DEPARTMENT OF BOTANY
Telangana University
Dichpally, Nizamabad-503322

(A State University Established under the Act No. 28 of 2006, A.P.
Recognized by UGC under 2(f) and 12 (B) of UGC Act 1956)

Accredited by NAAC 'B' Grade, CGPA: 2.61

B. Sc. (CBCS) Botany
Course Structure and Syllabus

w.e.f. 2016-2017

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B. Sc. (CBCS) Botany
Semester: I - VI
Course Structure

Paper	Paper Title	No. of Instruction Hours	Max. Marks	No. of Credits
B. Sc. I yr w.e.f. 2016-2017				
Semester – I				
I	Microbial diversity of Lower Plants	60 Theory (@4 per week)	80UE+20IE	4
		45 Practicals (@2 per week)	50	1
Semester – II				
II	Bryophytes, Pteridophytes, Gymnosperms and Paleobotany	60 Theory (@4 per week)	80UE+20IE	4
		45 Practicals (@2 per week)	50	1
B. Sc. II yr w.e.f. 2017-2018				
Semester – III				
III	Taxonomy of Angiosperms and Medicinal Botany	60 Theory (@4 per week)	80UE+20IE	4
		45 Practicals (@2 per week)	50	1
Semester – IV				
IV	Plant Anatomy, Embryology and Palynology	60 Theory (@4 per week)	80UE+20IE	4
		45 Practicals (@2 per week)	50	1
B. Sc. III yr w.e.f. 2018-2019				
Semester – V				
V	Cell Biology and Genetics	45 Theory (@3 per week)	80UE+20IE	3
		45 Practicals (@2 per week)	50	1
VI & VII	Elective: I – Ecology & Biodiversity / Elective: II – Horticulture	45 Theory (@3 per week)	80UE+20IE	3
		45 Practicals (@2 per week)	50	1
Semester – VI				
VIII	Plant Physiology	45 Theory (@3 per week)	80UE+20IE	3
		45 Practicals (@2 per week)	50	1
IX & X	Elective: I – Tissue Culture & Biotechnology / Elective: II – Seed Technology	45 Theory (@3 per week)	80UE+20IE	3
		45 Practicals (@2 per week)	50	1

B. Sc. (CBCS) Botany- I year
Semester-I - Paper-I
Microbial Diversity of Lower Plants

Theory Syllabus

Credits- 4
(60 hours)

UNIT - I

1. Brief account of Archaebacteria, Actinomycetes. (4h)
2. Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to *Oscillatoria, Nostoc* and *Anabaena* (6h)
3. Lichens: Structure and reproduction; ecological and economic importance. (5h)

UNIT- II

4. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro. (7h)
5. Bacteria**:** Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice.
6. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl (8h)

UNIT-III

7. General characters, structure, reproduction and classification of algae (Fritsch) and thallus organization in algae. (3h)

8. Structure and reproduction of the following: (5h)
   Chlorophyceae- *Volvox, Oedogonium* and *Chara.*
   Phaeophyceae- *Ectocarpus* (2h)
   Rhodophyceae- *Polysiphonia.* (3h)

9. Economic importance of algae in Agriculture and Industry. (2h)

UNIT-IV

10. General characters and classification of fungi (Ainsworth). (3h)
11. Structure and reproduction of the following: (10h)
    (a)Mastigimycotina- *Albugo*
    (b) Zygomycotina- *Mucor*
    (c) Ascomycotina- *Saccharomyces* and *Penicillium.*
    (d) Basidiomycotina- *Puccinia*
    (e) Deuteromycotina- *Cercospora.*
12. Economic importance of fungi in relation to mycorrhizae and mushrooms. General account of mushroom cultivation (2h)

References:

1. Alexopolous, J. and W. M. Charles. 1988. Introduction to Mycology. Wiley Eastern, New Delhi.
2. Mckane, L. and K. Judy. 1996. Microbiology – Essentials and Applications. McGraw Hill, New York.
3. Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
4. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi.
5. Sambamurthy, A. V. S. S. 2006. A Textbook of Plant Pathology. I. K. International Pvt. Ltd.,
New Delhi.
6. Sambamurthy, A. V. S. S. 2006. A Textbook of Algae. I. K. International Pvt. Ltd., New Delhi.
7. Sharma, O. P. 1992. Textbook of Thallophyta. McGraw Hill Publishing Co., New Delhi.
8. Thakur, A. K. and S. K. Bassi**.** 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.
9. Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. Botany for Degree Students: Algae. S. Chand& Company Ltd, New Delhi.
10. Vashishta, B. R. 1990. Botany for Degree Students: Fungi, S. Chand & Company Ltd, New Delhi.

B. Sc. (CBCS) Botany-I year
Semester-I - Paper-I
Microbial Diversity of Lower Plants

Practical Syllabus

(45 hours)

1. Study of viruses and bacteria using electron micrographs (photographs). (3h)
2. Gram staining of Bacteria. (3h)
3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi:
   Viruses: Tobacco mosaic
   Bacteria: Angular leaf spot of cotton and Rice tumgro.
   Mycoplasma**:** Little leaf of Brinjal and Leaf curl of papaya (3h)
   Fungi: White rust on Crucifers, Rust on wheat & Tikka disease of Groundnut. (6h)
4. Vegetative and reproductive structures of the following taxa:
   Algae: *Oscillatoria*, *Nostoc*, *Volvox*, *Oedogonium*,*Chara* ,*Ectocarpus* and *Polysiphonia.* (6 h)
   Fungi: *Albugo*, *Mucor*,*Saccharomyces*, *Penicillium*, *Puccinia* and *Cercospora* (6h)
5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. White rust of Crucifers, Rust on wheat & Tikka disease of Groundnut (9h)
6. Lichens: Different types of thalli and their external morphology (3 h).
7. Examination of important microbial, fungal and algal products:
Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc. (3h)
8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies). (3h)

B. Sc. (CBCS) Botany- I year
Semester-II - Paper-II
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

Theory Syllabus

Credits- 4
(60 hours)

UNIT-I

1. Bryophytes**:** General characters and classification. (3h)
2. Structure, reproduction, life cycle and systematic position of *Marchantia, Anthoceros* and *Polytrichum.* (Development stages are not required). (10h)
3. Evolution of Sporophyte in Bryophytes. (2h)

UNIT-II

4. Pteridophytes: General characters and classification (Sporne's) (3h)
5. Structure, reproduction, life cycle and systematic position of *Rhynia, Lycopodium, Equisetum* and *Marsilea*. (10h)
6. Stelar evolution, heterospory and seed habit in Pteridophytes. (2h)

UNIT-III

7. Gymnosperms: General characters, structure, reproduction and classification (Sporne's). (4h)
8. Distribution and economic importance of Gymnosperms. (3h)
9. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum* . (8 h)

UNIT-IV.

10. Palaeobotany: Introduction, Fossils and fossilization ; Importance of fossils. (8 h)
11. Geological time scale; (4 h)
12. Bennettitales: General account. (3 h)

References:

1. Watson, E. V. 1974. The structure and life of Bryophytes, B. I. Publications, New Delhi.

2. Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany.

S. Chand & Company Ltd, New Delhi.

3. Sporne, K. R. 1965. Morphology of Gymnosperms. Hutchinson Co., Ltd., London.

4. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany - Pteridophyta (Vascular Cryptogams). . Chand & Company Ltd, New Delhi.

5. Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.

6. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi.

7. Thakur, A. K. and S. K. Bassi**.** 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.

8. Vashishta, B. R., A. K. Sinha and Adarsha Kumar. 2008. Botany for Degree Students: Bryophyta. S. Chand & Company Ltd, New Delhi.

9. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany for Degree Students: Gymnosperms. Chand & Company Ltd, New Delhi.

B. Sc. (CBCS) Botany- I year
Semester-II - Paper-II
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

(45 hours)

Practical Syllabus

1.Study of Morphology (vegetative and reproductive structures) and anatomy of the following

Bryophytes: *Marchantia*, *Anthoceros* and *Polytrichum*. (9 h)

2. Study of Morphology (vegetative and reproductive structures) and anatomy of the following

Pteridophytes: *Lycopodium*, *Equisetum* and *Marsilea*. (9 h)

3. Study of Anatomical features of *Lycopodium* stem, *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double stained permanent mounts. (12h)

4. Study of Morphology (vegetative and reproductive structures) of the following taxa:

Gymnosperms: *Pinus* and *Gnetum*. (6 h)

5. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double stained permanent mounts. (6h)

6. Fossil forms using permanent slides / photographs: *Rhynia* and *Cycadeoidea.* (3h)

B. Sc. (CBCS) BOTANY- II YEAR
Semester-III - Paper-III
Taxonomy of Angiosperms and Medicinal Botany

Theory syllabus

Credits-4
(60 hours)

UNIT - I

1. Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantle. An introduction to Angiosperm Phylogeny Group (APG). (7h)
2. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. (4h)
3. Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code - a brief account. Herbarium: Concept, techniques and applications. (4h)

UNIT-II

4. Systematic study and economic importance of plants belonging to the following families: Polypetalae : Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae
5. Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae
6. Monochalmydeae: Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae. (15h)

UNIT - III

7. Ethnomedicine: Scope, interdisciplinary nature, distinction of Ethnomedicine from Folklore medicine. (3h)
8. Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP and CDRI. (5h)
9. Plants in primary health care: Common medicinal plants – Tippateega (*Tinospora cordifolia*), tulasi (*Ocimum sanctum*), pippallu (*Piper longum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*), Turmeric (*Curcuma longa*). Evaluation of crude drugs. (7h)

UNIT-IV

10. Traditional medicine vs Modern medicine: Study of selected plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action of modern medicine: Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina***)**, Nela usiri *(Phyllanthus amarus),* Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). (8h)
11. Pharmacognosy: Introduction and scope. Adulteration of plant crude drugs and methods of identification - some examples. Indian Pharmacopoeia. (4h)
12. Plant crude drugs: Types, methods of collection, processing and storage practices. (3h)

References:

Pandey, B. P. 2007. Botany for Degree Students: Diversity of Seed Plants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd, New Delhi.

Rastogi, R. R. and B. N. Mehrotra. 1993. Compendium of Indian Medicinal Plants. Vol. I & Vol.II.
CSIR, Publication and Information Directorate, New Delhi.

Sivarajan, V. V. and I. Balasubramaniyan. 1994. Ayurvedic Drugs and their Plant Sources. Oxford and IBH, New Delhi.

Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold, London.

Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.

Davis, P. H. and V. H. Heywood. 1963. Principles of Angiosperm Taxonomy. Oliver and Boyd, London.

Heywood, V. H. 1965 . Plant Taxonomy. ELBS , London.

Heywood, V. H. and D. M. Moore (Eds). 1984. Current Concepts in Plant Taxonomy. Academic Press, London.

Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.

Jeffrey, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge. London.

Joshi, S. G. 2000. Medicinal Plants. Oxford and IBH, New Delhi.

Kokate, C. and Gokeale- Pharmocognacy- Nirali Prakashan, NewDelhi.

Lad, V. 1984. Ayurveda – The Science of Self-healing. Motilal Banarasidass, New Delhi.

Lewis, W. H. and M. P. F. Elwin Lewis. 1976. Medical Botany. Plants Affecting Man's Health. A Wiley Inter science Publication. John Wiley and Sons, New York.

B. Sc. (CBCS) BOTANY- II YEAR
Semester-III - Paper-III
Taxonomy of Angiosperms and Medicinal Botany

Practical syllabus

(45 hours)

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus
   (Minimum of one plant representative for each family) (24h)
2. Demonstration of herbarium techniques. (3 h)
3. Identification,medicinal value & active principle present in the following plants : Tulasi (*Ocimum sanctum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*). (6 h)
4. Ethnomedicinal value/practice of the following plants:
   Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina***)**, Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). (6h)
5. Pharmacognosy:
   Powder analysis : Pippalu (*Piper longam)*, Nela usiri (*Phyllanthus niruri*),
   Study of Organoleptic (sectional study) of the following:
   Tippateega (*Tinospora cordifolia*) and Turmeric (*Curcuma longa*). (6h)
6. Candidate has to submit at least 30 herbarium sheets

Skill Enhancement Course
(Credits 2)
Nursery and Gardening

Lectures: 30

Unit 1: (15Lectures)

Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.

Unit 2: (15Lectures)

Gardening: definition, objectives and scope - different types of gardening -landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures

Suggested Readings

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH PublishingCo., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

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B. Sc. (CBCS) BOTANY- II YEAR
Semester-IV- Paper IV
Plant Anatomy, Embryology and Palynology

Theory syllabus

Credits-4
(60 hours)

UNIT - I:

1. Meristems*:* Types, histological organization of shoot and root apices and theories. (3h)
2. Tissues and Tissue Systems*:* Simple, complex and special tissues. (6 h)
3. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths. (6 h)

UNIT-II

4. Stem and root anatomy*:* Vascular cambium - Formation and function. (3h)
5. Anomalous secondary growth of Stem - *Achyranthes, Boerhaavia, Bignonia, Dracaena;* Root– *Beta vulgaris* (5h)
6. Wood structure*:* General account. Study of local timbers – Teak (*Tectona grandis*), Rosewood, (*Dalbergia latifolia*), Red sanders, (*Pterocarpus santalinus*) Nallamaddi (*Terminalia tomentosa*) and Neem (*Azadirachta indica*). (7h)

UNIT - III

7. Introduction: History and importance of Embryology. (2h)
8. Anther structure, Microsporogenesis and development of male gametophyte. (6h)
9. Ovule structure and types; Megasporogenesis; types and development of female gametophyte. (7h)

UNIT-IV

10. Pollination - Types; Pollen - pistil interaction. Fertilization. (4h)
11. Endosperm - Development and types. Embryo - development and types; Polyembryony and Apomixis - an outline. (5h)
12. Palynology- Pollen morphology, NPC system and application of Palynology. (6h)

References:

Bhattacharya et. al. 2007. A textbook of Palynology, Central, New Delhi.

Bhojwani, S. S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.

M.R.Saxena- A textbook of Palynology.

Vashista- A textbook of Anatomy.

P.K.K.Nair- A textbook of Palynology.

Esau, K. 1971. Anatomy of Seed Plants. John Wiley and Son, USA.

Johri, B. M. 1984. Embryology of Angiosperms. Springer-Verleg, Berlin.

Kapil, R. P. 1986. Pollination Biology. Inter India Publishers, New Delhi.

Maheswari, P. 1971. An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.

B. Sc. (CBCS) BOTANY- II YEAR
Semester-IV- Paper IV
Plant Anatomy, Embryology and Palynology

Practical syllabus

(45 hours)

Suggested Laboratory Exercises:

1. Demonstration of double staining technique. (3 h)
2. Tissue organization in root and shoot apices using permanent slides (3 h)
3. Preparation of double stained Permanent slides

Primary structure: Root - *Cicer*, *Canna*; Stem – *Tridax*, *Sorghum* (6 h)

Secondary structure: Root – *Tridax* sp.; Stem –*Pongamia*

Anomalous secondary structure: Examples as given in theory syllabus. (6 h)

4. Stomatal types using epidermal peels. (3 h)
5. Microscopic study of wood in T.S., T.L.S. and R.L.S. (6 h)
6. Structure of anther and microsporogenesis using permanent slides. (3 h)
7. Structure of pollen grains using whole mounts - *Hibiscus, Acacia* and Grass). (3 h)
8. Pollen viability test using Evans Blue – *Hibiscus* (3 h)
9. Study of ovule types and developmental stages of embryo sac. (3 h)
10. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides. (3 h)
11. Isolation and mounting of embryo (using *Cymopsis / Senna* / *Crotalaria*) (3 h)

Skill Enhancement Course
(Credits 2)
SERICULTURE

Lectures: 30

Unit 1: Introduction (10 Lectures)

Sericulture: Definition, history and present status; Silk route

Types of silkworms, Distribution and Races

Exotic and indigenous races

Mulberry and non-mulberry Sericulture

Life cycle of *Bombyxmori*

Structure of silk gland and secretion of silk

Unit 2: Rearing of Silkworms (10 Lectures)

Selection of mulberry variety and establishment of mulberry garden

Rearing house and rearing appliances

Disinfectants: Formalin, bleaching powder, RKO

Silkworm rearing technology: Early age and Late age rearing

Types of mountages

Spinning, harvesting and storage of cocoons

Pests of silkworm: Uzi fly, dermestid beetles and vertebrates

Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial

Control and prevention of pests and diseases

SUGGESTED READINGS

- Handbook of Practical Sericulture: S.R. Ullal and M.N. Narasimhanna CSB,Bangalore
- Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI, Mysore.
- Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. Ltd., Tokyo, Japan1972.
- Manual of Silkworm Egg Production; M. N. Narasimhanna, CSB, Bangalore 1988.
- Silkworm Rearing; Wupang—Chun and Chen Da-Chung, Pub. By FAO, Rome 1988.
- A Guide for Bivoltine Sericulture; K. Sengupta, Director, CSR & TI, Mysore 1989.
- Improved Method of Rearing Young age silkworm; S. Krishnaswamy, reprinted CSB, Bangalore, 1986.

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B. Sc. Botany- III Year
Semester-V - Paper-V (Core)
Cell Biology and Genetics

Theory Syllabus

Credits-3

Unit - I: **45 hours**

1. Plant cell envelope: Ultra structure of cell wall, molecular organization of cell membranes. (4h)

2. Nucleus: Ultra structure, Nucleic acids - Structure of DNA, types and functions of RNA. (4 h)

3. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. DNA Replication. Special types of chromosomes: Lampbrush Polytene and B - chromosomes. (7h)

Unit - II:

4. Extra nuclear genome: Mitochondrial and plastid DNA, plasmids. (3 h)

5. Cell division: Cell and its regulation; mitosis, meiosis and their significance (3h)

6. Mendelism: Laws of inheritance. Genetic interactions - Epistasis, Complementary, Supplementary and inhibitory genes. (5h)

Unit - III:

7. Linkage: A brief account and theories of Linkage. Crossing over: Mechanism and theories of crossing over. (4 h)

8. Genetic maps: Construction of genetic maps with Two point and Three point test cross data. (3h)

9. Mutations: Chromosomal aberrations - structural and numerical changes; Gene mutations, Transposable elements. (3 h)

Unit-IV

10. Gene Organization- Structure of gene, Genetic code, Method of Replication of DNA in Eukaryotes & Prokaryotes (3h)

11. Mechanism of transcription in Prokaryotes and Eukaryotes, translation (4h)

12. Regulation of gene expression in prokaryotes (*Lac* and *Trp* Operons). (2h)

References:

1. Sharma, A. K. and A. Sharma. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harward Academic Publishers, Australia.

2. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding. S.Chand & Company Ltd., New Delhi.

3. Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.

4. Snustad, D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc., U S A.

5. Strickberger, M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company.

6. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.

B. Sc. (CBCS) Botany- III Year
Semester-V - Paper-V (Core)
Cell Biology and Genetics

Practical Syllabus

(45 hours)

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies. (6 h)
2. Study of various stages of mitosis using cytological preparation of Onion root tips. (6 h)
3. Study of various stages of meiosis using cytological preparation of Onion flower buds. (3h)
5. Solving genetic problems related to monohybrid, dihybrid ratio incomplete dominance and interaction of genes (minimum of six problems in each topic). (12h)
6. Construction of linkage maps; two and three point test cross. (6 h)
7. Study of ultra structure of cell organelles using photographers. (6h)
8. Study of Special types of Chromosomes (6h)

B. Sc. (CBCS) Botany-III Year
Semester-V - Paper VI
Elective Paper (Discipline centric)
Ecology & Biodiversity

Theory Syllabus

Credits-3
(45 hours)

UNIT - I

1. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids, Biogeochemical cycles - Carbon Cycle (4h)
2. Definition of Environment: Atmosphere (Troposphere, Stratosphere , Mesosphere , Ionosphere), Hydrosphere, Lithosphere & Biosphere. (3h)
3. Plants and environment: Ecological factors - Climatic (Light and Temperature), and biotic. Ecological adaptations of plants. (5h)

UNIT - II

4. Edaphic Factors: Soil- Formation- Weathering, mode of formation-residual;Transported: Colluvial, Alluvial, Glacial & Eolian. Soil erosion & Conservation. (4h)
5. Population ecology: Natality, Mortality, Growth curves, Ecotypes & Ecads. (4h)
6. Community ecology: Frequency, density cover, Life forms &Biological spectrum. (4h)

UNIT- III

7. Community Dynamics: Succession - Serial stages, Modification of physical environment, Climax formation with reference to Hydrosere and Xerosere. (4h)
8. Production ecology: Concepts of productivity - Primary and Secondary Productivity. (4h)
9. Biodiversity: Concepts, Convention of Biodiversity - Earth Summit (Copenhagan). (4h)

UNIT - IV

10. Biodiversity- Levels, threats and value (3h)
11. Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism. (3 h)
IUCN categories, RED data book
12. Principles of conservation – *Insitu* and *Exsitu*. Role of organizations in the conservation of Biodiversity - WWF and NBPGR. (3h)

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. Universities Press (India) Private Limited, Hyderabad.
2. Khitoliya, R. K. 2007. Environmental Pollution – Management and Control for Sustainable Development. S. Chand & Company Ltd., New Delhi.
3. Michael, S. 1996. Ecology. Oxford University Press, London.
4. Mishra. D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd.,New Delhi.
5. Odum, E. P. 1983. Basics of Ecology. Saunder's International Students Edition, Philadelphia.
6. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.
7. Verma, P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi

B. Sc. (CBCS) Botany-III Year
Semester-V - Paper VI
Elective Paper-I (Discipline centric)
Ecology & Biodiversity

Practical Syllabus

45 hours

1. Study of plant communities by Quadrat Method (9h)
2. Estimation of carbonates and bicarbonates in the given water sample. (6h)
3. Determination of soil texture (composition of clay, sand silt etc.) and pH. (6h)
4. Study of morphological and anatomical characteristics of plant communities using locally available plant species: Hydrophytes (*Eichhornia, Hydrilla, Pistia, Nymphaea, Vallisneria*), Xerophytes: (*Asparagus,Opuntia, Euphorbia spp*), Halophytes (*Rhizophora, Avicennia*) . (12h)
5. Value of biodiversity (12h)

a) Medicinal value: *Catharanthus, Tinospora* and *Emblica*

b) Timber Value: *Acacia, Tectona* and *Azardirachta*

c) Aesthetic Value: *Mangifera, Ficus, Ocimun*

B. Sc. (CBCS) BOTANY: III YEAR
Semester-V - Paper VII
Elective Paper-II (Inter disciplinary)
Horticulture

Theory Syllabus

Credits-3
(45 hours)

UNIT - I

1. Definition, branches, scope and economic importance of horticultural crops (2h)
2. Nutritive value of fruits and vegetables (3h)
3. Classification of horticultural crops based on -Climatic requirements, Season of growth, Plant parts used for consumption and Botanical classification (5h)

UNIT - II

4. Manures: Definition, importance of manures FYM (compost), oil cakes, green manure, Organic manures and vermi-compost. (3h)

5. Natural Propagation: By seeds, Vegetative Structures like Bulbs, Tubers, Corms, Rhizomes, Root stock, runners, Offsets and suckers. (4h)
6. Artificial Propagation: Cutting, Layering, Grafting and Budding (4h)

UNIT - III

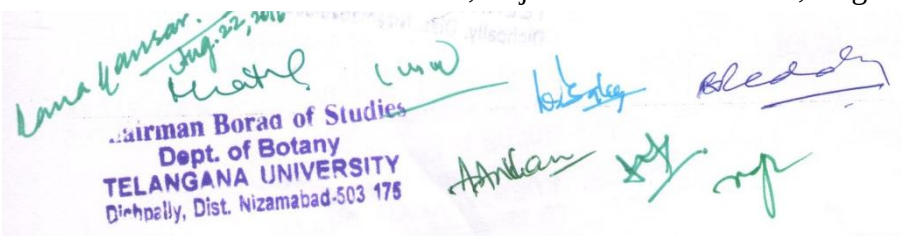
7. Application of the following plant growth regulators in horticulture - (3h)
   Auxins, Gibberellins, Cytokinins, Ethylene and Brassinosteroids.
8. Green house technology- definition, types, layout, construction, irrigation systems, care and attention, hardening of plants. (3h)
9. Horticulture as a business definition and nature, organization, planning and operation of horticulture farm business. (3h)

UNIT- IV

10. Soil and climatic requirements of horticultural crops, Selection of site, planning, training, pruning and Cropping system; Garden implements and their uses. (5h)
11. Management: Orchard management, Nutrition management, Water management and Weed Management. (4h)
12. Organic Farming; Bonsai techniques. (6h)

References:

1. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur
2. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.
3. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.
4. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi
5. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi
6. Edmond, J.B. T.L.Senn, F.S. Andrews and P.G.Halfacre, 1975. Fundamentals of Horticulture, Tata MC. Graw Hill Publishing Co.New Delhi
7. George Acquaah, 2002, Horticulture-principles and practices. Prentice-Half of India pvt. Ltd., New Delhi.
8. Hartman, H.T. and Kester, D.E. 1986. Plant propagation – Principles and Practices – Prentice Hall of India Ltd., New Delhi.
9. Jacob John. P. 2008. A hand book of post harvest management of fruits and vegetables. Daya publishers.
10. Jitendra Singh. 2006. Basic Horticulture. Kalyani Publishers, New Delhi.
11. Rajan, S. and B.L. Markose. 2007. Propagation of horticultural crops. New India Publishing, New Delhi.
12. Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2005. Production technology of spices and plantation crops. Agrobios, Jodhpur.
13. Singh, D.K. 2008. Hi-tech horticulture. Agrotech publishers, Udaipur
14. Singh, N.P. 2005. Basic concepts of fruit science. International Book Distributing Co., Lucknow.
15. Surendra Prasad and U. Kumar. 1999. Principles of horticulture, Agro-botanica, Bikaner, India.
16. Sureshkumar, P. Sagar and Manish Kanwat. 2009. Post harvest physiology and quality management of fruits and vegetables. Agrotech publishers, Udaipur
17. Utpal Banerjee. 2008. Horticulture. Mangal Deep publishers
18. Vijaikumar UmRao. 2008. Horticulture terms – Definitions and Terminology. IBD publishers, Dehradun
19. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth –Heinemam, Oxford University Press.
20. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.
21. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.



B. Sc. (CBCS) BOTANY: III YEAR
Semester-V - Paper VII
Elective Paper-II (Inter disciplinary)
Horticulture

Practical Syllabus

(45 hours)

1. Garden tools and implements. (3h)
2. Identification and description of any two varieties/hybrids of tropical and subtropical vegetable, fruit, flower and ornamental crops. (3h)
3. Propagation practices by seed, Vegetative propagation (Rhizome, bulb, corm), cutting, layering, budding, grafting with two examples. (9h)
4. Seed propagation- seed treatments, sowing and seedling production. (6h)
5. Nursery practices, transplanting, field preparation, sowing/planting, use of herbicides, top dressing of fertilizers and use of growth regulators. (6h)
6. Nursery containers, media, potting and repotting of plants, hardening of plants in nursery, shade regulation in nursery, plant protection in nursery plants (Demonstration) (6h)
7. Packing nursery plants for local and long distance markets. (Demonstration) (3h)
8. Making of organic-compost. (9h)

B.Sc. III Year

Semester-V

Plant Biodiversity and Human Welfare

GE-1E (2 hrs/week) Credits-2 Generic Elective-I 30 hours

Theory Syllabus

Unit-I:

1. Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at The ecosystem level, Agro-biodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.

2. Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro-biodiversity, Projected scenario for biodiversity loss,

3. Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ and ex situ conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit-II:

4. Role of plants in relation to Human Welfare; a) Importance of forestry their utilization and commercial aspects. b) Avenue trees. c) Ornamental plants of India. d) Alcoholic beverages through ages. Wood and its uses.

5. Fruits and nuts: Important fruit crops their commercial importance.

6. Management of Plant Biodiversity: Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Suggested Readings

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

B.Sc. III Year

Semester-V

Skill Enhancement Course SEC-3 (2 hrs/week) (Credits 2) Lectures: 30

Mushroom Culture Technology

UNIT-I

1. Introduction & history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.

2. Cultivation Technology. Infrastructure; substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves.

3. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

UNIT-II

4. Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

5. Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

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

B. Sc. (CBCS) Botany: III Year
Semester-VI - Paper-VIII (Core)
Plant Physiology

Theory Syllabus

Credits-3
(45 hours)

UNIT - I

1. Water Relations*:* Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis; water, osmotic and pressure potentials; absorption, transport of water, ascent of sap; transpiration; Stomatal structure and movements. (7h)
2. Mineral Nutrition*:* Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency. (3h)
3. Stress physiology: concept and plant responses to water, salt and temperature stresses (2h)

UNIT- II

4. Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, enzyme kinetics, factors regulating enzyme action. (4h)
5. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; Factors effecting Photosynthesis, photophosphorylation
6. Carbon assimilation pathways: C3, C4 and CAM. (8h)

UNIT - III

7. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway. (6h)
8. Translocation of organic substances: Mechanism of phloem transport; source-sink relationships. (2h)
9. Nitrogen Metabolism*:* Biological nitrogen fixation, nitrate reduction, ammonia assimilation, (GS-GOGAT, transamination) (4h)

UNIT- IV

10. Lipid Metabolism: Structure and function of lipids. (3h)
11. Growth and Development: Physiological effects of phytoharmones–Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids (3h)
12. Physiology of flowering and photoperiodism. Role of Phytochrome in flowering. (3h)

References:

1. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons Inc., New York, USA
2. Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
3. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
4. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc.,USA.
5. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.

B. Sc. (CBCS) Botany: III Year
Semester-VI - Paper-VIII (Core)
Plant Physiology

Practical Syllabus

(45 hours)

1. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of *Rheodiscolor* / *Tradescantia*. (6h)
2. Determination of rate of transpiration using Cobalt chloride method (3h)
3. Determination of stomatal frequency using leaf epidermal peelings / impressions (6h)
4. Determination of catalase activity using potato tubers by titration method (6h)
5. Separation of chloroplast pigments using paper chromatography technique (12h)
6. Estimation of protein by Biuret method (6h)
7. Mineral deficiency- Detail study of Micronutrients and Macro nutrients (3h)
8. Identification of C_3, C_4 and CAM plants (3h)

B. Sc. (CBCS) Botany-III Year
Semester-VI – Paper-IX
Elective Paper (Discipline centric)
Tissue Culture and Biotechnology

Theory Syllabus

Credits-3

UNIT - I **(45 hours)**

1. Tissue culture: Introduction, sterilization procedures, explants, culture media – composition and preparation; Micropropagation. (5h)
2. Organ culture: Vegetative Organs-Root, Shoot, Leaf culture (6h)
   Reproductive Organs-Anther, Ovary, Ovule, Embryo culture
3. Callus culture, Cell and Protoplast culture (4h)

UNIT- II

4. Somatic hybrids and Cybrids. (4h)
5. Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds. (6h)
6. Production of hairy roots and its applications in production of secondary metabolites. (2h)

UNIT - III

7. Biotechnology: Introduction, history, scope and applications. (3h)
8. rDNA technology: Basic aspect of gene cloning, Enzymes used in gene cloning-Restriction enzymes, Ligases, Polymerases. (4h)
9. Gene cloning-Vectors – cloning vehicles (Plasmid, Cosmids, Bacteriophages, & Phasmids) application of r DNA technology. (5h)

UNIT- IV

10. Gene Libraries: Genomic Libraries, cDNA Libraries, Polymerase chain reaction and its applications. (4h)
11. Method of gene transfer in plants (*Agrobacterium* and Microprojectile) (4h)
12. Production of transgenic plants, Bt –application in cotton and brinjal. Application of Transgenic in crop improvement. (3h)

References:

1. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004.
2. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press
4. (India) Private Limited, Hyderabad.
5. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company,
6. New Delhi.
7. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi
8. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977..
9. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India)
10. Private Limited, Hyderabad..
11. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.
12. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth,
13. Thomson Learning Inc., USA..

B. Sc. (CBCS) Botany-III Year
Semester-VI – Paper-IX
Elective Paper (Discipline centric)
Tissue Culture and Biotechnology

Practical Syllabus

Major Experiments:

1. Estimation of plant DNA. (Tomato) (6h)
2. Production of synthetic seeds /Encapsulation of embryo (3 h)
3. Preparation of plant tissue culture medium. (6h)

Minor Experiments:

4. Callus Micropropagation (3h)
5. Demonstration of Micropropagation/ multiple shoots (6h)
6. Anther culture (3 h)
7. PCR –Demonstration (3h)
8. Study of biotechnology products: Samples of antibiotics and vaccines (6h)
9. Photographs of transgenic plants – Bt Cotton, Bt –Brinjal. (3h)
10. Instruments used in Biotechnology lab- Autoclave, Laminar air flow, Hot air oven and Incubator. (6h)

B. Sc. (CBCS) BOTANY: III YEAR
Semester-VI – Paper-X
Elective Paper-II (Inter disciplinary)
Seed Technology

Theory Syllabus

Credits-3
(45 hours)

UNIT- I

1. Seed: Structure and types. Seed dormancy: causes and methods of breaking dormancy (4h)
2. Seed storage: Long term and short term storage. Orthodox and recalcitrant seeds. Packing of seeds – Principles, practices, bagging and labelling. (3h)
3. Physico and Bio-chemical changes during seed storage. (2h)

UNIT-II

4. Seed viability, factors affecting seed viability and genetic erosion. (3h)
5. Cultural practices and harvesting of Seed: Isolation, Sowing, Cultural practices, harvesting and threshing of the following crops (9h)

a) Rice
b) Cotton
c) Sunflower

6. Seed Treatment to control seed borne disease –General account (3h)

UNIT-III

7. Structure of pollen and ovule-Types of ovules, Collection and storage of pollen (3h)
8. Principles of hybrid seed production-Cross pollination, Emasculation, Self pollination, role of pollinators and their management. (6h)
9. Seed development in cultivated plants, seed quality concept, importance of genetic purity of seed. Hybrid seed production and Heterosis. (4h)

UNIT-IV

10. Seed production technology; seed testing- Procedures of seed testing, seed testing laboratories and importance of seed testing.
11. Seed certification- History, Seed certification agency, Indian minimum, general and specific seed certification standard. (3h)
12. Seed banks- National, International and Millennium seed banks. (3h)

References:

1. Agrawal, P. K. 1993. Hand Book of Seed Technology. Dept. of Agriculture and Cooperation.
   National Seed Corporation Ltd., New Delhi
2. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004.
   Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Bedell, Y. E. Seed Science and Technology. Indian Forest Species. Allied Publishers Limited, New Delhi.
4. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press (India) Private Limited, Hyderabad.
5. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
6. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi
7. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977..
8. Hartman, H. T. and D. E. Kestler. 1976. Plant Propagation: Principles and Practices. Prentice & Hall of India, New Delhi.
9. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India) Private Limited, Hyderabad..
10. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.
11. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA..
12. Tiwari, G. N. and R. K. Goal. Green House Technology – Fundamentals, Design, Modelling and Application. Narosa Publishing House, New Delhi.
13. Tunwar, N. S. and S. V. Singh. 1988. Indian Minimum Seed Certification Standards. The Central Seed Certification Board, Govt. of India, New Delhi.

B. Sc. (CBCS) BOTANY: III YEAR
Semester-VI – Paper-X
Elective Paper-II (Inter disciplinary)
Seed Technology

Practical syllabus

(45 hours)

Major Experiment

1. Testing of seed viability using 2, 3, 5-triphenyl tetrazolium chloride (TTC). (3h)
2. Estimation of amylase activity of germinating seeds (Qualitatively). (3h)
3. Demonstration of seed dressing using fungicides to control plant diseases. (3h)
4. Demonstration of seed dressing using Biofertilizers (BGA) to enrich nutrient supply. (3h)

Minor Experiments

5. Emasculation, bagging of flower for hybrid seed production. (6h)
6. Dissection of Dicot embryo (bean) and Monocot embryo (maize). (6h)
7. Pollen viability test using Evan's blue staining. (*Hibiscus*). (3h)
8. Harvesting and Importance of following seeds:
   Rice,
   Maize,
   Cotton,
   Groundnut and
   Sunflower. (6h)
9. Types of ovules: Orthotropous, Anatropous and Campylotropous. (3h)
10. Structure of pollen grains: *Hibiscus* and grass. (3h)
11. Study visits to research institutes, seed tests and certification laboratories and places seed banks. (6h)

B.Sc. III Year

Semester-VI

ECONOMIC BOTANY

GE-1E (2 hrs/week) Credits-2 Generic Elective-II 30 hours

Theory Syllabus

Unit-I:

1. Cultivated Plants: Concept of origin, their importance.

2. Vegetables: Nutritional and Commercial values of Root crops, leafy and fruit vegetables.

3. Cereals: Rice, Wheat and maize -Origin, morphology and uses

4. Pulses: General account with special reference to Gram and soybean

5. Millets: Nutrient significance of Sorghum, Finger millet, Pearl millet, Foxtail millet.

Unit-2:

6. Spices: General account with special reference to clove and black pepper.

7. Fruits and nuts: Commercial and nutritional value of South Indian fruits. Cashew nut, Almond and Walnut.

8. Beverages: Tea & Coffee - morphology, processing, uses.

9. Oils and Fats: General description with special reference to groundnut and sunflower

10. Fiber Yielding Plants: General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

Suggested Readings

1. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.

2. B.P. Pandey (2007). Economic Botany, S. Chand & Company Ltd. New Delhi. 17/e.

B.Sc. III Year

Semester-VI

Skill Enhancement Course

SEC-4 (2 hrs/week) (Credits 2) Lectures: 30

BIOFERTILIZERS

Unit-I

1. Microbes as biofertilizers – *Rhizobium* – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. (4h)

2. *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. (8h)

3. Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, the role of blue green algae and *Azolla* in rice cultivation. (4h)

Unit-II

4. 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. (8h)

5. Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – preparation of biocompost, types and method of vermicomposting – field Application. (6h)

Suggested Readings

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.