTHURAI
NAGAPATTINAM (Dt.), TAMIL NADU.

upto 17-18 is enclosed.

கற்றனைத்தூறுமறிவு

Since 1955

DEGREE OF BACHELOR OF SCIENCE
IN
BOTANY

(CHOICE BASED CREDIT SYSTEM)

SYLLABUS AND COURSE STRUCTURE FOR B.Sc. BOTANY

(FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 – 2016 ONWARDS)

(upto 2017-18 batch)

from - 18-19 new syllabus.

VISION

Our vision is to be a progressive department that serves as a research centre for the plant sciences, by training graduates who will be leaders in botanical education and research, and to energize the public appreciation of plants and microbes.

MISSION

Our mission is to discover and convey scientific knowledge about the biology of plants and to promote awareness and appreciation of the diverse and vibrant field of Botany.

A.V.C.COLLEGE (AUTONOMOUS), Mannampandal, Mayiladuthurai
B. Sc., Botany - Choice Based Credit System
Regulations and Syllabus
(Effective from the Academic year 2015 - 16 onwards)

OBJECTIVES OF THE COURSE:

This course will enable the students

- To gain knowledge of the importance of plants in conserving food and fuel.
- To acquire skills in drawing by actual observation at its original and natural condition.
- To know the nutritive value of food and maintain 'Health and Care Problems'
- To create awareness in the understanding of extinct plants.
- To create awareness of natural resources and methods of Conservation.
- To develop student skills of growing various horticultural plants thereby to raise a nursery.
- To train in techniques of Vegetative propagation and gardening.
- To motivate for self-employment by knowledge and practicing in the preparation of Mushroom technology
- 'Earn while learn' can be done with the acquirement of basic knowledge in growing some medicinal plants.
- To gain knowledge for exploration of new plants of unknown value and known plants of unknown value of their secondary metabolites.
- To gain a knowledge of the techniques of producing desirable plants through the study of molecular biology and genetic engineering.

SCOPE:

- This course considers the patterns of plant diversity and the processes that generate and maintain plant diversity. It is an interdisciplinary approach in which major groups of plants are overviewed in holistic manner.
- This course also considers the Biology of plants. Different branches of Botany are given due importance us they deserve. Practical's are framed with an aim to improve skills in microcopy, observation, drawing, and laboratory exercise. During field trips the students are exposed to basic ecological principles and interactions.
- Students who complete this course will have better understanding on the types and sources of plants by diversity and the role of human and non-human factors in plant diversity.
- Students will better understanding plants and their importance in Biosphere as life sustaining components.
- Students who complete this course can pursue research. As topics from relevant course are included there is a scope for the student to have opportunity in employment in state and central governments. Also the student has a scope for self-employment.

REGULATIONS OF UG COURSE IN BOTANY:

1. CONDITION FOR ADMISSION

A candidate who has passed Higher Secondary Examination in Academic or vocational stream with Botany/Biology under higher secondary board of examination, Tamil Nadu

2. DURATION OF THE COURSE

The course for the degree of Bachelor of Science shall consist of three academic years divided into six semesters. Each Semester consists of 90 working days.

3. FEATURES OF CBCS

Under Choice Based Credit System (CBCS), a set of papers consisting of Core papers, Elective papers, Skill based elective papers and Non -major elective papers are offered. Beside the Core Papers, which are totally related to the major subject, the students have the advantage of studying supportive papers and non -major papers. This provides enough opportunity to the students to learn not only the major subject but also inter disciplinary and application oriented subjects.

4. CREDITS

In CBCS, each paper is assigned with a certain number of Credits depending upon the workload of the students. The total Credits to be earned by a student to qualify for the degree is 140. The credit of the paper is fixed by giving due weightage to the syllabus content and contact hours per week.

5. PASSING MINIMUM

THEORY

End Semester Examination (ESE) : 75 marks
Continuous Internal Assessment (CIA) : 25 marks

Classification of Internal Assessment Structure

CIA Tests (2)	-	60Marks
Assignments (3)	-	20 Marks
Seminar	-	10 marks
Attendance	-	10 Marks

Total Marks = 100 marks – converted to 25 Marks

Passing minimum (CIA) 40%	- 10 Marks
Passing minimum (ESE) 40%	- 30 Marks
Total Passing minimum	= 40 Marks

PRACTICAL

End Semester Examination (ESE) : 60 marks
Continuous Internal Assessment (CIA) : 40 marks

Classification of Internal Assessment Structure

Model Tests (2)	-	60Marks
Assignments (3)	-	20 Marks
Record	-	10 marks
Attendance	-	10 Marks
Total Marks	=	100 marks – converted to 40 Marks

Passing minimum (CIA) 40% - 16Marks
Passing minimum (EA) 40% - 24 Marks

Total Passing minimum = 40 Marks

- The candidate shall be declared to have passed the examination if the candidates secure not less than 30 marks out of 75 marks in the End semester examination in each theory paper and 10 marks out of 25 marks in the Internal Assessment and in total not less than 40 marks.

- For the practical paper 24 marks out of 60 marks in the End semester examination and the record notebook taken together and 16 marks out of 40 marks in the Internal Assessment and in total 40 marks. There is no passing minimum for the record notebook. However submission of a record notebook is a must.

Important:

New additional Academic Regulations implemented for the Students admitted in UG course from the academic year 2016-17 and onwards

- **As per the UGC Guidelines the modified study period for UG courses is – 3years (Time span) + 5 years**
  (The Student should complete the degree within eight years, for example – 2016-17 admitted students should complete the course before 2023-2024).

B.Sc., BOTANY COURSE STRUCTURE (FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 – 2016 ONWARDS)

Semester	Part	Course	Paper Title	Instruction hrs/ week	Credits	Exam hrs.	Marks		Total
							Int	Ext	
I	I	LC1	Tamil	06	03	03	25	75	100
	II	ELC1	English	06	03	03	25	75	100
	III	CC1	Algae, Fungi, Bacteria, Virus Lichens & Plant Pathology	05	05	03	25	75	100
		CC2	Practical-I(covering CC - 1)	02	02	03	40	60	100
		I AC 1	Allied Zoology - Theory I	07	04	03	25	75	100
		I AC 2	Practical – I (Covering AC1)	02	01	03	40	60	100
		SBC1	Mushroom Cultivation	02	02	03	25	75	100
	Total			**30**	**20**				**700**
II	I	LC2	Tamil Paper 2	06	03	03	25	75	100
	II	ELC2	English Paper 2	06	03	03	25	75	100
	III	CC3	Bryophytes, Pteridophytes &Palaeobotany	05	05	03	25	75	100
		CC4	Practical II (Covering CC 3)	02	02	03	40	60	100
		I AC 3	Allied Zoology Theory II	07	04	03	25	75	100
		I AC 4	Practical -II (Covering 1 AC 3)	02	01	03	40	60	100
		SBC 2	Herbal Entrepreneurship	02	02	03	25	75	100
	Total			**30**	**20**				**700**
III	I	LC3	Tamil Paper 3	06	03	03	25	75	100
	II	ELC3	English Paper 3	06	03	03	25	75	100
	III	CC5	Gymnosperms, Anatomy & Embryology	05	05	03	25	75	100
		CC6	Practical III (Covering CC 5)	02	02	03	40	60	100
		IIAC 5	Allied Chemistry Theory 1	07	04	03	25	75	100
		IIAC 6	Allied Chemistry Practical (covering IIAC1&3)	02	00	-	-	-	-
		SBC3	Horticulture	02	02	03	25	75	100
	Total			**30**	**19**				**600**

Semester	Part	Course	Paper Title	Instruction hrs/ week	Credits	Exam hrs.	Marks		Total
							Int	Ext	
IV	I	LC4	Tamil Paper 4	06	03	03	25	75	100
	II	ELC4	English Paper 4	06	03	03	25	75	100
	III	CC7	Morphology &Taxonomy of Angiosperms	05	05	03	25	75	100
		CC8	Practical IV(Covering CC7)	02	02	03	40	60	100
		IIAC 7	Allied Chemistry Theory	07	04	03	25	75	100
		IIAC 8	Allied Chemistry practical	02	02	03	40	60	100
		NMEC1	Elective – (from zoology)	02	02	03	25	75	100
	Total			**30**	**21**				**700**
V	III	CC 9	Cytology, Genetics, Evolution & Plant Breeding	04	04	03	25	75	100
		CC 10	Fundamentals of Microbiology	04	04	03	25	75	100
		CC 11	Bioinstrumentation and Biostatistics	04	04	03	25	75	100
		CC 12	Practical V (Covering 9, 10 & 11)	05	05	03	40	60	100
		MBE1	Maj.Elective- Medical Botany	04	04	03	25	75	100
		MBE2	Maj.Elective-Plants and Society	04	04	03	25	75	100
		NMEC2	Elective – (from Zoology)	02	02	03	25	75	100
		SSD 1	Soft skills Development	02	02	03	25	75	100
		EA 01	Gender Studies	01	01	03	25	75	100
	Total			**30**	**30**				**900**
VI	III	CC 13	Plant Physiology & Biochemistry	05	05	03	25	75	100
		CC 14	Plant.Ecology & Phytogeography	05	05	03	25	75	100
		CC 15	Principles of Biotechnology	05	05	03	25	75	100
		CC 16	Practical VI (Covering 13,14 & 15)	06	05	03	40	60	100
		MBE3	Maj. Elec III .Biofertilizers	05	05	03	25	75	100
	IV	VBC	Human Values and Ethics	02	02	03	25	75	100
		ES	Environmental Studies	02	02	03	25	75	100
	V	EA 02	Extension Activities	-	01	-	-	-	-
	Total			**30**	**30**				**700**
Grand Total				**180**	**140**				**4300**

B.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
I	**Core Course – I: ALGAE, FUNGI, BACTERIA, VIRUS, LICHENS & PLANT PATHOLOGY**	**15 BO 101**	**5**	**5**

OBJECTIVES:

- *To understand the major groups of plants and their Characteristics.*
- *To trace their interrelationships and to study their economic importance.*

Unit -1: ALGAE **15Hrs**

GENERAL ACCOUNT OF THE FOLLOWING

Classification of Algae(Fritsch), Range of Thallus organization in Algae. NIT
Types of life Cycles, Economic Importance of Algae, Algal Biofertilizers.

Unit -2: DETAILED STUDY OF THE FOLLOWING **15Hrs**

Nostoc	Chara
Volvox	Diatoms(Pennate&Centric)
Cladophora	Gracillaria (x) Sargassum
Caulerpa	Dictyota

2·5 1.

Unit -3:FUNGI : **15 Hrs.**

Classification of fungi (Ainsworth 1973), Mycorrhiza: Types and their role in agriculture
Economic Importance of fungi

DETAILED STUDY OF THE FOLLOWING:

Plasmodiophora	Saccharomyces
Pythium	Peziza
Albugo	Puccinia
Aspergillus	Lycoperdon.

10 1.

Unit -4: BACTERIA, LICHEN AND VIRUS **15Hrs**

Bacteria-Structure, Nutrition and Reproduction Asexual- Binary fission and endospore formation, Sexual –Conjugation in Bacteria
Lichen- Structure, Nutrition and Reproduction-Usnea
Virus- Nature, Structure (TMV and Bacteriophage), Biosynthesis, Transmission.

20 1.

Unit-5: PLANT PATHOLOGY **15Hrs**

Bacterial Diseases - Citrus canker -Paddy blast
Fungal Diseases - Red rot of sugar cane -Tikka disease of Ground nut
Viral diseases- -Bunchy top of Banana -Tobacco mosaic disease

20-1.

Total 52·5 1.

REFERENCES:

1. Sharma, O.P (2011). Algae, Tata McGraw Hill Education Private limited, New Delhi.
2. Vashishta, BR, Sinha AK, and SinghVP (2011). Botany For Degree Students Algae, S. Chand. Pub.New Delhi
3. Pandey, BP (1994). Algae.S. Chand & Company Ltd. New Delhi.
4. Bold, HC &Wynne, MJ (1985).Introduction to the Algae. Prentice Hall of India, New Delhi.
5. Fritsch, FE (1945). Structure and reproduction of Algae. Cambridge University press.

6. Sharma, OP (2011). Fungi and allied microbes The McGraw –Hill companies, New Delhi
7. Sharma, PD (2003).The Fungi. Rastogi Publications, Meerut
8. Bessey, E.A (1979). Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
9. Mehrotra, RS, Aneja KR (1990).An Introduction to Mycology , New Age International Pub, New Delhi
10. Webster,J (1970) Introduction to fungi , Cambridge university press ,London

11. Muthukumar, S. and Tarar, JL (2006).Lichen Flora of Central India, Eastern book Corporation , New Delhi.
12. Dharani Dhar Awasthi (2000). A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi

13. Sharma ,PD. (1992). Microbiology , Rastogi & Co., Meerut
14. Pelzer, MJ, Chan, ECS and Krieg, NR .(1983). Microbiology , Tata MaGraw Hill Publishing House , New Delhi
15. Power and Dagainwala .(1994). General Microbiology , Himalayan publishing House, New Delhi

16. Biswas,SB, Biswas, A(1997). An introduction to viruses (4th Edition .Vikas .pub.House . Pvt. Ltd New Delhi
17. Nayudu MV(2008) . Plant viruses, Tata McGraw - Hill Education, New Delhi
18. Mandahar Cl (1987). Introduction to plant viruses, S. Chand & company, Pvt . Ltd , New Delhi

19. Agrios, GN (1997) Plant Pathology (4th ed) Academic Press.
20. 4.Mehrotra, RS (1980). Plant Pathology – TMH, New Delhi.
21. Pandey, BP. (1999). Plant Pathology. Pathogen and Plant diseases. S. Chand & Co. New Delhi.
22. Rangaswami, G (1999). Disease of Crop plants of India Prentice Hall of India Pvt. Ltd.
23. Sharma PD(2004). Plant Pathology, Rastogi Publishers

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B.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**Core Course – II MAJOR PRACTICAL – I (covering the core course – I, Algae, Fungi, Bacteria, Viruses, Lichens and Plant pathology)**	**15BOP 102**	**2**	**2**

Detailed study of the types mentioned in the theory.

-To make suitable micro preparations of the types studied.

-To identify types from algal mixtures.

-To study the pathological specimens included in the syllabus.

-To maintain observation and record note book.

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B.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**Skill Based Course – I MUSHROOM CULTIVATION**	**15 SBO 101**	**2**	**2**

OBJECTIVES:

- *To understand the cultivation technology of mushrooms.*
- *To understand the concept of mushroom storage and analyze problems in mushroom cultivation.*

Unit -1 **6 Hrs**

Introduction: Morphology, types of mushroom – Edible and Poisonous mushrooms – Importance and Nutritional value of edible mushrooms.

Unit -2 **6 Hrs**

Spawn Preparation: Substrates for spawn – Culture rack – Preparation of mother spawn – Sterilization of mother spawn.

Unit -3 **6 Hrs**

Cultivation Technology: Mushroom bed preparation using locally available substrates (Paddy straw; sugarcane trash; Maize straw; banana leaves) – Cultivation of Oyster mushroom and Paddy straw mushroom.

Unit -4 **6 Hrs**

Diseases and pests of mushrooms – bacterial blotch, green mold, Brown plaster mold, cab web, - pests – cocid and phorid flies.

Unit -5 **6 Hrs**

Processing and Preservation: Storage of edible mushroom – Delicious recipes of mushroom – uses of mushrooms – food, medicines, brain drugs – marketing of edible mushrooms.

REFERENCES:

1. Nita Bahl, (2002). Hand Book on Mushroom Cultivation. 4th Edition, Vijay Primlani for Oxford & IBH Publishing Co., Press, New York, New Delhi.
2. Biswas, S, Datta, M and Nagachan, S.V. (2012). Mushrooms- A manual for cultivation. PHI Learning Private Limited, New Delhi.
3. Krishnamoorthy, (1999). Hand Book of Mushroom Cultivation. TNAU Publications, Coimbatore, TN,India.
4. Dey S.C., (2000), Mushroom growing, Agrobios (India), Jodhpur.
5. Jana, B.L. (2014), Mushroom culture, Agrotech publishing Academy, Udaipur.

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B.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**Core Course – III: BRYOPHYTES, PTERIDOPHYTES AND PALAEOBOTANY**	**15 BO 203**	**5**	**5**

OBJECTIVES:

- *To study in detail on classification and characters of Bryophytes.*
- *To study on the classification, morphology and reproductive structure of Pteridophytes.*
- *To study in detail about the various types of fossils.*

Unit -1 SNK **15 Hrs**

BRYOPHYTES: GENERAL ACCOUNT OF THE FOLLOWING:

- Classification of Bryophytes (Smith)
- Range of thallus structure in Bryophytes.
- Vegetative reproduction in Bryophytes.
- Ecology of Bryophytes.

Unit -2 GA **15 Hrs.** 20'/

DETAILED STUDY OF THE FOLLOWING

Marchantia – Anthoceros –Funaria.

Unit -3 BM **15Hrs.**

PTERIDOPHYTES: GENERAL ACCOUNT OF THE FOLLOWING

- Classification of Pteridophytes (Reimer)
- Stelar types and their evolution in Pteridophytes.
- Heterospory and seed habit
- Apogamy and Apospory.

Unit -4 BM **15 Hrs.**

DETAILED STUDY OF THE FOLLOWING:

Psilotum – Lycopodium – Selaginella – Equisetum - Marsilea.

Unit - 5 SR **15 Hrs.**

PALAEOBOTANY: GENERAL ACCOUNT OF THE FOLLOWING

- Geological time scale
- Fossils – types and methods of fossilization.

DETAILED ACCOUNT OF THE FOLLOWING

Rhynia – Lepidodendron – Lepidocarpon - Calamites.

REFERENCES:

1. Sharma, OP (2013). Bryophytes, McGraw Hill education (India) Pvt..Ltd, New Delhi
2. Vashishta, Sinha AK (2011). Bryophytes, S.Chand &Company ltd., New Delhi
3. Rashid, A (1998).An Introduction to Bryophyta, Vikas Pub.Ltd, Newdelhi
4. Prem Puri (1981). Bryophytes: Morphology, Growth and differentiation. Atma Ram and Sons, New Delhi.
5. Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand &company Ltd, New Delhi
6. Sharma, O.P. (2012). Textbook of Pteridophyta, TATA MacMillan India Ltd., New Delhi
7. Rasheed, A. (1999). An Introduction to Pteridophyta, Vikas Publishing Co., NewDelhi.
8. Sporne,K.R. (1972) . The Morphology of Pteridophytes, B.I. Publications, Madras
9. Arora M.P. (1990). Evolutionary biology, Himalaya Publication House, Delhi.
10. Kirkaldy, J.E. (1963). The study of Fossils. Hutchinson Educational, London

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B.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**Core course – IV – MAJOR PRACTICAL – II - (covering the core course – III, Bryophytes, Pteridophytes and Palaeobotany)**	**15 BOP 204**	**2**	**2**

Detailed study of the types mentioned in the theory.

-To make suitable micro preparations of the types studied (excluding Psilotum).

-Morphological study of the types included in the syllabus.

-To conduct field trip (to study fossil specimens)

-To maintain observation and record note book.

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B.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**Skill Based Course – II HERBAL ENTREPRENEURSHIP**	**11 SBO 202**	**2**	**2**

OBJECTIVES:

- *To study the scope and importance of medicinal palnts.*
- *To understand the status of herbal trade.*
- *To study the preparation of various herbal products.*

UNIT-1 **6 Hrs.**

Scope and importance of medicinal plants. Current status of herbal trade in India and Abroad. Methods of cultivation; Nursery Preparation and maintenance of field. Cultivation of Aloe vera,Acorus calamus.

UNIT-2 **6 Hrs.**

Formulation of herbal products for marketing; collection-drying- powdering-packing – labelling and marketing.

UNIT–3 **6 Hrs.**

Preparation of herbal food products: Soups – *Moringa oleifera, Murraya koenighii, Alternanthera sessilis, Aerva lanata*; Vegetable salads, Germinated seeds. Pickles- Goose berry and Ginger.

UNIT-4 **6 Hrs.**

Preparation of herbal refreshments: Herbal tea – sweet and hot (*Mentha viridis*). *Cyanodon dactylon* juice, Hibiscus drinks, Medicated water – *Ocimun sanctum, Aegle marmelos, Coleus vetiveroides, Premna tomentosa, Carum copticum.*

UNIT-5 **6 Hrs.**

Preparation of herbal medicines: herbal oil – hair oil and pain oil, herbal syrup, decoction, infusion, tincture and Insect repellents.

REFERENCES :

1. Bhattacharjee, S.K. (2004). Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
2. Handa, S. S. and V. K. Kapoor, (1993). Pharmacognosy. Vallabh Prakashan, New Delhi.
3. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
4. Jain, (2001). Medicinal plants. National Book Trust, New Delhi.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**Core Course – V GYMNOSPERMS, ANATOMY AND EMBRYOLOGY**	**15 BO 305**	**5**	**5**

OBJECTIVES:

- *To study the classification, morphology and reproductive structures of various gymnosperms*
- *To study the various components of wood*
- *To study the basic principles of embryology*

Unit – 1 GYMNOSPERMS **15 Hrs.,**

- Classification K.R.SPORNE (1965)
- Structure and Reproduction of Cycas, Williamsonia and Gnetum.
- Economic importance of Gymnosperms.

Unit - 2 ANATOMY **15 Hrs.,**

- Plant Tissue: Classification, Simple and complex tissues
- Meristems – Classification. Distribution and theories (Apical cell theory, Histogen theory and Tunica Carpus theory)
- Tissue Systems:Epidermal, Ground and Vascular tissue system
- Primary structure of dicot and monocot stem, Root and Leaf

Unit – 3 **15 Hrs.,**

- Secondary thickening (Normal): Dicot stem and Root, Pits, Annual rings, heart wood and sap Wood, Tyloses.
- Anomalous Secondary Thickening: Abnormal position and behavior of Cambium, Accessory cambium, Extrastelar cambium, and Inter xylery phloem
- Secondary thickening in Monocot: Eg. *Dracaena*

Unit – 4 EMBRYOLOGY **15 Hrs.,**

- Microsporangium: Structure, microsporogenesis and development of male gametophyte
- Megasporangium: Structure, megasporogenesis and Types of ovules – Detailed study of monosporic (Polygonum type) Bisporic (Allium type) and Tetrasporic (Peperomia type) Embryo sac. Double Fertilization and its significance

Unit – 5 **15 Hrs.,**

- Endosperm: Nuclear, Cellular & Helobial endosperms - Ruminate endosperm and Endosperm Haustoria
- Embryo: Development of Dicot embryo (*Capsella bursa-pastoris*) Monocot embryo (*Luzula forsteri*); Polyembryony and Apomixis – causes and significance.

REFERENCE

1. Bhatnagar and Moitra, (1996). Gymnosperms. New age International Publishers, New Delhi.
2. Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate pub and Distributer, New Delhi
3. Biswas, C. and Johri, B.M. (2004). The Gymnosperms. Narosa Publishing House, New Delhi.
4. Chamberlain, C.J. (1934). Gymnosperms: Structure and Evolution. Chicago Reprinted (1950) New York.
5. Pandey B,P., (2015)(Edn.) Plant Anatomy S. Chand Publ. New delhi.
6. Vashista P.C (1984). Plant Anatomy –Pradeep publication , Jalandhar
7. Esau, K.(1960). Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
8. Esau, K.(1977). Anatomy of seed plants. Wiley Eastern Publication, New Delhi.
9. Fahn, A.(1989). Plant Anatomy. Macmillan Publication (P) Ltd, Singapore
10. Coutler E.G (1969) Plant Anatomy-Part1 Cells and Tissues –Edward Arnold London
11. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, 5th Edition, Vikas Publishing House. Delhi.
12. Pandey , AK (2000). Introduction to Embryology of Angiosperms 1st Edition :CBS; New Delhi
13. Maheswari, P.(1976). An introduction to the Embryology of Angiosperms. TATA McGraw - Hill Publishing Co., Ltd., New Delhi.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**Core Course – VI MAJOR PRACTICAL – III (Covering the core course – V, Gymnosperms, Anatomy and Embryology)**	**15 BOP 306**	**2**	**2**

- Morphological and anatomical study of the Gymnosperm specimens mentioned in the syllabus.
- Study of simple and complex tissues by using permanent slides.
- Micro preparations – primary and secondary structure of monocot and dicot stem, root and leaf
- Anomalous secondary thickening of stem pertaining to the syllabus
- T.S. of anther. Pollinium mounting, Types of ovules, male and female gametophytes, Endosperms, Embryo mounting (Tridax)

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**Skill Based Course – III HORTICULTURE**	**15 SBO 303**	**2**	**2**

OBJECTIVES:

- ❖ *To understand main principles and importance of Horticulture*
- ❖ *To develop skill in horticulture techniques*
- ❖ *To enable self reliant knowledge and self employment*

Unit – 1 **6 Hrs.,**

- Definition, scope importance and divisions in Horticulture
- Propagation of horticultural plants – budding, grafting, layering and cutting

Unit – 2 **6 Hrs.,**

- Manures, manuring and irrigation
- Bio fertilizers and their mode of application – phytohormones and their role in plant preparation
- Transplantation – Nursery and their maintenance
- Horticultural implements and their uses

Unit – 3 **6 Hrs.,**

- Orchard cultivation
- Brief study of propagation of mango, and guava
- Fruit drop and storage of fruits

Unit – 4 **6 Hrs.,**

- Floriculture
- Layout and components of ornamental garden
- Indoor gardening and indoor plants – Bonsai
- Floral arrangement and indoor decorations

Unit – 5 **6 Hrs.,**

- General classification of vegetable – root crops, legume crops, leafy vegetable, fruit crops
- Intercropping – crop rotation – cultural hints on growing Bhendhi, Tomato

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REFERENCE

1. Kumar, N., 1997 An introduction to Horticulture, Rajalakshim publishers.
2. Edward Railey, H & Carrol L.Shry, Jr., 1988 Introductory Horticulture, Delmar pub.Inc.
3. Edmond,J.B, 1997. Fundamentals of Horticulture, Tata McGraw Hill, New Delhi.
4. Vishnu Swamp, 1997. Ornamental Horticulture, Mc millan India Ltd,
5. Manibushan Rao, K1995. Textbook of Horticulture, Mc millan India Ltd New Delhi.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**Core Course – VII MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS**	**15 BO 407**	**5**	**5**

OBJECTIVES:

- *To study the basic systems of classification and salient features of few families*
- *To learn herbarium techniques*
- *To study the floral characters with an aim to identify the taxa authentically*
- *To prepare taxonomic keys with the help of morphological and floral characters*

Unit – 1 **REPRODUCTIVE MORPHOLOGY** **15 Hrs.,**

- Inflorescence: Cymose, Racemose , Corymb, Spike, Special types – Cyathium, Hypanthodium & Verticillaster
- Flowers: Description of typical dicot and Moncot flowers
- Fruits: Simple, Aggregate and multiple fruits

Unit – 2 **PRINCIPLES OF TAXONOMY** **15 Hrs.,**

- Classification types – Artifical, Natural and Phylogenetic (Linnaeus, Bentham and Hooker, Engler and Prantl) - Merits and demerits
- Botanical Nomenclature: Typification, Citation of author, Priority and Publication
- Herbarium techniques – Collection, Drying, Mounting & Preservation; Floras; types of Keys
- Modern trends in Taxonomy – Chemotaxonomy and Numerical Taxonomy.

Unit – 3 **15 Hrs.,**

- Detailed study of the salient features and economic importance of the following families – Nymphaeaceae, Capparidaceae, Caesalpineae, Cucurbitaceae, Apiaceae

Unit – 4 **15 Hrs.,**

- Detailed study of the salient features and economic importance of the following families – Rubiaceae, Asteraceae, Apocynaceae, Convolvulaceae, Lamiaceae

Unit – 5 **15 Hrs.,**

- Detailed study of the salient features and economic importance of the following families – Amaranthaceae, Moraceae, Orchidaceae, Arecaceae and Poaceae

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REFERENCES

1. Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I - IV) ,Central Book, Dept., Allahabad

2. Heywood VH. (1967). Plant Taxonomy, Edward Arnold , London

3. Jeffery C. (1982). An introduction to Plant Taxonomy, J& A Churchill Ltd., London

4. Mathew, K.M. (1983). The Flora of Tamil Nadu Carnatic, The Rapinat Herbarium, Trichy

5. Pandey, B.P.(1997).Taxonomy of Angiosperms , S.Chand & Co., New Delhi.

6. Gamble,J.S , Fisher,L.E.F .(1967). The Flora of The presidency of madras (Vol - III) BSI, Calcutta

7. Davis , P.H and Heywood ,V.M. (1965). Principles of Angiosperm Taxonomy ,Oliver and Boyd Edinburgh

8. Jain S.K. and Rao R.R. 1976. A hand book of field and herbarium technique. Today and tomorrow's Publishers, New Delhi.

9. Jeffery C. (1968) An Introduction to Plant Taxonomy, J and A Churchill. London.

10. Sambamurthy A..S.S. 2005.Taxonomy of Angiosperms, I.K. International Pvt. Ltd, New Delhi.

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B.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**Core course – VIII: MAJOR PRACTICAL – IV (covering the core course – VII, Morphology and Taxonomy of Angiosperms)**	**15 BOP 408**	**2**	**2**

- Dissection and description of inflorescences and flowers with reference to syllabus
- Description of fruits and their economic importance belonging to the families included in the syllabus
- Taxonomic key preparation
- Field study – The students are expected to go for field trip to different types of floristic regions for at least four days under the supervision of the course teachers concerned
- Submission of herbarium sheets (20 nos.) along with field note book
- Herbarium visit

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Core Course – IX: CYTOLOGY, GENETICS, EVOLUTION AND PLANT BREEDING**	**15 BO 509**	**4**	**4**

OBJECTIVES:

- *To study the light and sub microscopic structures of Prokayotic and Eukayotic plant cells*
- *To give and insight in to the science of heredity*
- *To study the basic Mendelian genetics*
- *To study on principles, scope and methods involved in Plant breeding*
- *To understand the concept of evolution and learn various theories.*

CYTOLOGY

Unit – 1 **15 Hrs.,**

Cell wall-primary and secondary, Middle lamella, pits - simple and bordered, plasmodesmata.

Cytoplasm: Plasma membrane,(fluid mosaic model) structure and function of the cell organelles vacuoles, Endoplasmic reticulum, dictyosomes, Lysosomes, mitochondria, Chloroplast and Ribosomes.

Unit – 2 **15 Hrs.,**

Nucleus: Ultra structure, chromosome structure and special types of Chromosomes (Lampbrush and polytene chromosomes). Chemical nature of DNA, Structure, replication; Structure and types of RNA. Cell division- Mitosis and Meiosis.

GENETICS:

Unit – 3 **15 Hrs.,**

Laws of Mendel, monohybrid and dihybrid crosses. Incomplete dominance, Interaction of genes, Lethal factor, complementary factor, Epistasis and Multiple factor hypothesis. Linkage and crossing over – Linkage in Drosophilla and maize. Mechanism of crossing over. Sex Determination. Sex Linked inheritance. (eg) Eye colour in Drosophila, colour blindness in Man.

Unit – 4 **15 Hrs.,**

Extra chromosomal inheritance-plastid inheritance in Mirabilis, - Male sterility in Maize.

Mutations: Mutagens-physical and chemical; chromosomal and Gene mutations.

Ploidy : Euploidy and aneuploidy.

Concept of the Gene : The Genetic code and its characteristics- cistron, muton and recon.

EVOLUTION:

Unit – 5 **15 Hrs.,**

Evidences of organic evolution. Theories of organic evolution - Lamarckism, Darwinism, and Neo Darwinism & Mutation theory

PLANT BREEDING:

Introduction - Selection: Mass, Pureline and clonal.
Hybridization techniques - Hybrid Vigour.
Breeding methods of paddy, sugarcane and cotton.

REFERENCE:

1. Shukla R.S., and chandel P.S., (2002), Cytogenetics, Evolution and plant breeding, S.Chand & Company Ltd. Ram Nagar, New Delhi.

2. Rastogi, SC (1992) .Cell biology, Tata McGrew-Hill,New Delhi.

3. Sundararajan ,S (2000). Cytology, Anmol publication (P) ltd, New Delhi.

4. Gupta, PK.(2002).Genetics.Rastogi publishers,Meerut.

5. Chauduri, HK. (1971).Elementary Principles of Plant Breeding, Oxford and IBH Co., New Delhi.

6. Singh, BD (2002).Plant Breeding, Kalyani Publishers, Ludhiana.

7. Verma, P.S and V.K. Agarwal, V.K. (2004). Cell Biology, Genetics Molecular Biology, Evolution and Ecology. S. Chand and Co. New Delhi.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Core Course – X: FUNDAMENTALS OF MICROBIOLOGY**	**15 BO 510**	**4**	**4**

OBJECTIVES:

- *To study the different types of micro organisms and their activities*
- *To understand and exploit their potentialities in agriculture, industry and other environmental aspects.*
- *To study the role of microbes as beneficial and as pathogens.*

Unit – 1 **15 Hrs.,**

INTRODUCTION:

- Scope of Microbiology
- History of Microbiology
- Characterization and classification of microorganisms.
- Pure Culture techniques
- Staining techniques (Algae, Fungi and Bacteria)
- Maintenance of culture;

Unit – 2 **15 Hrs.,**

AGRICULTURAL MICROBIOLOGY

- Biofertilizers – Algal, Fungal & Bacterial
- Biological Nitrogen fixation (symbiotic & non-Symbiotic)
- Biopesticides - *Bacillus thuringiensis*, NPV

Unit – 3 **15 Hrs.,**

INDUSTRIAL MICROBIOLOGY

- Structure and design of a typical fermentor, Culture systems:– Batch, continuous and Fed batch culture.
- Industrial production of alcohol.
- Vitamins – Riboflavin.
- Antibiotics – Penicillin.

Unit – 4 **15 Hrs.,**

FOOD MICROBIOLOGY

- Kinds of food (perishable and non-perishable)
- Chemistry of food spoilage
- Food preservation – Principles and methods
- Microbiology of milk and meat
- Food borne diseases.

Unit – 5 **15 Hrs.,**

ENVIRONMENTAL MICROBIOLOGY

- Microbiology of air
- Microbiology of soil
- Aquatic microbiology
- Microbes in sewage disposal

REFERENCE

1. R.C. Dubey and D.K. Maheshwari (2012). A text book of Microbiology, S. Chand & company Ltd, New Delhi.

2. Pelczar, Chan and Kreig (1993). Microbiology – 5th edition, Tata Mc Graw-Hill Co Ltd. New Delhi.

3. Ananthanarayanan, R and Panicker, C.K.J. (2002). Text book of Microbiology. VI Edition, Orient Longman, Chennai.

4. Powar, C.B. and Daginawala (1991). General Microbiology Vol I and II – Himalaya Publishing house, Bombay.

5. Prescott, Haley, Klein (1993). Microbiology-WCB Publishers, England, II Edition

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Core COURSE – XI: BIOINSTRUMENTATION AND BIOSTATISTICS**	**15 BO 511**	**4**	**4**

OBJECTIVES:

- *To initiate the students into research activities*
- *To learn to handle various instruments, their principles and procedures.*
- *To understand working principle of various instruments used in biological studies.*
- *To provide details on the application of statistical methods in biology.*

Unit -1 **15 Hrs.,**

Basic Principles and structure of Light Microscope; Ocular, Objectives and condenser, Aberrations, Micrometry - Principle and Applications of Stage and Ocular micrometer. Principles and structure of Electron microscope – SEM & TEM.

Unit- 2 **15 Hrs.,**

Micro technique – preparation for microscopic observation – Whole mount, Smears, Squash, sections.
Microtomy: Fixation, Dehydration, Infiltration, Embedding, Sectioning.
Microtome's – Types- Principles and operating mechanisms of Rotary Microtome.

Unit -3 **15 Hrs.,**

Centrifugation: Principles, components, mechanism and application of clinical, Refrigerated and ultra-centrifuges.
Chromatography: Basic principles, types – Paper, Column, Thin layer.
Electrophoresis (SDS –PAGE).

Unit -4 **15 Hrs.,**

Principle and Application of Colorimetry and Spectrophotometer.
Basic principles of pH meter and its operation, types of Electrodes,
Measurement of pH.

Unit -5 **15 Hrs.,**

BIOSTATISTICS: Population, Sampling, mean, median & mode-Standard deviation, Standard error, Presentation of data (Tables, diagram – bar diagram Histogram, Pie diagram, Graph – Curve & Polygon).
INTRODUCTION TO COMPUTER: Computer and its peripherals, input and output devices; MS Office (MS Word; Excel; PPT) e-mail, search engines, Internet and its applications.

REFERENCE:

1. Patki L.R, Bhalchandra B.L, Jeevaji I.H.(1987). An introduction to Microtechnique, S.Chand and company (Pvt)ltd, New Delhi.

2. Marimuthu, R. (2008). Microscopy and Microtechnique. MJP Publishers,Chennai.

3. Wilson K, Walker, J. (1994). Principle and techniques of practical biochemistry, 4th ed) Cambridge university press, Cambridge.

4. Palanivelu P (2013) .Analytical Biochemistry and Separation techniques , 20th century Publications, Palkalai nagar ,Madurai.

5. Khan, I.A., and Khannum, A., (1994).Fundamentals of Biostatistics, Vikas Pub., Hyderabad.

6. Sundar Rao P.S.S and Richard J(2011) Introduction to Biostatistics and research methods , PHI learning private LtD , New delhi.

7. Johansen, DA (1940). Plant Microtechnique, TATA McGraw Hill Book Co., Ins., New Delhi.

8. Peter Gray (1964). Hand book of Basic Microtechnique. McGraw hill publication, New York.

9. Alexis Leon and Mathews Leon (1999), Introduction to computers, Leon Tech World, Chennai.

10. Gurumani, N. (2009), An introduction to Biostatistics (II revised edition), MJP publishers, Chennai.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Core course -XII- MAJOR PRACTICAL - V (covering the core course - IX, X and XI)**	**15 BOP 512**	**5**	**5**

- Observation of plant cells- Onion peel and Hydrilla leaf.
- Preparation of root tip squash and identification of stages in mitosis.
- Demonstration of eukaryotic cell organelles.
- Training in solving problems in monohybrid, dihybrid, incomplete dominance, interaction of genes and linkage.
- Demonstration of hybridization techniques – emasculation, bagging and labeling.
- Demonstration of vestigial organs, Eye-Nyctitating membrane, Analogous organs – insects and bats, Embryological evidences – fish, chick and man.

- Preparation of common media, sterilization methods, staining of bacteria (Grams) isolation and enumeration of microbes in soil and water.
- Study of motility by hanging drop, Pure culture of bacteria – streak and poured plates.
- Microbiology of milk and antibiosis.

- Microscope – demonstration of components and diagrams.
- Staining of hand sections
- Demonstration of colorimeter, spectrophotometer, centrifuge and microtome.
- Study of basic statistical methods used in interpreting scientific data.

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B.Sc., Botany (*for the students admitted from 2015-16 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Major Based Elective – I : MEDICAL BOTANY**	**15 BOE 501**	**4**	**4**

OBJECTIVES:

- *To study the various systems of medicines.*
- *To enable to identify the medicinal taxa.*
- *To understand the preliminary phytochemistry of plants*

Unit -1 **9 Hrs.,**

History and scope – Definition of common medicinal terms.
Systems of medicine – Ayurveda, Siddha and Unani, Homeopathy, Cultivation, harvesting, processing, storage, marketing and utilization of medicinal plants (General).

Unit -2 **9 Hrs.,**

Systematic description, cultivation, chemical constituents and medicinal uses of the following medicinal plants – *Ocimum sanctum, Eucalyptus globulus, Azadirachta indica, Allium cepa, Phyllanthus amarus*.

Unit -3 **9 Hrs.,**

Ethno medico botany – Folklore medicine –Methods of preparations – administrations (internal and external) + Adjuvants – Chemistry of drugs.

Unit -4 **9 Hrs.,**

Pharmacognosy – classification of drugs – chemistry of drugs – *Zingiber officinale*, *Alstonia scholaris*, *Camellia sinensis*, *Chrysanthemum cinerarifolium* and *Myristica fragrans*.

Unit -5 **9 Hrs.,**

Utilization and bioactive compounds of the following medicinal plants.

- *Ricinus communis* (Laxatives)
- *Digitalis purpurea* (cardiotonics)
- *Datura metal* (Drugs acting on nervous system)
- *Rauwolfia serpentina* (Antihypertensives)
- *Vitex negundo* (Antirheumatics)

REFERENCES

1. Bhattacharjee, S.K. (2004). Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
2. Kumar,NC (1993). An Introduction to Medical Botany and Pharmacognosy Emkey Publications, Delhi.
3. Gokhale, SB., Kokate, C.K. and Purohit, AP (2003). Pharmacognosy. Nirali Prakashan, Pune.
4. Arumugam, K.R. and Murugesh, N (1990). Text book of Pharmacognosy. Sathya Publishers, Chinnalapatti (Tamilnadu) 624 201.
5. Handa, S. S. and V. K. Kapoor, (1993). Pharmacognosy. Vallabh Prakashan, New Delhi.
6. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
7. Jain, (2001). Medicinal plants. National Book Trust, New Delhi.

B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Major Based Elective - II: PLANTS AND SOCIETY**	**15 BOE 502**	**4**	**4**

OBJECTIVES:

- *To study the economic aspects of selected crops.*
- *To study the utilization of plants as food for human.*

Unit – 1 **9 Hrs.,**

Scope and Importance of plants and plant products.
Cereals: Major cereals and millets, nutritive values of cereals
Paddy - Ragi-distribution, cultivation and uses, improved varieties.

Unit –2 Food plants:

Pulses: Major pulse crops of our country, nutritive values of pulses- Distribution, cultivation and uses of red and black gram. **9 Hrs**

Unit- 3 Sugar crops:

Sugar yielding plants- sugar cane and sugar beet - distribution, extraction of juice, byproducts of sugar industry, improved varieties. **9 Hrs**

Unit- 4 Oil crops:

Classification of oil yielding plants – Ground nut and sunflower – cultivation, improved varieties, oil extraction and uses. **9 Hrs**

Unit- 5 Wood and fiber plants:

Classification of fibers – Textile fibers- Cotton - cultivation, improved varieties and uses. Wood-Teak cultivation, important varieties and uses.

REFERENCES:

1. Ashok Bendre and Ashok Kumar (1998-99). Economic Botany. Rastogi Publications, Meerut.
2. Govinda Praksh and Sharma, S.K. (1975). Introductory Economic Botany. Jai Prakash Nath, Meerut.
3. Gupta, S.K. and Kaushik, M.P. (1973). An Introduction to Economic Botany. K. Nath & Co., Meerut.
4. Hill, A.W. (1952). Economic Botany. Tata McGraw–Hill Publishing Co., New Delhi.
5. Pandey, B.P. (2000). Economic Botany. S. Chand & Company Ltd., New Delhi.
6. Sambamurthy, A.V.V.S. and Subrahmanyan, N.S. (1989). A Text Book of Economic Botany. Wiley Eastern Ltd., Madras.
7. Sen, S. (1992). Economic Botany. New Central Book Agency, Calcutta.
8. Verma, V. (1974). A Text Book of Economic Botany. Emkay Publications, New Delhi.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**SOFT SKILLS DEVELOPMENT**	**11SSD 501**	**2**	**2**

OBJECTIVES:

Today's world is all about relationship, communication and presenting oneself, one's ideas and the company in the most positive and impactful way. This paper intends to enable students to achieve excellence in both personal and professional life.

Unit – 1 Know Thyself/ Understanding Self.

Introduction to Soft skills – self discovery – Developing positive attitude – Improving perceptions – Forming values.

Unit –2 Interpersonal skills / Understanding others.

Developing interpersonal relationship – Team building group dynamics – Net working – Improved work relationship.

Unit- 3 Communication Skills / Communication with others.

Art of listening – Art of reading – Art of speaking – Art of writing – Art of writing e-mails – e mail etiquette.

Unit- 4 Corporate Skills / Working with others.

Developing body language – Practicing etiquette and mannerism – Time management - Stress management.

Unit- 5 Selling self / Job Hunting.

Writing resume /CV – Interview skills – Group discussion – Mock Interview – Mock GD – Goal setting – Career planning.

REFERENCES:

Text Books :

1. K.Meena and V.Ayothi.- A Book on development of Soft Skills.
2. K. Alex – Soft Skills, S.Chand & company Ltd. Ram Nagar, New Delhi, 110 055.

Reference Books :

1.John C. Maxwell – Developing the leader within you.
2. Jim Collins – Good to Great
3. Stephen Covey – The seven habits of highly effective people
4. Daniel Goleman – Emotional Intelligence
5. Shiv Khera – You can win

B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**GENDER STUDIES**	**11EA 501**	**1**	**1**

6. Stephen Covey – Principle centred leadership

OBJECTIVES:

- *To make boys and girls aware of each other's strengths and weaknesses.*
- *To develop sensitivity towards both genders in order to lead an ethically enriched life.*
- *To promote attitudinal change towards a gender balanced ambience and Women empowerment.*

Unit – 1 Concepts of Gender : Sex – Gender – Biological Determination – Patriarchy – Feminism – Gender Discrimination – Gender Discrimination – Gender Division of Labour – Gender Stereotyping – Gender sensitivity – Gender Equity – Equality – Gender mainstreaming – Empowerment.

Unit –2 Women Studies Vs Gender Studies : UGC's Guidelines – VII to XI Plans – Gender studies – Beijing Conference and CEDAW – Exclusiveness and Inclusiveness.

Unit- 3 Areas of Gender Discrimination : Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic violence – Sexual Harassment – State policies and Planning.

Unit- 4 Women Development and Gender Empowerment : Initiatives – International Women's Decade – International Women's Year – National policy for Empowerment of Women – Women Empowerment year 2001 – Mainstreaming Global policies.

Unit- 5 Women' movement and Safeguarding Mechanism : In India National / State Commission for Women (NCW) – All Women Police Station – Family Court – Domestic violence Act – Prevention of Sexual harassment at work place – Supreme Court guidelines – Maternity benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups- 73rd and 74th Amendment for PRIS.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	Core course – XIII : **PLANT PHYSIOLOGY AND BIOCHEMISTRY**	**15 BO 613**	**5**	**5**

OBJECTIVES:

- *To study the organization and physiology of plants*
- *To understand the working mechanism in plant metabolic events.*
- *To study the integrated activities of the plants.*

Unit -1 **18 Hrs.,**

Plant water relations- Diffusion, imbibition, osmosis, Water potential, Matric potential, Solute potential, pressure potential and their relationships.
Absorption of water and minerals, Mineral nutrition, Ascent of sap.
Translocation of solutes, Munch's mass – flow hypothesis.
Transpiration-types, Mechanism of stomatal action, Guttation.

Unit -2 **18 Hrs.,**

Photosynthesis- Photosynthetic pigments - Stages of photosynthesis – light reactions – cyclic and non-cyclic photophosphorylation. Calvin cycle. C4 and CAM pathway. Photorespiration

Respiration – Respiratory substrate, Respiratory Quotient, Mechanims of respiration – Glycolysis, Kreb's cycle, electron transport system, Oxidative phosphorylation and anaerobic respiration.

Unit -3 **18 Hrs.,**

Nitrogen metabolism- sources of Nitrogen – conversion of NH3.
Growth hormones – discovery and applications of Auxins, Gibberellins and Cytokinins, Photoperiodism and vernalization, Seed dormancy.

Unit -4 **18 Hrs.,**

Carbohydrates – Definition, Classification, Monosaccharides(Glucose & Fructose), Oligosaccharides (Maltose & Sucrose), Polysaccharides(Starch, Cellulose & Pectin)
Lipids – Classification, properties, Fatty acids & their types.

Unit -5 **18 Hrs.,**

Proteins – classification, properties and structure (Primary, secondary, tertiary and quarternary),

Enzymes – Major groups, IUB classification, properties, Mechanism of action and factors affecting enzyme action.

REFERENCES

1. Pandey, SN and Sinha, BK (2001). Plant Physiology. Third revised edition, Vikas publishing House Pvt. Ltd, New Delhi.

2. Jain ,VK (2007).Fundamentals of plant physiology , S. Chand & Compamy ltd, New Delhi.

3. Verma,V (2008).Text book of plant Physiology, Ane's student edition ,Newdelhi

4. Devlin, O.P. 1974. Plant Physiology, Affiliated East West Press Pvt. Ltd.

5. Noggle, G.R. & Fritz, G. (1976). Introductory Plant Physiology, Prentice – Hall, India.

6. Taiz and Zeiger, Plant Physiology, V edition, (2010), Sinauer Associates, Inc Pub Sunderland,
7. Massachuesetts, USA.

8. Salisbury, F.B. & Ross, S. (1974). Plant Physiology, Prentice – Hall, India.

9. Rastogi , S.C (2003). Outlines of Biochemistry , CBS Publishers &Distributors , New Delhi.

10. Jain J.L. *et al.,*(2008). Fundamentals of Biochemistry, Chand, New Delhi.

11. Satyanaryana U, Chakrapaani U, (2006). Biochemistry, Books and Allied (P)Ltd.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	Core course – **XIV:** **PLANT ECOLOGY AND PHYTOGEOGRAPHY**	**15 BO 614**	**5**	**5**

OBJECTIVES:

- *To study the various aspects of ecology*
- *To know about various ecological factors*
- *To know in detail on various types of vegetation*
- *To understand the principles of phytogeography.*

Unit – 1 **15 Hrs.,**

Approaches to the study of Ecology. Ecological groups of plants – Ecological adaptations of Hydrophytes, Mesophytes, Xerophytes, Halopyhtes, Parasites & Epiphytes.

Unit – 2 **15 Hrs.,**

Ecological factors- Climatic factors: Light, Temperature, Precipitation, atmospheric humidity and Wind.

Edaphic factors: Soil components and their effects on vegetation.

Biotic factors: Interaction between plants growing in Community & Living organism.

Succession: Kinds of Succession: Hydrosere and Xerosere.

Unit – 3 **15 Hrs.,**

Population Ecology – Basic Concept – characteristics of population – Population structure.

Community Ecology:

- Characteristics of Community
  Concept of Classification of Community.
- Units of Vegetation-formation, association, Consociation & Society.

Unit – 4 **15 Hrs.,**

Vegetation Types of India – Evergreen, Deciduous, Scrub jungle, Sand dunes and Mangroves.

Plants as bioindicators and environmental monitoring.

Unit – 5 **15 Hrs.,**

Phytogeography – Principles – Phytogeographical zones of India.

Floristic regions of India: Age and area hypothesis, Endemism and theories, Continental drift.

REFERENCE

1. Sharma, P.D (2009). Ecology and Environment, Rastogi Publications.
2. Shukla, R.S. &P.S. Chandel (1991) : Plant Ecology & Soil Science S.Chand & Co., New Delhi.
3. Vasishta, P.C, (1979) Plant Ecology, Vishal Publication.
4. Verma, V,A (1981) Text Book of plant Ecology, Emkay Publication.
5. Sharma, J.P. (2004). Environmental Studies, Laxmi Publications (P) Ltd. New Delhi.
6. Ambasht R.S., (1978). The Book of Plant Ecology, Students friends Co.
7. Odum, E.P. (1971). Fundamentals of Ecology (2 nd Edn.). Saunders & Co.,
8. Philadelphia & Natraj Publishers, Dehradun.
9. Cain, S.A . (1944). Foundations of Plant Geography Harper & Brothers, N.Y.
10. Mani, M.S (1974) : Ecology &Biogeography of India Dr. W. Junk Publishers,he Haque.
11. Good, R. (1997) : The Geography of flowering Plants (2ndEdn.,) Longmans. Green & Co., Inc., London & Allied Science Publishers, New Delhi-495pp.,

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	Core course – **XV: PRINCIPLES OF BIOTECHNOLOGY**	**15 BO 615**	**5**	**5**

OBJECTIVES:

- *To provide an opportunity to acquire more knowledge in biotechnology*
- *To enable the students to pursue higher studies and research work in biotechnology*
- *To provide an opportunity to get employment in biotechnology industries and laboratories.*

Unit – 1 **15 Hrs.,**

Introduction, Scope and importance; Application of Biotechnology in industry, agriculture and medicine; future prospects and impacts of biotechnology.

Unit – 2 **15 Hrs.,**

TISSUE CULTURE

Techniques: (explants, sterilization, preparation of M.S.medium), types and induction of callus, growth and differentiation, micropropagation and organogenesis, Protoplast isolation and fusion, somatic hybridization- synthetic seeds. Application of tissue culture in agriculture and forestry.

Unit – 3 **15 Hrs.,**

GENETIC ENGINEERING:

Role of Restriction enzymes (Endonucleases and ligases) and Vectors (Plasmid, cosmid and phagemid) -Gene cloning – principle, objectives and methods – Steps involved in genetic engineering – Selection, identification and screening of recombinants, Expression of cloned genes. Applications of GMOs.

Unit – 4 **15 Hrs.,**

IMMUNO TECHNOLOGY AND ENZME ENGINEERING

Immunoglobulins – Types and structures: Hybridoma- production technology and applications of Monoclonal antibodies – Genetic engineering for vaccine production for Hepatitis.

Industrial Enzyme: - types, sources and production (amylase and protease) - immobilization of enzymes.

Unit – 5 **15 Hrs.,**

APPLICATIONS OF BIOTECNOLOGY

Single cell protein – *Spirulina,*
Mycoprotein – Yeast
Hydrogen production – Cyanobacteria,
Biogas production - Methanogens
Transgenic plants for disease resistance

REFERENCE

1. Dubey, RC (2004)A text book of Biotechnology - 3rd Edition , S.Chand & Company Ltd, New Delhi.

2. Gupta, PK.(2004).Elements of Biotechnology",I st edition Rastogi publications – Meerut

3. Purohit, SS.(2005), Biotechnology- Fundamentals & Application, 3rd Edition . Mrs. Saraswathi Purohit for student Edition, India.

4. Razdan, MK (2008) Introduction to plant tissue culture" ,2nd edition Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.

5. Ignacimuthu , S., (2003). Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

6. Kalyan Kumar De., (1997). Plant Tissue Culture – New Central Book Agency (P) Ltd., Calcutta.

7. Kumaresan, V, (2009). "Biotechnology", Saras Publications, Nagercoil.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	**Core course –XVI– MAJOR PRACTICAL – XVI (covering the core course – XIII, XIV and XV)**	**15 BOP 616**	**6**	**5**

- Experiments to be carried out by students in physiology – Osmotic pressure (plasmolytic method), Osmosis (potato osmoscope), determination of water potential, absorption and transpiration, Ganong's potometer, Willmott's bubbler (effect of monochromatic light), effect of Co2 concentration on photosynthesis, separation of leaf pigments (paper chromatography), Ganong's respiroscope.

- Experiments for demonstration only - in physiology – Thistle funnel experiment, test-tube funnel experiment, Khune's vessel, -buffer, -colorimeter, pH meter.

- Biochemistry – Qualitative tests for carbohydrates, Paper chromatography, Thin layer chromatography and column chromatography.

- Ecology – Study of plant community by –species area curve method, quadrat method (qualitative and quantitative), line transect method. – Morpho anatomical studies of xerophytes, mesophytes, hydrophytes, halophytes, parasites and epiphytes. – study of pond ecosystem, study of soil.

- Biotechnology – Sterilization techniques, preparation of MS medium, isolation of protoplast (mechanical method), callus induction, encapsulation of embryoids (synthetic seeds), visit to a tissue culture laboratory.

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B.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	**Major Based Elective – III: BIOFERTILIZERS**	**15 BOE 603**	**5**	**5**

OBJECTIVES:

- *To understand the importance of biofertilizers in agriculture*
- *To know various types of microbial inoculants used as biofertilizers*
- *To know the methodology of isolation, identification, cultivation, mass multiplication and method of application of biofertilizers.*

Unit – 1 **12 Hrs.,**

Biofertilizer – Introduction – Advantages of biofertilizers.

General Characteristics of Bacterial biofertilizers: Rhizobium, Azospirllum, Azotobacter and Phosphobacteria.

Unit – 2 **12 Hrs.,**

Fungi as Biofertilizers – General Characteristics of Ecto and Endo Mycorrhizae and their effects on plants – Classification of mycorrhizae – AM fungi and their uses.

Unit – 3 **12Hrs.,**

Cyanobacteria: *Nostoc, Anabaena, Scytonema*

Symbiotic and Non – symbiotic Nitrogen fixation – nif genes, mechanism of N_2 fixation.

Unit – 4 **12 Hrs.,**

Fermentors – Structure and types

Production of bio inoculants: Mass production of *Rhizobium, Phosphobacteria, Cyanobacteria* and *Azolla*

Unit – 5 **12 Hrs.,**

Field trials and applications of different biofertilizers.

Production and marketing of biofertilizers.

REFERENCE

1. Subba Rao, N.S. (2000). Soil Microbiology. Oxford and IBH Publishing Co. Ltd., New Delhi.
2. Subba Rao, N. S., 1998, Biofertilizers in agriculture and forestry. India Book House Ltd. New Delhi.
3. Somani. L.L. (2007). Hand book of Biofertilizers, Agrotech Publishing Academy, Udaipur.
4. Jaiswal, A.P. and Gupta, N.C. (2013), Biofertilizers technology, Enkay publishing house, New Delhi.
5. Varma, A. and Hock, B. (1995). Mycorrhiza. Springer–Verlag, Berlin.
6. Purohit S.S.(1999) Basic & agricultural biotechnology, Agrobotanica publishers. New Delhi

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B.Sc., Botany (*for the students admitted from 2015-16 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
VI	**HUMAN VALUES AND ETHICS**	**11VBC601**	**2**	**2**

Unit – 1 Introduction : Value education and its Relevance to present day – Meaning of value education – Value education in Kural – Personal values : Love - Compassion – Gratitude – Courage – Optimism – Friendship.

Unit – 2 Ethics : Ethical question for the Society – Overcoming Dilemma – Ethical and Ethics – Value system – Definition of Value – Categorization of values – Method of Building – Value system – Desired and Desirable values – Changing values.

Unit – 3 War, Peace and Terrorism : War – Avoiding wars – Terrorism _ What is Terrorism – Perception of Terrorism – U.N. definition of Terrorism – Different types of Terror acts – Peace – Signs for an everlasting Peace.

Unit – 4 International Law and Human Rights : Laws of States – International laws – Human rights – Implementing and Safeguarding Human rights – The fundamentals of International law – International law in operation.

Unit – 5 Happiness and Contentment : Courage and Resilience – Love, Patience and Empathy – Relationship – Citizenship – Personal values – Troubleshooting – Cultivation good manners – Being persuasive – Being authentic.

REFERENCES:

Text Books :

1. N.S.Raghunathan.- (2010) Value Education, Margham Publications, Chennai.

Reference Books :

1.Jayashree Suress and B.S.Raghavan – (2009), Human Values and Professional Ethics (Value and Ethics of Profession), S.Chand and Company Ltd, New Delhi.
2. D.R.Kiran – (2007), Professional Ethics and Human Values, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

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2019-20

II B.Sc

A.V. C. College (Autonomous), Mannampandal – 609 305.
Choice Based Credit System (CBCS)
(For the Students Admitted from 2018 – 2019 onwards)

GENERAL INTEREST COURSE
ENVIRONMENTAL STUDIES

SEMESTER II 16ES601
SUBJECT CODE: ~~18ES 201~~

CREDIT: 2
HOURS: 2/WEEK

Unit: 1 The Multidisciplinary nature of environmental studies (2 lectures)

Definition, scope and importance.
Need for public awareness

Unit: 2 Natural Resources:
Renewable and non-renewable resources:
Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit: 3 Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-

- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4 **Biodiversity and its conservation**

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

(8 lectures)

Unit: 5 **Environmental Pollution**

Definition

Causes, effects and control measures of :

a. Air Pollution
b. Water Pollution
c. Soil Pollution
d. Marine Pollution
e. Noise pollution
f. Thermal Pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.

(8 lectures)

Unit: 6 **Social Issues and the Environment**

GA

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7 **Concepts and Definitions of Disaster Management**

GA

- Hazard and Vulnerability profile of India
- Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management
- Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, Plans, programmes and legislation

Unit: 8 **Ill-Effects of Fireworks**

SM

- Man , Environment and Climate Change - Firework and Celebrations Fireworks and Health Hazards - Types of Fire - Types and Uses of Fire Extinguishers - Firework and Safety – Creating Awareness on Reducing the Usage of Fireworks.

Unit: 9 **Field Work**

- Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions Web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p

(M) Magazine (R) Reference (TB) Textbook

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10/12/2018

Allied Course – Botany for Zoology (Day) & Microbiology (Eve)
and Non Major Elective Courses for Zoology (Day)
offered by Botany Department

(For the candidates admitted from the academic year 2015-2016 onwards)

Sem	Part	Course	Title	Int. Hrs./ Week	Credit	Exam Hrs	Marks		Total
							Inter	Ext	
I	III	AC 1	Allied Botany Theory – I	07	04	03	25	75	100
I	III	AC 2	Allied Botany Practical I	02	01	03	40	60	100
II	III	AC 3	Allied Botany Theory – II	07	04	03	25	75	100
II	III	AC 4	Allied Botany Practical II	02	01	03	40	60	100
IV	III	NMEC 1	Economic Botany	02	02	03	25	75	100
V	III	NMEC 2	Biofertilizers & Mushroom Technology	02	02	03	25	75	100

B.Sc., Zoology (*for the students admitted from 2015-16 onwards*) **and** B.Sc., Microbiology (*for the students admitted from 2016-17 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**Allied Course – I: PLANT DIVERSITY, ANATOMY AND EMBRYOLOGY**	**15 ABO 101**	**7**	**4**

OBJECTIVES:

- *To understand the major groups of plants and their Characteristics.*
- *To study the basic principles of embryology and anatomy.*

Unit -1 **21 Hrs**

General account of Bacteria; ultrastructure, mode of nutrition, Asexual, parasexual phenomenon and economic importance.

Viruses: Physical and chemical nature, Ultrastructure of TMV, Bacteriophage, Replication

Viral diseases-their transmission, prevention and control.

Unit -2 **21 Hrs**

Thallophytes
Algae: Nostoc, Oedogonium, Ectocarpus, Polysiphonia
Fungi: Albugo, Penicillium,Agaricus.

Unit - 3 **21 Hrs**

Bryophyta:Funaria,
Pteridophyta:Lycopodium and Nephrolepis
Gymnosperm:Cycas

Unit - 4 **21 Hrs**

Anatomy: Tissues – Simple and Complex
Primary structure: Dicot – Root, stem & leaf
Normal Secondary thickenings: Dicot Root, Stem Eg. Tinospora.

Unit - 5 **21 Hrs**

Embryology; Microsporangium, Microsporogenesis and male gametophyte. Megasporangium- Types of Ovule, Megasporogenesis, Female gametophyte (Polygonum type)- Double fertilization, type of endoperm- Development of dicot embryo.

REFERENCES:

1. Pandey, B.P. (2001). College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd., New Delhi.
2. Sharma, PD (2003).The Fungi. Rastogi Publications, Meerut
3. Gangulee & Khar, 1980. College Botany Vol. I & II Tata Mc Graw Hill, New Delhi.
4. Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand &company Ltd. New Delhi
5. Pandey, S.N., Misra, S.P and Trivedi, P.S. 1970. A text book of Botany (Vol II).Vikas Publishing House Pvt. Ltd. Delhi.
6. Pandey B,P., (2015)(Edn.) Plant Anatomy S. Chand Publ. New delhi.
7. Vashista P.C (1984). Plant Anatomy –Pradeep publication , Jalandhar
8. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, 5th Edition, Vikas Publishing House. Delhi.
9. Pandey , AK (2000). Introduction to Embryology of Angiosperms 1st Edition :CBS; New Delhi

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B.Sc., Zoology (*for the students admitted from 2015-16 onwards*) **and** B.Sc., Microbiology (*for the students admitted from 2016-17 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**Allied –BOTANY PRACTICAL – I (Covering the syllabus of Allied theory paper – I)**	**15 ABOP 102**	**2**	**1**

1. To make suitable micro preparations of algae, fungi, bryophytes, pteridophytes, gymnosperms (mentioned in the syllabus) and to describe and identify the same.

2. To make suitable micro preparations of the stem, root and leaf of dicot and monocot and to identify the same giving reasons.

3. To demonstrate the developmental stages of micro and megasporangia.

4. To critically comment on the structure of bacteria and viruses (TMV and T4 phage).

5. To maintain observation and record note book.

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B.Sc., Zoology (*for the students admitted from 2015-16 onwards*) and B.Sc., Microbiology (*for the students admitted from 2016-17 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**Allied Course – II : BOTANY-II (TAXONOMY, PHYSIOLOGY, ECOLOGY, AND BIOTECHNOLOGY)**	**15 ABO 203**	**7**	**4**

OBJECTIVES:

- *To study in the basic system of classification and salient features of a few families.*
- *To understand the physiological principles of plants.*
- *To understand the basic mechanism involved in biotechnology.*
- *To study the basic principles of ecology.*

Unit-1 **21 Hrs.**

TAXONOMY: Outlines of Bentham and Hookers Classification. Study of the following families and economic importance of plants included in the families.

Annonaceae, Rutaceae, Fabaceae, Cucurbitaceae.

Unit-2 **21 Hrs.**

Rubiaceae, Asclepiadaceae, Lamiaceae, Amaranthaceae, Orchidaceae and Poaceae.

Unit-3 **21 Hrs.**

PHYSIOLOGY: Absorption of water, Absorption of minerals, Photosynthesis. Light and dark reaction, Nitrogen cycle.

Respiration: Aerobic-Glycolysis, kreb's Cycle, Electron Transport System, Anaerabic – fermentation. Growth hormones – General structure & Physiological Effects of Auxin, Gibberellins & cytokinins.

Unit-4 **21 Hrs.**

ECOLOGY: Basic concept of Ecosystem
Factors affecting Vegetation-Climatic, edaphic and biotic factors.
Xerophytes-Nerium and Opuntia.
Hydrophytes-Hydrilla, Nymphaea.
Mesophytes-Helianthus, Hibiscus.

Unit-5 **21 Hrs.**

PLANT BIOTECHNOLOGY
Enzymes (Restriction enzymes, DNA Ligase)
Cloning Vectors (plasmid, cosmid, Ti Plasmid, CaMV
Production of rDNA
Production of Transgenic plants-BT - Cotton
Tissue culture techniques (Aseptic conditions, MS media, callus induction)

REFERENCE:

1. Pandey, B.P.(1997).Taxonomy of Angiosperms , S.Chand & Co., New Delhi.
2. Sambamurthy A..S.S. 2005;Taxonomy of Angiosperms, I.K. International Pvt. Ltd, New Delhi.
3. Jain ,VK (2007).Fundamentals of plant physiology , S. Chand & Compamy ltd, New Delhi.
4. Verma,V (2008).Text book of plant Physiology, Ane's student edition , New Delhi
5. Sharma, P.D (2009). Ecology and Environment, Rastogi Publications.
6. Shukla, R.S. &P.S. Chandel (1991) : Plant Ecology & Soil Science S.Chand & Co., New Delhi.
7. Dubey, RC (2004)A text book of Biotechnology - 3rd Edition , S.Chand & Company Ltd, New Delhi.
8. Kumaresan, V, (2009). "Biotechnology", Saras Publications, Nagercoil.

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B.Sc., Zoology (*for the students admitted from 2015-16 onwards*) **and** B.Sc., Microbiology (*for the students admitted from 2016-17 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**Allied – BOTANY PRACTICAL – II (Covering the syllabus of Allied theory paper – II)**	**15 ABOP 204**	**2**	**1**

1. To describe plants in technical terms and to identify the family by the observed morphological characters of vegetative and floral parts.

2. To dissect flower and to construct the floral diagram.

3. To critically comment the experimental set-ups in plant physiology.

4. To demonstrate the ecological groups of plants (morphological and anatomical adaptations)

5. To acquire practical knowledge in tissue culture techniques (media preparation, callus induction, etc)

6. To critically comment the tools and techniques in genetic engineering.

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B.Sc., Zoology *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**Non Major Elective Course – I ECONOMIC BOTANY (for II B.Sc., Zoology students)**	**13 NMBO 401**	**2**	**2**

OBJECTIVES:

- *To study the economics aspects of selected crops*
- *To study the utilization of plants as food for human*

Unit – 1 **09 Hrs.,**

- Scope of economic botany
- Cereals: Paddy (*oryza sp.,*) and millets (Sorghum) – distribution, method of cultivation, improved varieties – conservation and nutritive values

Unit – 2 **09 Hrs.,**

- Pulses: Black gram (*Vigna mungo*) – distribution, methods of cultivations, improved varieties – conservation and nutritive values

Unit – 3 **09 Hrs.,**

- Oil crops: Ground nut (*Arachies hypogea*) and gingely oil (*Sesamum indicum)* Cultivation, extraction and its uses

Unit – 4 **09 Hrs.,**

- Wood and fiber plants: Teak wood (*Tectona grandis*) and cotton (*Gossipium hirsetum*) cultivation, important varieties and it's uses

Unit – 5 **09 Hrs.,**

- Medicinal plants: Tulsi (*Ocimum* sp.), Keezha nelli (*Phyllanthus* sp.), distribution, cultivation and uses.

REFERENCES:

1. Ashok Bendre and Ashok Kumar (1998-99). Economic Botany. Rastogi Publications, Meerut.
2. Govinda Praksh and Sharma, S.K. (1975). Introductory Economic Botany. Jai Prakash Nath, Meerut.
3. Gupta, S.K. and Kaushik, M.P. (1973). An Introduction to Economic Botany. K. Nath & Co., Meerut.
4. Hill, A.W. (1952). Economic Botany. Tata McGraw–Hill Publishing Co., New Delhi.
5. Pandey, B.P. (2000). Economic Botany. S. Chand & Company Ltd., New Delhi.
6. Sambamurthy, A.V.V.S. and Subrahmanyan, N.S. (1989). A Text Book of Economic Botany. Wiley Eastern Ltd., Madras.
7. Sen, S. (1992). Economic Botany. New Central Book Agency, Calcutta.
8. Verma, V. (1974). A Text Book of Economic Botany. Emkay Publications, New Delhi.

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B.Sc., Zoology *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
V	**Non Major Elective Course – II: BIOFERTILIZERS AND MUSHROOM TECHNOLOGY (for III B.Sc., Zoology students)**	**15 NMBO 502**	**2**	**2**

OBJECTIVES:

- *To know the basic aspects of biofertilizers*
- *To know about the production and mass multiplication of various microbes used as fertilizers*
- *To understand the cultivation technologies of mushrooms*

Unit – 1 **6 Hrs.,**

BIOFERTILIZER ORGANISMS – General Characteristics of Cyanobacteria – Nostoc, Anabaena & Scytonema - Bacteria - Rhizobium, Azospirillum, Azotobacter, Fungi - General charctersitcs of Ecto, Endo and Ectendo mycorrhizae; Pteridophyte- Azolla.

Unit – 2 **6 Hrs.,**

BIOFERTILIZATION PROCESS

Nitrogen Fixation-symbiotic and Free living nitrogen Fixation
Phosphate solubilizers and their importance.
Role of Micoroorganisms in carbon cycling

Unit – 3 **6 Hrs.,**

PRODUCTION OF BIOINOCULANTS

- Isolation, mass cultivation and applications of
  - Rhizobium
  - Cyanobacteria
  - AM Fumgi

Unit – 4 **6 Hrs.,**

EDIBLE MUSHROOMS

- Classification - Edible and poisonous mushrooms
- Nutritional value of edible mushrooms
  Morphology and life cycles of edible mushrooms (Agaricus)
- General characteristics of *Agaricus bisporus, Volvariella, Calocybe*, and *Pleurotus*

Unit – 5 **6 Hrs.,**

MUSHROOM CULTIVATION

- Production of mother spawn and spawn multiplication.
- Production of composts – long method and short method.
- Cultivation of *Agaricus bisporus* (button mushroom)
- Cultivation of *Pleurotus* (oyster mushroom)

REFERENCE

1. Subba Rao, N.S. (2000). Soil Microbiology. Oxford and IBH Publishing Co. Ltd., New Delhi.

2. Subba Rao, N. S., (1998), Biofertilizers in agriculture and forestry. India Book House Ltd. New Delhi.

3. Somani. L.L. (2007). Hand book of Biofertilizers, Agrotech Publishing Academy, Udaipur.

4. Jaiswal, A.P. and Gupta, N.C. (2013), Biofertilizers technology, Enkay publishing house, New Delhi.

5. Nita Bahl, (2002). Hand Book on Mushroom Cultivation. 4th Edition, Vijay Primlani for Oxford & IBH Publishing Co., Press, New York, New Delhi.

6. Biswas, S, Datta, M and Nagachan, S.V. (2012). Mushrooms- A manual for cultivation. PHI Learning Private Limited, New Delhi.

7. Krishnamoorthy, (1999). Hand Book of Mushroom Cultivation. TNAU Publications, Coimbatore, TN,India.

8. Dey S.C., (2000), Mushroom growing, Agrobios (India), Jodhpur.

9. Jana, B.L. (2014), Mushroom culture, Agrotech publishing Academy, Udaipur.

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B.Sc., BOTANY MAJOR AND ALLIED BOTANY - THEORY

QUESTION PAPER MODEL (for Core Course & Allied Course)

B.Sc., Degree Examination, APRIL / NOVEMBER

Time: 3 hrs. Maximum: 75 Marks

Part – A (10 x 2 = 20 Marks)
Answer ALL the questions.
All questions carry equal marks. Draw diagrams wherever necessary.
Each answer should not exceed 50 words
(Two questions from each unit)

Q.No. 1&2 From UNIT-I

Q.No. 3& 4- From UNIT-II

Q.No. 5&6 From UNIT-III

Q.No. 7&8 From UNIT-IV

Q.No. 9&10 From UNIT-V

Part – B (5x5 = 25 marks)
Answer ALL the questions
All Question carry equal marks
(One question from each unit with internal choice)
Each answer should not exceed 200 words.

Q.No. 11. a (or) b From UNIT-I

Q.No. 12. a (or) b From UNIT-II

Q.No. 13. a (or) b From UNIT-III

Q.No. 14. a (or) b From UNIT-IV

Q.No. 15. a (or) b From UNIT-V

Part – C (3x10 = 30 marks)
Answer any THREE questions
One question from each unit
All Question carry equal marks. Each answer should not exceed 500 words.

Q.No. 16. From UNIT-I

Q.No. 17. From UNIT-II

Q.No. 18 From UNIT-III

Q.No. 19. From UNIT-IV

Q.No. 20. From UNIT-V

B.Sc., BOTANY - THEORY

QUESTION PAPER MODEL (for Non Major Elective Course, Skill based courses, Soft skills development, Environmental studies, Gender studies & Value Education papers)

B.Sc., Degree Examination, APRIL / NOVEMBER

Time: 3 hrs. Maximum: 75 Marks

Answer any FIVE questions

(One question compulsorily from each unit & not more than two questions from a unit)

1.

2.

3.

4.

5.

6.

7.

8.

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2018-19 closed.

2015-16 ONWARDS

DEPARTMENT OF BOTANY

PG PROGRAMME STRUCTURE

A.V.C.COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

M.Sc., BOTANY

Programme structure under CBCS
(For the candidates admitted from the academic year 2015-2016 onwards)

Semester	Course	Title	Int. Hrs./ Week	Credit	Exam. Hours	Marks		Total
						Inter	Ext	
I	CC I	Plant Diversity	07	05	03	25	75	100
	CC II	Anatomy, Wood technology, Morphogenesis and Embryology.	07	05	03	25	75	100
	CC III	Environment and Conservation	06	05	03	25	75	100
	CC IV	Practical-I (cov. CCI to CCIII)	06	03	04	40	60	100
	EC-1	Elective- Horticulture	04	04	03	25	75	100
II	CC V	Advances in Systematics & Economic Botany	07	05	03	25	75	100
	CC VI	Cytogenetics & Molecular Biology	07	05	03	25	75	100
	CC VII	Microbiology & Phytopathology	06	05	03	25	75	100
	CC VIII	Practical-II (cov.CC V to VII)	06	03	04	40	60	100
	EDC-1	Offered by other departments	04	02	03	25	75	100
III	CC IX	Physiology, Biochemistry & Biophysics	06	05	03	25	75	100
	CC X	Biotechnology & Genetic Engineering	05	05	03	25	75	100
	CC XI	Forest science	05	05	03	25	75	100
	CC XII	Practical-III(cov.CC IX to XI)	06	03	04	40	60	100
	EDC-II	Offered by other departments	04	02	03	25	75	100
	EC-II	Elective – Marine Botany	04	04	03	25	75	100
IV	CC XIII	Herbal Technology	06	05	03	25	75	100
	CC XIV	Research Methodology	06	05	03	25	75	100
	CC XV	Practical-IV (cov.CCXIII&XIV)	06	04	04	40	60	100
	EC-III	Bioinformatics and Bionanotechnology	06	04	03	25	75	100
		Project Work & Viva-Voce	06	06	-	-	-	100

EDC **Offered by department of Botany**

1. **Horticulture**
2. **Herbal medicine**

M.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**CORE COURSE - I: PLANT DIVERSITY (ALGAE, FUNGI, BRYOPHYTA, PTERIDOPHYTES AND GYMNOSPERMS)**	**15 PBO 101**	7	5

OBJECTIVES:

- To understand the major groups of plants and their Characteristics.
- To trace their interrelationships and to study their economic importance and evolutionary trends.

UNIT – I **21 Hrs.,**

General characteristics of Algae;
Classification of Algae (Fritsch), Contributions of Indian Algologists – T.V.Desikacharry
Range of thallus variation and reproduction in Algae.
Life Cycle patterns in Algae.
Economic Importance of Algae.

UNIT – 2 **21 Hrs.,**

General characteristics of Fungi.
Classification of Fungi (Ainsworth), Contribution of Indian Mycologist; C.V.Subramanian.
Nutrition, Mycelial structure, Reproduction and Types of fruit bodies in Fungi.
Economic importance of Fungi.

UNIT – 3 **21 Hrs.,**

General Characteristics of Bryophytes.
Classification of Bryophytes (Rothmaler).
Contribution of Indian Bryologist Kashyap.
Gametophytic and Sporophytic Structures in Bryophytes.
Reproduction and Alternation of generations in Bryophytes.
Origin, evolution and economic importance of Bryophytes

UNIT – 4 **21 Hrs.,**

General Characteristics of Pteridophytes
Classification of Ptridophytes (Sporne)
Contribution of Indian Pteridologist – Manikkam.
Phylogeny and Evolutionary trends in Ferns
Stelar and Soral evolution in Pteridophytes.
Gametophytes in Eusporangiate and Leptosporangiate forms.
Life cycles patterns in Pteridophytes.

UNIT – 5 **21 Hrs.,**

General Characters of Gymnosperms.
Classification of Gymnosperms (K.R.Sporne)
Contribution of Birbal Sahni.
Economic importance of Gymnosperms.

REFERENCES:

1. Fritch, F.E – Structure and Reproduction of Algae Vol.-I & II
2. Round, F.E. – Biology of Algae
3. Venkataraman, G.S – Algae form and function
4. Alexopoulos, C.J – Introduction to mycology
5. Bessey, E.J – Morphology and Taxonomy of Fungi
6. John Webster – Introduction to Fungi
7. Bower, F.O – The Ferns Vol. I, II & III
8. Sporne, K.R – The Morphology of Pteridophytes
9. Sporne, K.R – The Morphology of Gymnosperms

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
I	**CORE COURSE – II: ANATOMY, WOOD TECHNOLOGY, MORPHOGENESIS AND EMBRYOLOGY**	**15 PBO 102**	**7**	**5**

OBJECTIVES:

- To enable the students to have a comprehensive idea of a tissues and tissues system
- To enable the students to learn the significance of anatomy, wood technology, morphogenesis and experimental and applied embryology
- To prepare students for carriers in wood products industry

UNIT-1 **21 Hrs**

Vascular and cork cambium- structure, development and function. Ontogeny and phylogeny of xylem and phloem- components of secondary xylem and phloem. Leaf initiation and ontogeny.

UNIT-2 **21 Hrs**

Nodal anatomy- types; Root stem transition-secretory structures-floral anatomy, Senesence and abscission-Healing of wounds, Anomalous secondary growth.

UNIT-3 **21 Hrs**

Nature and Properties of wood – Physical, Chemical and Mechanical. Durability of wood. Defects in wood. Wood seasoning and machining. Composite wood and Adhesives Production of commercial wood (plywood, fibre boards and particle boards). Wood industry in India. Wood substitutions.

UNIT-4 MORPHOGENESIS **21 Hrs**

Differentiation of xylem and phloem in vitro and in vivo. Polarity, asymmetrical cell division. Surgical experiments and their importance in plant morphology. Role of Cytoplasm and nucleus in plant morphogenesis. Role of Hormones in plant morphogenesis.

UNIT-5 EXPERIMENTAL EMBRYOLOGY **21 Hrs**

Pollen culture and Haploid Production; Embryo Culture; Ovule and Seed Culture; Ovary Culture; Parthenocarpy types and significances.

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REFERENCES:

1. Fahn, A – Plant Anatomy
2. Esau, K – Plant Anatomy
3. Eames and Mac. Daniel – Plant Anatomy
4. Bard, J – Morphogenesis
5. Sinnott, E.W – Morphogenesis
6. Bhojwani, S.S & Bhatnagar, S.P – Embryology of Angiosperms
7. Maheswari, P – An introduction to Embryology of Angiosperms
8. Johri, B.E – Embrology of Angiosperms.
9. Brown et al., - Text book of wood technology
10. Tieuran, H.D – Wood Technology

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
I	**CORE COURSE – III : ENVIRONMENT AND CONSERVATION**	**15 PBO 103**	**6**	**5**

OBJECTIVES:

- To give an insight into environmental pollution in the environment
- To provide knowledge on the uses of energy and its types, water chemistry, soil chemistry
- To study the conservation of existing flora and fauna.

UNIT –1
Hrs. **18**

Definition, principles and scope of Environmental science. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Ecosystems: Structure and functions, Abiotic and Biotic components, energy flows, food chains, food wed, ecological pyramids, types and diversity.

UNIT- 2
Hrs. **18**

Water chemistry: Chemistry of water, concept of DO, BOD, COD, sedimentation, coagulation, filtration, Redox potential. Soil Chemistry: Inorganic and organic components of soil, Nitrogen pathways and NPK in soils. Toxic chemicals in Air and Water: Pesticides in water, Insecticides, carcinogens in the air.

UNIT-3
Hrs. **18**

Sun as source of energy; solar radiation and its spectral characteristics; fossil fuels; principles of generation of hydroelectric power, tidal, wind, geothermal energy; bio energy – energy from biomass and biogas; Environmental implication of energy use: air and thermal pollution.

UNIT–4
Hrs. **18**

Conservation of resources – endangered flora and fauna their identification and documentation – Conservation strategies, ex-situ approach – seed storage, tissue culture and cryopreservation, gene bank, pollen bank and seed bank. In-situ approaches – Biosphere reserves, national parks and sanctuaries.

UNIT – 5
Hrs. **18**

Environmental education; Global environmental changes -- ozone depletion, global warming and climatic changes; Waste lands and their reclamation; Desertification and its control; Environmental hazards, Eutrophication and restoration of Indian lakes.

REFERENCES:

1.Odum,E.P - Fundamentals of Ecology
2.Ambasht,H.D - A text book of plant Ecology
3.Ignacimuthu.S.D. - Applied plant Biotechnology
4.Kumar H.D - Modern concepts of Ecology
5.Harvinder Sohal and A.K.Srivastava - Environmental Biotechnology

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M.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
I	**CC IV- PRACTICAL – I:** **Covering CC I to CC III**	**15 PBOP 104**	**6**	**3**

PLANT DIVERSITY (ALGAE, FUNGI, BRYOPHYTA, PTERIDOPHYTES AND GYMNOSPERMS)

- Detailed study of the types mentioned in the theory.
- To make suitable micro preparations of the types studied

ANATOMY

- Study of Anomalous Secondary Growth of *Bogainvilliea, Boearhaavia, Nyctanthus, Bignonia*
- Study of Nodal anatomy (Unilocunar, Bilocunar and Trilocunar)

EMBRYOLOGY

- Study of Dicot Embryo – Type of ovules (Spotters)

ENVINRONMENTAL SCIENCE

- Determination of dissolved O_2 and CO_2 in various water samples.
- Study of Vegetation analysis

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
I	**ELECTIVE COURSE – I: HORTICULTURE**	**15 PBOE 101**	**4**	**4**

OBJECTIVES:

- To understand the main principles and importance of horticulture.
- To develop skill in horticulture techniques.
- To develop potential for self employment

UNIT-1
12Hrs

Importance and scope of horticulture – Divisions of horticulture – Climate, soil and nutritional needs – Plant propagation method – Cutting, layering, grafting and budding.

UNIT-2
12Hrs

Principles and methods of designing outdoor garden – hedges, edges, fences, trees, climbers, rockeries, arches, terrace garden – Lawn making and maintenance – Water garden.

UNIT-3
12Hrs

Indoor gardening – Foliage plants, flowering plants, hanging basket, Bonsai plants – Training and pruning. Floriculture – Cultivation of commercial flower crops – Rose, Jasmine and Chrysanthemum, flower decoration – Dry and wet decoration.

UNIT-4
12Hrs

Classification of vegetables, cultivation of important vegetable – Tomato, potato, onion, Layout for a model kitchen garden.

UNIT-5
12Hrs

Fruit drops – Induction of flowering, flower thinning, fruit setting, fruit development. Cultivation of important fruit crops – Mango, Grapes and Guava. Cultivation of tree species – Eucalyptus and Teak.

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REFERENCES:

1. K.Manibushan Rao, - Textbook Horticulture, Mac Millan Indian Ltd, New Delhi.
2. N. Kumar - An Introduction to Horticulture. Rajalakshmi Publications, Nagercoil.
3. J.B. Edmond. - Fundamentals of Horticulture. Tata Mc Graw Hill, New Delhi.
4. S.Prasad and U.Kumar - Fundamentals of Horticulture. Agro Botainca Publications and Distributors, Bikaner, India.

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
II	**CORE COURSE – V: ADVANCES IN SYSTEMATICS AND ECONOMIC BOTANY**	**11PBO205**	7	5

OBJECTIVES:

- To study the basic systems of classification and salient features of few families
- To learn herbarium techniques.
- To study the floral characters with an aim to identify the taxa authentically.
- To prepare taxonomic keys with the help of morphological and floral characters.
- To study the various types of floral distribution in Tamilnadu.
- To study the economic aspects of selected crops
- To study the utilization of plants as food for human.

UNIT-1 **21 Hrs.**

History of Indian systematics. Taxonomic hierarchy. Plant nomenclature basis, rules and typification. Preparation of key, Herbarium preparation and maintenance Taxonomic literature-Flora and Monograph ,Comprehensive view of various approaches to plant classification-artificial (Linnaeus) natural, (B&H), Phylogenetic (Hutchinson and Takhtajan)

UNIT-2 **21 Hrs.**

Detailed study: Salient features, description, distribution and economic importance of the following families. Ranunculaceae, Magnoliaceae, Cruciferae, Portulacacae, Sterculiaceae, Vitaceae (E&P), Sapindaceae, Combretaceae, Myrtaceae, Onagraceae, Cucurbitaceae, Apiaceae.

UNIT-3 **21 Hrs.**

Oleaceae, Boraginaceae, Solanaceae, Bignoniaceae, Nyctaginaceae, Aizoaceae (F&P) Podostemonaceae, Loranthaceae, Casuarinaceae, Amarillidaceae, Commellinaceae, Arecaceae Cyperaceae and Poaceae.

UNIT-4 **21 Hrs.**

Taxonomic evidences – Morphology, Comparative plant anatomy, Cytotaxonomy, embryology palynology, ecology and physiology – chemotaxonomy and numerical taxonomy.

UNIT-5 **21 Hrs.**

Industrial Timbers, Fibers, Cellulose, Starch & paper, latex and Rubber, Essential oils, gums, resins, tannins, alkaloids, Drugs and narcotics.

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REFERENCES:

1) Naik V.K.,Principles of plant Taxonomy, IBH Oxford.
2) Vasishta P.C. 1994, Taxonomy of Angiosperms.
3) Dutta SC., Systematic Botany.
4) Sing Y and Jain D.K., Taxonomy of Angiosperms.
5) Sharam O.P., 1993, Plant Taxonomy.
6) Susheela M.Dass 2003, Plant Taxonomy.
7) Chopra G.L 2004, Angiosperms (Systematics and Life Cycle),Pradeep Publications, Jalandar.
8) Lawrence H.W., 1969, Taxonomy of Vascular plants.
9) Jeffery C.1976, An Introduction to plant taxonomy, Allied Publication.
10) Rendle R.B., The classification of flowering plants Vol. I, II and III Oxford-clarendon.
11) Hill A.F - Economic botany
12) G. Prakash & Sharma - Introductory economic botany
13) B.P. Pandey - Botany Volume – I & II

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
II	**CORE COURSE – VI: CYTOGENETICS AND MOLECULAR BIOLOGY**	**11PBO206**	**7**	**5**

OBJECTIVES:

- To understand the organization and functioning of genetic material
- To comprehend the intricacy of regulation of genes
- To understand the mechanism of gene expression

UNIT-1 **21 Hrs.**

Prokaryotic and Eukarvotic genome organization. Nucleic acids-Chemical and Physical structure of DNA and RNA. Chromosomal proteins – DNA replication in prokarvotes and Eukaryotes; Transposans.

UNIT-2 **21 Hrs.**

Genetic code and characteristics, redundancy, protein synthesis – Transcription and Translation – Operon model – lacoperon; Positive and negative control. Marker Techniques: RAPD and RFLP.

UNIT-3 **21 Hrs.**

Methods of genetic recombination conjugation, transformation and transduction in Prokaryotes; Gene interaction-cytoplasmic inheritance in plants – Euploids and aneuploids. Extra nuclear inheritance – chloroplast & mitochondria.

UNIT-4 **21 Hrs.**

Linkage and crossing over, chromosome mapping-Quantitative inheritance-sex determination in plants – sex linked inheritance and genetic disorders – Biochemical genetics with reference to Neurospora.

UNIT-5 **21 Hrs.**

Spontaneous and induced mutation-chromosomal aberrations-Gene mutations and detection of gene mutations- Molecular mechanism of mutations – DNA damage and repair.

Frequency of genes in populations – Hardy-Weinberg genetic equilibrium – Genetic polymorphism.

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REFERENCES:

1) Freifulder, D – Molecular biology
2) De Robertis & De Robertis – Cell and Molecular Biology
3) Lewin, B – Genes Vol. I – VI
4) Strick Berger – Genetics II
5) Sinnott, Dunn & Dobzhansky – Principles of Genetics

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
II	**CORE COURSE – VII: MICROBIOLOGY AND PHYTOPATHOLOGY**	**11PBO207**	**6**	**5**

OBJECTIVES:

- To study the different types of microorganisms and their activities
- To understand and exploit their potentialities in agriculture, industry and other environmental aspects
- To study the mechanism of infection and colonization of plant diseases
- To study disease cycle and control measures of various plant diseases.

UNIT-1 **18 Hrs.,**

General classification of microorganisms (Whittaker)
Microorganisms - Collection of samples, methods of Sterilization. Culture media and staining techniques for algae fungi and bacteria – pure culture techniques and maintenance.General characters of Viruses, Mycoplasma and protozoa.
Structure growth and reproduction of bacteria.

UNIT-2 **18 Hrs.,**

Biofertilizers (Azolla, Azotobacter, Azospirillum, Rhizobium, Blue Green Algae)
Biopesticides (Bacterial, Fungal and Viral)
Mycorrhiza.
Mushroom cultivation

UNIT-3 **18 Hrs.,**

Microbiology of water, Air, Soil.
Microbes in decomposition and recycling process.
Food Spoilage and Food preservation.
Microbiology of Milk, Meat and Poultry.

UNIT-4 **18 Hrs.,**

Koch's postulates and Inoculum potential.
Parasitic and Non-Parasitic causes of diseases – Disease symptoms
Entry and Invasion of the host plant and damage to host Tissues
Toxins in pathogenesis
Mechanical and Chemical resistance to entry and spread.

UNIT-5 **18 Hrs.,**

Epidemiology – The causes of epidemics, environment and pathogenic factors.
Importance of plant protection and protective methods
Integrated Pest Management (Physical, Chemical and Biological)
Diseases caused by Bacteria, Fungi, Viruses in paddy, sugarcane, cotton, banana, mango & groundnut.

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REFERENCES:

1) Prescott, et.al., - Microbiology.
2) Pelczar, et. al., - Microbiology – concepts and applications.
3) Sulliman and Santharam – General Mirobiology.
4) Merhrotra, R.S. – Plant Pathology.
5) Agarios, G.N. – Plant Pathology.
6) Rangaswami, G, - Diseases of crop plants of India.
7) Sharma, P.D. – Microbiology and plant pathology.

M.Sc., Botany (for the students admitted from 2015-16 onwards)				
Semester	Paper Title	Paper code	Hours/ week	Credits
II	**CC-VIII-PRACTICAL – II:** **(Covering CC – V, VI and VII)**	**11PBOP208**	**6**	**3**

ADVANCES IN SYSTEMATICS AND ECONOMIC BOTANY

- Dissection and description of inflorescences, flowers and fruits with reference to syllabus
- Dissection, identification, observation and sketching the floral parts of the plants belonging to the families included in the syllabus
- Exercises in Key - making
- Field study – The students are expected to go for field trip to different types of floristic regions for at least four days under the supervision of the course teachers concerned and submission of minimum 25 herbarium sheets along with field note book
- Visit to a herbarium.
- Study of Binomial identification using flora

CYTOGENETICS

- Training in solving problems in monohybrid, dihybrid, sex linked inheritance, Genetic frequency and Chromosome map

MICROBIOLOGY

- Sterilization methods and media preparations
- Isolation and study of Coprophillous fungs
- Estimation of acidity in milk and curd
- Microbial analysis of Milk
- Isolation of Microorganism from the soil
- Staining of Bacteria, Hanging drop technique and Haemocytometer

PHYTOPATHOLOGY

- Demonstration of Koch's postulates
- Estimation of Total free amino acids, Flavonoids, Total Phenols, Total Chlorophyll, Ascorbic acid and Sugar of infected and normal leaves

M.Sc., Botany
(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
II	**EXTRA DECIPILINARY COURSE I: HORTICULTURE**	**15EDBO201**	**4**	**4**

OBJECTIVES

- To understand the main principles and importance of horticulture.
- To develop skill in horticulture techniques.
- To develop potential for self employment.

UNIT-1 **12 Hrs.,**

-Scope and importance of horticulture
- Divisions of horticulture
-Types of garden- public garden, kitchen garden, indoor garden – potted plants, cut flowers, hanging baskets, bonsai, and hydroponics.
- Garden components – lawn, shrub, climbers, trees, creepers, flower beds & borders, hedges and edges, paths, rockery, water garden and topiary.

UNIT-2 **12 Hrs.,**

-Planning a garden, creating a design
- Establishment of garden
- Plant propagation methods – cutting, layering, grafting, budding
- Role of growth hormones in horticulture

UNIT-3 **12 Hrs.,**

-Manuring – role and advantages of important types of fertilizers and manures
- Time and application of manures and fertilizers
- Foliar application of nutrients
- Irrigation - systems – fertigation

UNIT-4 **12 Hrs.,**

-Cultivation of vegetables- Brinjal/ Tomato
- Fruits – Banana/ Mango/
- Flower – Jasmine/ Chrysanthemum
- Medicinal Plants – Sarpagantha/ Pepper
- Green houses – types

UNIT-5 **12 Hrs.,**

-Plant protection and weed control
- General account of insecticides, fungicides, pesticides and biocontrol
- Common diseases of fruits & vegetables crops (blight of potato, bunch top of banana)

REFERENCE:

1. K.Manibushan Rao, - Textbook Horticulture, Mac Millan Indian Ltd, New Delhi.

2. N. Kumar - An Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.

3. J.B. Edmond. - Fundamentals of Horticulture.Tata Mc Graw Hill, New Delhi.

4. S.Prasad and U.Kumar - Fundamentals of Horticulture. Agro Botainca Publications and Distributors, Bikaner, India.

M.Sc., Botany

(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
III	**CORE COURSE – IX : PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS**	**15 PBO 309**	**6**	**5**

OBJECTIVES:

- To understand the working mechanism in plant-metabolic pathways
- To facilitate the integrated activities of the plants
- To elucidate the interrelationships of the cellular components
- To study the biophysical principles of plants

UNIT – I **18 hrs.**

Physico – chemical properties of water. Osmosis, diffusion, water potential – Mechanisms for ascent of sap. Surface phenomena – transport of ions across the membrane – active and passive theories. Mineral salt absorption theories. Types of transpiration – mechanism of stomatal movement and theories of transpiration.

UNIT - II **18 hrs.**

Photosynthesis: Plant pigment, photosynthetic apparatus – photo phosphorylation – photosystem I & II, methods of carbon fixation: C3, C4 & CAM Pathways – factors affecting photosynthesis: photorespiration.

Respiration: Respiratory substrate – glycolysis, Kreb's cycle, electron transport and oxidative phosphorylation – Pentose Phosphate Pathway.

UNIT – III **18 hrs.**

Nitrogen fixation – symbiotic and asymbiotic: molecular mechanism of nitrogen fixation. Growth regulators and their physiological effects – Auxin, Gibberellins, Cytokinin, Abscisic acid and Ethylene. Synthetic hormones – 2,4-D & BAP. Photoperiodism and vernalization. Physiological basis of Salt and drought tolerance.

UNIT –IV **18 hrs.**

Structure, classification and properties of carbohydrates, protein and lipid. Biosynthesis of fatty acids and Glycerol. Oxidation of fatty acids – Enzyme (Apo enzyme, co enzyme and cofactors) structure, classification and mechanism of enzyme action. Activators, inhibitors – factors influencing enzyme action.

UNIT – V **18 hrs.**

Law of thermodynamics, concept of free energy, enthalpy and entropy. Beer's and Lambert's Law. Radioactivity and Tracer techniques and their uses. Measurement of radioactivity using GM counter and scintillation counter.

REFERENCES:

Noggle & Fritz	-	Introductory Plant Physiology
Salisburry & Ross	-	Plant Physiology
Devlin	-	Plant Physiology
Mengal & Kirkay	-	Principles of Plant Nutritions
Lehninger. A.C.	-	Biochemistry
J.L. Jain	-	Biochemistry
Robber C. Bohinshi	-	Modern Concepts in Biochemistry
White,Handler & Smith	-	Principles of Biochemistry
Boodwin & Mercer	-	Introduction to Plant Biochemistry
Candlisto J.K	-	Lecture notes on Biochemistry
Eric E. Conn et al	-	Outline of Biochemistry
Hess	-	Plant Physiology
Steward F.C	-	Plant Physiology (Vol. I – VI D)
Beevers	-	Nitrogen Metabolism in plants
Bray C.M	-	Nitrogen Metabolism in plants
Mengal & Kirkay	-	Principles of Plant Nutrition
Epstein	-	Mineral Nutrition in plants – Principles And Perspectives
Taiz. B	-	Plant physiology
Hopkins	-	Plant physiology

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M.Sc., Botany

(for the students admitted from 2015-16 onwards)

Semester	Paper Title	Paper code	Hours/ week	Credits
III	**CORE COURSE – X : BIOTECHNOLOGY & GENETIC ENGINEERING**	**15 PBO 310**	**5**	**5**

OBJECTIVES:

- To know the art of recombinant DNA technology
- To understand the basic principles of micropropagation
- To understand the industrial applications of microbes

UNIT-I **15 Hrs.**

TOOLS OF GENETIC ENGINEERING:

Biotechnology: Potentialities and limitations, Tools of genetic engineering – Vectors; Plasmid, Cosmid, and Viruses. Enzymes; restriction endonucleases, DNA ligase, S1 Nuclease, alkaline Phosphatase, reverse transcriptase. Genomic and cDNA libraries; construction and uses.

UNIT-II **15 Hrs.**

GENETIC ENGINEERING METHODS

Gene transfer Methods: – Agrobacterium mediated gene transfer: artificial methods – chemically mediated DNA uptake, electroporation, micro-injection, particle gun bombardment lipofection, ultrasonication and scrapfection techniques.

UNIT III **15 Hrs.**

PLANT TISSUE CULTURE

Culture techniques: media preparation, choice of explants, callus induction and Somatic embryogenesis and Synthetic seed technology, Embryo culture and its applications, protoplasts fusion technology and somatic hybrids. Anther culture and haploid production. Suspension cell culture and Secondary metabolites production. Cryopreservation of germplasm.

UNIT-IV **15 Hrs.**

INDUSTRIAL BIOTECHNOLOGY

Fermentation technology – Types of fermentors, screening and Improvement of industrially important microbes. Industrial production of Ethanol, Penicillin, Riboflavin, Citric acid and amylase. Immobilization Techniques, Production of Monoclonal antibodies and Hybridoma technology.

UNIT-V **15 Hrs.**

BIOSAFETY AND INTELLECTUAL PROPERTY RIGHTS

Biosafety-methods and implication of Genetically modified organisms. Intellectual Property Rights (IPR) Patents, trademarks, trade secrets and copy rights, GATT, TRIPR, and WTO; Patenting of biological materials (process and product); Patenting of transgenics, Bioethics of GMOs.

REFERENCES:

1. Gupta,P.K - Elements of Biotechnology
   Rastogi publications
2. De,K.K - Plant tissue culture
   New central book agency,Calcutta 1987
3. Dubey,R.C - Text book of Biotechnology,
   S.Chand & Co, New Delhi 2001.
4. Kumar,H.D. - Molecular Biology and Biotechnology
   Vikas Publishers, New Delhi 1993.
5. Martell and Smith - Plant Biotechnology,
   Cambridge U.K. 1983,
6. Old,R.W and Primerose, S.B - Principles of Gene manipulation,
   Blackwell Scientific publications,
   London 1996.

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M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**CORE COURSE – XI: FOREST SCIENCE**	**15 PBO 311**	**5**	**5**

OBJECTIVES:

- To prepare students for employment in forest services
- To know the uses and importance of forest products

UNIT-I **15 hrs.**

Scope, merits of combining traditional botany and forestry practices. General introduction to forest, natural and manmade, forest types – tropical, sub tropical, temperate, evergreen, semi evergreen, deciduous and social.

UNIT-II **15 hrs**

Land use, Forest area and population, Forests and adverse environmental conditions. Major vegetation, - Forest products of India (medicinal plants, essential oils, mushrooms , honey, wax, horns, ivory,)

UNIT-III **15 hrs**

Importance of forests, Wild life and Biosphere reserves in India,. – Deforestation, ecological crisis due to deforestation, - Regeneration of forests, Afforestation and peoples participation, - Social and community forestry, Agro forestry, Forest protection, Forest and integrated development, Biofencing in Coastal areas.

UNIT-IV **15 hrs**

Silviculture: Concept and scope of study, forest in general form, composition, classification of Indian forest and their conservation. Silvicultural systems – Clear felling, uniform, shelter – selection. – cultivation of economically important species – *Pinus roxburghii, Acacia nilotica, Tectona grandis, Terminalia arjuna.*

UNIT-V **15 hrs**

Ecological and physiological factors influencing vegetation; natural and artificial regeneration of forests; nursery techniques – seed technology – collection, storage, pretreatment, germination and establishment. Forest and wildlife management

REFERENCE:

1. G.S.Puri, V.M.Mehr Homji R.K.Gupta, & S.Puri. - Forest Ecology, oxford and IBH Pub. Co. New Delhi.

2. M.P. Singh - Forest Environment and Biodiversity, Daya Publishing house, New Delhi.

3. S.S. Negi - Indian Forests, Forestry and Wild life Indus Publishing Co., New Delhi.

M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**PRACTICAL – III: PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS; BIOTECHNOLOGY & GENETIC ENGINEERING, FOREST SCIENCE**	**15 PBOP 312**	**6**	**3**

PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS

- Determination of Osmotic Pressure (De Vries Method), Water potential (Dye method), water content of leaf
- Estimation of Total aminoacids, amylase activity
- Effect of temperature on membrane permiability

BIOTECHNOLOGY & GENETIC ENGINEERING

- Isolation of Protoplast (mechanical method), VAM fungi (root sample)
- Estimation of casein from milk
- Extraction and estimation of leghaemoglobin from root nodules
- Preparation of M.S medium
- Embryo and callus culture

FORESTY AND SYLVICULTURE

- Seed Process
- Nursery techniques

M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**ELECTIVE COURSE II: MARINE BOTANY**	**15 PBOE 302**	**4**	**4**

OBJECTIVES:

- To learn the marine biodiversity
- To learn marine ecology and economic importance of seaweeds

UNIT I **12 Hrs.,**

Marine environment-sea, coastal and estuarine. Zonation, Dynamics of sea water-current,waves,tides. Characterization of planktonic ,benthic and abyssal life. Marine pollution-types, sources, causes and remedies.

UNIT II **12 Hrs.,**

Marine diversity- Phytoplanktons and zooplanktons - Diatoms, Dinoflagellates, marine cyanobacteria, Silicoflagellates. Importance of phytoplankton.
-Factors influencing marine biodiversity
-Algal blooming- types, causes and impact

UNIT III **12 Hrs.,**

Sea weed - types and their characteristics, ecological, phytochemical and Economic importance of seaweeds. Methods for assessment of seaweed resources – collection, preservation, chemical composition of seaweeds.

UNIT IV **12 Hrs.,**

Seagrass - Biomass, Ecological importance of seagrass, factors determining biomass production. - Sand dunes and salt marshes – importance – factors controlling distribution. - Mangroves – salient features and their ecological importance

UNIT V **12 Hrs.,**

Seaweed mass cultivation and commercial Production and uses of agar agar, alginate, carrageenin, fucoxanthin and astaxanthin. Production and chemical composition of Seaweed liquid fertilizers.

REFERENCES:

1. Introduction to marine Botany, M. C. Connonghey, 4th Ed.
2. Marine Biology. Hermann Friedrich, Pan Macmillan, 1969.
3. Plankton and productivity, Raymond University Press, Michigan, 1980.
4. Algal cultures and phytoplankton ecology. Gordon & Elliott Fogg, University of Wisconsin Press, 1965.
5. Marine Plankton – A practical guide. Newell and Newell, Hutchinson & Co. Ltd.,London, 1963

M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
III	**EXTRA DISCIPLINARY COURSE – II : HERBAL MEDICINE**	**15 EDBO 302**	**4**	**2**

OBJECTIVES:

- To enrich the systematic Botany which can be utilized for botanical diagnosis of fragmentary crude drugs
- To enable the students in identifying medicinal taxa
- To know the preliminary phytochemistry of plant organs
- To understand the therapeutic properties of some common medicinal herbs

UNIT-I **12 hrs.**

General Information, Systems of Indian Medicine: Siddha, Ayurvedha, Unani and Homeopathy. Folklore medicine.

UNIT-II **12 hrs**

General Introduction to Pharmacognosy. Medicinal terms. Crude and Commercial drugs. Classification of Crude drugs. Evaluation of Crude drugs. Substitution. Detection of Adulteration in Crude drugs.

UNIT-III **12 hrs**

Systematic position, morphology, cultivation, collection, chemical nature and therapeutic properties of the following medicinal plants,

Centella asiatica, Eugenia caryophyllata, Coriandrum sativum, Piper nigrum, Curcuma domestica, Zingiber officinalis and *Cinnamomum zeylanicum.*

UNIT-IV **12 hrs**

Allergens – pollen, drug, skin and photosensitizing allergens. Remedial plants for the following – CNS, Cardiac, Cancer, Diabetics.

UNIT-V **12 hrs**

Preparation of Crude and Commercial drugs: Infusion, Decoction, Insect repellents, Suppositories, Tincture, Herbal syrups, Compresses, Poultice, Ointments, Herbal oil and Herbal salves.

REFERENCES:

1. Pharmacognosy - Kokate et al(1994), Nirali Prakashan
2. Practical Pharmacognosy - Kokate et al 1994), Nirali Prakashan
3. An Introduction to Medical Botany – N.C. Kumar,
4. Indian Medicinal Plants - Kiritikar and Basu
5. Cultivation of medicinal and aromatic plants – A.A. Farooki.
6. Principles of Plant systematics and Medical Botany – S.Anbazhakan

M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**CORE COURSE – XIII: HERBAL TECHNOLOGY**	**15 PBO 413**	**6**	**5**

OBJECTIVES:

- To understand the various systems of medicines
- To enable the students in identifying medicinal taxa
- To know the preliminary phytochemistry of plant organs
- To understand the therapeutic properties of some common medicinal herbs

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UNIT-I **18 Hrs.,**

Introduction, History, Scope and Importance of Medicinal Plants. Cultivation of Medicinal and Aromatic Plants in India. Role of Biotechnology in medicinal plants- Production of secondary metabolites through cell, Tissue and organ Culture. Indian Trade in Medicinal and Aromatic Plants.

UNIT-II **18 Hrs.,**

Allergens, Teratogens, Hallucinogens. Remedial plants for Cancer, CNS, Cardiac, Respiratory problems, Diabetics, Rheumatism and Urogenital disorders.

UNIT-III **18 Hrs.,**

History, Definition and Scope of Pharmacognosy. Traditional and Alternative Systems of Medicine. Classification of Crude drugs. Collection and Processing of crude and commercial drugs. Scheme for Pharmacognostical studies of Crude drugs.

Preparation of herbal drugs – Infusion, Decoction, Lotion, Insect repellants, Suppositories, Tincture, Herbal syrups, Poultice and Herbal oil.

UNIT-IV **18 Hrs.,**

Analytical pharmacognosy – Drug Adulteration, Methods of drug evaluation, Biological testing crude drug, preliminary phytochemical screening of Medicinal Plants with reference to secondary metabolites. Pharmacological evaluation of herbal drugs.

UNIT-V **18 Hrs.,**

Cultivation, Collection, Chemical nature and Therapeutic uses of the following herbal drugs;

Leaves : *Phyllanthus amarus, Centella asiatica*
Flower : *Eugenia caryophyllata, Crocus sativus.*
Fruits : *Coriandrum sativum, Piper nigrum*
Seeds : *Sesamum indicum, Terminalia chebula*
Rhizome : *Curguma domestica, Zingiber officinalis.*
Bark : *Cinchona officinalis, Cinnamom zeylanicum*
Root : *Rauwolfia serpentina, Gloriosa superba*

REFERENCES:

1. Pharmacognosy - Kokate et al (1994), Nirali Prakashan

2. Practical Pharmacognosy – Kokate etal(1994), Nirali Prakashan

3. An Introduction to Medical Botany – N.C.Kumar, Emkay Publications, New Delhi.

4. Indian Medicinal Plants - Kiritikar and Basu

5. Cultivation of medicinal and aromatic plants – A.A. Farooki.

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M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**CORE COURSE – XIV : RESEARCH METHODOLOGY**	**15 PBO 414**	**6**	**5**

OBJECTIVES:

- To learn the biological techniques used in research fields
- To know the principle and methodology of various instruments
- To learn the applications of statistics in scientific research

UNIT-I **18 Hrs.,**

Principles and structure of Light Microscope, Phase contrast, fluorescence and Electron Microscope (TEM and SEM)- Microphotography.

HISTOLOGICAL TECHNIQUE:

Killing and Fixation, dehydration, sectioning, Maceration, and staining.

UNIT-II **18 Hrs.,**

Principles, and application of pH meter, preparation of buffers.

Chromatographic techniques: Paper, TLC, Column, Ion exchange, Affinity, GLC and HPLC. Basic principles of SDS – PAGE.

UNIT-III **18 Hrs.,**

BIOPHYSICAL METHODS: Principle, construction and uses of the following;

Centrifuge and its types – X – Ray diffraction – UV-VIS Spectrophotometer – Atomic absorption spectrophotometer and Flame photometer.

UNIT-IV **18 Hrs.,**

BIOMETRY: Collection of Data - Populations, Samples, Sampling Techniques, Diagrammatic and Graphical representations of data. Mean, Median and Mode.

Standard Deviation, Coefficient of Variance, Correlation and Regression. ANOVA (One way)

UNIT-V **18 Hrs.,**

Thesis writing and preparations of research articles Writing of abstract, introduction, Review of Literature, Materials and Methods, Results, Discussion and Summary – Bibliography, Proof reading and editing. Preparation for oral presentation – Power point presentation – Poster presentation.

REFERENCES:

1. Prasad and Prasad - Outlines of Microtechniques, Emkay Publication, Delhi.

2. Anbalagan K. (1985) - Electrophoresis a Practical approach

3. Jayaraman, J (1985) - Laboratory Mannual in Biochemistry

4. Jayaraman j (1972) - Techniques in Biology, Higginbotham's

5. Guptha, S.P(1990) - Statistical methods. 25th Edn. Sultan Chand & Sons, New Delhi.

6. Mandal, C & NAMBIAR, p – Agricultural Biostatistics.

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M.Sc., Botany (*for the students admitted from 2015-16 onwards*)				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**PRACTICAL – IV: HERBAL TECHNOLOGY AND RESEARCH METHODOLOGY**	**15 PBOP 415**	**6**	**4**

HERBAL TECHNOLOGY

- Microscopical examination of organized and unorganized crude drugs
- Determination of ash values and extractive values of crude drugs
- Qualitative determination of screening of preliminary phytochemicals
- Submision of economically important plant products (fibers, edible oils, essential oils, resins and gums)
- Quantitative Estimation of secondary metabolites (phenols and flavonoids)

RESEARCH METHODOLOGY

- Separation of leaf pigments (Paper and TLC methods)
- Manuscript preparation and journal format, proof reading, preparation of power point
- Biostatistics problem (mean, median, mode and SD)

M.Sc., Botany *(for the students admitted from 2015-16 onwards)*				
Semester	Paper Title	Paper code	Hours/ week	Credits
IV	**ELECTIVE COURSE II: BIOINFORMATICS AND BIONANOTECHNOLOGY**	**15 PBOE 403**	**6**	**4**

OBJECTIVES:

- To know the bioinformatics tools in solving biological problems
- To study the role of bionanomaterials in human welfare

UNIT-I **12 Hrs.,**

Introduction to Computer – Organization of Computer – Input and Output devices.

- Internet and Intranet – Multimedia and Virtual libraries.
- Computer net-working – LAN, WAN, MODEM, Fiber optics network.
- Introduction to MSDN (Microbial strain Data Network)

UNIT-II **12 Hrs.,**

Introduction to Bioinformatics.

- Nucleic acid databases- Gen bank and DNA Data Bank of Japan, NCBI
- Protein database: Protein Data bank (PDB) SWISSPROT, SCOP
- BLAST and FASTA

UNIT-III **12 Hrs.,**

Software in Bioinformatics: General software features and trends of C and C++, PERL - Emerging areas of Bioinformatics: Pharmocogenomics – Chemoinformatics – Human Genome Project

UNIT-IV **12Hrs.,**

Bionanotechnology -Introduction – Green synthesis of Nanoparticles and its possible applications in human welfare – Characterization of nanostructure – Bio-nanomaterials in Tissue engineering.

UNIT-V: **12Hrs.,**

Nanotechnology in Biomedical Applications: – DNA based Nanomaterials as biosensors – nano materials for drug delivery- Environmental implications of Nanoparticles and toxic effects.

REFERENCES:

1. Leon A and Leon.M - Fundamentals of Information Technology
2. J.M.Martin and Princeton - Introduction to Database systems..
3. David Pereson - Oracle 8 – The complete
4. Gary Cornell - Visual Basic 6
5. Adams V.D. Fields C.Venter J.C - Automated DNA sequencing and Analysis.
6. Bishop V.J Rawlings C.J(Eds) - Nucleic acid and protein sequence analysis. A Practical approach.
7. Suhal S. (Co.,) - Computational methods in genome research.
8. Sulabha K.K – Elements of nanotechnology
9. Misener Bioinformatics – Methods and Protocols, IBD Publishers, New Delhi