

**THE NEW COLLEGE (AUTONOMOUS),
CHENNAI – 600 014.
B. Sc, DEGREE COURSE IN
PLANT BIOLOGY & PLANT BIOTECHNOLOGY**



**SYLLABUS – CBCS PATTERN
(2012 - 2013)**

THE NEW COLLEGE (AUTONOMOUS), CHENNAI – 600 014.

**B. Sc, DEGREE COURSE IN
PLANT BIOLOGY & PLANT BIOTECHNOLOGY**

Semester	Name of the Subject	Exam Duration (Hrs)	Max. Marks		
			CIA	Semester	Total
Frist Semester Major: Paper - I	Plant Diversity – I	3	25	75	100
Allied: Paper - I	Allied Botany – I	3	25	75	100
Major: Practical -I	Covering Major Paper I &	3	25	65	100
	Practical Record			10	
Second Semester Major: Paper -II	Plant Diversity – II	3	25	75	100
Allied: Paper - II	Allied Botany – II	3	25	75	100
Major: Practical -II	Covering Major Paper II	3	25	65	100
	& Practical Record			10	
Allied: Practical	Allied Papers I & II	3	25	65	100
	& Practical Record			10	
Third Semester Major: Paper -III	Anatomy, Embryology of Angiosperms	3	25	75	100
Major:Practical -III	Covering Major Paper III	3	25	65	100
	& Practical Record			10	
Fourth Semester Major: Paper -IV	Environmental Science & Phytogeography	3	25	75	100

Semester	Name of the Subject	Exam Duration (Hrs)	Max. Marks		
			CIA	Semester	Total
Major: Practical -IV	Covering Major Paper IV	3	25	65	100
	& Practical Record			10	
Fifth Semester Major: Paper -V	Angiosperm Morphology & Taxonomy	3	25	75	100
Major: Paper -VI	Cell Biology & Molecular Biology	3	25	75	100
Major: Paper -VII	Herbal Medicine	3	25	75	100
Major: Paper -VIII	Economic Botany	3	25	75	100
Major: Paper -IX	Modern Plant Pathology	3	25	75	100
Major: Practical -V	Major Paper V – IX	3	25	55	100
	Practical Record			10	
	Herbarium			10	
Sixth Semester Major: Paper -X	Genetics, Plant breeding & Biostatistics	3	25	75	100
Major: Paper –XI	Horticulture	3	25	75	100
Major: Paper -XII	Plant Physiology	3	25	75	100
Major: Paper -XIII	Plant Biotechnology	3	25	75	100
Major: Paper -XIV	Plant Microtechnique	3	25	75	100
Major: Practical -VI	Major Paper X – XIV	3	25	65	100
	Practical Record			10	

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IB. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

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(Effective from the academic year 2011 – 2012)

CORE – 01 : Plant Diversity – I Credits: 5 Code: LM101.

(Algae, Fungi, Lichen, Viruses & Bacteria)

7 Lecture Hours and 2 Practical Hours per week

Unit I:

General characteristics and classification of algae – F. E. Fritsch, 1945 Economic importance – Agar agar; Alginates; Carrageenin; Diatomaceous earth; Single Cell Protein; Biofertilizers and Antibiotics.

Unit II:

Distribution, Structure, reproduction and life cycle of *Nostoc*; *Caulerpa*; *Pinnularia*; *Sargassum* and *Gracilaria* (No developmental studies).

Unit III:

General characteristics and classification of fungi- Alexopoulos & Mims 1992 Economic importance of Fungi –Edible mushrooms; Antibiotics and Myccorrhiza

Unit IV:

Detailed study of the structure, reproduction and life cycle of *Albugo*, *Peziza*; *Puccina* and *Fusarium*.

Unit V:

General characters, structure and economic importance of Viruses, Bacteria and Lichens (*Usnea*).

Practical: All the items included in the Theory.

Reference Books:

- 1.Fritch. F.E. 1945. Structure and reproduction of Algae. Volume. I & II. Cambridge University press.
- 2.Smith G.M.1955.Cryptogamic Botany. Vol.1 McGraw Hill
- 3.Chapman ,VJ& Chapman ,D.j. 1981 .The Algae ,Macmillan
- 4.Vasishta. B.R;1990. Botany for degree students, Algae, S.Chand & Co
- 5.Singh. V; Pandey,P.C & Jain, D.K,1998.AText book of Botany for under graduate students. Rastogi publications.
- 6.Alexopoulos, C.J & mims C.V,1992,Introductory Mycology, John Wiley & sons.
7. Vasishta ,B.R. 1990 Botany for degree students, Fungi, S.Chand& Co
- 8.Singh,V, Pandey ,P.C and Jain, D.K;1998.A text book of botany for Undergraduate students.Rastogi publications.
- 9.Dube H.C.1993.An introduction to Fungi .Vikas, New Delhi .
- 10.Bold Hc and Wyne M. J.1978 Introduction to the Algae : Structure and function Practice Hall of India New Delhi.

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I B. Sc

(Effective from the academic year 2011 – 2012)

Allied Botany - I

(Anatomy, Embryology and Taxonomy) - Credits: 4 Code: AB 101

7 Hours Lecture and 2 Hours Practicals

Unit I: Anatomy

Normal secondary thickening in Dicot stem and root.

Anomalous secondary growth in Dicot stems – *Nyctanthes* and *Boerhaavia*.

Anomalous secondary growth in Monocot stems – *Dracaena*.

Unit II: Embryology

Structure of mature anther, structure of mature ovule – its types – fertilization.

Unit III: Taxonomy

General outlines of Bentham and Hooker's system of classification – Merits and demerits.

Unit IV:

Study of the range of characters of *Annonaceae*, *Cucurbitaceae*, *Apocynaceae*, *Euphorbiaceae* and *Liliaceae*.

Unit V:

General characters of Bacteria, Classification; Ultra Structure of *E.coli*, Economic importance,

General account of plant viruses (TMV).

Reference Books:

1. Ganguly, A. K. 1971, General Botany Vol II. The New Book Stall, Calcutta.
2. Rao, K. M., Krishnamurthy, K. V. and Rao, G. 1979, Ancillary Botany, Viswanathan private Ltd.
3. Kumar, N. 1999, Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.
4. Rasool, S. K. and Sekar, T. 2004. Allied Botany, Popular Book Depot.
5. Gupta, P. K. Elements of Biotechnology, Rastogi and company.

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(Effective from the academic year 2011 – 2012)
CORE – 03: Plant Diversity – II – Credits: 5 Code: LM202.
7 Lecture Hours and 2 Practical Hours per week

Unit I:

General characteristics Features and classification of Bryophytes (Watson, 1967), Distribution, structure, reproduction and life cycle of *Marchantia*; *Anthoceros* and *Polytrichum* (No developmental studies).

Unit II:

General characteristics features and classification of Pteridophytes (Reimer, 1954) Stellar evolution, Apospory, Apogamy and Heterospory.

Unit III:

Detailed study of structure, reproduction and life cycle of *Lycopodium*, *Equisetum* and *Marsilea* (No developmental studies).

Unit IV:

General characteristics features and classification of Gymnosperms (K. R. Sporne, 1965) Detailed study of structure, reproduction and life cycle of *Cycas* and *Arucaria*.

Unit V:

Methods of fossilization, kinds of fossils – impressions, compressions casts, molds and petrifications. Geological time scale. Carbon dating.
Brief study of the following fossils – *Lepidodendron* and *Calamites*.

Practical: All the items included in the Theory.

Reference Books:

- 1.Parihar .N.S; 1967 .An introduction to Embryophyta Vol-I &II . General Book Depot.
- 2.Premuri,1973 Bryophytes-Abroad perspective, Atmaram & Sons.
- 3.Smith. G.M; 1955.Cryptogamic Botany. Vol-II.McGraw Hill
- 4.Sporne, K.R;1976, Morphology of Pteridophytes, BI Publications.
- 5.Vasishta, B.R.1978. Bryophytes. S.Chand &Co
- 6.Vasishta ,P.C, 1976. Botany for degree students VolIV, S.Chand& co
- 7.Chamberlain. C.J 1957 Gymnosperms.Structure & Evolution.
- 8.Sporne, K.R: 1967 .Morphology of Gymnosperms.Chand & co
- 9.Arnold. C.A 1947. Introduction to Paleobotany , McGrawHill.
- 10.Shukla .A and Mishra .S.P 1982 Essentials of Paleobotany . Vikas publishing House. Pvt.Ltd
- 11.Vasishta. P.C;1971. Pteridophytes.S.Chand & Co.

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IB. Sc

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(Effective from the academic year 2011 – 2012)

Allied Botany -II – Credits: 4 Code: AB 202.

(Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms,

Plant Physiology & Plant Biotechnology)

7 Hours Lecture and 2 Hours Practicals

Unit I:

Structure and life history of *Nostoc*, *Chara*, *Sargassum*, *Gracilaria*, *Albugo*, *Penicillium* and *Puccinia*.

Unit II:

Structure and life history of *Polytrichum*, *Selaginella* and *Cycas*.

Unit III:

Photosynthesis – Light reactions & Dark reactions (Calvin cycle)

Respiration – Glycolysis, Krebs cycle & Electron Transport System.

Unit IV:

Plant Hormones – Auxins, Gibberellins and Cytokinins – their application.

Unit V:

Plant Biotechnology – Introduction, Genetic Engineering; Role of Transgenics in crop improvement.

Practical: All the items included in the Theory.

Reference Books:

1. Ganguly, A. K. 1971, General Botany Vol II. The New Book Stall, Calcutta.
2. Rao, K. N., Krishnamurthy, K. V. and Rao, G. 1979, Ancillary Botany, Viswanathan private Ltd.
3. Kumar, N. 1999, Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.
4. Rasool, S. K. and Sekar, T. 2004. Allied Botany, Popular Book Depot.
5. Gupta, P. K. Elements of Biotechnology, Rastogi and company.
6. Trivedi, P. C. 2000. Plant Biotechnology – Recent Advances: Panima Publishing Corporation.

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IIB. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2011 – 2012)

CORE –05: Anatomy, Embryology of Angiosperms – Credits: 5 Code LM 303.

7 Lecture Hours and 2 Practical Hours per week

Unit I:

Meristem – Characteristics, Classification; Theories of Shoot apex and Root apex Organization, Apical Cell Theory, Histogen Theory, Tunica Corpus Theory, Zonation Theory and Quiescent Center Concept.

Unit II:

Normal secondary thickening in Dicot stem (*Tridax sp*) and Dicot root (Bean). Anomalous secondary growth in Dicot stems – *Nyctanthes sp* and *Boerhaavia. sp* Monocot stem – Normal (*Chloris sp*) Anomalous (*Dracaena sp*).

Unit III:

Nodal anatomy – Unilacunar, Trilacunar and Multilacunar
Anatomy of Monocot and Dicot leaves.

Unit IV:

Microsporangium and Microsporogenesis; Development of Male gametophyte Ovule –types; Development of Female gametophytes – Monosporic (*Polygonoum*) Bisporic (*Allium*) and Tetrasporic (*Peperomia*).

Unit V:

Fertilization – Double fertilization and Post fertilization changes. Development of Endrosperm – Nuclear, Cellular and Helobial). Dicot (*Capsella bursapastoris*) and Monocot (*Luzula forsteri*) Embryo development; Apomixis.

Practical: All the items included in the Theory.

Reference Books:

1. Pandey, B. P.1997. Plant Anatomy. Chand & Company (V. edition).
2. Esau, K. 1985. Anatomy of seed plants John Willey.
3. Cutter, E. G. 1989. Plant Anatomy Part -1; Addison – Wesley Publishing Company.
4. Fahn, 1985. Plant Anatomy. Hakkibutz Hameuhad Publishing House Ltd.
5. Vashista, P. C. 1991. A Text book of Plant Anatomy. S. Nagin & Company.
6. Maheswari, P. 1991. An Introduction to Embryology of Angiosperms. Tata – Mc Graw Hill Pub. Co.Ltd.
7. Swamy, B. G. L & Krishnamoorthy, K. V. 1990. From flower to fruits, Tata – Mc Graw Hill Pub. Co.Ltd.
8. Bhojwani, S. S & Bhatnagar, S. P. 1987. Embryology of Angiosperms, Vikas Publishing Houses, Pvt. Ltd.

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(Effective from the academic year 2011 – 2012)

CORE – 07: Environmental Science and Phytogeography – Credits:5 Code: LM 404

7 Lecture Hours and 2 Practical Hours per week

Unit I:

Ecosystem – concept; structure and function components
Food chain; Food web; Energy flow; Agro ecosystem.

Unit II:

Plant succession; Hydrosere and Xerosere; Adaptations – Mesophytes, Hydrophytes, Xerophytes and Halophytes with special reference to mangroves.

Unit III:

Energy sources: Nuclear energy, Biofuels and Wind energy
Natural disaster management; remote sensing.

Unit IV:

Biodiversity and its conservation – In –situ and Ex- situ; Endemism, Endangered plants

Unit V:

Phytogeographic region of India – Ever green forests, Deciduous forests; Scrub jungle and Mangrove forests,

Practical: All the items included in the Theory.

Reference Books:

- 1.Allen,H.Benton William,E.Werner .1976. Field Biology & Ecology . McGraw HillPub.Ltd.
- 2.Smith, W.H.1981. Air pollution and forest: interactions between air contaminants and forest ecosystems.
- 3.Odum, E.P.1983.Basic Ecology. Holt-Sanders international editions.
- 4.Mabberly. O.J; 1983 .Tropical rain forest ecology .Blackie& Sons Ltd
- 5.Singh. D.V.1985. The peoples representations and Global environment
- 6.Shukla . R.S &Chand P.S. 1990. Plant Ecology . S.Chand co.Pvt. Ltd
- 7.Kumar, H.D.1990 Mordern Concept of Ecology Vikas Pub. House Pvt.Ltd
- 8.Krishna Iyyer. V.K 1992. Environmental protection and legal defence. Storing Publishers Pvt. Ltd
- 9.Asthana, D.K & Meera Asthana 2005 . Problems and solutions S.Chand Co Ltd.

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(Effective from the academic year 2010 – 2011)

CORE – 09: Angiosperm Morphology &Taxonomy – Credits: 5 Code: BPBM 505.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Morphology

Flower - Parts, Symmetry, Floral diagram and Floral formula

Inflorescence - Definition and types – Racemose, cymose, Mixed and special types.

Fruits and Seed - Classification & Type.

Unit II:

Taxonomy and its importance, Concept of a taxon – genus and species. Binomial nomenclature, I.C.B.N, Taxonomic Hierarchy and Herbarium techniques.

Unit III:

Type of classifications – 1.Artificial (Linnaeus) 2.Natural (Bentham & Hooker) only outline classification needed – merits and demerits.

Unit IV:

A detailed study of the range of characters of the following families and their economic importance – Dicotyledons – Annonaceae; Capparidaceae; Sterculiaceae; Cucurbitaceae; Solanaceae; Bignoniaceae; Acanthaceae and Scrophulariaceae.

Unit V:

A detailed study of the range of characters of the following families and their economic importance – Monoclamydae – Amaranthaceae and Moraceae.

Monocotyledons – Orchidaceae; Commelinaceae; Poaceae and Scitamineae.

Practical: All the items included in the Theory.

Reference Books:

- 1.Lawrence, G.H.M. 1985. An introduction to plant Taxonomy, Central book depot, Allahabad.
- 2.Porter CL. 1982. Taxonomy of flowering plants .Eurasia Publication House, New Delhi
- 3.Rendle .A. B. 1980. The Classification of flowering plants (Vol.1&2) Vikas students Edn.
- 4.Pandey B.P. 1987. Taxonomy of Angiosperms.
- 5.Kaushik,M.P. 1997. Modern Botany ,Prakash publications, Muzaffarnagar(UP)
6. Mitra, J.N Mitra, D & Chowdhuri, S.K 1990. Studies in Botany, Vol.1 Moulik Library, Calcutta.
- 7.Hutchinson,J; 1969. Evolution & Phylogeny of flowering plants. Academic Press: London.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

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(Effective from the academic year 2010 – 2011)

CORE – 10: Cell Biology & Molecular Biology – Credits: 5 Code: BPBM 506.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction to Cell Biology; Cell Theory; Cell Dimensions; Types of cell – Prokaryotic and Eukaryotic.

Cell Boundaries; Cell Wall – Introduction, Occurrence, Gross structure – Layers ie Primary wall, Secondary wall, Tertiary wall, Middle lamella, Plasmodesmata and Pits (Simple and Bordered), Ultra structure; chemistry and function.

Plasma membrane – Occurrence, Molecular organization, Models, Chemistry and Functions.

Unit II:

Occurrence, Structure and functions of Endoplasmic Reticulum,

Golgi bodies, Sphaerosomes; Glyoxisomes; Ribosomes; Mitochondria and Chloroplast.

Autonomy of organelles.

Unit III:

Occurrence, Structure and functions of Nucleus; Nucleolus; Organization of Chromosomes – Euchromatin; Heterochromatin

Special types of chromosomes – Giant Chromosomes (Polytene, Lamp brush and β Chromosomes).

Cell cycle, Interphase (G1, S, G2) Mitotic Phase (M – Phase), Cytokinesis phase (C - phase) and Mitosis.

Molecular Biology

Unit IV:

Central dogma in Molecular Biology; Structure and functions of genetic material; DNA as Genetic material, Replication and Repair. RNA as Genetic material, structure, types and function.

Unit V:

Gene regulation in Prokaryotes – Lactose – Operon; Positive and negative regulation. Genetic engineering – Vectors; Restriction enzymes; Recombinant DNA Synthesis, Transformation of host selection & Screening of recombinants.

Practical: All the items included in the Theory.

Reference Books:

1. Brown W.V and Bertke, E.M. 1974. A text book of cytology C.V Mosley Co. St. Louis.
2. Cohn, NS 1979. Elements of cytology, Freeman book co
3. De Robertis E.M.P and De Robertis E.M.F. Jr. 1987. Cell and Molecular Biology Lea and Febiger.
4. Verma P.S and Agarwal V.K. 1995. Cell Biology and Evolution.
5. Freifelder D. Essentials of Molecular Biology, Jorner and Bartlette pub inc. Boston.
6. Freifelder D. 1990. Molecular Biology, Narosa Publishers
7. Watson J.D. et al. Molecular biology of the gene. The Benjamin/Cummings.
8. Freifelder D. Microbial genetics. Jones & Bartlette Publications
9. Brown, TA; Gene cloning.

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IIIrd B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

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(Effective from the academic year 2010 – 2011)

MBE 01: Herbal Medicine– Credits: 3 Code: BPBM 507.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Importance and relevance of Herbal Medicine –
Pharmacognosy – Aim and Scope : Indigenous system of Medicine; Classification of drugs;
Primary and Secondary metabolites; Primary metabolite – Carbohydrates and lipids, Secondary
metabolites – Alkaloids, Glycosides, Tannins, Resins and Gums.

Unit II:

Botanical description and active principles of leaves (Cocoa, Digitalis); Flower (Rose, Saffron),
Fruits (Pomogranate; Black pepper) Seeds (Castor) and Entire plant as Drugs (*Vinca*,
Phyllanthus)

Unit III:

Pharmacognosy of some selected herbals; Leaf (*Senna*), Brak (*Cinnamomum*), Root (*Rauwolfia*)
Rhizome (*Zingiber officinalis*)

Unit IV:

Drug Industry – marketing, Adultration, Sophisitication, Spiolage, Contamination and Storage.

Unit V:

Standradization of Crude Durgs by Anatomical and Phytochemical Methods.

Practical:

1. Detecting original drug yielding plants from the adulterants through anatomical studies of plant organs such as Leaf, Petiole, Stem, Root, Rhizome and Bark.
2. Phytochemical analysis of Curde Drugs (Ex: Strach, Volatile oil, Alkaloids and other chemicals).

Reference books

1. Agarwal, O.P. 1985. Chemistry of Organic – Natural products Vol-II
2. Gamble, J.S and Fisher, 1921. CEC. Flora of the Presidency of Madras I, II, and III Volumes.
3. Mathew K.M., 1988. Flora of the Tamil Nadu and Carnatic
4. Nair N.C and Henry, A.N ., 1983. Flora of Tamil Nadu, Botanical survey of India
5. Chopra R.N Nagar S.L and Chopra I.C., 1956. Glossary of Indian Medicinal Plants.
6. Chopra R.N., Chopra I.C. handa K.L and Kanpur L.D., 1994. Indigenous drugs of India.
7. Chopra R.N., Badhuvar R.L & Gosh G., 1965. Poisonous Plants of India.
8. Wallis, T.E., 1967. Text book of Pharmacognosy.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2010 – 2011)

CORE – 11 Economic Botany – Credits: 5 Code: BPBM 508.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction – Food plants – plant and plant products of industrial value.
Cereals - Rice & Wheat, Millets – Sorghum & Pearl Millet. Pulses – Soya bean, Pea nut and Green gram.

Unit II:

Fibers & Fiber yielding plants – Cultivation, Extraction and uses of fibres. Soft fibres- Corchorus & Linum – Hard fibres.

Manila hemp – *Musa textilis*, Surface fibres – *Gossypium*. Timber – detailed study of harvesting and processing of wood in *Tectona*. Rubber – extraction and processing with reference to *Hevea brasiliensis*

Unit III:

Sugar – *Saccharum officinarum* – Cultivation, harvesting and extraction.

Spices – *Eugenia caryophyllata* – Cultivation, harvesting.

Beverages *Coffea arabica* and *Thea* – Cultivation, harvesting.

Pulp and Paper - Raw materials, pattern of cultivation – resources availability – manufacture of Pulp – Gums – Resin and Turpentine.

Unit IV:

Vegetables – Root Vegetable – Tapioca (*Manihot esculenta*) cultivation and uses. Stem Vegetable – Potato (*Solanum tuberosum*) cultivation and uses. Herbage Vegetable – Cabbage (*Brassica oleracea*). Fruit Vegetable – Tomato (*Lycopersicon esculentum*).

Unit V:

Fruits – Tropical fruits, Mango (*Mangifera indica*) and Banana (*Musa paradisiaca*) cultivation and uses. Temperate fruits – Apple (*Malus pumila*) and Grape (*Vitis vinifera*).

Practical: All the items included in the Theory.

Reference Books:

1. Pandey, B. P. 1987. Economic Botany.
2. Verma, V. 1984. Economic Botany.
3. Hill, A. W. 1981. Economic Botany. McGraw Hill Publishers.
4. Willis, T.E. 1994. Text Book of Pharmacognosy. Tata McGraw Hill Publishers
5. Gokhale, S. B. 1992. Pharmacognosy. S. Chand & Co.
6. Ansari, S. H. 1993. Pharmacognosy. S. Chand & Co

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

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(Effective from the academic year 2010 – 2011)

CORE – 12: Modern Plant Pathology – Credits: 5 Code: BPBM 509.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

A brief history of Plant Pathology; Principles of Plant Pathology; Symptomatology - Study of infection – Entry of Fungal, Bacterial Viral Pathogens.

Unit II:

Dissemination of Pathogens – spore dispersal, role of vector in viral transmission, influence of Weather – Wind, Temperature and Humidity.

Unit III:

Disease resistance – Morphological, cytological biochemical and genetical basis; and 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 pathogens, Detection of plant pathogens using molecular tools incorporation of resistant genes.

Unit V:

Study of causal organisms, symptoms and control of (a) Little Leaf of Brinjal; (b) Buncy Top of Banana; (c) Late Blight of Potato; (d) Red Rot of Sugarcane; (e) Bacterial Blight of Rice; (F) Citrus Canker; (G) Leaf Curl of Papaya and H) Fusarium Wilt of Cotton.

Practical:

1. A detailed study of diseased specimens included in the theory.
2. Demonstration of isolation and culturing of plant pathogens.
3. Effect of fungicide on the growth of plant pathogen (Demonstration only).

References:

1. Wheeler, B. E. J. 1992. An introduction to plant diseases. Oxford & IBH.
2. Rengasamy, G. Diseases of crop plants of India. Prentice Hall.
3. Singh, R. S. Plant diseases. Oxford & IBH.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2010 – 2011)

CORE – 14: Genetics, Plant breeding and Biostatistics – Credits: 5 Code: BPBM 610.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Mendelism; Monohybrid, Dihybrid and Test Cross ratios deviation – Allelic & non – allelic interactions.

Chromosome theory of linkage, crossing over, recombinations and mapping of genes on chromosomes, sex determination in plants; polyploidy.

Unit II:

Extra nuclear inheritance, inheritance of mitochondrial and chloroplast genes. Population genetics – Hardy -Weinberg- Principle and factors affecting it.

Plant breeding:

Unit III:

Principles involved in plant breeding. Method of crop improvement; selection (Pure Line, Mass and Clonal). Hybridization, Introduction & Acclimatization. Heterosis – causes and effects.

Unit IV:

DNA sequencing-Gibert and Maxim's chemical method; Sanger and Coulson's enzymatic Messing's M 13, short gun cloning and Hongs systematic method; computer aided sequencing.

Biostatics:

Unit V:

Types of sampling and variables in biology. A brief study of collection, analysis and presentation of data; Measurement of central tendency – Mean, Mode and Median. Measure of Dispersion – Range, Standard Deviation and Standard Error and Chi – Square test.

Practical:

1. Genetic problems –test cross, back cross and allelic /non-allelic interactions.
2. Biostatistical problems covered in theory.
3. Gene mapping -3 point test cross.

References:

1. Stanfield, W.D. Genetics 2nd Ed, McGraw Hill.
2. Goodenough, V. Genetics 3rd Ed, Saunders College publishing.
3. Freifelder D. Microbial genetics. Jones & Bartlette pub.Inc.Boston
4. Verma & Agarwal ,Genetics ,Chand & Co
5. Lewin . B Gene IV Oxford University press
6. Allard R.W 1960, Principles of plant breeding ,John Willey & Sons INC.NY
7. Sharma J.R.1994 Principles and practice plant breeding. Tata McGrawHill publishing co.Ltd . New Delhi
8. Sundaram D.D and G. Tulsidas 1967. Introduction to cytogenetics and plant breeding Popular Book Depot.Chennai.
9. Programmed statistics (Question -answer) B.L. Agarwal, New age International (P)Ltd.,
10. Practical Mathematical statistics H.C Saxena S. Chand & Co.
11. Rama Krishnan, P. 1995. Biostatistics. Saras Publication.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2010 – 2011)

MBE: 2 - Horticulture – Credits: 3 Code: BPBM 611.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction – scope and division of Horticulture; history of gardening – some famous gardens in India; types of Garden – Indoor garden, Public garden, Kitchen garden, Garden Implements and accessories.

Unit II:

Nursery structures –Nursery beds, propagating frames, hot beds green house and glass houses. Nursery Management – Cottage, Layerage, Graftage, Potting and Repotting. Preparation of soil mixture. Organic farming –vermiculture and composting.

Unit III:

Gardens Operation; Planting and Transplantation, Pinching, Debudding, Defoliation, Staking, Pruning. Mulching and Topiary.

Unit IV:

Terrace garden, Rock Garden, Hydroponics, Terrarium, Arches, Pergolas Bonsai and Lawn.

Unit V:

Cut – flowers, flower arrangements commercial floriculture, cultural practices of Rose and Jasmine.

Practical:

Layering – Grafting – Budding – Potting - Terrarium.

References:

1. Kumar.N 1990, Introduction to Horticulture , Rohini agenciesn Nagarcoil
2. Prasad, 2005 Principles of Horticulture , International book dist, Dehradun.
3. Chauhan,D.V.S., 1968, Vegetable production in India , Ram Prasad , SMS Agra
4. Edmund J.B Senn T.L Andrews F.S and Halforce R.G 1990. Fundamentals of Horticulture 14th ed) Tata McGraw Hill Pvt .Co. London.
5. Gopaldaswami Iyengar K.S 1970 Complete gardening in India , Kalyan press, Bangalore.
6. Jules J.Janick.J 1982. Horticulture science, 3rd Edition Surjeet publication , New Delhi .
7. Nayak K.1963. South Indian fruits and their culture .
8. Randhawa G.S 1973. Ornamental Horticulture in India. Today and Tomorrow printers and publishers, New Delhi
9. Percy Lancaste ,1979. Gardening in India , Mohan Makhijani and Rekha printers,New Delhi.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2010 – 2011)

CORE – 15: Plant Physiology – Credits: 5 Code: BPBM 612.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Plant water relations – diffusion, permeability, osmosis water potential and its components

Absorption of water - Apoplast and Symplast, Passive and active absorption Transpiration types and significance; Stomatal Physiology. Factors affecting transpiration.

Unit II:

Enzymes – General properties, Nomenclature & Classification, Coenzymes and Cofactors mechanism of action and enzyme regulation.

Unit III:

Photosynthesis –Radiant energy, Absorption spectrum, Action spectrum, Hill reaction, Red drop and Emerson Enhancement effect; Pigment systems – I and II, Photo electron transport and Photophosphorylation.

Path of Carbon in photosynthesis – C3 Photosynthetic cycle (Calvin cycle). C4 Photosynthetic cycle (Hatch & Slack pathway).

Respiration – Anaerobic (fermentation); Aerobic – Glycolysis, Krebs cycle, Electron Transport system, Oxidative Phosphorylation & Respiratory Quotient.

Unit IV:

Nitrogen Metabolism – Nitrogen importance, nitrogen cycle – nitrate assimilation, ammonification, nitrification, denitrification, nitrogen fixation – physical (non-biological) & biological; nitrogen fixing organisms, Rhizobium Symbiosis.

Biosynthesis of amino acids – Reductive and Transamination.

Unit V:

Plant growth –Plant growth regulators (Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic acid) mechanism of action and practical application.

Photomorphogenesis – photoperiodism, dormancy and vernalization.

Practical:

Experiments to be performed and recorded by students individually.

1. Determination of Osmotic potential of cell sap by Plasmolytic methods.
2. Effect of temperature and chemicals on membrane permeability.
3. Study of rate of Transpiration under different environmental factors.
4. Study of Amylase activity.
5. Separation of plant pigments by Paper Chromatography.
6. Study of rate of Photosynthesis under different wavelengths (Red, Green & Blue) of light.
7. Comparison of rate of Respiration of different respiratory substrates.
8. Determination of RQ using Respirometer.
9. Seed viability test by using Tetrazolium Chloride.

Demonstration Experiments:

1. Determination of ratio of water absorption and transpiration by weighing method.
2. Study of Catalase activity.
3. Split Pea stem test for IAA.

References:

1. Arditti, J & Dunn, A. 1969. Experimental plant physiology. Holt, Rinehart and Winston.
2. Devlin, R.M. 1966. Plant physiology. Affiliated East West Press.
3. Devlin, R. M & Witham, F.H. 1985. Plant Physiology.
4. Noggle, G.R & Fritz, G. J. 1982. Introductory Plant Physiology. Prentice private Limited.
5. Pandey, S. N & Sinha, B. K. 1985. Plant Physiology. Vani Educational Books.
6. Roa, K. N; Sudhakara Roa, G & Bharathan. S. 1987. The functioning plant S. Viswanathan Pvt. Ltd.
7. Salisbury, F. B & Ross, C.W. 1986. Plant Physiology. CBS Publisher and distributors.
8. Bajracharya, D. 1999. Experiments in Plant Physiology. A Laboratory Manual.
9. Rasool, S. k & Sekar, T. 2004. Allied Botany. Popular Book Depo, Chennai.

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III.B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2010 – 2011)

CORE – 16: Plant Biotechnology – Credits: 5 Code: BPBM 613.

4 Lecture Hours and 2 Practical Hours per week

Unit I:

Biotechnology – definition, history and scope. Isolation and cultivation of economically important microbes. a) Fresh water alga (*Scenedesmus*) and b) Fungus (*Aspergillus*).

Unit II:

Tissue culture – Media (MS & B5), Callus formation and protoplast fusion with reference to improvement of plants.

Single Cell Protein (SCP) – Microorganisms used in SCP (*Scenedesmus and Spirulina*).

Unit III:

Mushroom cultivation – Paddy Straw and Oyster Mushroom, Nutritional Value and methods of cultivation, control of pests and pathogens.

Biofertilizer – Blue green algae, *Azolla*, Fungi, Mycorrhiza (VAM) Bacterium *Azospirillum*.

Unit IV:

Production of primary metabolites – Ethanol production by yeast; Citric acid production by *Aspergillus niger*.

Production of secondary metabolites – Antibiotics (Penicillium). Enzymes from microbes and their application – amylase, protease and glucose oxidase.

Unit V:

Applications of recombinant technology with special reference to Agrobacterium mediated transgenics (Bt and viral coat protein expression), Bioethics, Patenting, Biopiracy and Biosafety.

Practical: All the items included in the Theory.

Reference Books:

1. Borowitzka, M. A & Borowitzka, L.J. Microalgal Biotechnology.
2. Doods, J.H & Roberts, L.W. Experimentals in plant tissue culture. Cambridge University Press
3. Sasson, A. Biotechnologies challenges and promises UNESO.
4. Srivatsatava, H. S. An Introduction to Biotechnology Willy eastern
5. Trehan, M. D; Boffey,S; Goulding R.A & Stanbury, P. Bio-technology, The Biological Principles. Tata McGraw Hill.
6. Wiseman, A. Principles of Biotechnology – 2nd edition, Surrey University Press UK.

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III B. Sc: PLANT BIOLOGY & PLANT BIOTECHNOLOGY
SYLLABUS –CBCS PATTERN
(Effective from the academic year 2010 – 2011)
CORE – 17: Plant Microtechnique – Credits: 5 Code: BPBM 614.
4 Lecture Hours and 2 Practical Hours per week

Unit I:

Light Microscopy – History and Optical principles use and care of microscopes – A brief study of Electron Microscopes –T.E.M and S.E.M.

Unit II:

Principles and techniques – Fixatives and Fixation; Stains and Staining.

Unit III:

Microscopic preparation; semi- permanent and permanent.

Unit IV:

Special techniques – Squash – Smear and Maceration.

Unit V:

Microtomy – Types of microtomes (Rotary and Sledge) and their uses.

Practical:

1. Preparing and recording of microscopic preparation as in unit III.
2. Learning the skills of special techniques as in unit IV.

References:

1. Johansen, D. A. 1940. Plant Microtechnique. Tata McGraw Hill.
2. Sasse John, E. 1964. Botanical Microtechnique. Oxford & IBH.
3. Grav, P. 1964. Hand Book of Basic Microtechniques. McGraw Hill.
4. Alan Peacock, H. 1966. Elementary Microtechnique. Edward Arnold (Publishers) Ltd.
5. Duddington, C. L. 1960. Practical Microscopy. Pitman.
6. Mc Cluney, C.L. 1961. Hand book of Microscopical Technique. Wafner.