THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. BOTANY

DEGREE COURSE
CBCS PATTERN

(With effect from 2017 - 2018)

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							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	Phycology and Mycology	25	75	100
4	III	Core Practical	Practical-1	3	0		0	0	0
5	III	ALLIED - 1	Paper-1	4	4	Zoology I	25	75	100
6	III	Allied Practical	Practical-1	3	0		0	0	0
7	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English	Paper-2	4	4	English	25	75	100
10	III	Core Theory	Paper-2	6	5	Bacteriology, Virology, Lichenology, Bryophytes and Plant Diseases	25	75	100
11	III	Core Practical	Practical-1	3	3	Covering Papers I and II	25	75	100
12	III	ALLIED-1	Paper-2	4	4	Zoology II	25	75	100
13	III	Allied Practical	Practical-1	3	2	Zoology	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
				30	**25**		**200**	**600**	**800**
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	3	3	Pteridophytes, Gymnosperms and Paleobotany	25	75	100
19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	ALLIED-2	Paper-3	4	4	Chemistry I	25	75	100
21	III	Allied Practical	Practical-2	3	0		0	0	0
22	IV	Skill based Subject	Paper-1	3	3	Horticulture	25	75	100
23	IV	Non-major elective	Paper-1	2	2	Medicinal Botany	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
24	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25	II	English	Paper-4	6	4	English	25	75	100
26	III	Core Theory	Paper-4	3	3	Cytology and Plant Anatomy	25	75	100
27	III	Core Practical	Practical-2	3	3	Covering Papers III and IV	25	75	100
28	III	ALLIED-2	Paper-4	4	4	Chemistry II	25	75	100
29	III	Allied Practical-2	Practical-2	3	2		25	75	100
30	IV	Skill based Subject	Paper-2	3	3	Mushroom Cultivation	25	75	100

31	IV	Non-major elective	Paper-2	2	2	Horticulture	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
32	III	Core Theory	Paper-5	6	5	Morphology and Embryology of Angiosperms	25	75	100
33	III	Core Theory	Paper-6	6	5	Taxonomy of Angiosperms and Economic Botany	25	75	100
34	III	Core Theory	Paper-7	6	5	Genetics, Plant Breeding, Evolution and Biostatistics	25	75	100
35	III	Core Practical	Practical-3	3	0		0	0	0
36	III	Core Practical	Practical-4	3	0		0	0	0
37	III	Elective	Paper-1	3	3	A. Tissue Culture B. Plant Pathology C. Bio fertilizers	25	75	100
38	IV	Skill based Subject	Paper-3	3	3	Herbal Science	25	75	100
				30	**21**		**125**	**375**	**500**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
39	III	Core Theory	Paper-8	5	5	Plant Physiology and Plant Bio–Chemistry	25	75	100
40	III	Core Theory	Paper-9	5	4	Ecology and Phyto geography	25	75	100
41	III	Core Theory	Paper-10	5	4	Biodiversity, Bioinformatics and Toxicology	25	75	100
42	III	Core Practical	Practical-3	3	3	Covering Papers 5, 6 & 7	25	75	100
43	III	Core Practical	Practical-4	3	3	Covering Papers 8, 9 &10	25	75	100

44	III	Elective	Paper-2	3	3	A. Plant Biotechnology B. Seed Biology C. Ethno botany	25	75	100
45	III	Elective	Paper-3	3	3	A. Microbiology B. Biostatistics & Computer Application in Botany C. Herbal Home Remedies & Water Management	25	75	100
46	IV	Skill based Subject	Paper-4	3	3	Micro Technique	25	75	100
47	V	Extension Activities		-	1		100	0	100
				30	**29**		**300**	**600**	**900**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Sem)	2	4	8	100	200
	Allied (Even Sem)	2	4	8	100	200
	Allied –Prac (Even Sem)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Env. 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	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**41**		**140**		**4100**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. BOTANY

SYLLABUS
CBCS PATTERN
(With effect from 2017 - 2018)
SEMESTER I

PAPER - 1
PHYCOLOGY AND MYCOLOGY

ALGAE
UNIT-I

History of algologist, General characters of algae, Classification of algae (F.E. Fritsch, 1945). Distribution of algae, Thallus organization of algae.

UNIT-II

Salient features of Chlorophyceae. Detail study of structure, reproduction and Life cycle of *Oedogonium, Chlorella* and *Chara*. salient features of Phaeophyceae. Detail study of structure, reproduction and life cycle of *Sargassum*. salient features of Bacillariophyceae. Detail study of structure, reproduction and life cycle of Diatoms.

UNIT-III

Salient features of Rhodophyceae. Detail study of structure, reproduction and life cycle of *Gracilaria*. Salient features of cyanophyceae. Detail study of structure, reproduction and life cycle of *Nostoc*. Economic importance of Algae.

UNIT-IV

General characters, mode of nutrition and occurrence of fungi. Classification for Fungi - (Alexopolous). Detail study of structure, reproduction and life cycle of Myxomycetes and Phycomycetes: Example - *Stemonites* and *Albugo*.

UNIT-V

Detail study of structure, reproduction and life cycle of Ascomycetes, Basidiomycetes and Deuteromycetes; Example - *Penicillium*, *Puccinia* and *Cercospora*. Economic importance of Fungi.

Books Suggested:

1. Fritsch, F.E. 1945. Structure reproduction of the Algae Vol. l & II, Cambridge University Press, London.
2. Vashishta, B.R. 1990 Botany for degree students, Algae. S. Chand & Co. Ltd., Ram Nagar, New Delhi.
3. Venkateshwaran, V.A. Text book of Algae. Marahi Book depot, Guntur.
4. Alexopoulos, C.J., C.W. Mims and M. Blackwell. 2007. Introductory Mycology. IV Edition. Wiley India (P) Ltd., Daryaganj, New Delhi..
5. Robet Edward Lee.1980 Phycology, Cambridge Unversity Press, London.
6. Vashista. B.R. 1981 Botany for Degree students Fungi. S. Chand & Co. Ltd., Ram Nagar, New Delhi.

ALLIED

ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

SEMESTER II

PAPER - 2

BACTERIOLOGY, VIROLOGY, LICHENOLOGY, BRYOPHYTES AND PLANT DISEASES

UNIT-I: BACTERIOLOGY

General Characters, Shape of bacteria, bacteria Flagellation, structure of bacteria, type of bacterial Nutrition, Respiration, Reproduction (asexual and sexual) in Bacteria, Economical Importance. Bacterial straining (Grams stain)

UNIT-II: VIROLOGY

General Characters, Classification of viruses, shape of viruses, Properties, Structure and Multiplication of TMV and T4 Bacteriophage.

UNIT-III: LICHENOLOGY

Nature, Occurrence, Classification Structure, Vegetative and Sexual Reproduction, Nutrition (With particular reference to fruticose lichen.) Economical importance, Role in Succession and Monitoring Pollutants.

UNIT-IV: BRYOPHYTES

General Characters, Classification of bryophytes (Reimers, 1954). Study the thallus Structure, reproduction and life cycle of the following types. (Excluding the developmental studies) *Marchantia* and *Polytrichum*. Economical importance of bryophytes.

UNIT-V: PLANT DISEASES

Detailed study of the following diseases and control measures.

1. Ground nut leaf spot disease. (Cercospora)
2. Tobacco Mosaic Disease.
3. Citrus Canker.

BOOKS SUGGESTED

1. Dube H.C. (1978), A text Book of Fungi, Bacteria and Viruses, Vikas publishing House, Pvt., Ltd., New Delhi & Bangalore.
2. Mishra. A and Agarwal R.P. (1978) Lichens A Preliminary text. Oxford and IBH. 66 janapath, New Delhi 110 001.
3. Parihar, N.S.1985. An introduction to Embryophyta – Bryophytes. Central Book Depot. Alahabad.
4. Sambamurthy A.V. S.S. 2006. A Textbook of Plant Pathology. I.K. International Pvt.Ltd., New Delhi
5. Vashishta. B.R., A.K. Sinha and Adarsh Kumar. 2005. Botany for Degree students- Bryophyta. S. Chand and Company Ltd., New Delhi.
6. Vashishta. B.R. (1978). Bryophyta. S.Chand & Co, Ram Nagar, New Delhi - 110 001,
7. Singh. R.S. 2005. Principles of Plant Pathology – 4th edition. Oxford & IBH

CORE PRACTICAL I
(COVERING PAPERS 1 AND 2)

I. PHYCOLOGY AND MYCOLOGY

1. A detailed study of structure of thallus and reproductive structure of forms given below *Nostoc, Oedogonium, Chlorella, Chara*, Diatoms, S*argassum* and *Gracilaria*.

2. Observation and recognition of materials and organisms given in fungi. *Stemonites, Albugo, Penicillium, Puccinia & Cercospora*.

3. Economic importance of agar-agra, SCP, diatomaceous earth, edible mushroom, penicillin,

II. BACTERIOLOGY, VIROLOGY, LICHENOLOGY, BRYOPHYTES AND PLANT DISEASES

1. Structure of bacteria (*E. coli*), TMV and T4-Bacteriophage

2. General observation of thallus and reproductive structure of fruticose lichen (Usnea), Marchantia and Polytrichum.

3. Recognition of Pathological specimens and control measures of plant diseases given in Unit V.

ALLIED

ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

ALLIED PRACTICAL

ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

SEMESTER III

PAPER - 3

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Pteridophytes:

UNIT-I

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

UNIT-II

Structure and life cycle of the following types (Excluding developmental studies) 1. *Lycopodium* 2. *Selaginella* 3. *Equisetum* 4. *Adiantum* and 5. *Marselia*.

Gymnosperms

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: 1. Cycas, 2. Pinus.

Paleobotany

UNIT-IV

Geological time scale. Radio carbon dating. Types of fossilisation - Impressions, compressions, casts, molds, petrifactions, and coal balls. Importance of the study of palaeobotany.

UNIT-V

Nomenclalture of fossil plants. Brief study of the following fossils: Lepidodendron, Lepidocarpon, Calamites and Williamsonia.

BOOKS SUGGESTED:

1. Smith, G.M. 1972. Cryptogamic botany Vol. - II Mc Graw Hill, New Delhi.
2. Sporne, K.R. 1976. Morphology of Petridophytes, BI Publications. Pvt. Ltd., New Delhi.
3. Pandey B.P. 1977. A Text book of Botany Bryophyta, Peridophyta and Gymnosperms K.Nath & co. Meeret.
4. Sporne K.R. 1965. Morphology of gymnosperms. B.I. Publications Pvt. Ltd. New Delhi

5. Rashid, A 1976. An Introduction to Pteridophyta Vikas Publishing House Pvt. Ltd., New Delhi
6. Bhatnagar S.P. and A. Moitra 1996. Gymnosperms, New age International publishers (p) Ltd. New Delhi.
7. Margulis. L. and K.V. Sehwatz (2nd ed.) 1988. Five Kingdoms: Anm illustrated Guide to phyla of life on Earth W.H. Freeman & Co. New York.
8. Arnold C.R. 1947. Introduction to Paleobotany. TMH Publishing Co. Ltd., Bombay.
9. Shukla. A and Mishra S.P. 1975. Essentials of Paleobotany. Vikas publishing house Pvt. Ltd. Delhi.
10. Shirpad N. Agashe, 1995. Paleobotany. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
11. Wilson N.Stewart and Gar, W.Rothwell. 2005. Paleobotany and the evolution of plants 2nd Edn., Cambridge University Press, Cambridge, U.K.

ALLIED

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

1.1General 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, Fux, 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

2.1 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).

2.3Stereoisomerism – 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 – 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

5.1Nuclear 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 –
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

UNIT- I

Importance and scope of Horticulture. Types of Gardens – Public Garden, Kitchen Garden, Indoor Garden – Potted Plants, Hanging Baskets, Cut Flowers, Bonsai, Hydrophonics 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 Banana Bunchy top).

Books Suggested:

1. Bose T.K. & Yadaw, C.P. (1989) commercial flowers, naya prokash Calcutta - India.
2. Bose. T.K. and Mukerijee. D (1987 Gardening in India, Oxford Book house, 66, Janapath, New Delhi-110 001.
3. Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi - India.
4. 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.
5. Prasad. S and Kumar U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India-334 003.

NON - MAJOR ELECTIVE

PAPER - 1

MEDICINAL BOTANY

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). Chemistry of Drugs (Basics).

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 – Genetics, Breeding methods applied to medicinal herbs. Drug Adulteration. Methods of Drug evaluation.

References:

1. Pharmacognosy - GE Trease and WC Evans. E LBsociety. Baelliere Tindall. London.
2. Pharmacognosy & Pharmacotherapeutics.Saroskar and S.D.Bhandarkar Popular Pakashan, Bombay.
3. Textbook of Pharmacognosy- T.E. WALLIS Fifth Edition. CBS Publishers and distributors Delhi.
4. Pharmacognosy - S.S.Handa and V.K.Kapoor second edition. Vallabh Prakash, Delhi.
5. Pharmacognosy - S.S.Handa and V.K.Kapoor second edition CBS publishers and distributors, Delhi.
6. An introduction to Medicinal Botany & Pharmacognosy-N.C KumarEmkay Publications. New Delhi.
7. Pharmacognosy - C.K.Kokate, A. Purohit and S.R.Gokhale 12th Edition Nirali Prakas
8. A Hand Book of Medicinal Plants, Prajapathi ND Agrobios, Jodhpur.
9. A Hand Book of Medicinal Herbs., DeshpandeDJ Agrobios, Jodhpur.

SEMESTER IV

PAPER - 4

CYTOLOGY AND PLANT ANATOMY

UNIT-I

Prokariyotic and Eukariotic cell. Ultra structure of plant cell, Cell wall with chemistry and function. Structure, Chemistry and function of Cytoplasm and plasma membrane

Cell Organelles: Structure and origin of the following: Endoplasmic Reticulum, Golgi complex, Lysosomes, Mitochandria, Plastids and Ribosomes.

UNIT-II

Structure and Functions of Nucleus, Nucleoplasm, Chromosome, special types of chromosomes - Polytene and Lambrush chromosomes, Nucleic acids - DNA and RNA molecular structure and functions. Replication of DNA
Cell inclusions (Non living): Cystolyth, crystals, raphids, starch grains.
Cell divisions - Mitosis and Meiosis and their significances

ANATOMY

UNIT-III

Tissues: Classification - structural characteristics and functions of the following tissues. Meristamatic, simple and complex and permanent.
Tissue system - Epidermal and vascular, stomatal types, apical meristem - Theories.
Primary structure of stem and root of Dicotyledons and monocotyledons. Internal structure of leaves of Dicot and monocot.

UNIT-IV

Secondary structure of stem and root of Dicotyledons. Anamalous secondary growth of Dicotyledons stem of Boerhaavia, Nyctanthus.
Secondary growth in monocotyledons. Dracaena.

UNIT-V

Origin and structure of secondary xylem and secondary phloem. Annual rings, heart wood and sapwood, periderm, wound healing, leaf Abscission, Vascular cambium, laticifers, nodal anatomy, uni - tri - multi lacunar nodes.

BOOKS SUGGESTED:

CYTOLOGY

1. 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.
2. Verma.P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.
3. Wolfe, S.L. 1993. Molecular and Cellular Biology. Wadsworth Publishing Co, Clifornia.

ANATOMY

1. ESAU, Plant Anatomy, 1965 Wiles Eastern, New Delhi.
2. Eams A.J. and Mac Daniel. An Introduction to Plant Anatomy. TMH Edition. Tata MC. Graw Hill Publishing Co.ltd. Bombay - New Delhi.
3. Pande, B.P. 1979. Plant Anatomy. S. Chand & Co, Ram Nagar, New Delhi.

CORE PRACTICAL - 2
(COVERING PAPERS 3 AND 4)

PTERIDOPHYTES

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

GYMNOSPERMS

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

PALEOBOTANY

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

CYTOLOGY

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

ANATOMY

1. Study of simple & Complex tissues (primary and secondary).
2. Study of internal structure of Young and old stem of dicotyledons. Young and Old root of dicotyledons. Normal stem and root of Monocotyledons. Anomolous stem of dicotyledons - Boerhaavia, Nyctanthes and Monocotyledons - Dracaena.
3. Study of internal structure of Dicot and Monocot leaves.
4. Study of stomatal types.
5. Nodal Anatomy: uni, tri, and multi lacunar node.

ALLIED

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 Biologcal 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

4.1Paints - 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.

SKILL BASED SUBJECT

PAPER - 2

MUSHROOM CULTIVATION

UNIT-I

Life cycle of Mushrooms - Identification - edible and poisonous Mushrooms - external factors for growth. Economic importance of Mushrooms as food

UNIT-II

History of mushroom cultivation -- selection - 'starter' - preparation of spawn - preparation of Compost (outdoor and indoor beds) - incubation - Harvesting and marketing

UNIT-III

Spawn production - grain, powder and granular spawn - mother spawn - planting spawn - preparation of culture (Tissue culture and spore culture), preservation and storage of culture - various media (PDA, malt extract, Wheat extract, compost extract)

UNIT-IV

Cultivation of white Button Mushrooms (*Agaricus bisporus*) and Oyster Mushrooms (*Pleurotus* spp) – materials – sterilization – spawning and fruiting – house design for pleurotus – preservation, canning drying, Cultivation of paddy straw Mushrooms – Preparation, Spawn making – Methods of Cultivation.

UNIT-V

Mushroom technology – nutritive value of edible Mushrooms- Medicinal value of Mushrooms, Advantages of Mushrooms Cultivation – Harvesting & Marketing.

LITERATURES:

1. Kannaiyan.S and Ramasamy.K, 1980. A Handbook of Edible Mushroom. Today and Tomorrows. Printers and Publishers, New Delhi, 104 p.

2. Pathak V.N, Nagendra Yadav and Maneesha Gaur. 1998. Mushroom Production and Processing Technology. Agrobios (India) Jodhpur, 179 p.

NON-MAJOR ELECTIVE

PAPER - 2

HORTICULTURE

UNIT- I

Importance and scope of Horticulture. Types of Gardens – Public Garden, Kitchen Garden, Indoor Garden – Potted Plants, Hanging Baskets, Cut Flowers, Bonsai, Hydrophonics 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)

REFERENCE BOOKS:

1. Bose T.K. & Yadaw, C.P. (1989) commercial flowers, naya prokash Calcutta - India.
2. Bose. T.K. and Mukerijee. D (1987 Gardening in India, Oxford Book house, 66, Janapath, New Delhi-110 001.
3. Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi - India.
4. 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.
5. Prasad. S and Kumar U. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasnagar, Bikaner, India-334 003.

SEMESTER V

PAPER - 5

MORPHOLOGY AND EMBRYOLOGY OF ANGIOSPERMS

UNIT - I

Morphology – Root System, Modification of Roots, Shoot System, Modification of Stem, The leaf – Structure of a Leaf, Stipules, Phyllotaxy, Leaf shape, leaf margin, leaf apex, leaf surface, leaf texture, leaf venation, types of leaves, modification of leaves. Buds. Prefoliation, Vernation.

UNIT – II

Inflorescence – Types of inflorescence, Flower parts, symmetry, form, position of the ovary, perianth, calyx, corolla, forms of corolla, Aestivation. Androeciuam – attachment of anthers, dehiscence of anthers, union of Stamens, length of stamens, nature of Stamens and Pollen.

UNIT – III

Gynoecium – Types, fusion of carpels, Placentation, Ovule types. Types of Pollination. Fruits types, Dispersal of Fruits and seeds.

UNIT-IV

Structure and development of anther, structure of mature pollen and Male gametophyte. Structure and development of ovule. Female gametophyte Monosporic (Polygonum type) Fertilization - Double fertilization - Syngamy - triple fusion - post fertilization changes.

UNIT-V

Endosperm types - nuclear, cellular - helobial - Ruminate endosperms, function of endosperms
Development of embryo in Dicot (Capsella) and Monocot (Najas).
A brief account on Polyembryony, parthenocarpy.

REFERENCE BOOKS:

1. Bhojwani, S.S. and Bhatnagar, S.P. 1981. Embryology of angiosperms. Vikas Publication Pvt.Ltd. New Delhi. Eames, A.J and Mac Daniel, 1975.
2. Johri, B.M, 1984. Embryology of Angiosperms. Springer- Verlag.
3. Maheshwari, P. 1963. An Introduction to embryology of Angiosperms. Tata Mc Grow Hill. Newyork.
4. Singh.V., P.C. Pandey and D.K.Jain. 2003. Embryology of Angiosperms. Rastogi Publications. Meerut.

PAPER – 6

TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

TAXONOMY OF ANGIOSPERMS:

UNIT-I

Principles of Taxonomy, Taxonomy and its importance. Herbarium technique, Botanical survey of India. Systems of Classification: Outline classification of Bentham & Hooker.
Taxonomic hierarchy (major and minor categories)
Plant Nomenclature - Forms of Scientific names.

UNIT-II

Concept of a taxon: A brief reference to citation of author.
Chemotaxonomy. Numerical taxonomy and Molecular Taxonomy.

UNIT-III

Detail study of the range of Characters and plants of economical importance in the following families after introduction of important technologies in morphological features:
Annonaceae, Rutaceae, Cucurbitaceae, Asclepiadaceae, Convolvulaceae, Verbenaceae, Euphorbiaceae, Amaranthaceae, Poaceae and Liliaceae.

UNIT-IV

Economic Botany – Fibre types: Fibre yielding plants, Principal Woods of India. Medicinal Plants: Drugs obtained from roots, underground stems, barks, stems, leaves, flowers, fruits, seeds and entire plants.

UNIT-V

Spices and condiments: Spices obtained from roots, underground stems, barks, flower buds and flower, fruits, seed and Leaves. Fatty oils. Oil Yielding Plants.

REFERENCE BOOKS:

1. Davis, P.H. & V.H. Heywood, 1968. Principles of Angiosperm Taxonomy, Oliver & Boyd Edinburgh & London.
2. Pandey.B.P. 2009. Taxanomy of Angiosperms. S.Chand & Co. Ltd. New Delhi.
3. Jain, S.K.and R,R,Rao, 1977. A handbook of field and herbarium methods. Today and tomorrow's printers and publishers, New Delhi.
4. Sivarajan, V.V., 1999. Principles of plant taxonomy, Oxford and IBH Stace, C.A, 1989. Plant taxonomyand Biosystematics. Edward Arnold, London.

PAPER - 7

GENETICS, PLANT BREEDING, EVOLUTION AND BIOSTATISTICS

UNIT-I

Mono hybrid and Dihybrid cross, test cross, back cross, Mendel's Laws. Deviation from Mandelian ratio – incomplete dominance, lethal factor, complementary factor, supplementary factor, duplicate, Epistasis and inhibitory. Polygenic inheritance – Inheritance of Wheat Kernal and hair length in Maize.

UNIT-II

Linkage – Crossing over and recombination. Gene Mapping. Chromosome theory of inheritance. Sex determination in plants, Sex Linked Inheritance, sex linked diseases, haemophilia, colour blindness. Extra nuclear inheritance - male sterility in corn, population genetics, Hardy - Weinbergs principles.

UNIT-III

Gene concept: Biochemical mutant in Neurospora, splitgene, exon, intron, cistron, recon, muton, gene regulation, operon concept, control system in lac, (lac operons), gene expression in eukaryotes.

UNIT-IV

Plant Breeding: Objectives, Plant introduction, selection, hybridization techniques, Hybrid Vigor, heterosis, Interspecific and intergeneric. Polyploidy and its applications in plant breeding. Breeding for crop improvement for paddy, *Gajanus gajan* and Sugarcane.

UNIT-V

Evolution: Origin of life, Evolutionary theories of Lamarck, Drawin, De Vries, Modern synthetic theory of evolution.
Biostatistics: Mean, median, mode and standard deviations, standard errors.

REFERENCES BOOKS:

1. Gupta, P.K, 2000. Gentics. Rasatogi publications, Meerut.
2. Singh,B.D. 1996. Principles of plant breeding. Oxford IBH. New Delhi.
3. Singh,B.D. 2001. Plant Breeding, Principles and Methods. Kalyani Publications, , New Delhi Singh.B.D.2005.Genetics.Kalyani Publishers. New Delhi.
4. Vijendra Das, L.D. 2005. Genetics and Plant Breeding, New Age International (P) Ltd., New Delhi.

ELECTIVE

PAPER - 1

A. TISSUE CULTURE

UNIT-I

History of plant tissue culture research - Basic principles of plant tissue - Totipotency of cells, differentiation, dedifferentiation and redifferentiation.

UNIT-II

Methodology - Sterilization (physical and chemical methods), Plant cell culture methods, Culture media, MS and B5, Phytohormones, Callus induction

UNIT-III

Organ culture, Shoot tip Culture, Apical Meristem culture, Ovary Culture, Ovule Culture, Endosperm Culture, Embryo culture – application of Embryo rescue technique. Callus subculture maintenance, Metabolic patterns in callus culture, Harvesting and measurements, Morphogenesis in callus culture.

UNIT-IV

Synthetic Seeds – Limitation of synthetic seeds, production of synthetic seeds, artificial seeds, use of artificial seeds(Commercial production and Uses) Protoplast isolation and purification and culture, media (F5- Medium Frearson et al 1973 Nagata and Takeba 1971, Modified B5 Medium), Methods of isolation (Enzymatic Isolation), Isolation from leaves, shoot and root apex, root storage organs, Pollen grain etc, Protoplast fusion.

UNIT-V

Tissue culture and crop improvement - Agro bacterium mediated gene transfer technology - microinjection - particle bombardment; Bioreactors in plant tissue culture.

REFERENCES BOOKS:

1. Brown C. W and Thorpe T. A 1984 Cell culture and Somatic Cell Genetics of plants, Academic Press Orlando.
2. Chu, C 1978 Plant Tissue Culture, Peking Science Press, Peking.
3. Gamborg O. L and Phillips. G.G. 1975 Plant Cell, Tissue culture and Organ culture Fundamental Methods. Narosa Publishing House, New Delhi.
4. Evans D. A, Sharp W. A, Amirato, P. V., Yamada, Y 1983 Ed. Hand Book of Plant Cell Culture, Macmillan, New York.
5. Street, H. E. 1977 Plant Tissue and Cell Culture - Botanical Monograph, Blackwell Scientific Publications.

PAPER I

B. PLANT PATHOLOGY

UNIT-I

A brief history of plant pathology; Principles of plant pathology; Symptometology-study of infection- entry of fungal, bacterial and viral pathogens; Leaf spot, Blight, Wilt, Rot, Rust, Smut, Powdery mildew, Downy mildew, Leaf mosaic and Phyllody.

UNIT-II

Classifications of plant diseases, Dissemination of pathogens-spore dispersal, role of vectors in viral transmission, influence of weather-wind, temperature and humidity.

UNIT-III

Disease resistance-morphological, cytological, biochemical and genetical. Cross protection. Role of toxins and enzymes in plant pathogenesis.

UNIT-IV

Modern methods of disease forecast- epiphytotics- causes, course, decline and prophylaxis; Cultural, Control of plant diseases, Plant protection-Prevention; eradication-chemical, biological, genetical- breeding, hybridization- immunization.

UNIT-V

Study of the following Plant diseases:

a) Blast disease of Rice

b) Red rot of Sugarcane

c) Tikka of Ground-nut

d) Bacterial blight of Rice

e) Citrus canker

f) Leaf curl of Papaya

g) Fusarium wilt of Cotton.

REFERENCE BOOKS:

1. Plant pathology by G.P.Gupta
2. Illustrated dictionary of Plant pathology Vyas, N.L
3. Microbial Plant pathology- Whitney, P.J
4. Plant pathology- Singh, R.S.
5. Plant pathology-Mehortra, R.S.
6. Introduction to principle of Plant pathology ed.3- Singh, R.S.
7. Lab. Manual of Plant pathology- Pathak U.N
8. Text book of Modern Plant pathology- Bilgrami.K.S & Dube.

PAPER - 1

C. BIOFERTILIZERS

UNIT – I

General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass cultivation, carrier based inoculants, symbiosis.

UNIT – II

Azospirillum, isolation and mass cultivation – carrier based inoculant, associative effect of different microorganisms. Azotobacter – classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass cultivation.

UNIT – III

Cyanobacteria (blue green algae), Azolla and Anabaena azolla association, nitrogen fixation, fators affecting growth, blue green algae and Azolla in rice cultivation.

UNIT – IV

VA-Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

UNIT – V

Organic farming – Green manuring and organic fertilizers, recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermin composting – field Application.

REFERENCE BOOKS:

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad.

SKILL BASED SUBJECT

PAPER - 3

HERBAL SCIENCE

UNIT-I

Pharmacognosy - Definition and History. Different systems of Medicines - Indian systems of medicine – Siddha, Ayurveda and Unani systems. Classification of drugs (elementary). Chemistry of Drugs (Basics). Branches of Pharmacognosy and phyto chemicals - reserve materials; Secretory materials; excretory materials.

UNIT-II

Medicinal gardening – in the Hills and plains; house gardens; plants for gardening. Poisonous plants- Types of plant poison; action of poisons; treatment of Poisons with an example.

UNIT-III

Morphological studies - Chemical constituents. Therapeutic and other Pharmaceutical uses of Bark - Cinchona, Leaves - Adathoda and Eucalyptus, Flower - Clove. Fruits and seed - Wood apple, Gooseberry and Poppy seed, Underground stem - Ginger, Unorganized drugs. Gum - Acacia, Resin - Turpentine, Fixed oil - Castor oil. Exports values of medicinal plants.

UNIT-IV

Botanical description and active principle of root drugs; rhizome, woods and bark drugs.
Botanical description and active principle of leaves; flowers; fruits; seeds and entire plants as drugs.

UNIT-V

Cultivation of medicinal plants in India. Breeding methods applied to medicinal plants. Herbal medicine preparation**:** Decoction, infusion, syrup, tincture and poultice.
Food: herbal salad, chutney, soup and Tea

REFERENCE BOOKS:

1. C.K. Kokale, C.K. Kokate & Purohit – Pharmacognosy, Nirali Prakasan, New Delhi.
2. E.Edwin Jerald & Sheeja Edwin Jerald – Text Book of Pharmacognosy and Phytochemistry, CBS Publishers & Dist., NewDelhi.
3. A Hand Book of Medicinal Plants, Prajapathi ND Agrobios. Jodhpur
4. A Hand Book of Medicinal Herbs, Deshpande DJ Agrobios. Jodhpur.

SEMESTER VI

PAPER - 8

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

PLANT PHYSIOLOGY

UNIT-I

Water uptake, Osmosis, Translocation of water, ascent of sap, transpiration, stomatal physiology, water stress and its significance. Mineral nutrition - micro and macronutrients and their deficiency symptoms. Growth measurement -growth curve. Plant growth regulators: auxins, gibberellins, cytokinins and ethylene, their regulation and application in agriculture. Photoperiodism, vernalization, phytochrome.

UNIT-II

Photosynthesis - Radiant energy, Absorption spectrum, Action spectrum - structure of Photosynthetic pigments, - Red Drop Phenomena, Enhancement effect. Cyclic and Non - cyclic photophosphorylation, C3 and C4 pathways, photorespiration.

PLANT BIOCHEMISTRY:

UNIT-III

Classification, structure and Properties of Carbohydrates, Lipids and Proteins.
Enzymes - Properties, Nomenclature and classification as per ECIUB (Enzyme commission of the international Union Biochemistry) - Cofactor - Co - enzymes and factors affecting enzyme action.

UNIT-IV

Respiration - Aerobic, Anaerobic: Glycolysis - Kreb's cycle - Oxidation - Reduction potential - ATP synthesis, bioenergetics - factors affecting respiration. Respiration as an amphibolic process.

UNIT-V

Nitrogen metabolism: sources of nitrogen, role of Nitrogen, Conversion of nitrate to ammonia - assimilation of ammonia. urea cycle, mechanism of biological nitrogen fixation. Protein synthesis and Genetic code.

PAPER - 9

ECOLOGY AND PHYTOGEOGRAPHY

UNIT – I

ECOLOGY

Biotic and abiotic factors and their influence on vegetation – a brief account of microbes, plants, animals, soil, wind, light, temperature, rainfall and fire. Biogeochemical cycles (Nitrogen, Carbon)

UNIT – II

Ecosystem – concept, processes and components. Food chain, food web, energy flow, pyramids. Types of ecosystems - fresh water, marine and grassland.

UNIT – III

Autecology and Synecology – Vegetation – Formation, Association, Consociation, Society – development of vegetation. Migration – ecesis, colonization, Methods of study of vegetation (Quadrat and transect). Plant succession – Hydrosere and Xerosere. Morphological and anatomical features of hydrophytes, mesophytes and Xerophytes

UNIT – IV

Pollution -air, water, soil, noise, thermal, radiation and its control. Agricultural pollution, insecticides, pesticides, fungicides, herbicides. wastewater treatment.

UNIT – V

PHYTOGEOGRAPHY

Phytogeography – principles – vegetation types in India. Tropical rain forest, Sholas and Deciduous Forest – Sand dunes and Mangrove vegetation and Scrubjungle, phytogeographical regions of India.

PAPER - 10

BIODIVERSITY, BIOINFORMATICS AND TOXICOLOGY

UNIT-I

BIODIVERSITY: Definition-Values and uses of biodiversity-biodiversity at global, national (India) and local levels. Hotspots, threats to biodiversity-conservation of biodiversity.

UNIT-II

Biodiversity-ecological species and genetic species concept-classical and modern, inter and intra specific species diversity. Allopatric and sympatric speciation-endemism, relics and paleoendemism.

BIOINFORMATICS

UNIT-III

Introduction to computers, components of computer, fundamental of networking, internet, intranet, search engines- yahoo, Google, etc. telnet, ftp, introduction to databases.

UNIT-IV

Introduction to bioinformatics, scope, biological databases- NCBI, EMBL and DDBJ. Pairwise sequence analysis, local and global alignment, BLAST and FASTA, DNA sequencing methods. protein sequencing.

TOXICOLOGY

UNIT-V

Environmental toxicants-classification-occurrence-source-effects on plants. Heavy metal toxicity-lead and chromium-bioaccumulation. Atmospheric toxicants-carbon monoxides, sulphur oxides.

BOOKS/REFERENCES SUGGESTED:

1. Fankel, O.H., Brown, A.H.D and Bouden, J.J. The conservation of plant biodiversity.
2. Kalavathy, S (E.D) 2004, environmental studies, Bishop Heber college Pub., Trichy.
3. Rajamannar, 2004 Environmental studies EVR College Pub. Trichy.
4. Bioinformatics, a practical guide to the analysis of Genes and proteins by A.D Baxevanis and B.F.Quelliettee.
5. Gibas and Jamback, developing bioinformatics computer skills, O.Reilly Associates.
6. Sharma, P.D. 1993, Environmental biology and toxicology. Rastogi and co, Meerut.

CORE PRACTICAL -3

(COVERING PAPER 5, 6 & 7)

PRACTICAL:

TAXONOMY:

1. Morphology study of root, stem, leaf and inflorescence. Fruit types with suitable example.

EMBRYOLOGY:

1. T.S. anther at various stages of development (permanent slide)
2. Types of ovule (permanent slide)
3. Male gametophyte, Female Gametophyte.
4. Embryo sac (permanent slide)
5. Stages in the development of dicot and monocot embryos (slide)
6. Mounting of Dicot embryos (Globular, Heart shaped stage)
7. Types of Endosperms (Permanent slide)

REFERENCE BOOKS:

TAXONOMY:

1. Annie Ragland, 1999. Fundamentals of botany Vol.3. Saras publication.

EMBRYOLOGY BOOKS

1. Bhojwani. S.S. and Bhatnagar. S.P. 1978. The embryology of Angiosperms. Vikes Publishing Pvt. Ltd., Delhi.
2. Maheswari P.1971. An introduction to embryology of Angiosperms Tata Mc Graw Hill, Delhi.
3. Swamy B.G.L. and Krishnamurthy K.V. 1950. From flower to fruit. Tata Mc Graw Hill, New Delhi.

PRACTICAL:

TAXONOMY

1. A detailed study of the range of vegetative and floral characters of plants belonging to the families mentioned in the theory part.
2. Submission of 15 herbarium sheet with proper field note book for practical examination.
3. Field trips to places within or outside the state for seven days for plant collection and also to study the plants in their natural habitats.
4. Economic botany.

REFERENCE BOOKS:

TAXONOMY:

1. Singh, V. and Jain, D.K - Taxonomy of Angiosperms - Rastogi Publications, Meerut.
2. Pandey, B.P. 2007 Botany for Degree Students. S. Chand & Co. New Delhi.
3. Vasishta, P.C. 1974 Taxonomy of Angiosperms. S. Chand & Co., Chennai.

ECONOMIC BOTANY:

1. Hill AW. 1951 Economic Botany - Mc Graw Hill, New Delhi.
2. Pandey, B.P., Economic Botany, S.Chand & Co., NewDelhi.

GENETICS:

PRACTICAL

1. Simple problems on Monohybrid and Dihybrid ratio and interaction of factors.
2. Construction of chromosome maps using three - point test cross data.
3. Hybridization techniques - Emasculation, Bagging (For demonstration only)

REFERENCES:

1. Allard, R.W. 1960. Principal of plant breeding. John wileg, NEWYORK.
2. Gupta, P.K. 2000. Genetics. Rastogi publications. Meerut.
3. Sinnott, E.W; L.C. Dunn and T. Dobzhansky 1958. Principle of genetics. McGraw Hill, Newyork.
4. Verma, P.S and Agarwal. V.K. 2007. Genetics. S. Chand & Co. Chennai.

CORE PRACTICAL

PAPER 8, 9 & 10

I. List of physiology experiments:

1. Determination of solute potential by plasmolytic method.
2. Colorimetric determination of effect of solvents and temperature on membrane permeability.
3. Separation of plant pigments by paper chromatography.
4. Study the rate of photosynthesis under different light intensities.
5. Study the rate of photosynthesis under different CO_2 concentrations.
6. Determination of respiration rate under different substrates using respiroscope method.

II. List of Biochemistry experiments:

1. Preparation of standard graph for $KmNO_4$ by using colorimetric method.
2. Qualitative test for amino acid and protein.
3. Qualitative test for sugars (Glucose, sucrose & starch)

III. DEMONSTRATION EXPERIMENTS IN PLANT PHYSIOLOGY AND BIOCHEMISTRY:

1. Fermentation experiment.
2. Study of relative rates of transpiration of different plants.
3. Assay of protease or amylase.
4. Test for alkaloid.
5. Induction of roots by auxins.
6. Effect of temperature, pH on enzyme activity.

IV **ECOLOGY & PHYTOGEOGRAPHY**

1. Study of morphological and internal structural adaptations of locally available hydrophytes, xerophytes, mesophytes and epiphytes. Eg. Hydrophyte: Nymphaea, Hydrilla. Xerophytes: Nerium, Casuarina. Mesophytes: Tridax, Vernonia. Epiphytes: Vanda
2. Construction of meter quadrat – to study the percentage of frequency & abundance.
3. Map of phytogeographical regions of India

V **BIODIVERSITY, BIOINFORMATICS AND TOXICOLOGY**

1. Map of Hotspots
2. Procedure for BLAST, FAST.
3. Procedure for pairwise sequence analysis.

REFERENCE BOOKS:

1. Bidwell .R.G.S. 1974. Plant Physiology. Macmillan. Publication Co. Newyork.
2. Ting. I.P. 1982 Plant Physiology. Addison Wesley Publication Co. Philippines.
3. Conn. E.E.; P.K. Stumps; G. Brueming and Doi. R.G. 1987. Outlines of Biochemistry. John wiley & Co. Newyork.
4. Rastpgo, S, N. Mendinatta and P. Rastogi. 2003. Bio-informatics—Concepts, skills and application. CBS. publication, New Delhi.

ELECTIVE

PAPER - 3

A. PLANT BIOTECHNOLOGY

UNIT-I

Introduction to plant Biotechnology, scope; Plant genome organization - chloroplast genome; nucleosome; C-value paradox; TATA box.

UNIT-II

Genetic engineering - Basic principles, Restriction endonucleases; Cloning vectors – plasmids, phages and cosmids, Transposans; Methods of gene transfer – electroporation, viral vectors, particle gun method and microinjection; Ti plasmid mediated transfer –*Agrobacterium tumifaciens*. Genetic manipulation of eukaryotic cells.

UNIT-III

Methodology to develop transgenic plant - herbicides resistance, drought resistance, pests and insects resistance and pathogens resistance. Biocontrol of plant diseases and pest. Molecular farming - edible vaccines; Flavr savr tomato.

UNIT-IV

Plant as a bioreactor, Production of primary and secondary metabolites by plant tissue culture. Algal biotechnology - Algal biomass production and maintenance. Fungal biotechnology - single cell protein production.

UNIT-V

Intellectual property rights – Private public sector issues – Physical property and intellectual property – Farmers rights – Plant breeders' right – trade secrets. Patents – Patenting of biological Materials – patents for higher plants and microbes – Patenting transgenic organisms.

BOOKS/REFERENCES SUGGESTED:

1. Dubey. R.C. 2006. A text book of Biotechnology. S. Chand & Co. New Delhi - 110055
2. Brown, C.W.I Cambell and F.G. Priest 1987. Introduction to biotechnology. Blackwell scientific publishers. Oxford.
3. Ignacimuthu.S 1996. Basic biotechnology, Tata Mc Graw Hill publishing Co. Ltd. NewDelhi.

ELECTIVE

PAPER - 2

B. SEED BIOLOGY

UNIT – I

Classification of seeds. Morphology and structural details of seeds Cereals: Paddy and Wheat, Pulses: Dolichos and Glycine, Oil seeds: Castor, Fibers: Cotton, Vegetables: Cucurbita. Study on importance of seed.

UNIT – II

Chemical composition of seeds mentioned above. Germination - General account. Factors affecting germination. Changes that take place during germination (physical and chemical) Treatments given to quicken germination.

UNIT – III

Epigeal and Hypogeal germination, Germination mechanism. Seed germination test under laboratory conditions using paper (BP & TP) sand and soil. Germination ecology: Environmental factors and germination behaviour.

UNIT – IV

Seed viability; Topographical Tetrazolium Test. Preparation of solution and methods of application & evaluation. Seed vigour: Concept, Direct and Indirect vigour tests.

UNIT – V

Dormancy – Primary and secondary dormancies. Significance, factors involved, methods used to break dormancy.

REFERENCE BOOKS:

1. Mayer A. M & Poljakoff Mayer – 1975. Germination of seeds –
2. Bryant J . A 1985. Seed physiology -–Edward Arnold, London.
3. Rattan Lal Agarwal. Seed technology — 2nd edn .
4. B. P. Pandey. Economic Botany –

ELECTIVE

PAPER - 2

C. ETHNOBOTANY

UNIT-I

Ethnobotany: Introduction, concept, scope and objectives. Ethnobotany as an interdisciplinary science. The relevance of ethno botany in the present context. Major ethnic groups in Tamilnadu. (Any five)

UNIT-II

Methodology of Ethno botanical studies. a) Field work b) Herbarium c) Ancient Literature d) Temples and sacred places. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

UNIT-III

Plants and Tribal medicine: Significance of the following plants in ethno botanical practices (along with their habitat and morphology) *a) Azadiractha indica* b) *Ocimum sanctum* c) *Vitex negundo*. d) *Gloriosa superba* e) *Tribulus terrestris* f) *Pongamia pinnata* g) *Cassia auriculata* h) *Indigofera tinctoria*. Role of ethnobotany in modern medicine with special example *Rauvolfia sepentina., Trichopus zeylanicus.*

UNIT-IV

Role of ethnic groups in conservation of plant genetic resources. Participatory forest management. Sharing of wealth concept with few examples from India.

Unit-V

Ethnobotany as a source of drug. a) Reserpine b) Artemisin c) Gugulipid d) Cocaine e) Strychnine.

REFERENCE BOOKS:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981
3. S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
4. S.K. Jain, 1990. Contributions of Indian ethnobotany. Scientific publishers, Jodhpur.
5. Cotton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –Chichester
6. Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-1996
7. Faulks, P.J. 1958. An introduction to Ethnobotany, Moredale pub. Ltd. London
8. Gary J Martin, 2008. Ethnobotany A Methods manual, Earth scan, London.

ELECTIVE

PAPER - 3

A. MICROBIOLOGY

UNIT-I

Introduction to microbiology - Scope of microbiology, history of microbiology, classification and nomenclature of microorganisms. Wittaker`s five kingdom concept. microscopic examination of microorganisms.

UNIT-II

Methods of isolation of algae , fungi, cyanobacteria from soil and water samples. Staining techniques like grams staining, acid fast and flagellar staining. Bacterial culture, growth curve

UNIT-III

structural organization and multiplication of bacteria (E.coli), virus (TMV), bacteriaphage (T4), fungi (Yeast), algae (Chlorella & Nostoc), actinomycetes and mycoplasma.

UNIT-IV

control of microorganisms -physical and chemical methods. general account of microorganisms involved in human diseases, (Skin diseases, respiratory disorders). General account of microbes used as biofertilizers and P solubilizers. Mass production of Rhizobium, Azospirillum.

UNIT-V

Microbial products: Production of penicillin, enzymes - chitinase, protease, organic acid - citric acid and vitamin (B12). Biopesticides; microorganisms and pollution control.

REFERENCE BOOKS:

1. Pelczar, MJ.; JR. E.C.S. Chan and Noel R. Krieg. (Ed) Text book of Microbiology Tata Me Graw Hill. Co. New Delhi. India.
2. Prescott LM., Harley JP, and Klein DA. Microbiology, 3rd Edition, Wm. C. Brown Publishers, 1996.
3. Patel AH 2005. Industrial Micro Biology. Published by Macmillan India Ltd., new Delhi.

ELECTIVE

PAPER - 3

B. BIOSTATISTICS & COMPUTER APPLICATION IN BOTANY

UNIT-I

Biostatistics – Definition, Application and scope of biostatistics; statistical terms and symbols; Primary data and secondary data; methods of data collection; methods of sampling. census vs sampling.

UNIT-II

Processing of data - classification, tabulation; Frequency distribution; Diagrammatic representation - line diagram, bar diagram, pie diagram and cartogram; graphic representation.

UNIT-III

Measures of central tendency – mean, median and mode; measure of dispersion- standard deviation, standard error; correlation analysis- kinds and degree; Chi square test for goodness of fit.

UNIT-IV

History of computers, Types of Computers, Basic computer concepts, parts of a computer-input (key board, Mouse) and Output devices (Monitors, Printers), computer memory (RAM,ROM), Storage Devices (Floppy disk, Compact disk, Hard disk), Central Processing Unit, Software, Hardware, Computer peripherals – Mouse, Modem.

UNIT-V

Computer Network (LAN,WAN), DATA-Representation- Number systems- Binary, arithmetic, Organizing information- the database – definition-Data entry indexing – storage – retrieval – Operating systems – WINDOWS 2000, Word Processing software MS-Office. Introduction to DESKTOP PRINTING (DTP).

REFERENCE BOOKS:

1. Mandal & Nambiar : Agricultural Statistics, Agrobios Publications, Jodhpur
2. P. Parihar: Biostatistics & Biomentry, Agrobios Publications, Jodhpur
3. S. Palanichamy & M. Manoharan : Statistical methods for Biologists, Palani Paramount publications, New Delhi
4. N. Ramakrishnan: Fundamentals of Biostatistics, Sarao Publications, Naaagercoil
5. Peter Norton: Introduction to Computers, Tata MC Graw Hill Publishing Co., New Delhi-34
6. Ramesh Bangia: The Complete Computer course Cyber Tech. Publishers, New Delhi
7. M. Lotia, P. Nir & P. Lotia, Modern Computer Hardware course BPB Publishers,
   New Delhi
8. Texali: Lordstar professional 4.0 made simple. Tata Mc Graw Hill Publishing Co., New Delhi.

ELECTIVE

PAPER - 3

C. HERBAL HOME REMEDIES AND WATER MANAGEMENT

UNIT-I

History and role of the herbs in day-to-day life. Beneficial aspects of herbal plants as food -common greens, vegetables and edible oils (general account only). Study of some common plants which are used as medicine -*Calotropis gigantea*. Centella *asiatica, Cissus quadrangularis, Rosa centifolia, Piper betel, Ocimum sanctum, Azadirachta induce, Curcuma longa, Zingiber officinalis* and *Lawsonia inermis.*

UNIT-II

Herbal remedies - herbal first aid, home remedies-for common cold, fever, headaches, migraines and digestive disorders, ear, eye, mouth and throat infections. Skin care using herbal products.

WATER MANAGEMENT:

UNIT-III

Water-chemical properties and biological importance. Potable water, Measurement of water quality, BOD, COD, evaluation of drinking water quality.

UNIT-IV

Water pollution- industrial, Agricultural and heavy metal pollution. Water quality in and around industrial sites. Sewage treatment. Drinking water treatment

UNIT-V

Water management, recreational aspects of water - quality of swimming pool water. Water quality monitoring. Environmental impact assessment.

REFERENCE BOOKS:

1. T.V. SAIRAM, 1999. Home Remedies Vol-I-V
2. R.Bentley and H. Trimen 2000. Medicinal Plants Vol-I-III
3. O.LONGMAN 1997.Indian Medicinal Plants Vol-I-V
4. Dwivedi, P. 2004, Environmental pollution and Environmental management. Scientific publishers India.
5. Tripathi, G. and Pandey, G.C. 2001. Current topics in environmental sciences.
6. Trivedy, R.K. 2000. Aquatic pollution and toxicology
7. Rama Raju, P.V. and Murali Krishna, 1998. Environmental sanitation. Environmental protection Society, Kakida.

SKILL BASED SUBJECT

PAPER - 4

MICRO TECHNIQUE

UNIT-I

Principle, instrumentation and applications of Light Microscopy, Transmission Electron Microscope (TEM) and Scanning electron Microscope (SEM).

UNIT-II

Microphotogrphy - Principles - Working Mechanism. Camera lucida - Working principles and uses. Micrometry - Stage and ocular micrometer - method of measurement - uses.

UNIT-III

Microtechnical Process - Principles - Techniques - Killing, Fixation and Fixatives, clearing and embedding. Stains - types - staining procedures.

UNIT-IV

Microscopic preparations - Temporary, Semi - Permanent and Permanent, Special techniques - Whole mount - Smear - Squash - Maceration.

UNIT-V

Types of Microtomes and their uses; Rotary Microtome - Rocking Microtome - Sledge microtome.

REFERENCE BOOKS:

1. Alan peacock H.1966 Elementary Microtechnique Edward Arnold (Pub) Ltd.
2. Duddington - C.L. 1960 Practical Microscopy, Pitinan.
3. Cray P.Hand Book of Basic Microtechnique. Mac - Graw Hill, New Delhi.
4. Johnson D.A. 1940 Plant Microtechnique. Mac - Graw Hill, New Delhi.
5. MC Clung, C.L.1961, Hand book of Microscopical Technique.
6. Patki L.R.1992 An Introduction to Microtechnique S.Chand & Company, New Delhi.
7. Prasad & Prasad 2000 Emkay Publications, Delhi.
8. Puru's M.J.et al 1966 Laboratory Techniques in Botany Butter Worths.

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