Botany Syllabus

B. Sc., and M. Sc.,

(2018 - 2019 onwards)

DEPARTMENT OF BOTANY

Periyar E.V.R. College (Autonomous)
Re Accredited with A Grade by NAAC
Tiruchirappalli – 620 023

PERIYAR E.V.R.COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI - 23									
GENERAL COURSE PATTERN FOR UG – SINCE-2018 – 2019									
S.No.	PART	COURSE	COURSE TITLE	Exam Hrs.	Hrs.	Credits	Internal Exam	External Exam	Total
I SEMESTER									
1	P – I	TAMIL I	**Tamil paper - I**	**3**	6	3	25	75	100
2	P- II	ENGLISH I	**English Paper –I**	**3**	6	3	25	75	100
3	P-III	CORE I	**Plant Diversity - I**	**3**	6	6	25	75	100
		CORE II*P	**Core Practical -I**	**-**	2	-	-	-	-
4		FIRST ALLIED I	**Paper –I Zoology**	**3**	4	4	25	75	100
		FIRST ALLIED II*P	**Zoology Practical - I**	**-**	2	-	-	-	-
5	P-IV	VE	**Value Education**	**3**	2	2	25	75	100
6		SBE I	**Mushroom Cultivation**	**3**	2	2	25	75	100
			TOTAL		**30**	**20**	**150**	**450**	**600**
II SEMESTER									
7	P- I	TAMIL II	**Tamil Paper – II**	**3**	6	3	25	75	100
8	P- II	ENGLISH II	**English Paper - II**	**3**	6	3	25	75	100
9	P- III	CORE II*P	**Core Practical -I**	**3**	4	4	40	60	100
10		CORE III	**Plant Diversity - II**	**3**	6	6	25	75	100
11		FIRST ALLIED II*P	**Zoology Practical -I**	**3**	2	2	40	60	100
12		FIRST ALLIED III	**Paper III - Zoology**	**3**	4	4	25	75	100
13	P-IV	ES	**Environmental Studies**	**3**	2	2	25	75	100
			TOTAL		**30**	**24**	**205**	**495**	**700**
III SEMESTER									
14	P-I	TAMIL III	**Tamil Paper - III**	**3**	6	3	25	75	100
15	P-II	ENGLISH III	**English paper - III**	**3**	6	3	25	75	100
16	P-III	CORE IV	**Anatomy and Embryology**	**3**	4	4	25	75	100
		CORE V*P	**Core Practical - II**	**-**	2	-	-	-	-
		SECOND ALLIED II	**Paper – IV Chemistry**	**3**	4	4	25	75	100
17		SECOND ALLIED II*P	**Chemistry Practical - I**	**-**	2	-	-	-	-
18		ME I	**Microbiology**	**3**	4	4	25	75	100
19	P-IV	SBE II	**Herbal Botany**	**3**	2	2	25	75	100
			TOTAL		**30**	**20**	**150**	**450**	**600**

PERIYAR E.V.R.COLLEGE(AUTONOMOUS), TIRUCHIRAPPALLI - 23									
GENERAL COURSE PATTERN FOR UG – SCIENCE-2018 – 2019 ONWARDS									
S.No.	**PART**	**COURSE**	**COURSE TITLE**	**Exam Hrs.**	**Hrs.**	**Credits**	**Internal Exam**	**External Exam**	**Total**
IV SEMESTER									
20	P – I	TAMIL IV	**Tamil Paper - IV**	**3**	6	3	25	75	100
21	P- II	ENGLISH IV	**English paper - IV**	**3**	6	3	25	75	100
22	P-III	CORE V*P	**Core Practical Paper - II**	**3**	4	4	40	60	100
23		CORE VI	**Cytology, Genetics and Evolution**	**3**	6	6	25	75	100
24		SECOND ALLIED II*P	**Chemistry Practical - I**	**3**	2	2	40	60	100
25		SECOND ALLIED III	**Paper –VI Chemistry**	**3**	4	4	25	75	100
26	P-IV	NME I	**NME I A or NME I B**	**3**	2	2	25	75	100
			TOTAL		**30**	**24**	**205**	**495**	**700**
V SEMESTER									
27	P – III	CORE VII	**Taxonomy of Angiosperms**	**3**	6	5	25	75	100
28		CORE VIII	**Horticulture and Plant Breeding**	**3**	6	4	25	75	100
29		CORE IX	**Plant Biotechnology**	**3**	6	4	25	75	100
30		CORE X P	**Core Practical - III**	**3**	4	4	40	60	100
31		ME II	**Morphology and Economic Botany**	**3**	4	4	25	75	100
32	P-IV	NME II	**NME II A or NME II B**	**3**	2	2	25	75	100
33		SSD	**Soft Skill Development**	**3**	2	2	25	75	100
34	P - V	EA	**Campus Flora Study**	-	-	1	25	75	100
			TOTAL		**30**	**26**	**215**	**585**	**800**
VI SEMESTER									
35	P-III	CORE XI	**Biophysics, Biochemistry and Biostatistics**	**3**	6	5	25	75	100
36		CORE XII	**Plant Physiology**	**3**	6	6	25	75	100
37		CORE XIII	**Ecology, Phytogeography and Conservation Biology**	**3**	5	4	25	75	100
38		CORE XIV –P	**Core Practical - IV**	**3**	5	4	40	60	100
39		ME III	**Food and Nutrition**	**3**	5	4	25	75	100
40	P -IV	SBE III	**Biofertilizers and Biopesticides**	**3**	2	2	25	75	100
41	P - V	GE	**Gender Equality**	**3**	1	1	25	75	100
			TOTAL		**30**	**26**	**190**	**510**	**700**
			GRAND TOTAL		**180**	**140**	**1115**	**2985**	**4100**

PERIYAR E.V.R.COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI - 23									
GENERAL COURSE PATTERN FOR UG – SINCE-2018 – 2019 NME									
S.No.	**PART**	**COURSE**	**COURSE TITLE**	**Exam Hrs.**	**Hrs.**	**Credits**	**Internal Exam**	**External Exam**	**Total**
IV SEMESTER									
1	P-IV	NME I A	**Medicinal Botany**	**3**	2	2	25	75	100
2	P-IV	NME I B	**Mushroom Cultivation**	**3**	2	2	25	75	100
V SEMESTER									
3	P-IV	NME II A	**Horticulture**	**3**	2	2	25	75	100
4	P-IV	NME II B	**Economic Botany**	**3**	2	2	25	75	100

SEMESTER I

CORE PAPER – I PLANT DIVERSITY-I

(ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND BRYOPHYTES)

Hours: 6
Credits: 6
Code:

Objectives: Cryptogams include 84% of World's Botanical diversity. Scientific information on these group of plants excepting Pteridophytes will be taught along with an introduction to plant diseases.

Unit – I

Classification of Algae (Fritsch). General characters of various divisions of Algae. Structure and reproduction of *Oscillatoria, Nostoc*, *Oedogonium* and *Volvox*.

Unit – II

Structure and reproduction of *Navicula, Dictyota and Polysiphonia.* Economic importance of Algae.

Unit – III

Classification of Fungi (Alexopolous). General characters – Structure and reproduction of *Albugo, Penicillium*, *Polyporus* and *Puccinia.* Economic importance of Fungi. General characters and classification of Lichens – Structure and reproduction of *Usnea*.

Unit – IV

Causal organism, symptoms and control measures of Blast disease of Paddy, Red rot of Sugarcane, Tikka disease of Groundnut, Wart disease of Potato, Citrus canker, Little leaf of Brinjal, Bunchy top of banana and TMV.

Unit – V

Classification of Bryophytes (Rothmaler). Structure and reproduction of *Porella, Anthoceros* and *Funaria*. Economic importance of Bryophytes.

Text Books

1. Singh and Pandey – (1966) College botany Vol-I Books of India Publishers
2. Vashishta, B. R. *et al*. (2008). Botany for Degree Students - Algae. S. Chand and Co.Ltd., New Delhi.
3. Kumar, H. D. (1989). Introductory Phycology. East-West Press, Madras.
4. Sharma, O. P. (1986). Textbook of Algae. Tata McGraw Hill, New Delhi.

5. Kumaresan V. Algae & Bryophytes. Saras publications, Tamil Nadu.
6. Sharma, P. D. (1987). The Fungi. Rastogi and Co., Meerut.
7. Vashishta, B. R. and Sinha, A. K. (2007). Botany for Degree Students - Fungi. S. Chand and Co. Ltd., New Delhi.
8. Hale, M. E. Jr. (1983). Biology of Lichens. Edward Arnold, Maryland.
9. Vashishta, B. R. *et al*. (2008). Botany for Degree Students: Bryophyta. S. Chand and Co. Ltd., New Delhi.
10. Kumaresan V. Fungi & Plant Pathology. Saras publications, Tamil Nadu.

Reference Books

1. Bold, H. C. and Wyne, M. J. (1978). Introduction of Algae - Structure and Reproduction. Prentice Hall, New Jersey.
2. Chapman, C.J. and Chapman, D.J. (1981). The Algae. 2nd ed. Macmillan, London.
3. Alexopoulus, C. J. and Mims, C. W. (1979). Introductory Mycology. Wiley Eastern Ltd., New York.
4. Bessey, E. A. (1979). Morphology and Taxonomy of Fungi. Vikas Publishing House Pvt. Ltd., New Delhi.
5.Parihar, N. S. (1972). An Introduction to Embryophyta-I: Bryophyta. Central Book Depot, Allahabad.
6. Watson, E. V. (1971). The Structure and Life of Bryophytes. B.I. Publications, New Delhi.

SEMESTER I

SKILL BASED ELECTIVE PAPER -1

MUSHROOM CULTIVATION

Hours: 2
Credits: 2
Code:

Objectives: This paper is an introduction to mushroom cultivation and will give basic knowledge and techniques required in mushroom cultivation.

Unit – I

Introduction – History- Scope of mushroom cultivation – Types of edible mushroom available in India – Food value of mushrooms – Medicinal value of mushrooms.

Unit – II

Life cycle of common edible mushroom (*Agaricus*), Identification – edible and poisonous mushrooms – external factors for growth.

Unit – III

Salient features of common edible mushrooms – *Agaricus bisporus* - *Volvariella volvacea, Pleurotus sajor – caju* .

Unit – IV

Cultivation of Paddy straw mushroom – Cultivation of Oyster mushroom – Cultivation of White Button mushroom.

Unit – V

Diseases of mushrooms (Fungal – Dry bubble; Bacterial – Brown blotch; Viral – Dieback disease) – Preservation and storage of mushrooms – Food Preparation (Soups, cutlets, omlet and samosas).

Text Books

1. Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.

2. Marimuthu, T. et al. (1991). Oster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
3. Kappor , JN. (1999) Mushroom Cultivation. ICAR. NewDelhi.

Reference Books

1. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
3. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
4. Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

SEMESTER I

ALLIED BOTANY I

Hours: 4
Credits: 4
Code:

Objectives: To learn about the external and internal structure and economic importance of Thallophytes, Bryophytes, Pteridophytes and Gymnosperms and to learn about external morphology, description and classification of higher plants

Unit – I (Algae)

Classification of Algae – Structure and life cycle of the following (Developmental studies excluded) of *Oscillatoria*, *Oedogonium*, *Sargassum.* Economic importance of algae.

Unit – II (Fungi and plant Pathology)

Classification of Fungi – Structure and reproduction of *Albugo*, and *Penicillium* Economic importance of fungi. Causative Organism, symptoms and control measures of Blast disease of Paddy, Tikka disease of Groundnut and Red rot disease of Sugarcane.

Unit - III (Bryophytes, Pteridophytes and Gymnosperms)

Structure and reproduction (Developmental studies excluded) of *Funaria*, *Selaginella* and *Cycas*.

Unit - IV (Taxonomy of angiosperms)

Bentham and Hooker's system of classification – Study of the families with their economic importance – Annonaceae, Rutaceae, Rubiaceae, and Caesalpiniaceae.

Unit – V

Study of the families with their economic importance – Cucurbitaceae, Apocynaceae, Solanaceae, and Poaceae.

Text Books

1. Ganguly A.K. 1971, General Botany, Vol.I. The New Book Stall, Calcutta.
2. Rao. K.N. Krishnamurthy K.V. and Rao. G., 1979, Outlines of Botany, Viswanathan Private Ltd.
3. Dutta A.C., College Botany, Vol. I & II.

Reference Books:

1. Vashishta, B.R., Sinha,A.K. and Singh,V.P. 2010 ,"Algae", Nineth Edition S.Chand and Co.,
New Delhi.
2. Vashishta, B.R. 2008 , "Fungi", Sixth Edition, S.Chand and Co., New Delhi.
3. Pandey, B.P. "College Botany Vol. I," 2011, Eighth Edition, S.Chand and Co., New Delhi.
4. A.V.S.S. Sambamurthy, 2011, "Bryophytes, Pteridophytes, Gymnosperms and Paleobotany,
I.K International Pvt. Ltd, New Delhi.
5. B.K. Verma. 2011"Introduction to taxonomy of Angiosperms, PHI Learning LTD, New Delhi.

SEMESTER II

CORE PAPER -III

PLANT DIVERSITY - II

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Hours: 6
Credits: 6
Code:

Objectives: This course deals with the structure and development of primitive vascular plants and stelar evolution .This course aims to develop the basic knowledge on the diversity among the plant life forms.

Unit - I

Pteridophytes - General characteristics - Classification of Pteridophytes (Riemers) - Economic importance - Structure and Reproduction in *Psilotum*, *Lycopodium*, and *Selaginella*.

Unit - II

Structure and Reproduction in *Equisetum, Ophioglossum* and *Adiantum.*

Unit - III

Structure and Reproduction in *Marsilea*. Stelar evolution in Pteridophytes - Evolution of heterospory and seed habit. Apospory and Apogamy.

Unit - IV

Gymnosperms - General characteristics - Classification of Gymnosperms (Sporne) - Economic importance - Structure and Reproduction of *Cycas, Pinus* and *Gnetum.*(Developmental studies excluded)

Unit - V

Fossil - Types of fossil - Compression, Impression, Petrifaction and Coal Balls. Carbon dating - Geological time scale - A brief study of *Rhynia*, *Lepidodendron*, *Calamites* and *Williamsonia*.

Text Books

1. Sundararajan, S. (2007). Introduction to Pteridophyta. New Age International Publishers,

New Delhi.

2. Vashishta, P. C. *et al*. (2008). Botany for Degree Students: Pteridophyta. 5th Edition S. Chand

Co. Ltd., New Delhi.

3. Parihar N.S. (1959). An introduction of Peridophytes. Central Book Depot. Publishers.

4. Trivedi P.C. (2002). Advances in Pteridology. Pointer Publishers.

5. Rashid. A (1978). An introduction of Peridophytes. Vikas publishers

6. Sporne, K. R. (1974). The Morphology of Gymnosperm. B.I. Publications,

S. Chand and Co. Ltd., New Delhi.

Reference Books

1. Govil C.M. (2011). Gymnosperm. Krishna Prakashan Media.

2. Bhatnagar S.P. and Alok Moitra (1996). Gymnosperms. New Age International.

3. Sambamurthy, A.V.S.S. (2005). A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. I.K. International Publishing House. New Delhi.

4. Shukla, A. C. and Mishra, S. P. (1982). Essentials of Paleobotany. 2nd Edition.

Vikas Publishing House Pvt. Ltd., New Delhi.

5. Arnold C.A. (1972). An introduction to Paleobotany. New York, McGraw-Hill Publishers.

6. Stewart, W. N. (1983). Paleobotany and the Evolution of Plants, Cambridge University Press,

Cambridge, London.

SEMESTER I & II

CORE PAPER -II

CORE PRACTICAL – I

Hours: 2 + 4
Credits: 4
Code:

Practical covering

Core Paper I

- Algae
- Fungi
- Lichens
- Plant Pathology
- Bryophytes

Core Paper III

- Pteridophytes
- Gymnosperms
- Paleobotany

SEMESTER II

ALLIED BOTANY III

Hours: 4
Credits: 4
Code:

Objectives: To learn about internal structure, morphogenesis, internal physiology of plants and Environment factors.

Unit – I (Cytogenetics)

Structure and functions of Cell wall , Plasma membrane , Chloroplast, Mitochondria, Golgi bodies, Endoplasmic reticulum and Nucleus. Mendel's Laws – Monohybrid and Dihybrid Cross.

Unit – II (Anatomy)

Structure, types and functions of Parenchyma, Collenchyma and Sclerenchyma. Structure of Xylem and Phloem components. Primary structure of Monocot stem and Dicot stem; Monocot root and Dicot root ; Monocot leaf and Dicot leaf.

Unit – III (Embryology)

Structure and development of anther- Male gametophyte. Structure and types of Ovules, female gametophyte (*Polygonum* type) – Structure and types of Endosperm .

Unit – IV (Plant Physiology)

Absorption of water. Transpiration and factors influencing the transpiration. Photosynthesis – Light and Dark reactions - C_3 Cycle. Respiration – Glycolysis, Kreb's Cycle. Growth Hormones: Auxins, Gibberellins and Cytokinins

Unit – V (Ecology)

Autecology – Synecology –Components of ecosystem – Pond ecosystem – Grassland ecosystem - Food Chain – Food Web – Ecological adaptations of Xerophytes –*Nerium*. Hydrophytes – *Eichhornia.*

Text Books

1. Ganguly A.K. 1971, General Botany, Vol.I. The New Book Stall, Calcutta.
2. Rao. K.N. Krishnamurthy K.V. and Rao. G., 1979, Outlines of Botany, Viswanathan Private Ltd.
3. Dutta A.C., College Botany, Vol. I & II.

Reference Books:

1. H.D. Kumar, "A textbook of Cytology, Genetics, and Evolution," Kalyani Publishers, New Delhi
2. S.N. Pandey and A. Chadha, "Plant anatomy and embryology", Vikas Publication Pvt. Ltd, New Delhi, 1997
3. Ancillary Botany ,Vol.II Prof .A. Muneeswaran.
4. Jain, V.K., "Fundamentals of Plant Physiology", Ninth Revised Edition, S.Chand and Co.,New Delhi, 2007.
5. R.S. Ambasht and N.K. Ambasht, Plant Ecology, CBS, 15th edition, New Delhi, 2008

SEMESTER I & II

ALLIED PRACTICAL – II

Hours: 2 + 2
Credits: 3
Code:

Practical covering

Allied Botany I

- Algae
- Fungi
- Plant Pathology
- Bryophytes
- Pteridophytes
- Gymnosperm
- Taxonomy

Allied Botany III

- Cytogenetics
- Anatomy
- Embryology
- Plant Physiology
- Ecology

SEMESTER III

CORE PAPER – IV

ANATOMY AND EMBRYOLOGY

Hours: 4
Credits: 4
Code:

Objectives: This course will introduce the types of tissues, normal and abnormal anatomical features of plants and will impart the knowledge about the various aspects of embryo formation in angiosperms.

Unit – I

Meristems – Origin and Classification - Root apex and Shoot apex - theories (Apical, Histogen and Tunica-corpus theory) - Quiescent Centre . Plant Tissues - Simple permanent tissues - Parenchyma, Collenchyma and Sclerenchyma (Fibres and Sclereids) - structure and function- Complex permanent tissues (Xylem and Phloem)

Unit – II

Primary structure of Root, Stem and Leaf in Dicots and Monocots. Detailed account of secondary growth in Dicot stem and root. –Nodal Anatomy (Types)

Unit – III

Features of wood –Annual rings- heart wood - sap wood - Lenticels – Periderm formation. Detailed account of Anomalous Secondary growth in *Aristolochia*, *Nyctanthes*, *Boerhaavia* and *Dracaena*.

Unit – IV

Microsporangium - Microsporogenesis – Microgametogenesis (Development of male gametophyte). Ovule (structure and Types) - Megasporangium - Megasporogenesis – Megamagetogenesis (Development of female gametophyte). Development of monosporic embryo sac (*Polygonum*)

Unit – V

Double fertilization and Triple fusion –Development of Dicot embryo (*Capsella*) and Monocot embryo (*Luzula*) . Endosperm (Nuclear, Cellular and Helobial). Brief account of Apomixis, Polyembryony and Parthenogenesis.

Text Books

1. Pandey, B.P. 2007. Plant Anatomy, S. Chand & Co. De, New Delhi.

2.Tayal,M.S. 2004 . Plant Anatomy ,Rastogi Publications, Meerut.

3. Brown et al., 1981. Text book of Wood Technology, Mc Graw Hill Inc. New York.

4. Bhojwani, S S. & Bhatnagar, S.P. 2008. Embryology of Angiosperms, Vikas Publishing House (P) Ltd., New Delhi.

5.Singh,V., Pande,P.C. & Jain,D.K. 2005.Embryology of Angiosperms, Rastogi Publications, Meerut

Reference Books

1. Cuttler, EG. 1969. Plant Anatomy - Part I Cells & Tissue. Edward Arnold Ltd., London.

2. Esau K. 1985. Plant Anatomy (2nd ed.) Wiley Eastern Ltd. New Delhi

3.Maheswari, P. 1985. An Introduction to the Embryology of Angiosperms .Tata McGraw Hill Publishing Co.,Ltd., New Delhi.

SEMESTER -III

MAJOR ELECTIVE PAPER -I

MICROBIOLOGY

Hours: 4
Credits: 4
Code:

Objectives: This course will introduce the student to the world of microbes, which are there in every possible niche. The beneficial and detrimental aspects will be taught.

Unit – I

Historical outline of microbiology. Contributions of Leeuwenhoek, Louis Pasteur, Robert Koch and Ivanowsky-Characterization and Classification of microorganisms -Sterilization methods – Physical and chemical - Composition of nutrient agar medium, nutrient broth and PDA medium.

Unit – II

Bacteria – outline of classification (Bergey's Manual of Systematic Bacteriology, 2nd Edition) – morphology, ultra structure, reproduction and economic importance. Virus: General characters, Structure and multiplication.

Unit – III

Agricultural and soil microbiology - common soil microflora - Biofertilizer - Role of microbes in nitrogen fixation and phosphate solubilization. Biogeochemical cycles.

Unit – IV

Medical and food microbiology – Antibiotics and their mode of action (Penicillin, Streptomycin and Erythromycin). Food microbiology – microbial spoilage of food, food poisoning – food borne infections – Food preservation methods – physical and chemical.

Unit – V

Environmental microbiology – microbial remediation of industrial effluents– microbial preservation of raw materials, enzymatic treatment during industrial process, Waste treatment – solid (compost) and liquid (sewage). Fermentation process –alcoholic fermentation and acetic acid fermentation. Microbes and their role in leaching metals (Bioleaching).

Text Books

1. நுண்ணுயிரியல் 2015. P. Chandrasekaran, TK Publishers, Pudukkottai.
2. Microbiology. 2015. RC Dubey and DK Maheswari, S. Chand & Co., New Delhi.
3. Microbiology. 2015. PD Sharma, Rastogi Publications, Meerut

Reference Books

1. Microbiology. 1986. M.J. Pelczar, Jr., E.C.S. Chang and N.R. Krieg, McGraw Hill Company,Newyork.
2. Microbiology - concepts and applications. 1993. M.J. Pelczar, Jr., E.C.S. Chan and N.R. Krieg, McGraw Hill Company.
3. Microbiology. 1993. L.M. Prescott, J.P. Harley D.A. Klein – Wm.c. Brown publishers. Dutique, Jawa, Melbourne.
4. Modern Microbiology. 1962. Wayne w. Umbreit – W.H, Freeman and company, London.
5. Basic and Practical Microbiology. 1986. Ronald M. Atlas, Mac.Milleen Company, Newyork.

SEMESTER III

SKILL BASED ELECTIVE PAPER II

HERBAL BOTANY

Hours: 2
Credits: 2
Code:

Objectives: To understand the traditional system of Medicine, to explore and exploit the Medicinal uses and applications of Medicinal Plants .

Unit - I

History , Scope and importance of Medicinal plants. Indigenous Medicinal sciences- Definition and Scope . Ayurveda - History , origin , panchamahabhutas , Saptadhatu . Tridosha concepts and Rasayana . Siddha –Origin of Siddha , Basis of Siddha system . Unani – History and concept.

Unit - II

Classification of Drugs . Brief study about the Botany , Chemical constituents , Uses, Adulterants, Commercial varieties of the following drugs. Root Drugs –*Rauwolfia*; Leaf Drugs –*Gymnema sylvestre* ; Stem Drugs – *Santalum album* ; Bark Drugs – *Terminalia arjuna* ; Flower Drugs – *Cassia auriculata*; Seed Drugs – *Strychnos nux vomica*; whole plant –*Andrographis paniculata*. Dry powder microscopy.

Unit - III

Pharmacological action of Plant Drugs – Action on the Autonomic Nervous System , Central Nervous System – Stimulants and Depressants.

Unit - IV

Pharmacological action of Plant Drugs – Action on the Heart Muscles and Blood Vessels – Gastro-intestinal tract

Unit - V

Herbal Cosmetics – Pimple and Acne, Skin and Hair Care , Leucoderma and Teeth care .

Text Books

1. Jain S.K. (1989) Methods and approaches in Ethnobotany, Society of Ethnobotanists,

Lucknow.
2. Pal D.C. and Jain S.K. (1998) Tribal Medicine. Naya Prakash Publishers, Calcutta.
3. Shukla R.S. (2000) Forestry for Tribal Development. AH Wheeler & Co., Ltd., India.

Reference Books

1. Sharol Tilgner N.D. (1999). Herbal Medicine – From the heart to the Earth.
Printed in the USA, by Malloy Lithographing Inc.
2.Kumar N.C. (1993) Introduction to Medical Botany and Pharmacognosy. Emkay Publications,
New Delhi.

SEMESTER IV

CORE PAPER VI

CYTOLOGY, GENETICS AND EVOLUTION

Hours: 6
Credits: 6
Code:

Objectives: In this paper exposure would be given to Cells and their role as structural, biological and functional units of all living organisms. Heredity is a vital aspect of any Botany course and its basics will be dealt.

Unit I:

Cell theory - Ultrastructure of prokaryotic and eukaryotic cell. Ultra Structure and function of– Boundaries - Cell wall and Plasma membrane; Membrane bound organelles - Endoplasmic reticulum, Mitochondria, Plastids, Lysosomes, Spherosomes and Peroxisomes.; Non-membrane bound organelle - Ribosomes

Unit II:

Protoplasm composition - Ultrastructure of nucleus, nucleolus and their functions. Structure and types of Chromosomes, Polytene chromosome and Lamp brush chromosome - Cell division – Cell cycle - Amitosis, Mitosis, Meiosis and its significance.

Unit III:

Heredity and variation - Mendelian principles of inheritance- Mono and Dihybrid cross. Incomplete dominance - Test cross - Back cross – Lethal genes (Plant examples) and significance - Multiple Alleles.

Unit IV:

Gene interaction and Polygenic inheritance. Linkage and crossing over and its significance – sex linkage - Sex determination in plants and human beings - Cytoplasmic inheritance in plants.

Unit V:

An elementary account on origin of life, evolutionary concepts in explaining the diversity of life. Theories of Lamarck, Charles Darwin, Hugo de Vries and modern synthetic theories.

Textbooks

1. Meyyan, R.P., (2000) : Genetics & Evolution Saras Publication, Nagercoil, India
2. Gupta, P.K. (2000) : Genetics Rastogi Publishers, Meerut, India
3. Agarwal., V.K. (2000) : Simplified course in Genetics(B.Sc., Zoology) S. Chand & Co., New Delhi
4. Sharma N.S. 2005, Molecular Cell Biology, International Book distributors, Dehradun
5. Verma P.S. and Agarwal V.K. 1986, Cell Biology and Molecular Biology (Cytology) S. Chand and Company, New Delhi.

Reference Books

1. Winchester, A.M. (1958) : Genetics(3rd Edition) Oxford & IBH Publishing House, New Delhi
2. Singleton, R. (1963) : Elementary Genetics D. Van Nostrand Co., Ltd., Inc., N.Y. & Affiliated East West Press (P) Ltd., New Delhi
3. Chandrasekaran, S.N. & Parathasarathy , S.V. (1965) : Cytogenetics and Plant Breeding P. Varadhachari & Co., Madras
4. Sinha, U.& Sinha, S. (1989) : Cytogenetics, Plant Breeding & Evolution Vikas publishing House, New Delhi-408pp.,
5. Ahluwalia, K.B. (1990) : Genetics Wiley Eastern Ltd.,New Delhi
6. Sandhya Mitra (1994) : Genetics-A Blue Print of Life Tata McGraw Hill Publishing Co., Ltd., New Delhi

SEMESTER III & IV

CORE PAPER - V

CORE PRACTICAL – II

Hours: 2 + 4
Credits: 4
Code:

Practical covering

Core Paper IV

- Anatomy
- Embryology

Major Elective Paper I

- Microbiology

Core Paper VI

- Cytology
- Genetics
- Evolution

SEMESTER IV

NON-MAJOR ELECTIVE PAPER – I A

MEDICINAL BOTANY

Hours: 2
Credits: 2
Code:

Objectives: To understand the traditional system of Medicine and to explore and exploit the Medicinal uses of Plants .

Unit – I

Herbal Medicines -History and Scope, Indian Systems of Medicines - Siddha , Ayurveda and Unani systems . Classification of Crude Drugs .

Unit - II

Identification , Collection and cultivation of Medicinal plants in pots –garden – farms .

Unit - III

Drugs containing Glycosides – (*Aloe vera , Centella asiatica , Andrographis paniculata*) . Tannins – (*Terminalia chebula* and *Phyllanthus emblica*) . Lipids – (*Olea europea* and *Arachis hypogaea*)

Unit - IV

Drugs containing - Terpenoids (Eucalyptus oil), Phenolics (*Phyllanthus amarus*) – Protein Drugs (Lectins) and Alkaloidal Drugs *(Catharanthus roseus*) . An elementary account on Allergens – Aero allergens (Pollen and Spore allergens)

Unit – V

Herbal Cosmetics preparation – Pimple and Acne, Skin, Hair and Oral care.

Text Books

1. Jain S.K. (1989) Methods and approaches in Ethnobotany, Society of Ethnobotanists, Lucknow.
2. Pal D.C. and Jain S.K. (1998) Tribal Medicine. Naya Prakash Publishers, Calcutta.
3. Shukla RS (2000) Forestry for Tribal Development. AH Wheeler & Co., Ltd., India

Reference Books:

1. Kumar .N.C. (1993). Introduction to Medical Botany and Pharmacognosy.Emkay Publications, Delhi.
2. Sharol Tilgner .N.D.(1999). Herbal medicine from the Heart to the Earth.Printed in the USA,by Malloy Lithographing Inc.

SEMESTER IV

NON-MAJOR ELECTIVE PAPER – I B

MUSHROOM CULTIVATION

Hours: 2
Credits: 2
Code:

Objectives: This paper is an introduction to mushroom cultivation and will give basic knowledge and techniques required in mushroom cultivation.

Unit – I

Introduction – History- Scope of mushroom cultivation – Types of edible mushroom available in India – Food value of mushrooms – Medicinal value of mushrooms.

Unit – II

Life cycle of common edible mushroom (*Agaricus*), Identification – edible and poisonous mushrooms – external factors for growth.

Unit – III

Salient features of common edible mushrooms – *Agaricus bisporus* - *Volvariella volvacea, Pleurotus sajor – caju* .

Unit – IV

Cultivation of Paddy straw mushroom – Cultivation of Oyster mushroom – Cultivation of White Button mushroom.

Unit – V

Diseases of mushrooms (Fungal – Dry bubble; Bacterial – Brown blotch; Viral – Dieback disease) – Preservation and storage of mushrooms – Food Preparation (Soups, cutlets, omlet and samosas).

Text Books

4. Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.

5. Marimuthu, T. et al. (1991). Oster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
6. Kappor , JN. (1999) Mushroom Cultivation. ICAR. NewDelhi.

Reference Books

5. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
7. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
8. Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

SEMESTER V

CORE PAPER – VII

TAXONOMY OF ANGIOSPERMS

Hours: 6
Credits: 5
Code:

Objectives: Angiosperms are a group of flowering plants that represent a major community in the plant kingdom. They include about 2,50,000 species distributed all over the world. They are the most highly evolved group of plants and appeared on Earth about 130 million years ago and this paper will introduce ways and means of identifying them.

Unit – I

Historical background of classification - Artificial, natural and phylogenetic systems. Importance of taxonomy. Classification by Bentham and Hooker, Engler and Prantl & Takhtajan; brief reference of Angiosperm Phylogeny Group (APG) Classification.

Unit – II

Species/Genus/Family and other categories; species concept and intraspecific categories - subspecies, varieties and forms. Field inventory, Herbarium preparation and management; important herbaria and botanical gardens of the world and India. BSI. Documentation: Flora, Monographs, Journals, Online Journals and Keys.

Unit – III

A detailed study of the following families and their economic importance:

Dicots - Polypetalae:

1) *Thalamiflorae* - Nymphaeaceae, Annonaceae, Capparidaceae and Tiliaceae.

2) *Disciflorae* - Meliaceae, Rhamnaceae and Rutaceae

Unit – IV

A detailed study of the following families and their economic importance:

Dicots - Polypetalae:

3) *Calyciflorae* - Fabaceae, Caesalpinaceae, Mimosoideae, Cucurbitaceae and Apiaceae

Gamopetalae:

1) *Inferae* - Rubiaceae and Asteraceae

2) *Hetermoerae* - Sapotaceae

Unit – V

A detailed study of the following families and their economic importance:

3) *Bicarpellatae* - Apocynaceae, Convolvulaceae, Acanthaceae and Verbenaceae

Monochlamydeae:

1) *Curembryeae* - Amaranthaceae

2) *Unisexuales* - Euphorbiaceae

Monocots:

1) *Coronarieae* – Commelinaceae

2) *Glumeae* - Poaceae

Text Books

1. Pandey, B. P. (1989). Taxonomy of Angiosperms (Systematic Botany). S. Chand & Co. Ltd.,
Ram Nagar, New Delhi.
2. Vashista, P.C. (1997). Taxonomy of Angiosperms. S. Chand & Co., New Delhi.
3. Palaniappan, S. (2000). Angiospermgalin Vagaippadu (in Tamil), V.K Publishing House, Chennai. 6.
4. Palaniappan, S. (2002). Thavara Pura amaippial (in Tamil), V.K Publishing House, Chennai.

Reference Book

1. Sivarajan, V.V. (1993). Introduction to Principles of Plant Taxonomy, Oxford & IBH Publishing Co., New Delhi. 27 5.
2. Naik, V.N (1996). Taxonomy of Angiosperms, Tata McGraw Hill Publishing Co., (P) Ltd, New Delhi.
3. Singh, V & Singh, D.K (1983). Taxonomy of Angiosperms, Rastogi Publications, Meerut.
4. Lawrence, G. H. M (1953). Taxonomy of Vascular Plants, Oxford & IBH Publishes, New Delhi.

SEMESTER V

CORE PAPER VIII

HORTICULTURE AND PLANT BREEDING

Hours: 6
Credits: 4
Code:

Objectives: This course will help the student to understand the principle of basic techniques in Horticulture and Plant breeding and know about the progresses made.

Unit – I

Importance and scope of horticulture. Classification of horticultural crops –fruits and vegetables. Garden implements & tools. Garden designs. Types of gardens –Formal, Informal and Kitchen. Establishment and maintenance of Lawn.

Unit – II

Garden – its components – hedges, edges, rockery, topiary, water garden, indoor gardening, green houses, bonsai. Orchard – establishment, planning, layout, cultivation. Use of plant growth regulators in horticulture – Induction of rooting, flowering, fruit set and ripening.

Unit – III

Methods of Plant Propagation – Cutting - Layering – Grafting –Budding. Stock – Scion relationship in grafting. Training & Pruning. Nursery preparation and maintenance. Cut flowers – training and pruning.

Unit – IV

Breeding – basic principles, introduction & scope, selection (Mass, Pureline and Clonal). Hybridization – Selfing and Crossing Techniques – Heterosis – Hybrid vigour.

Unit – V

Breeding for disease resistance. Role of polyploidy in plant breeding – Auto and Allopolyploids – Mutation Breeding.

Text Books

1. Kumar, N. (1987). Introduction to Horticulture., Rajalakshmi Publishers, Nagercoil.
2. Manibushan Rao, K. (1991). Textbook of Horticulture. Macmillan Publishing Co., New York.

3. Rao, K. M. (2000). Text Book of Horticulture. Macmillan India Ltd., New Delhi.
4. V.L. Sheela. (2011). Horticulture. MJP publishers, India.
5. Chopra, V. L. (1989). Plant Breeding. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Reference Books

1. Arora, J. S. (1992). Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
2. Edmond, J. B. *et al*. (1977). Fundamentals of Horticulture. Tata McGraw Hill Publishers Co. Ltd., New Delhi.
3. George Acquaah. (2002). Horticulture Principles and Practices. 2nd ed. Pearson Education, New Delhi.
4. Sundararajan J.S. et al. A guide to Horticulture. Thiruvenkadam Printers, Coimbatore.

SEMESTER V

CORE PAPER – IX

PLANT BIOTECHNOLOGY

Hours: 6
Credits: 4
Code:

Objectives: Plant Biotechnology includes genetic modification, genetic engineering and mutagenesis. This paper will deal with the basic principles of these.

Unit- I

Gene cloning: Cutting and joining of DNA – endonucleases, end modifying enzymes and ligase. Plasmid vectors – pBR322, pUC18; Cosmid, BAC and YAC. Vectors – cloning, shuttle and expression vectors – plant expression vectors. Promoters - tissue specific expression in plants.

Unit - II

Plant - Microbe interactions: Symbiotic nitrogen fixation in legumes by *Rhizobia* – biochemistry and molecular biology, *nif* and *nod* genes. *Agrobacterium* and crown gall tumours. Mechanisms of T-DNA transfer to plants. Ti-plasmid vectors for plant transformation – *Agrobacterium* mediated transformation.

Unit - III

Plant tissue culture: Plant cell, tissue and organ culture and its applications. Culture media – types, role of hormones. Totipotency, dedifferentiation and redifferentitation. Types of cultures – callus, cell suspension, protoplast, anther, microspore, doubled haploids. Somatic embryogenesis and organogenesis. Somaclonal variation and its application.

Unit - IV

Genetic engineering in plants: Methods of transformation - selectable markers, reporter genes. Direct DNA transfer - Particle bombardment, electroporation and micro injection. Management of transgenics: Transgene stability and gene silencing, Escape and loss of transgene, Marker free plants.

Unit - V

Application of Plant genetic Engineering: Insect resistance (Bt and Alpha amylase inhibitor) Herbicide resistance, engineering plants for abiotic stress tolerance. Long shelf life of fruits and flowers:- Use of ACC synthase and PGU - Antisense RNA technology. Bioethics and

Biosafety. Intellectual property rights: Introduction – Patents and Plant Variety Protection and Farmer's Rights (PVPFR).

Text Books

1. R.C. Dubey. 2015. A text book of Biotechnology, S.Chand & Co., New Delhi

2. P. Parihar. 2015. A text book of Biotechnology, Argobios Publications, Jodhpur

Reference Books:

1. Slater, Scott and Fowler. 2008, Plant Biotechnology, Oxford University Press.

2. Chrispeels, M.J. and Sadava, D.F. 1994. Plants, Genes and Agriculture, Jones and Bartlett.

3. Salter, H., and Barber, L. 1996. Molecular Genetics of photosynthesin, IRL press, Oxford.

4. Primrose, S.B. 1999, Molecular Biotechnology, Panima publishing corporation, New Delhi.

5. Hammond, J. 2000, Plant Biotechnology, Mc Garvery and V. Yusibov (eds), Springer-verlag, Germany.

SEMESTER V

MAJOR ELECTIVE PAPER - II

MORPHOLOGY AND ECONOMIC BOTANY

Hours:4
Credits: 4
Code:

Objectives : Angiosperms are a group of flowering plants that represent a major community in the plant kingdom. They include about 2,50,000 species distributed all over the world. They are the most highly evolved group of plants and appeared on Earth about 130 million years ago and this paper will introduce ways and means of identifying them.

Unit – I (Morphology)

Vegetative morphology – Introduction; Habit-Types; Life span; Habitat; Root system - Characteristic features, Regions of root; Types of roots, Functions, Modification of roots- Tap root (Storage, Nodulated, Pneumatophore, Assimilatory, Root buttress), Adventitious (Storage, Mechanical- Prop roots, Stilt roots (Balancing roots)- types and functions)

Unit – II (Morphology)

Shoot system - Characteristic features, Buds - Terminal, axillary and Adventitious buds- modifications; Stem modifications - aerial, sub aerial, underground; comparison of underground stem and root- branching of stem; Leaf –Parts – Venation, Types -simple and compound; Phyllotaxy-Symmetry of leaves; Modification of leaf (tendrils, spines, hooks, scales, leaf bladders, foliar roots, storage, pitcher, phyllode)

Unit – III (Morphology)

Reproductive Morphology - Inflorescence & Types - Racemose, Cymose, Mixed and special types; Flower- Monoecious, Dioecious, Polygamous, floral symmetry; Calyx, corolla, Perianth; Aestivation; Androecium – structure and types (Adelphy, epipetalous, syngenesious, gynostegium, pollinia, Didynamous, Tetradynamous); Gynoecium –Parts – syncarpous and apocarpous, Gynobasic style; Gynandrophore, Placentation, Construction of floral diagram and floral formula- *Crotolaria*, *Catharanthus*, *Phyllanthus* and *Oryza* ; Fruit – Definition and types.

Unit – IV (Economic Botany)

Cereals - Wheat and Rice (origin, morphology, processing & uses). Brief account of millets. Legumes - General account, importance to man and ecosystem. Sugars & Starches - Morphology and processing of sugarcane, products and by-products of sugarcane industry. Spices - Listing of important spices, their family and part used, economic importance with special reference to fennel, saffron, clove and black pepper.

Unit V (Economic Botany)

Beverages - Tea and Coffee (morphology, processing & uses). Essential Oils - General account. *Cymbopogon citratus* Oil - extraction method, comparison with fatty oils & their uses. Natural Rubber and Para-rubber: tapping, processing and uses. Timber plants - General account with special reference to teak and pine. Fibres - Classification based on the origin of fibres, Cotton and Jute (morphology, extraction and uses).

Text Books

1. Pandey, B. P. (1989). Taxonomy of Angiosperms (Systematic Botany). S. Chand & Co. Ltd.,
Ram Nagar, New Delhi.
2. Vashista, P.C. (1997). Taxonomy of Angiosperms. S. Chand & Co., New Delhi.
3. Palaniappan, S. (2000). Angiospermgalin Vagaippadu (in Tamil), V.K Publishing House, Chennai. 6.
4. Palaniappan, S. (2002). Thavara Pura amaippial (in Tamil), V.K Publishing House, Chennai.
4. Kochaar, S. L. (). Economic Botany.

Reference Book

1. Sivarajan, V.V. (1993). Introduction to Principles of Plant Taxonomy, Oxford & IBH Publishing Co., New Delhi. 27 5.
2. Naik, V.N (1996). Taxonomy of Angiosperms, Tata McGraw Hill Publishing Co., (P) Ltd, New Delhi.
3. Singh, V & Singh, D.K (1983). Taxonomy of Angiosperms, Rastogi Publications, Meerut.
4. Lawrence, G. H. M (1953). Taxonomy of Vascular Plants, Oxford & IBH Publishes, New Delhi.

SEMESTER V

CORE PAPER – X

CORE PRACTICAL – III

Hours: 4
Credits: 4
Code:

Practical covering

Core Paper VII

- Taxonomy

Core Paper VIII

- Horticulture
- Plant Breeding

Core Paper IX

- Plant Biotechnology

Major Elective Paper II

- Morphology
- Economic Botany

NON MAJOR ELECTIVE PAPER II A

HORTICULTURE

Hours: 2
Credits: 2
Code:

Objectives: This course will help the student to understand the principle of basic techniques in Horticulture.

Unit - I

Importance and scope of Horticulture – classification of horticultural crops – importance of garden and types: Formal, Informal and kitchen garden.

Unit - II

Growth regulators used in Horticulture. Establishment of Lawn.

Unit - III

Plant propagation methods – Cutting, Layering, Grafting and Budding.

Unit - IV

Indoor gardening and landscaping – introduction – types of containers used – environmental factors.

Unit - V

Bonsai – introduction, kinds of bonsai, origin, training, pruning, watering, manuring, pests and diseases.

Text Books

1. Kumar, N. (1987). Introduction to Horticulture, Rajalakshmi Publishers, Nagercoil.

Reference Books

1. Arora, J. S. (1992). Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
2. Edmond, J. B. *et al*. (1977). Fundamentals of Horticulture. Tata McGraw Hill Publishers Co. Ltd., New Delhi.
3. George Acquaah. (2002). Horticulture Principles and Practices. 2nd ed. Pearson Education, New Delhi.

SEMESTER – V

NON MAJOR ELECTIVE PAPER – II B

ECONOMIC BOTANY

Hours: 2
Credits: 2
Code:

Objectives: This paper introduces the commercial potential of plants and will help the student to understand its importance.

Unit – I

Vegetables and tropical fruits – underground vegetables – Beetroot, Onion and Carrot. Leafy vegetables – *Amaranthus* and *Cannabis sativus*. Fruits of Cucurbitaceae (Water melon) and Solanaceae (Tomato)

Unit – II

Medicinal products from bark, leaves, flowers, fruits and seeds. Antibiotics – Penicillin and Erythromycin (source, production and uses)

Unit – III

Cultivation and harvest of Maize, Wheat and Paddy.

Unit – IV

Cultivation of pulses and nuts. Red gram, Black gram, Bengal gram and Cashewnut. Cultivation and uses of Spices and Condiments: Ginger and Pepper.

Unit – V

Wood and forest products : Timber, Paper and Rubber.

Text Books

1. Vardhana, R. 2009. Economic Botany (1st ed.), Sarup Book Publishers Pvt. Ltd., New Delhi.

Reference Books

2. Hill, A.F. 1952. Economic Botany; A Textbook of Useful Plants and Plant Products (2nd ed.), McGraw- Hill Book Co., Inc., New York.
3. Thompson, H.C. 1949. Vegetable Crops (4th ed.), McGraw- Hill Book Co., Inc., New York.
4. Wallis, T.E. 1946. Text book of Pharmacognosy. J. & A. Churchill Ltd, London.

SEMESTER VI

CORE PAPER – XI

BIOPHYSICS, BIOCHEMISTRY AND BIOSTATISTICS

Hours:6
Credits:5
Code:

Objectives: This paper deals with the study of various primary & secondary plant products and the principle of various bio-instruments and concepts in biophysics. Basic Biostatistics is also dealt.

Unit – I

Biophysics – laws of thermodynamics – enthalpy, entropy and free energy. Bioenergetics (ATP) dual nature of light (wave and particulate) – Energy status of atoms - ground, excited, singlet and triplet. De-excitation, heat and light phosphorescence, fluorescence. Biological effects of ionizing radiations.

Unit – II

pH and its determination - Buffers – Chromatography –principle ,uses and types – TLC and HPLC . Basic principles of Colorimetry and centrifugation. Electrophoresis – AGE and PAGE.

Unit – III

Chemical bonds – primary & secondary, Primary plant products – Carbohydrates: classification, structure and properties of glucose, sucrose and cellulose. Lipids - Fatty acids - classification, saturated and unsaturated fatty acids. Secondary plant products: alkaloids, terpenoids, phenolics and flavonoids.

Unit – IV

Nucleic acids –RNA, DNA (Types and functions). Double helical model of DNA. Satellite DNA. Amino acids – structure, classification and properties. Proteins –classification and structure (primary, secondary, tertiary).

Unit – V

Data collection, sources and methods, presentation, tabulation, graphical and diagrammatic representation, Histograms. Measures of central tendencies – Mean, Median and Mode. Standard deviation and Standard Error. Coefficient of variation – Chi square test, ANOVA (One Way)

Text Books

1. Trehan, K 1987. Biochemistry Wiley Eastern Ltd., New Delhi
2. Srivastava, H.S. 1990. Elements of Biochemistry. Rastogi Publications, Meerut, India
3. Narayanan, P. 2000. Essentials of Biophysics. New Age International Publishers(P)ltd., New Delhi, Bangalore, Calcutta, Chennai, Guwahati, Hyderabad, Lucknow, Mumbai
4. Annie & Arumugam, N. 2000. Biochemistry & Biophysics. Saras Publications, Nagercoil, Tamilnadu.
5. Arumugam N. Biostatistics. Saras publications. Tamil Nadu.
6. Khan & Khanum. Fundamentals of Biostatistics. 1994. Ukaaz publications, India.
7. Thiravia Raj S. 1999. Biophysics. Saras publications, Tamil Nadu.
8. Jain J.L. 1979. Fundamentals of Biochemistry. S. Chand & Co., Ltd.

Reference Books

1. Lehninger, A.L. (1984) : Biochemistry (2nd Edition). Kalyani Publishers, Ludhiana, New Delhi
2. Jayaraman, J. (1981) : Laboratory Manual of Biochemistry.Wiley Eastern Ltd., New Delhi
3. Stryer, L. (1989) : Biochemistrty. W.H. Freeman & Co., New York, San Francisco
4. Plummer, D. (1989) : Biochemistry –the Chemistry of life. McGraw Hill Book Co., London, N.Y. New Delhi, Paris, Singapore, Tokyo.
5. Casey, E.J. (1969) : Biophysics-Concepts and Mechanisms. Van Nostrand Reinhold Co., & Affiliated East West Press (P) Ltd., New Delhi.
6. Daniel M. (1989). Basic Biophysics for Biologists. Agrobotanical publishers. India.
7. Upadhay A. et al. (2000). Biophysical Chemistry – principles & Techniques. Himalaya publishing house, Delhi.

SEMESTER VI

CORE PAPER – XII

PLANT PHYSIOLOGY

Hours: 6
Credits: 6
Code:

Objectives: This paper deals with various physiological processes in plants related to metabolism, growth and reproduction; understand the various abiotic stresses faced by plants and to learn the different types of plant movements.

Unit – I

Role of water –biological significance, physical and chemical properties. Properties of solutions, suspensions and colloids. Osmotic and non-osmotic uptake. Ascent of sap – Cohesion and root pressure theories. Transpiration –Guttation.

Unit – II

Mineral nutrition – role of major & minor elements, mineral deficiency symptoms, Hydroponics, Foliar nutrition, Absorption of mineral salts, Active & passive absorption, Translocation of organic solutes, mass flow. Stress physiology – water stress, temperature stress, salt stress, role of plant physiology in agriculture.

Unit – III

Enzymes – nature and properties. Mechanism of enzyme action, factors affecting enzyme action. Nitrogen metabolism – source of nitrogen, nitrogen assimilation – protein synthesis. Respiration - respiratory substrates, aerobic and anaerobic, Glycolysis, Kreb's cycle, Electron transport, Oxidative phosphorylation and Energetics.

Unit – IV

Radiant energy and its role in photosynthesis. Action and absorption spectrum. Role of pigments, Emerson Enhancement effect, PS I and PS II, Photoelectron transport, cyclic and non cyclic photophosphorylation Carbon assimilation –C3, C4 and CAM cycles. Photorespiration.

Unit – V

Plant growth regulatory substances – Auxins, Cytokinins, Gibberellins and ABA. Phytochrome,

Photoperiodism. Seed dormancy. Vernalization. Senescence. Plant movements – Geotropism, Phototropism, Thigmotropism.

Text Books

1. Jain V.K. (1990) – Plant Physiology – S. Chand & Co. New Delhi.
2. Malik. C.P., and Srinivastra, (1995) – Plant Physiology.
3. Verma. S.K (1999) – Plant Physiology- S.Chand & Co., New Delhi.
4. Verma,S.K., 1999,A Text book of Plant Physiology, S. Chand & Co,New Delhi.

Reference Books

1. Fang. F.K., (1982) – Light Reaction path of photosynthesis, Vol 35. molecular biology, Biochemistry and Biophysics – Springer.
2. Palner. J.M., (ed) 1984 – the physiology and biochemistry of Plant respiration – Cambridge University Press. U.K.
3. Delvin. R.M. (1969) – Plant Physiology – Holt, Rinehart & Winston & Affiliated east west, Press (p) Ltd., New Delhi.
4. S. Salisbury. F.B. & C.W. Ross – (1999) Plant Physiology – CBS Publishers & Printers, New Delhi.
5. Noggle, G.R. and Frintz, G.J., 1976, Introductory Plant Physiology, Prentaice-Hall, India.

SEMESTER VI

CORE PAPER– XIII

ECOLOGY, PHYTOGEOGRAPHY AND CONSERVATION BIOLOGY

Hours: 5
Credits: 4
Code:

Objectives: The world is in a period of unprecedented environmental change. Learning how to live sustainably on this planet is going to require that humanity learns how to utilize and manage our natural resources more effectively and this paper will deal this.

Unit - I

Ecology – Definition; Plant Ecology and its divisions. Approaches to the study of Ecology – Autecology and Synecology. Applications of Plant Ecology. Factors influencing plant environment – climatic, edaphic and biotic factors.

Unit - II

Ecosystem concept – components of ecosystem- biotic and abiotic – producers, consumers and decomposers. Ecological pyramids, Food chain and Food web. Pond ecosystem. Grassland ecosystem. Units of vegetation – formation, association, consociation and society. Development of vegetation – migration, ecesis and colonization. Plant succession – Hydrosere and Xerosere.

Unit - III

Pollution types and its control –air pollution, water pollution, soil pollution, noise pollution, thermal pollution and radioactive pollution.

Unit - IV

Phytogeography – Basic principles – Theories of Continental drift, continuous and discontinuous distribution. Endemism – age and area hypothesis – Altitudinal and Latitudinal distribution of vegetation. Vegetation of India. Characteristic features of different types of forest and forest conservation.

Unit -V

Categories of Flora as per IUCN - Conservation of Genetic Resources – Red Data Book – Need for conservation. *in situ* and *ex situ* Conservation. Biological hot spots. Reserve Forests and Social Forestry. Sacred Groves. Buffer zones and role of tribes in conservation.

Text Books

1. Shukla, R. S. and Chandel, P. S. 2015. Textbook of Plant Ecology. S. Chand Publications

Pvt. Ltd., NewDelhi.

2. Chandrasekar, P. 2015. □□□□□□□□□□□□ □□□□□□□□□□□ , TK Publishers, Pudukkottai.

3. Palaniyappan, P. 2015. சூழலியல் Mohan Pathipagam, Chennai.

Reference Books

1. Muller-Dombols, D. and Ellenberg, H. (1974). Aims and Methods of Vegetation Ecology, Wiley, New York.

2. Odum, E.P. (1983), Basic Ecology, Sanders, Philadelphia.

3. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition. W.H. Freeman and Company.

4. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.

SEMESTER VI

MAJOR ELECTIVE PAPER- III

FOOD AND NUTRITION

Hours:5
Credits: 4
Code:

Objectives: This paper will enable the students to have an understanding about their food and Nutrition.

Unit - I

Introduction to Nutrition - food as a source of nutrients, functions of foods, definition of nutrients, adequate, optimum and good nutrition, malnutrition. Nutritional supplements.

Unit - II

BMI. Inter relationship between nutrition and health, Good health definition and parameters. Necessity for physical activities.

Unit - III

Preparation of diet chart for infant, adolescent, adult, senior people, pregnant women, lactating mother.

Unit - IV

Diets for gastro intestinal disorders, renal disorders, liver disorders, obesity, cardio vascular disorders and *Diabetes mellitus*.

Unit - V

Preparation of Indian Traditional food items (5 varieties : Adai, Pongal, Porridge, Sathu Maavu and Idli - 9 cereals to be used either singly or in combination for the recipes along with their nutritional values).

Text Books

1. Swaminathan, M. 1992. Human nutrition and Diet. Bappco, Bangalore.
2. Swaminathan, M., "Advanced Textbook of Foods and Nutrition", Vol I,II (2^{nd} Ed.revised) Bappco, Bangalore, 1985.
3. CFTRI - Traditional Foods - Some products and technologies, 1986, CFTRI Mysore.
4. Gopalan C., RN. Ramasastri and S.C. Balasubra-manian, 1977, "Nutritive Value of Indian Foods", National Institute of Nutrition, Hyderabad
5. Mudambi S.R., M.V. Rajagopal, "Fundamentals of Food and Nutrition", 2^{nd} Ed. Wiley Eastern Ltd. 1990.
6. Pocket Guide to Nutrition and Dietetics - 1st Edition - Elsevier

7. Shubhangini A. Joshi,(1992)' "*Nutrition and Dietetics*"Tata Mc Grow- Hill publishing Company Ltd,. New Delhi.
8. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai.

Reference Books

1. Wilson, EVAD, "Principles of Nutrition", 4th Ed. New York, John Wiley & Sons, 1979.
2. Swaminathan, M (1998), "Principles of Nutrition and Dietetics", Bappco, Bangalore.
3. Brain A. Fox and Allan G. Cameron, 1989, "Food Science, Nutrition and Health", 5th Edition, Edward Arnold.
4. Passmone R.and Eastwood M.A,(1986), "Human *Nutrition and Dietetics*" ...

e-Books(free)

1. "Dietetics" by Srilakshmi B,
2. "Clinical Dietetics and Nutrition" by Antia F P,
3. "Principles of therapeutic *nutrition and dietetics*" by Sharma A,

SEMESTER VI

SKILL BASED ELECTIVE – III

BIOFERTILIZERS AND BIOPESTICIDES

Hours:2
Credits: 2
Code:

Objectives: To educate the students on the principles, applications and advantages of Biofertilizers and Biopesticides.

Unit – I

General account of Biofertilizers and Biopesticides. Scope, Advantages and Importance of Biofertilizers.

Unit – II

Biofertilizers - Symbiotic Nitrogen fixers (*Rhizobium*) – Non-Symbiotic nitrogen fixers (*Azospirillum*) – Free Nitrogen Fixers (Cyanobacteria)

Unit – III

Phosphate solubilizers — *Bacillus megaterium* – Mycorrhiza as Biofertilizer – mass inoculum production and field application of mycorrhiza.

Unit – IV

Mass cultivation of microbial inoculants. Field application of *Rhizobium, Azospirillum* and Cyanobacteria

Unit – V

Biopesticides – Bacterial Pesticides (*Bacillus thuringiensis*), Viral Pesticides (NPV and CPV), Mycopesticides (*Entomophthora, Beauveria*) – Mechanism of Biocontrol.

Text Book

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

Reference Books

1. Verma A and Hock B. 1995. Mycorrhiza.

2. Yaacovokan, 1994 - Azospirillum, CBC press

3. Wicklow, D.T. and B.E. Soderstrom. 1997, Environmental and microbial relationships. Springer.

SEMESTER VI

CORE PAPER - XIV

CORE PRACTICAL – IV

Hours: 5
Credits: 4
Code:

Practical covering

Core Paper XI

- Plant Physiology

Core Paper XII

- Biophysics
- Biochemistry
- Biostatistics

Core Paper XIII

- Ecology
- Conservation Biology

Major Elective Paper III

- Food and Nutrition