

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc., BOTANY

UNDER CBCS

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	Communicative English I	25	75	100
3.	III	Core Theory	Paper-1	6	4	Phycology and Mycology	25	75	100
	III	Core Practical	Practical-1	4	0		0	0	0
4.	III	Allied -1	Paper-1	4	3	Zoology I	25	75	100
	III	Allied- 1	Practical-1	2	0		0	0	0
5.	III	PE	Paper 1	6	3	Professional English I	25	75	100
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		36	20		150	450	600
SEMESTER II									
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	Communicative English II	25	75	100
9.	III	Core Theory	Paper-2	5	4	Microbiology, Lichens, Bryology and Plant Pathology	25	75	100
10.	III	Core Practical	Practical-1	3	2	Covering Papers 1 and 2	25	75	100
11.	III	Allied-1	Paper-2	4	3	Zoology II	25	75	100
12.	III	Allied Practical - 1	Practical-1	2	2	Zoology	25	75	100
13.	III	PE	Paper 1	6	3	Professional English II	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		36	25		225	675	900

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III							CIA	Uni. Exam	Total
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	4	5	Pteridology, Gymnosperms and Paleobotany	25	75	100
	III	Core Practical	Practical-2	3	0		0	0	0
19.	III	ALLIED-2	Paper-3	4	3	Chemistry I	25	75	100
	III	Allied Practical	Practical-2	3	0		0	0	0
20.	IV	Skill based Subject	Paper-1	2	2	Horticulture	25	75	100
21.	IV	Non-major elective	Paper-1	2	2	Medicinal Botany	25	75	100
				30	20		150	450	600
SEMESTER IV							CIA	Uni. Exam	Total
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	4	5	Plant Cell Biology	25	75	100
25.	III	Core Practical	Practical-2	3	3	Covering Papers 3 and 4	25	75	100
26.	III	ALLIED-2	Paper-4	4	3	Chemistry II	25	75	100
27.	III	Allied Practical-2	Practical-2	3	2		25	75	100
28.	IV	Skill based Subject	Paper-2	2	2	Mushroom Cultivation	25	75	100
29.	IV	Non-major elective	Paper-2	2	2	Horticulture	25	75	100
				30	25		200	600	800
SEMESTER V							CIA	Uni. Exam	Total
30.	III	Core Theory	Paper-5	6	5	Anatomy and Embryology of Angiosperms	25	75	100
31.	III	Core Theory	Paper-6	6	5	Morphology and Taxonomy of Angiosperms & Economic Botany	25	75	100
32.	III	Core Theory	Paper-7	6	5	Genetics, Plant Breeding, Evolution and Biostatistics	25	75	100
	III	Core Practical	Practical-3	3	0		0	0	0
	III	Core Practical	Practical-4	3	0		0	0	0
33.	III	Internal Elective	Paper-1	3	3	A. Tissue Culture B. Mass Cultivation of Algae C. Bio safety and Bioethics	25	75	100
34.	IV	Skill based Subject	Paper-3	3	2	Ethno Botany and Herbal Medicines	25	75	100
				30	20		125	375	500
SEMESTER VI							CIA	Uni. Exam	Total

35.	III	Core Theory	Paper-8	5	5	Plant Physiology and Plant Biochemistry	25	75	100
36.	III	Core Theory	Paper-9	5	5	Ecology, Phytogeography and Toxicology	25	75	100
37.	III	Core Practical	Practical-3	3	3	Covering Papers 5, 6 & 7	25	75	100
38.	III	Core Practical	Practical-4	3	3	Covering Papers 8 & 9	25	75	100
39.	III	Core Project	Project – 1	5	5	(Individual / Group Project)	25	75	100
40.	III	Internal Elective	Paper-2	3	3	(to choose one out of 3) A. Plant Biotechnology B. Bio fertilizers C. Postharvest Technology	25	75	100
41.	III	Internal Elective	Paper-3	3	3	(to choose one out of 3) A. Fermentation Technology B. Computer Application in Botany C. Forestry	25	75	100
42.	IV	Skill based Subject	Paper-4	3	2	Plant and Water Conservation & Management	25	75	100
43.	V	Extension Activities		-	1		100	0	100
				30	30		300	600	900
					140				4300

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	43		140		4300

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc., BOTANY: CBCS PATTERN

(With effect from 2020 - 2021)

SEMESTER: III

CORE PAPER- 3

PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY

COURSE OBJECTIVES :

- ❖ To understand the distribution and classification of pteridophytes.
- ❖ To study the structure and life cycle of various groups of pteridophytes.
- ❖ To provide information to characteristics, classification, economic importance and life cycle of various groups of gymnosperms.
- ❖ To understand the importance of fossils and fossilization process in tracing evolution.
- ❖ To impart knowledge on various types of fossil plants.

UNIT - I

General characters, Distribution, Classification of Pteridophytes (Reimer 1954). Stellar evolution. Homospory and Heterospory. Origin of seed habits. Apogamy and Apospory.

UNIT - II

Structure and life cycle of the following types (Excluding developmental studies) *Lycopodium*, *Selaginella*, *Equisetum*, *Gleichenia*, *Adiantum* and *Marselia*.

UNIT - III

General characters of gymnosperms, Distribution of gymnosperms, Classification of gymnosperms by K.R. Sporne (1965). Economic importance - Detailed study of the following types: *Cycas*, *Pinus* and *Gnetum*

UNIT - IV

Geological time scale. Radio carbon dating. Types of fossilization - Impressions, compressions, casts, molds, petrifications, and coal balls. Importance of the study of paleobotany.

UNIT - V

Nomenclature of fossil plants. Detailed study of the following fossils: *Rhynia*, *Lepidodendron*, *Lepidocarpon*, *Calamites* and *Williamsonia*

TEXT BOOKS

- Unit - I:** Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand &company Ltd, New Delhi
- Unit - II:** Sharma, O.P. (2012). Textbook of Pteridophyta, TATA MacMillan India Ltd., New Delhi
- Unit - III:** Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate pub and Distributer, New Delhi
- Unit - IV:** Atchlay W.R & Woodnuff DS. (1981). Evolution and speciation, Cambridge University Press, Cambridge.
- Unit - V:** Kirkaldy, J.E. (1963). The study of Fossils. Hutchinson Educational, London

REFERENCE ITEMS: BOOKS, JOURNAL :

1. Eames, A.J.(1936). Morphology of Vascular Plants - Lower groups, Tata Mcgraw Hill Publishing company Ltd., New Delhi.
2. Sporne,K.R. (1972) . The Morphology of Pteridophytes, B.I. Publications, Madras
3. Sporne, KR. (1970). The morphology of Pteridophytes (The structure of Ferns and Allied Plants) Hutchinson University, London.
4. Chamberlain, C.J. (1934). Gymnosperms: Structure and Evolution. Chicago Reprinted 1950) New York.
5. Delveloryas, T. (1962). Morphology and evolution of fossil plants.
6. Doyle, W.T. (1970). Non Vascular Plants: Form and function. Belmont, California.
7. Kimura, M. (1983). The natural theory of molecular evolution, Cambridge University Press, Cambridge.
8. Arora M.P. (1990). Evolutionary biology, Himalaya Publication House, Delhi.

E- Materials :

[https://bio.libretexts.org/Bookshelves/Botany/Book%3A_Introduction_to_Botany_\(Shipunov\)/06%3A_Growing_Diversity_of_Plants/6.02%3A_Pteridophyta_-_the_Ferns](https://bio.libretexts.org/Bookshelves/Botany/Book%3A_Introduction_to_Botany_(Shipunov)/06%3A_Growing_Diversity_of_Plants/6.02%3A_Pteridophyta_-_the_Ferns)
<http://www.auburn.edu/academic/classes/biol/1030/rajamani/topic5%20BIOL1030NR.pdf>
<http://www1.biologie.uni-hamburg.de/b-online/palbot/teach/palbotteach.html>
<http://www1.biologie.uni-hamburg.de/b-online/ibc99/pbio100/lec19.html>
<http://www1.biologie.uni-hamburg.de/b-online/palbot/teach/palbotteach.html>

Course Out Comes:

1. To discuss the general Characteristic of pteridophytes
2. To differentiate the various genera in pteridophytes.
3. To learn the salient features and importance of gymnosperms
4. To acquire knowledge on fossils and fossilization
5. To know on various groups of fossil plants

PAPER - 3 CHEMISTRY - I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1 General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Flux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

1. Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3 Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons

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Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3 , PCl_5 , SF_6 and XeF_6 .

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1 Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking

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Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

SKILL BASED SUBJECT

PAPER -1

HORTICULTURE

Course Objectives :

- ❖ To promote the profession of Horticulture and the professionalism of those working in the industry
- ❖ To act as an authoritative body; consulting with Government and other policy making bodies on matters of interest or concern to professional horticulturists
- ❖ To confer recognized status upon professionally qualified and experienced horticulturists.
- ❖ To promote educational and training opportunities and encourage the development of all disciplines within horticulture
- ❖ To improving the environment

UNIT - I

Introduction, Divisions of horticulture, Importance and scope of horticulture, Principles of garden making, Types of pots and containers, Potting mixture and potting media – soil, sand, peat, sphagnum moss, vermiculite, Soil types, Soil preparation, Irrigation methods, Hydroponics

UNIT - II

Propagation methods, Cuttings, Layering – Air layering, Ground layering (Tip, Trench and Compound), Budding – T- budding, Grafting – Approach grafting, Bridge grafting, whip and tongue grafting, Garden tools and implements, Manures and fertilizers, Farmyard manure, compost, vermi compost and biofertilizers- Chemical fertilizers – NPK. Time and application of manures and fertilizers. Foliar sprays

UNIT - III

Components of Garden, Lawns and landscaping Trees, shrubs and shrubberies, climbers and creepers, Flower beds and borders, ornamental hedges, edges Drives, roads, walks and paths, Carpet beds, topiary, trophy, rockery. Conservatory or green houses, Indoor garden, Roof garden, Bonsai.

UNIT - IV

Flower Arrangement, Containers and requirements for flower arrangements Free style, Shallow and Mass arrangement, Japanese – Ikebana, Bouquet and garland making, Dry flower arrangement, Harvesting Methods, Storage, Marketing of Fruits, vegetables and flowers, Preservation and processing of fruits and vegetables.

UNIT - V

Growth regulators in horticulture, Rooting hormones , Growth promoters, Flower induction, Parthenocarpy, Plant protection, Common diseases of fruits and vegetable crops (Mango, Tomato). Weedicides, Fungicides, Pesticides

Field Study: Visit to a Botanical garden under the guidance of the teacher is encouraged.

Text Books:

Unit - I: Kumar, N., (1997). Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.

Unit - II: Edmond Musser & Andres (1994) Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.

Unit - III: Manibhushan Rao, K. Text book of Horticulture. Macmillan India Ltd. Chadha K.L(2003). Hand book of Horticulture, ICAR publication , New Delhi.

Unit - IV: Randhava, GS (1973). Ornamental horticulture in India. Today and Tomorrow Printers and Publishers, New Delhi.

Unit - V: Edmond Musser & Andres (1994) Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.

Reference Items: books, Journal:

1. Williams, CN., Uzo, JO , Peregrine, WTH (1991). Vegetable production in Tropics. Longman Scientific & Technical, Essex (UK).
2. Yawalkar, KS (1961). Vegetable crops of India. Agri-Horticultural Publishing House, Dharmapath, Nagpur.

E- Materials:

<http://ecoursesonline.iasri.res.in/course/index.php?categoryid=89>

Course Out Comes :

1. To increase food and ornamental plant production
2. To providing employment, often in rural areas
3. To improving the environment and management
4. To creating and managing valuable sports and recreation facilities as one of the main leisure pursuits - gardening
5. To gain knowledge of growth regulators, promoters and common diseases of horticultural crops.

NON MAJOR ELECTIVE

PAPER-1

MEDICINAL BOTANY

Course Objectives :

- ❖ To support the education of healthcare professionals in phytotherapy.
- ❖ To promote the production of medicinal plants as an alternative for diversification and the generation of income for family farms.
- ❖ To stimulate agro ecological practices.
- ❖ To support research and the implementation of medicinal plant programmes and projects in the municipalities
- ❖ To educate, study, develop, cultivate, benefits of medicinal plants

UNIT - I

Pharmacognosy - Definition and History. A general account of different survey of Different systems of Medicines - Indian systems of medicine – Siddha, Ayurveda and Unani systems. Classification of drugs (elementary).

UNIT - II

Morphological studies - Chemical constituents. Therapeutic and other Pharmaceutical uses of Bark - Cinchona, Leaves - Adathoda and Eucalyptus, Flower - Clove.

UNIT - III

Fruits and seed - Wood apple, Goosberry and Poppy seed, Underground stem - Ginger, Unorganized drugs. Gum - Acacia, Resin - Turpentine, Fixed oil - Castor oil.

UNIT - IV

A brief account of the following: a) Drugs acting on the Central Nervous system b) Drugs used in the disorders of the Gastro Intestinal tract and c) Cardio Vascular drugs. (Five Plant examples for each mentioned above)

UNIT - V

Cultivation of medicinal plants in India. Medicinal plants . Breeding methods applied to medicinal herbs. Drug Adulteration. Methods of Drug evaluation.

Text Books

Unit - I: John Jothi Prakash, E. (2003). Medicinal Botany and Pharmacognosy. JPR Publication, Vallioor, Tirunelveli.

Unit - II: Gokhale, SB., Kokate, CK. and Purohit, AP (1995). Pharmacognosy. Nirali Prakashan, pune

Unit - III: Prajapathi, Purohit, Sharma and Kumar. (2003). A Hand book of Medicinal plants. Agrobios Publications, Jodhpur.

Unit - IV: Kumar,NC (1993). An Introduction to Medical Botany and Pharmacognosy

Unit - V: John Jothi Prakash, E. (2003). Medicinal Botany and Pharmacognosy. JPR Publication, Vallioor, Tirunelveli.

Reference Items: books, Journal:

1. Kanny, Lall, Dey and Raj Bahadur, (1984). The indigenous drugs of India, International Book Distributors.
2. Sivarajan V.V and Balachandran Indra (1994). Ayurvedic drugs and their plant source. Oxford IBH Publishing Co.
3. Wallis,T.E (2005) Text Book of Pharmacognosy by CBS Pub. Delhi.
4. Kirthikar and Basu.(2012) Indian Medicinal Plants
5. Mohammed Ali, (2008–Vol-1). Pharmacognosyby CBS Publishers andDistributors
6. Ashutosh Kar, (2007). Pharmacognosy and Pharmaco Biotechnology - New Age. Publisher New Delhi.

E- Materials:

<https://science.umd.edu/classroom/bsci124/lec29.html>

Course Out Comes:

1. To discuss the various systems of medicines
2. Promotion of cultivation and conservation of medicinal plants.
3. To identify the plants to be conserved
4. To gain knowledge about the drugs process
5. To provide information to cultivate drug adulteration and evaluation

SEMESTER IV

CORE PAPER - 4

PLANT CELL BIOLOGY

Course Objectives:

- ❖ Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
- ❖ Students will understand how these cellular components are used to generate and utilize energy in cells
- ❖ Students will understand the cellular components underlying mitotic cell division.
- ❖ Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.
- ❖ To learn environmental or physiological changes, or alterations of cell function brought about by mutation.

UNIT - I

History and progress of cell biology- Prokaryotic and Eukaryotic cell. Ultra structure of plant cell, Cell wall with chemistry and function. Structure, Chemistry and function of Cytoplasm and plasma membrane.

UNIT - II

Cell Organelles: Structure and origin of the following: Endoplasmic Reticulum, Golgi complex, Lysosomes, Vacuole, Peroxisomes, Mitochondria, Plastids and Ribosomes. Structure and Functions of Nucleus, Nucleoplasm, Nucleolus and Chromatin.

UNIT - III

Chromosome, special types of chromosomes - Polytene and Lambrush chromosomes, Variation in Chromosome number (Numerical aberrations)- aneuploidy and Euploidy- haploidy, polyploidy- significance. Variation in Chromosome structure (Structural aberrations) - deletion, duplication, inversion and translocation- significance

UNIT - IV

Central Dogma, Semi conservative DNA replication – mechanism, enzymes involved in DNA replication- DNA polymerase, DNA gyrase, Helicase, Ligase, primase and other accessory proteins, Eukaryotic replication with special reference to replication licensing factor, assembly of new nucleosome, replication at the end chromosome telomere, telomerase concept.

UNIT - V

RNA processing, Aminoacylation of tRNA, Translation. Cell inclusions (Non living): Cystolith, crystals, raphids, starch grains. Cell divisions – Amitosis, Mitosis and Meiosis and their significances. Gene regulation – Lac operon.

Text Books:

Unit - I: Turner, P.C. A.G. MC Lennan. A.D. Bates And M.R.H. White. 1998. Instant Notes in Molecular. Biology. Viva Books Pvt. Ltd. Chennai.

Unit - II: Verma.P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.

Unit - III: Wolfe, S.L. 1993. Molecular and Cellular Biology. Wadsworth Publishing Co, Clifornia.

Unit - IV: Rastogi, SC (1992) .Cell biology , Tata McGrew-Hill,New Delhi

Unit - V: Sundararajan ,S (2000). Cytology , Anmol publication (P) ltd, New Delhi

Reference Items: books, Journal:

1. Dyansager,V.R (1986.Cytology and Genetics.Tata McGrew-Hill,New Delhi.
2. Karp,G (1995)Cell and Molecular Biology,John Wiley and Sons,New York

E- Materials :

https://cellbiology.med.unsw.edu.au/cellbiology/index.php/2010_Lecture_1

https://cellbiology.med.unsw.edu.au/cellbiology/index.php/2010_Lecture_2

<https://employees.csbsju.edu/ssaupe/biol327/Lecture/cell-wall.htm>

Course Out Comes:

1. Compare and contrast animal and plant cells and be able to distinguish each type under the microscope.
2. Identify the following structures on the slides and explain the functions of plasma membrane, cytoplasm, nucleus, nucleolus, cell wall, and plastids
3. To gain knowledge structure and functions of chromosomes.
4. To knowledge of DNA structure and replication
5. To gathering knowledge of RNA functions and their properties.

CORE PRACTICAL - II

PTERIDOLOGY, GYMNOSPERMS, PALEOBOTANY AND PLANT CELL BIOLOGY

Course Objectives :

- ❖ To learn practical knowledge of internal structures of pteridophytes
- ❖ To know Morphological characters and reproductive parts.
- ❖ To gain knowledge of structure and reproductive parts of gymnosperms
- ❖ To study the fossil plants
- ❖ To know detailed study of cell and cell division.
- ❖

PTERIDOLOGY

1. Study of morphology, internal structure and reproductive parts of *Lycopodium*, *Selaginella*, *Equisetum*, *Gleichenia*, *Adiantum* and *Marselia*.

GYMNOSPERMS

1. Study of morphology, internal structure and reproductive parts of *Cycas*, *Pinus* and *Gnetum*

PALEOBOTANY

1. Study of *Rhynia*, *Lepidodendron*, *Lepidocarpon*, *Calamites* and *Williamsonia*.

CELLBIOLOGY

1. Study of structure of plant cell and organelles by electron microscopy pictures from standard books.
2. Study of Cell inclusions (non living)- cystolith, crystals, raphids, starch grains.
3. Study of Mitosis by Squash technique (Onion root tip)
4. Study of Meiosis (Demonstration only)

ALLIED - 2
PAPER - 4
CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner’s Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biological functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald’s Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1 Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of FeSO₄ – Standard FAS.
5. Estimation of Oxalic acid – Standard FeSO₄.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe²⁺ using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- ❖ Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- ❖ Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- ❖ Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- ❖ Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- ❖ Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- ❖ Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.
- ❖ Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- ❖ A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- ❖ Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- ❖ Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N. Dash - Sultan Chand & Co – 2006.
- ❖ Understanding Chemistry – C. N. R. Rao, Universities Press – 2011.

SKILL BASED SUBJECT PAPER - 2

MUSHROOM CULTIVATION

Course Objectives :

- ❖ To strengthen the promotion of mushroom cultivation practices.
- ❖ To understand the techniques involved in the cultivation of edible mushrooms.
- ❖ To study the different preparation in pure culture methods.
- ❖ To create awareness the production and consumption of mushrooms.
- ❖ To explain the food types prepared from mushrooms and export value.

UNIT - I

Introduction - history - scope of edible mushroom cultivation - Types of edible mushrooms available in India - temperate mushroom, sub-tropical mushroom and tropical mushroom. Detail study of *Pleurotus citrinopileatus*, *Agaricus bisporus*.

UNIT - II

Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization - preparation of test tube slants to store mother culture – culturing of *Pleurotus* mycelium on Petri plates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

UNIT - III

Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hood, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house), water sprayer, tray, small polythene bag. Mushroom bed preparation - paddy straw, sugarcane trash. Factors affecting the mushroom bed preparation - Low cost technology.

UNIT - IV

Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutritional value of Proteins and amino acids, mineral elements - Carbohydrates, Crude fibre content - Vitamins. Medicinal values of mushrooms

UNIT - V

Food Preparation: Types of foods prepared from mushroom; Soup, Cutlet, Omelets, Samosa, Pickles, Curry. Value added products of mushroom. – mushroom soup powder, mushroom biscuit, mushroom nuggets, mushroom ketchup, candy, murabba, chips etc,. Research Centers - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Text Books:

Unit - I: Marimuthu, T, Krishnamoorthy, AS, Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

Unit - II: Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., Bangalore.

Unit - III: Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi

Unit - IV: Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I &Vol.II.

Unit - V: Manjit singh, Bhuvnesh vijay, Shwet kamal, GC Wakchaure (Eds.) (2011).
Mushrooms - cultivation, marketing and consumption. Directorate of
Mushroom research, ICAR, Chambaghat, Solan , HP-173213.

Reference Items: books, Journal:

1. Manjit singh, Bhuvnesh vijay, Shwet kamal, GC Wakchaure (Eds.) (2011) Mushrooms - cultivation, marketing and consumption. Directorate of Mushroom research, ICAR, Chambaghat, Solan , HP-173213.
2. Marimuthu, T, Krishnamoorthy, AS, Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology,Tamil Nadu Agricultural University, Coimbatore.

E- Materials:

https://www.academia.edu/11324578/Mushroom_Production_and_Processing_Teaching_Note_
<https://www.agrimoon.com/mushroom-culture-horticulture-icar-pdf-book/>

Course Out Comes :

1. To gain knowledge about edible mushrooms
2. To state the culture and methods of edible mushrooms
3. To know the cultivation technology and their factors affecting the mushrooms.
4. To state the different process of storing , nutrition and medicinal values of mushrooms
5. To understand the food preservation and processing techniques.

NON MAJOR ELECTIVE

PAPER - 2

HORTICULTURE

Course Objectives :

- ❖ To promote the profession of Horticulture and the professionalism of those working in the industry.
- ❖ To act as an authoritative body; consulting with Government and other policy making bodies on matters of interest or concern to professional horticulturists
- ❖ To confer recognized status upon professionally qualified and experienced horticulturists.
- ❖ To promote educational and training opportunities and encourage the development of all disciplines within horticulture
- ❖ To improving the environment

UNIT- I

Importance and scope of Horticulture. Types of Gardens – Public Garden, Kitchen Garden, Indoor Garden – Potted Plants, Hanging Baskets, Cut Flowers, Bonsai, Hydroponics and Soilless Production. Garden Components - lawn, trees, shrubs, climbers and creepers, flower beds and borders, hedge and edges, paths, rockery, Water garden and Topiary.

UNIT - II

Plant Propagation Methods – Cutting, Layering, Grafting, Budding, Stock – Scion Relationship. Use of Plant Hormones in Plant Propagation.

UNIT - III

Manures, Role, advantages and disadvantages of important types of fertilizers. Time and Application of Manures, Fertilizers and Plant Regulators. Foliar application of Nutrients. Drip irrigation – Fertigation.

UNIT - IV

Cultivation of Vegetables – Brinjal, Tomato and Onion. Cultivation of Fruits – Banana, Mango and Apple. Cultivation of Flowers – Jasmine, Rose and Orchid. Cultivation of Medicinal Plants – Nilavembu, Sarpagandha and Pepper. Organic Cultivation. Green House – Cultivation of Vegetables, Fruits and Flowers.

UNIT - V

Plant Protection and Weed control. General account of insecticides, fungicides, Pesticides and Biocontrol. Common Diseases of Fruits and Vegetable crops (Apple Scab, Blight of Potato and Bunchy top of Banana)

Text Books

Unit - I: Bose T.K. & Yadaw, C.P. (1989) commercial flowers, naya prokash Calcutta - India.

Unit - II: Edmond. J.B. Senn. T.L. Andrews - F.S. and Halfacre. R.G. (1988) Fundamental of Horticulture, Tata MacGraw - Hill Publishing Company Ltd., New Delhi-110 006.

Unit - III: Bose. T.K. and Mukerijee. D (1987) Gardening in India, Oxford Book house, 66, Janapath, New Delhi-110 001.

Unit - IV: Prasad. S and Kumar U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India-334 003.

Unit - V: Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi – India.

Reference Items: books, Journal:

1. Prasad. S and Kumar U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India-334 003.
2. Edmond. J.B. Senn. T.L. Andrews - F.S. and Halfacre. R.G. (1988) Fundamental of Horticulture, Tata MacGraw - Hill Publishing Company Ltd., New Delhi-110 006.

E- Materials:

<http://ecoursesonline.iasri.res.in/course/index.php?categoryid=89>

Course Out Comes :

1. To increase food and ornamental plant production
2. To providing employment, often in rural areas
3. To improving the environment and management
4. To creating and managing valuable sports and recreation facilities as one of the main leisure pursuits - gardening
5. To gain knowledge of growth regulators, promoters and common diseases of horticultural crops.