

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. BOTANY

DEGREE COURSE

CBCS PATTERN

(With effect from 2012 - 2013)

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	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	15	60	75
6	III	Allied Practical	Practical-1	3	0		0	0	0
7	IV	Environ. Studies		2	2	Environmental Studies	10	40	50
				30	20		100	325	425
SEMESTER II									
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	40	60	100
12	III	ALLIED-1	Paper-2	4	4	Zoology II	15	60	75
13	III	Allied Practical	Practical-1	3	2	Zoology	10	40	50
14	IV	Value Education		2	2	Value Education	10	40	50
15	IV	Soft Skill		2	1	Soft Skill	10	40	50
				30	25		160	465	625
SEMESTER III									
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

B.Sc. Botany: Syllabus (CBCS)

19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	ALLIED-2	Paper-3	4	4	Chemistry I	15	60	75
21	III	Allied Practical	Practical-2	3	0		0	0	0
22	IV	Skill based Subject	Paper-1	3	3	Horticulture	15	60	75
23	IV	Non-major elective	Paper-1	2	2	Medicinal Botany	10	40	50
				30	20		115	385	500
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	40	60	100
28	III	ALLIED-2	Paper-4	4	4	Chemistry II	15	60	75
29	III	Allied Practical-2	Practical-2	3	2		10	40	50
30	IV	Skill based Subject	Paper-2	3	3	Mushroom Cultivation	15	60	75
31	IV	Non-major elective	Paper-2	2	2	Horticulture	10	40	50
				30	25		165	485	650
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. Biofertilizers	25	75	100
38	IV	Skill based Subject	Paper-3	3	3	Herbal Science	15	60	75
				30	21		115	360	475
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 Phytogeography	25	75	100
41	III	Core Theory	Paper-10	5	4	Biodiversity, Bioinformatics and Toxicology	25	75	100

B.Sc. Botany: Syllabus (CBCS)

42	III	Core Practical	Practical-3	3	3	Covering Papers 5, 6 & 7	40	60	100
43	III	Core Practical	Practical-4	3	3	Covering Papers 8, 9 & 10	40	60	100
44	III	Elective	Paper-2	3	3	A. Plant Biotechnology B. Seed Biology C. Ethnobotany	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	15	60	75
47	V	Extension Activities		-	1		50	0	50
				30	29		270	555	825

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	75	150
	Allied (Even Sem)	2	4	8	75	150
	Allied -Prac(Even Sem)	2	2	4	50	100
	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	50	50
	Soft skill	1	1	1	50	50
	Value Education	1	2	2	50	50
	Lang. & Others/NME	2	2	4	50	100
	Skill Based	4	3	12	75	300
Part V	Extension	1	1	1	50	50
	Total	41		140		3500

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SYLLABUS

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SEMESTER I

PAPER - 1

PHYCOLOGY AND MYCOLOGY

ALGAE

UNIT-I

Classification and general characters of Algae. (Smith 1958) Classification, occurrence, distribution, thallus structures. Pigmentation, reserve food materials and life cycles of Oscillatoria and Nostoc.

UNIT-II

Classification, occurrence, distribution, thallus structures. Pigmentation, reserve food materials and life cycles of Oedogonium, Chlorella, Caulerpa and Chara.

UNIT-III

Classification, occurrence, distribution, thallus structures. Pigmentation, reserve food materials and types of life cycles of Chlorophyceae, Phaeophyceae and Rhodophyceae.

Examples - Diatoms, Sargassum, Gracilaria

Economic importance of Algae. Example: Agar, Diatomaceous earth, spirulina, Pigment producing algae (Ulva)

UNIT-IV

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

UNIT-V

Detail study of structure and reproduction and life cycle of Ascomycetes, Basidiomycetes and Deuteromycetes. Example - Penicillium, Peziza, Puccinia and Cercospora. Economic importance of Fungi, yeast, edible mushrooms.

Books Suggested:

1. Fritsch, F.E. 1945. Structure reproduction of the Algae Vol. I & 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. Webster.j. 1978 Introduction to Fungi, Cambridge University Press, London.
5. Robert Edward Lee.1980 Phycology, Cambridge University Press, London.
6. Vashista. B.R. 1981 Botany for Degree students Fungi. S. Chand & Co. Ltd., Ram Nagar, New Delhi.

ALLIED - 1

PAPER - 1

ZOOLOGY I

Objective:

To study the systemic and function morphology of invertebrates and chordates.

UNIT – I

Study types including life history. Protozoa – Entamoeba, Porifera- sycon. Coelenterata – Obelia geniculata. Platyhelminthes – Taenia solium.

UNIT – II

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

UNIT – III

Chordata – General characters, Prochordates: Morphology of Amphioxus Vertebrates: Shark.

UNIT – IV

Types study frog and calotes.

UNIT – V

Type study pigeon and Rabbit.

Note: In chordate to study only Morphology, digestive system, respiratory system, circulatory system and urinogenital system.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthkrishnan, 1992. Manual of Zoology. Vol. I & II, S. Viswanathan [printers and Publisher] Pvt. Ltd., Madras, 891p.
2. Kotpal series, 1988 – 1992. Rastogi Publication, 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 - Classification (Bergy's Manual of Bacteriology), Shape, Flagellation, Nutrition, Growth, Respiration and staining behavior of Bacteria. Reproduction in Bacteria, Economical Importance.

UNIT-II: VIROLOGY

General Characters, Chemical Components, Properties, Nomenclature and Classification, Transmission, 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 Reimers (1954). Study the Thallus Structure, Reproduction and Life Cycle of the Following Types. (Excluding the developmental studies) Marchantia and Polytrichum.

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, Bombay, Bangalore, Calcutta, Kanpur.
2. Mishra. A and Agarwal R.P. (1978) Lichens A Preliminary text. Oxford and IBH. 66 janapath, New Delhi 110 001.

3. Parkar. N.S. (1967) An Introduction to embryophyta - Vol I. General Book Dept. Indian University press, Allahabat.
4. Singh R.S. (1978) plant Diseases, Oxford and IBH, 66, Janapath, New Delhi - 110 001.
5. Vashishta. B.R. (1970), Botany for Degree students, Fungi, S. Chand & Co, Ramnagar, New Delhi - 110 055,
6. Vashishta. B.R. (1978), Bryophyta, S.Chand & Co, Ram Nagar, New Delhi - 110 001,
7. Watson E.V. (1964), The structure and Life History of Bryophytes Hutchinson University Press, London.

**CORE PRACTICAL I
(COVERING PAPERS I AND II)**

I. PHYCOLOGY AND MYCOLOGY

1. A detailed study of structure of thallus and reproductive structure of forms given below Oscillatoria, Nostoc, Oedogonium, Chlorella, Caulerpa, Chara, Diatoms, Sargassum and Gracilaria.
2. Observation and recognition of materials and organisms given in fungi. Albugo, Penicillium, Peziza, Puccinia & Cercospora.

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

1. General observation of thallus and reproductive structure of fruticose lichen (Usnea), Marchantia and Polytrichum.
2. Recognition of Pathological specimens and control measures of plant diseases given in Unit V.

ALLIED - 1
PAPER - 2
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 genes – Gene Function. Genetic Engineering and its application, sex linked inheritance.

UNIT –II

Embryogenesis – cleavage and gastrulation of Amphioxus. Human Physiology: Excretion structure of kidney and mechanism of urine formation.

UNIT – III

Disease of circulatory system - blood pressure, heart diseases – Ischemia, Myocardial Infarction, Rheumatic heart diseases, stroke.

UNIT – IV

Pollution – Environmental degradation, method of sewage treatment, effluents, solid wastes and recycling process – Green house effect – Global warming – Acid Rain.

UNIT –V

Evolution theories – Lamarkism & Darwinism.

REFERENCES:

1. Ekambarantha Ayyar, and Ananthkrishnan, 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.,

**ALLIED PRACTICAL
ZOOLOGY**

I MAJOR PRACTICAL

DISSECTIONS

Cockroach: - Digestive and nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of Mosquito, Cockroach and Honey bee
2. Placoid scales of shark

III Spotters

Entamoeba, Sycon, Obelia, Taenia Solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, sea star, T.S of arm of sea star to show tube feet, Amphioxus – Entire, Amphioxus – T.S through pharynx, Shark, Frog, Calotes, Pigeon and Rabbit – Entire, feathers of Pigeon.

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

Classification of Pteridophytes (Reimer 1954). Occurrence and distribution, stelar evolution, Homospory and Heterospory, 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

Distribution of Gymnosperms - general characters - economic importance - classification of Gymnosperms by K.R. Sporne (1965). Detailed study of the following types: 1. Cycas, 2. Pinus.

Paleobotany

UNIT-IV

Geological time scale. Radio carbon dating. Fossils and fossilisation. Kinds of fossils: Impressions, Compressions, casts, molds, petrifications, and coal balls. Importance of the study of palaeobotany.

UNIT-V

Nomenclature of fossil plants. Brief study of the following fossils: Lepidodendron, 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 Pteridophytes, BI Publications. Pvt. Ltd., New Delhi.
3. Pandey B.P. 1977. A Text book of Botany Bryophyta, Pteridophyta and Gymnosperms K.Nath & co. Meerut.
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. Schwatz (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 - 2

PAPER - 3

CHEMISTRY I

UNIT-I

- 1.1 Extraction of Metals – Minerals and Ores – Difference – Minerals of Iron, Aluminum and Copper – Ore dressing or Concentration of Ore – Types of Ore Dressing - Froth Floatation and Magnetic separation.
- 1.2 Refining of Metals – Types of Refining – Electrolytic, Van Arkel and Zone refining.
- 1.3 Extraction of Thorium.

UNIT-II

- 2.1 Preparation and Properties of Cyclohexane. Baeyer Strain Theory.
- 2.2 Polar Effects – Inductive effect, mesomeric effect and steric effect. (Acid and Base Strength).
- 2.3 Stereoisomerism – Types, Causes of optical activity of lactic acid and tartaric acid. Geometrical isomerism – maleic and fumaric acid.

UNIT-III

- 3.1 Chemical Kinetics – Distinction between Order and Molecularity. Derivation of First order rate equation – half life period of first order reactions.
- 3.2 Catalysis – Catalyst – auto catalyst – enzyme catalyst – promoters – catalytic poisoning – Active center – Distinction between homogeneous and Heterogeneous catalysis – Industrial applications of catalyst.
- 3.3 Photochemistry – Grothus Drapers law, Stark Einstein's law – quantum yield – photosynthesis, phosphorescence, fluorescence – chemiluminescence – photosensitization.

UNIT-IV

- 4.1 VSEPR Theory – Shapes of simple molecules BF_3 , PCl_3 , SF_6 and XeF_6 .
- 4.2 Fuels – Calorific value of fuels – non conventional fuels – need of solar energy – Applications – Bio fuels.
- 4.3 Osmosis – Osmotic pressure – reverse osmosis – desalination of sea water.

UNIT-V

- 5.1 Nuclear Chemistry – Definition of Half life period – Group displacement law – Radioactive series. Nuclear Fission and Fusion – Application of nuclear chemistry in Medicine, Agriculture, Industries – C^{14} Dating.
- 5.2 Crude oil - Petroleum – Petroleum refining – Cracking – Applications of Cracking. Naphthalene – Preparation – Properties and uses of Naphthalene.
- 5.3 Elements of Symmetry – Unit cell – Crystal lattice – types of cubic lattice – one example each.

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, 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, Orchid and Anthurium. Cultivation of Medicinal Plants – Periwinkle, 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 plant Biotechnology - 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

Plant cell structure and function. Prokaryotic and Eukaryotic cell (including Ultra structure). Cell wall, structure and chemistry. Function on cell wall. Cytoplasm, plasma membrane - Structure, Chemistry and function.

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

UNIT-II

Nucleus - Structure and Functions.

Nucleoplasm - Structure and Functions.

Chromosome - structure and Functions.

Euchromatin & heterochromatin, Giant chromosomes polytene and Lambrush chromosomes, Nucleic acids. Molecular structure and functions of DNA and RNA replications.

Cell inclusions (Non living)

Cell divisions - Mitosis and Meiosis.

ANATOMY

UNIT-III

Tissues: Classification - structural characteristics and functions of the following tissues. Meristematic, 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 stem Dicotyledons 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

PAPER 3 & 4

CYTOLOGY

1. Study of structure of plant cell organaells E.M. studies from standard books.
2. Study of Cell inclusions (non living) cystolyth, crystals, starch grains.
3. Cytochemical test for starch, sugar and protein.
4. Study of Mitosis by Squash technique.

ANATOMY

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

ALLIED - 2

PAPER - 4

CHEMISTRY II

UNIT-I Co-ordination Chemistry

- 1.1 Nomenclature of Coordination Compounds - Werner Theory of Coordination Compounds – Chelation – Functions and structure of haemoglobin and chlorophyll.
- 1.2 Industrial Chemistry:
Fertilizers and manures – Bio fertilizer – Manures and their importance – Role of NPK in plants – preparations and uses of urea, Ammonium nitrate, Potassium nitrate 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 Freon.

UNIT-II Carbohydrates

- 2.1 Classification – structure of glucose – properties and uses of starch – uses of Cellulose nitrate – Cellulose acetate.
- 2.2 Amino Acids and Proteins
Classification of amino acids – preparation and properties of Glycine – Classification of proteins based on physical properties and biological functions.
- 2.3 Primary and Secondary structure of protein (Elementary treatment only) composition of RNA and DNA and their biological role. Tanning of leather –alum (aluminum trichloride tanning –Vegetable tanning)

UNIT-III Electrochemistry

- 3.1 Specific and equivalent conductivity their determination – effect of dilution on conductance.
- 3.2 Kohlrausch law – Determination of dissociation constant of weak Electrolyte using conductance measurement – Conductometric Titrations.
- 3.3 P^H and determination by indicator method – Buffer Solutions – Buffer action – importance of buffer in the living system – Derivation of Henderson equation.

UNIT-IV

- 4.1 Paints – Pigments – Components of paints - Requisites of a good paint. Colour and Dyes – Classification based on constitution and application.

- 4.2 Vitamins
Biological activities and deficiency diseases of vitamin A, B, C, D and K – Hormones –
Functions of insulin and adrenaline.
- 4.3 Chromatography –Principles and applications of column, paper and thin layer
chromatography.

UNIT-V

- 1.1 Drugs – Sulpha drugs Uses and mode of action of sulpha drugs – Antibiotics – Uses
of Penicillin, Chloroamphenicols, streptomycin. Drug abuse and their implication-
alcohol –LSD
- 1.2 Anaesthetics – General and local anaesthetics – Antiseptics – Example and their
application. Definition and one example each for analgesics, antipyretics,
tranquillizers, sedatives, causes of diabetes, cancer and Aids.
- 5.3 Electrochemical Corrosion and its prevention.

ALLIED PRACTICAL CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of hydrochloric acid using standard sulphuric acid.
2. Estimation of Borax using standard sodium carbonate.
3. Estimation of FeSO_4 using standard Mohr salt solution.
4. Estimation of Oxalic acid using standard FeSO_4 .
5. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ using standard $\text{K}_2\text{Cr}_2\text{O}_7$.
6. Estimation of Copper using standard copper sulphate.
7. Estimation of Fe^{2+} using diphenylamine / N-Phenyl anthranilic acid as indicator
Students must write the short procedure for the given Estimation in the examination and submit the paper for evaluation.

ORGANIC ANALYSIS

Reactions of Aldehyde (aromatic), Carbohydrate, Carboxylic acid (mono and dicarboxylic acid), Phenol, Aromatic primary amine, Amide, and Diamide. Systematic Analysis of Organic compounds containing one functional group and characterization of confirmatory tests.

SKILL BASED SUBJECT

PAPER - 2

MUSHROOM CULTIVATION

UNIT-I

History of Mushroom cultivation - economic importance of Mushrooms as food - selection - 'starter' - preparation of spawn - preparation of Compost (outdoor and indoor beds - incubation - Harvesting and marketing.

UNIT-II

Life cycle of Mushrooms - Identification - edible and poisonous Mushrooms - external factors for growth.

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.

UNIT-V

Control of major diseases of microbes (green moulds, dry bubble, wet bubble, bacterial spot, viral brown disease) - pests (Sciarid flies, phorid flies, beetles) - nematodes (Mycophages)

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, 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, Orchid and Anthurium. Cultivation of Medicinal Plants – Periwinkle, 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. Androecium – 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. Pollination. Fertilization, 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 - Ruminant endosperms, function of endosperms

Development of embryo in Dicot (Capsella) and Monocot (Najas).

A brief account on Polyembryony, parthenocarpy.

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; Cronquist.

Taxonomic hierarchy (major and minor categories)

Plant Nomenclature - Forms of Scientific names.

Concept of a taxon: A brief reference to citation of author.

UNIT-II

Chemotaxonomy. Numerical taxonomy. 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.

PAPER - 7

GENETICS, PLANT BREEDING, EVOLUTION AND BIOSTATISTICS

UNIT-I

Mono hybrid and Dihybrid cross, test cross, back cross, Mendel's Laws. Deviation from Mendelian ratio – incomplete dominance, lethal factor, complementary factor, supplementary factor, duplicate and inhibitory. Polygenic inheritance – Inheritance of Wheat Kernel and ear 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 - Weinberg's principles, factors affecting.

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, Groundnut and Sugarcane.

UNIT-V

Evolution: Evolutionary theories of Lamarck, Darwin, De Vries, Modern synthetic theory of evolution.

Biostatistics: Mean, median, mode of standard deviations, standard errors.

ELECTIVE

PAPER - 1

A. TISSUE CULTURE

UNIT-I

History of plant tissue culture research - Basic principles of plant tissue - callus culture, 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, Medium for micro-propagation, 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 - Bioreactors.

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

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; Symptomatology-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

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- epiphytotic- causes, course, decline and prophylaxis; Cultural, breeding and chemical control – protectant and systemic fungicides. Molecular techniques in plant pathology; Detection of plant pathogens using molecular tools. Incorporation of resistant genes.

UNIT-V

Study of causal organisms and symptoms of

- 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.

Plant protection-Prevention; eradication-chemical, biological, genetical- breeding, hybridization- immunization.

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-Mehoratra, 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 multiplication, carrier based inoculants, Actinorrhizal symbiosis.

UNIT – II

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

UNIT – III

Cyanobacteria (blue green algae), Azolla and Anabaena azolla association, nitrogen fixation, factors 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. 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). 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; some poisonous plants; their toxicity and action.

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. Medicinal plants of exports values, rejuvenating herbs.

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 factors, water stress and its significance. Translocation in phloem. Mineral nutrition - macro and micronutrients and deficiency symptoms. Growth - measurement of growth, growth curve, PGR, auxins, gibberellins, cytokinins, ethylene. Growth regulation, application of hormones in agriculture. Photoperiodism, vernalization, phytochrome and biological clock.

UNIT-II

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

PLANT BIOCHEMISTRY:

UNIT-III

Brief account of organic chemistry - Properties, Structure and Classification of Carbohydrates, Lipids and Proteins.

Enzymes - Properties: Nomenclature and classification as per ECIUB (Enzyme commission of the international Union Biochemistry) - Cofactor - Co - enzymes and mode of action - factors.

UNIT-IV

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

UNIT-V

Nitrogen metabolism: Role of Nitrogen and sources, Conversion of nitrate to ammonia - assimilation of ammonia. Molecular nitrogen, mechanism of biological nitrogen fixation. Protein synthesis. 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. Nutrient cycling. Types of ecosystems - coastal and grassland.

UNIT – III

Autecology and Synecology – Vegetation – Units of Vegetation – Formation, Association, Consociation, Society – development of vegetation. Migration – ecesis, colonization, Methods of study of vegetation (Quadrat and transect) Plant succession – Hydrosere and Xerosere. Ecological classification of plants: Morphological and anatomical features of plants and their correlation to the habitat factors.

UNIT – IV

Pollution and its control, Atmospheric pollution – air – pollution – particulate matter. Chemicals, Acid rain, Radiation pollution, Noise pollution, Thermal pollution Soil pollution: Industrial effluents, agricultural pollution, plant residues, insecticides, pesticides, fungicides, herbicides. Water pollution – Industrial effluents (water soluble metals – liquid effluents oil).

UNIT – V

PHYTOGEOGRAPHY

Phytogeography – principles – vegetation types of 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 and bioinformatics; Types of hardware and software opening system. Fundamentals of networking, Operation of networks, telnet, ftp, www, Internet.

UNIT-IV

Protein structures-visualizing, predicting and function from a sequence. Chemical composition-biomolecules, DNA, RNA, structure of DNA, development of DNA sequence methods. Gene finder and feature detection in DNA.

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

PAPER 5, 6 & 7

PRACTICAL:

TAXONOMY:

1. Morphology materials and study of inflorescence types and 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. Study of vegetative morphology materials, Inflorescence types and Fruit types with suitable examples.
2. Description of plants in technical terms.
3. A detailed study of the range of Vegetative and floral characters of plants belonging to the families mentioned in the theory part.
4. Submission of 15 herbarium sheet with proper field note book for practical Examination. 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.
5. Economic importance.

REFERENCE BOOKS:

TAXONOMY:

1. Hill AW. 1951 Economic Botany - Mc Graw Hill, New Delhi.
2. Lawrence, G.H.M. 1967, Taxonomy of vascular plants. Oxford IBH Publishing Co. Ltd., New Delhi.
3. Singh, V. and Jain, D.K - Taxonomy of Angiosperms - Rastogi Publications, Meerut.
4. Pandey, B.P. 2007 Botany for Degree Students. S. Chand & Co. New Delhi.
5. Vasishta, P.C. 1974 Taxonomy of Angiosperms. S. Chand & Co., Chennai.

ECONOMIC BOTANY:

1. Economic Botany, TMHill.,Tata McGraw Hill., NewDelhi.
2. Economic Botany, Pandey, B.P., S.Chand & Co., NewDelhi.

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. Gupta, P.K. 2000. Genetics. Rastogi publications. Meerut.
2. Rangaswami, R.A. 1995. A. textbook of Agricultural statistics. New Age International publications, Chennai.
3. Sinnott, E.W; L.C. Dunn and T. Dobzhansky 1958. Principle of genetics. McGraw Hill, Newyork.
4. Swaminathan, M.S; P.K. Gupta and V. Singa. 1983. Cytogenetics of crop plants. Macmillan India Pvt. Ltd. New Delhi.
5. Verma, P.S and Agarwal. V.K. 2007. Genetics. S. Chand & Co. Chennai.
6. Winchester, A.M. 1967. Genetics. Oxford & IBH. Calcutta.

CORE PRACTICAL

PAPER 8, 9 & 10

PRACTICAL:

1. Determination of solute potential by plasmolytic method.
2. Effect of Chemicals, Temperature on membrane permeability, colorimetric determination.
3. Study of relative rates of transpiration of different plants.
4. Separation of pigments by paper chromatography.
5. Study the rate of photosynthesis under different light intensities.
6. Study the rate of photosynthesis under different CO_2 Concentrations.
7. Determination of respiration rate under different substrates using Respiroscope Method.

DEMONSTRATION EXPERIMENTS:

1. Induction of roots in leaves by auxins.
2. Effect of auxins of etiolated stems
3. Preparation of standard graph for Potassium dichromate by using colorimetric method.

PRACTICAL:

1. Test for starch, amino acid and protein.
2. Test for Alkaloid
3. Test for Saponin.

DEMONSTRATION EXPERIMENT:

1. Hydrolysis of starch by amylase.
2. Activity of catalase.
3. Quantitative and Qualitative estimation of Sugars.

REFERENCE BOOKS:

PLANT PHYSIOLOGY, BIOCHEMISTRY:

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.

PRACTICAL:

ECOLOGY:

1. Study of morphological and structural adaptations of locally available hydrophytes, xerophytes, mesophytes and epiphytes and correlate to their particular habitats.
Hydrophyte: Nymphaea, Hydrilla
Xerophytes: Nerium, Casuarina
Mesophytes: Tridax, Vernonia
Epiphytes: Vanda
2. Construction of quadrat – to study the percentage of frequency.

PHYTOGEOGRAPHY

1. Map of phytogeographical regions of India.

REFERENCE BOOKS:

ECOLOGY:

1. Odum, E.P. 1983. Basic Ecology. Holt – Saunders international editions.
2. Colinvaux, P.1986 Ecology. John Wiley and sons.
3. Kumar, H.D.1990 Modern concepts of ecology Vikas Publishing House Pvt. Ltd.
4. Shukla, R.S and Chandel, P.S. 1990 Plant Ecology. S. Chand and Co. Pvt. Ltd.

ELECTIVE

PAPER - 3

A. PLANT BIOTECHNOLOGY

UNIT-I

Biotechnology - history, Isolation and cultivation of economically important microbes (scenedesmus, Aspergillus) culture and purification of single cell protein (scenedesmus, spirulina), mushroom cultivation. Algal biomass production and maintenance.

UNIT-II

Genetic engineering – aims of Genetic Engineering, Techniques of Gene Manipulation. Recombinant technology. Outline of Cloning. Plasmid. Cosmid, Vectors. Genetic manipulation of eukaryotic cells.

UNIT-III

Production of primary and secondary metabolites by microbes. (Ethanol by yeast, citric acid by Aspergillus niger, penicillin) Bio fertilizers.

Plant genome organization - chloroplast genome - nucleus encoded genes - Agrobacterium rhizogenus mechanism of T - DNA synthesis, edible vaccines, Transgenic plants, BT - cotton, BT - tomato, bioethics.

UNIT-IV

Fermentation technology, Microbial growth, batch culture, continuous culture, fermentor designs and operators. Bioreactors, advantages of Microbial enzymes, industrial applications.

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

Morphology and structural details of seeds Cereals: Paddy / Wheat Pulses: Dolichos / 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

Seed germination test under laboratory conditions .Using paper (BP & TP) sand and soil. The environmental test conditions also be discussed. Evaluation of germination test.

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. Germination of seeds – Mayer A. M & Poljakoff Mayer – 1975
2. Seed physiology -Bryant J . A 1985 –Edward Arnold, London.
3. Recent advancement in the anatomy of Tropical seed plants Chowdhury K A U B Jawahar Nagar New Delhi.
4. Seed technology – Rattan Lal Agarwal – 2nd edn .
5. A text book of General Botany for colleges & Universities.
1. 2nd edn - Chapman & Hall. London.
6. Anatomy of seed plants.
7. Economic Botany – B. P. Pandey

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 *Rauwolfia 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, Characterization of microorganisms, microscopic observations. Wittaker`s five kingdom concept.

UNIT-II

Genetics of microorganisms- Modification and mutations, transformation, transduction and conjugation. Methods of replication. Methods of isolation of algae , fungi, cyanobacteria from soil and seed. Isolation of yeast from starchy materials. VAM and its isolation from soil.

UNIT-III

Introduction to phage genetics, fungi, molds, yeasts, Algae, protozoa, and viruses –TMV- Basic classification of each group of microorganisms, Methods of staining microorganisms, (Gram`s stain, Acid fast) Biocontrol.

UNIT-IV

General account of microbes used as biofertilizers, and P solubilizers and mobilizers. Mass inoculum production of *Rhizobium*, *Azospirillum*, *Azotobacter*. P solubilizers bacteria, Mycorrhizae, Blue green algae, *Azolla*.

UNIT-V

Microbial products, Antibiotics, enzymes - chitinase, protease, xylanase, laccase and vitamins, microorganisms involved in human diseases, (Skin diseases, respiratory disorders) Biopesticides

REFERENCE BOOKS:

1. Michael J. Pelczar; JR. E.C.S. Chan and Noel R. Krieg. (Ed) Text book of Microbiology Tata Me Graw Hill. Co. New Delhi.
2. Trivedi PC Applied microbiology Agrobios, Jodhpur.
3. Vijaya Ramesh K. Fundamentals of Microbiology MJ Pub., Chennai.
4. Bhatia AL, Microbiology Avinash Kar Publication, Jodhpur.

ELECTIVE

PAPER - 3

B. BIOSTATISTICS & COMPUTER APPLICATION IN BOTANY

UNIT-I

Bio statistics – Definition of bio-statistics, statistical terms – random Sampling – approximation of data – statistical error-logarithms.

UNIT-II

Frequency distribution-graphical representation- distribution of data in Biology – mean, median and mode – measure of dispersion, standard deviation, standard error -coefficient of variationlimits of the mean – Probability- - Chi square test for goodness of fit.

UNIT-III

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-IV

Computer Network (LAN,WAN), DATA-Representation- Number systems- Binary, arithmetic, Organizing information- the database – definition-Data entry indexing – storage – retrieval – Operating systems – WINDOWS 2000

UNIT-V

- a. Word Processing software MS-Office.
- b. DESKTOP PRINTING (DTP) - Application software like- ADOBE PageMaker, Corel Ventura and Microsoft Publisher and their uses.
- c. A Basic knowledge of Networking-Internet-email facilities, terminology connected with them and their uses in Botany. No Practical for this paper. Only Demonstration of computer application in Botany at The Computer Science Department Laboratory (or) wherever a PC facility is available in the college.

TEXT BOOKS:

1. Khan & Knanum : Fundamentals of Biostatistics, Ukkax publications, Hyderabad
2. R. Thiagarajan: Computers for Beginners Pvt., Ltd., Madras

REFERENCE BOOKS:

1. Mandal & Nambiar : Agricultural Statistics, Agrobios Publications, Jodhpur
2. P. Parihar: Biostatistics & Biometry, 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 indica*, *Curcuma longa*, *Zingiber officinalis*, *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. The complete medicinal, herbal Penelope Ody 1993. Dorling Kindersley Ltd., Great Britain.
2. Home Remedies Vol-I-V T.V. SAIRAM, 1999.
3. Medicinal Plants Vol-I-III R.Bentley and H. Trimmen 2000.
4. Indian Medicinal Plants Vol-I-V O.LONGMAN 1997.
5. Dwivedi, P. 2004, Environmental pollution and Environmental management. Scientific publishers India.
6. Tripathi, G. and Pandey, G.C. 2001. Current topics in environmental sciences.
7. Trivedy, R.K. 2000. Aquatic pollution and toxicology
8. Rama Raju, P.V. and Murali Krishna, 1998. Environmental sanitation. Environmental protection Society, Kakida.

SKILL BASED SUBJECT

PAPER - 4

MICROTECHNIQUE

UNIT-I

Light Microscopy - History - Optical Principles - uses and care of Microscopes - A brief survey of types of microscopes including Transmission Electron Microscope (TEM) and Scanning electron Microscope (SEM).

UNIT-II

Microphotography - 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. Stains - types - staining procedures.

UNIT-IV

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

UNIT-V

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

Sectioning of Bryophytes, Pteridophytes, Gymnosperm & Angiosperm.

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.
