

**S.D.N.B.VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
CHENNAI 600 044**

SYLLABUS AND REGULATIONS

CBCS

**BSC PLANT BIOLOGY & PLANT
BIOTECHNOLOGY (U.G.)**

CURRICULUM

AUTONOMY: MAJOR PAPER DETAILS

| SEMESTER | MAJOR PAPER | CODE | TITLE | CREDITS | HOURS | MARKS |
|----------|-------------|-------------|---|---------|---------|-------|
| I | I | UPB/CT/1001 | Phycology and Algal Biotechnology | 3 | 4 | 15+60 |
| | II | UPB/CT/1002 | Mycology, Fungal Biotechnology and Lichen | 3 | 4 | 15+60 |
| | | UPB/NE/1BF1 | Biofertilizer Production (NME) | 2 | 2 | |
| | | UPB/CP/2001 | Core Practical – I* | - | 4 | |
| II | III | UPB/CT/2003 | Hydrobiology of Fresh water | 3 | 4 | 15+60 |
| | IV | UPB/CT/2004 | Bryophytes and Pteridophytes | 3 | 4 | 15+60 |
| | | UPB/CP/2001 | Core Practical - 1 | 3 | 4 | 20+30 |
| | | UPB/NE/2BF2 | Biofertilizer Production Practical (NME) | 2 | 2 | |
| III | V | UPB/CT/3005 | General Microbiology | 3 | 4 | 15+60 |
| | VI | UPB/CT/3006 | Anatomy of Angiosperm and Embryology | 3 | 4 | 15+60 |
| | | UPB/CP/4002 | Core Practical – II* | - | 4 | |
| IV | VII | UPB/CT/4007 | Gymnosperms, Paleobotany and Evolution | 3 | 4 | 15+60 |
| | VIII | UPB/CT/4008 | Cell Biology | 3 | 4 | 15+60 |
| | | UPB/CP/4002 | Core Practical – II | 3 | 2 | 20+30 |
| V | IX | UPB/CT/5009 | Genetics and Biostatistics | 3 | 4 | 15+60 |
| | X | UPB/CT/5010 | Taxonomy of Angiosperm and Economic Botany | 3 | 4 | 15+60 |
| | XI | UPB/CT/5011 | Molecular Biology | 3 | 4 | 15+60 |
| | XII | UPB/CT/5012 | Ecology and Environmental Biotechnology | 3 | 4 | 15+60 |
| | XIII | UPB/CE/5001 | Core Elective -1, Herbal Medicine | 5 | 5 | 25+75 |
| | | | Core Project* | - | 3 | |
| | | UPB/CP/5003 | Core Practical – III* | - | 6 (3x2) | |
| VI | XIV | UPB/CT/6013 | Plant Pathology | 3 | 4 | 15+60 |
| | XV | UPB/CT/6014 | Plant Physiology, Biochemistry and Biophysics | 3 | 4 | 15+60 |
| | XVI | UPB/CT/6015 | Plant Biotechnology and Bioinformatics | 3 | 4 | 15+60 |
| | XVII | UPB/CT/6016 | Bio-Instrumentation | 3 | 4 | 15+60 |
| | XVIII | UPB/CE/6002 | Core Elective – II, Horticulture | 5 | 5 | 25+75 |
| | | | Core Project | 5 | 3 | 20+80 |
| | | UPB/CP/5003 | Core Practical - 3 | 3 | - | 40+60 |
| | | UPB/CP/6004 | Core Practical - 4 | 3 | 6 (3x2) | 40+60 |
| | | | Total | 75 | | 1800 |

*Practical I (At the End of II Semester) *Practical IV (At the End of VI Semester)

*Practical II (At the End of IV Semester)

*Project (At the End of VI Semester)

*Practical III (At the End of VI Semester)

I YEAR: SEMESTER I - MAJOR PAPER - I

PHYCOLOGY & ALGAL BIOTECHNOLOGY

UPB/CT/1001
Credits - 4

Lecture : 4 hrs /week
Practical : 2hrs/ week

Objectives: Previous knowledge of basic characters of algae at school level is required. Present syllabus highlights the information on algal forms and their role in Algal Biotechnology.

Unit I : Introduction to Algae, General characters – Pigmentation, Flagellation, Reserve food, Classification of Algae – F.E. Fritsch, 1945. **(10 hours)**

Unit II: General characteristic features of Cyanophyceae, Chlorophyceae, Phaeophyceae, Rhodophyceae. **(15 hours)**

Unit III: Structure, Reproduction and Life cycle of following genera :
Anabaena, Coleochaete, Sargassum, Gracilaria.
(15 hours)

Unit IV: Isolation and Culture of algae – Collection, Sterilization, Inoculation and Maintenance. **(10 hours)**

Unit V: Algal biofertilizers, SCP, their nutritional value and biomass production; Industrial products: Diatomaceous earth, Alginates, Agar. **(10 hours)**

PRACTICALS : **(30 hours)**
Anabaena, Coleochaete, Sargassum, Gracilaria and economic products included in the syllabus: Algal biofertilizers, SCP, Diatomaceous earth, Alginates, Agar. Culture of algae – Demonstration.

REFERENCES:

1. Bold, H.C and Wyne, M.J. 1978. Introduction to the Algae. Prentice hall of India.
2. Chapman,V.J and Chapman,D.J.1973. The Algae (2nd Ed) Macmillan.
3. Fritsch, F.E.1935 & 1945. Structure and Reproduction of Algae vol.1 & 2. Cambridge Press.
4. Kumar,H.D. & Singh,H.D. 1976. A text book of Algae.
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.
7. Vashishta, B.R. 1990. Botany for degree students, Algae. S. Chand & Co. Ltd., Ram Nagar, New Delhi.
8. Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. Botany for Degree Students: Algae. S. Chand& Company Ltd, New Delhi.
9. Sambamurthy, A. V. S. S. 2006. A Textbook of Algae. I. K. International Pvt. Ltd., New Delhi.

YEAR: SEMESTER I - MAJOR PAPER - II

MYCOLOGY, FUNGAL BIOTECHNOLOGY & LICHENS

UPB/CT/1002

Credits - 4 Theory : 4 hours/week

Practicals : 2 hours/week

Objectives: Previous knowledge of basic characters of fungi at school level is required. Present syllabus highlights the information on fungal forms and their role in Fungal Biotechnology.

Unit I : Broad classification of fungi (Alexopoulos). General characteristic features of the following classes: Oomycetes, Ascomycetes, Basidiomycetes.

(10 hours)

Unit II: Structure and reproduction of following genera: *Albugo*, *Aspergillus* and *Peziza*.

(10 hours)

Unit III: Economic importance of fungi: Citric acid production by *Aspergillusniger*. Antibiotics-Penicillin; Enzymes from microbes and their application-Amylase, Proteases.

(10 hours)

Unit IV: Mushroom cultivation : Oyster mushroom - nutritional value, method of cultivation and control of pests and pathogens.

(15 hours)

Unit V: Lichens: Occurrence, structure and reproduction of Lichens. *Usnea*. Economic importance of lichen.

(15 hours)

Practicals :

(30 hours)

Aspergillus, *Albugo*, *Peziza*: Cultivation of Mushroom, Citric acid, Lichens.

REFERENCES:

1. Webster, J. 1970. Introduction to Fungi. Cambridge University Press.
2. Alexopolous, J. and W. M. Charles. 1988. Introduction to Mycology. Wiley Eastern, New Delhi.
3. Biswas, S.B. and Biswas, A, 1976. An introduction to Viruses. Vikas Publishing House Pvt. Ltd.
4. Misra, A.S. and Agrawal, R.P, 1978. Lichens: A preliminary text. Oxford and IBH Publishing Co.
5. Alexopoulos C J, Mims C W, Blackwell M, (1996), Introductory Mycology, 4th ed., Blackwell Publishing
6. Vashishta, B. R. 1990. Botany for Degree Students: Fungi, S. Chand & Company Ltd, New Delhi.
7. Sambamurthy, A. V. S. S. 2006. A Textbook of Plant Pathology. I. K. International Pvt. Ltd., New Delhi.
8. 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.
9. Sharma O P, (1989), Textbook of Fungi, Tata McGraw-Hill Publishing Co. Ltd.

I YEAR: SEMESTER II: MAJOR PAPER III

HYDROBIOLOGY OF FRESH WATER

UPB/CT/2003
Credits – 4

Lecture : 4hrs/week
Practical : 2hrs/week

Objectives: This course provides knowledge on water resources, Plant diversity in water, Pollution causes, sewage disposal and Management.

Unit I : Biological, physical and chemical feature of lakes and rivers.

(10 hours)

Unit II: Classification of lakes (Eutrophic, Mesotrophic and. Oligotrophic). Plant diversity: Phytoplankton and Phytobenthos.

(10 hours)

Unit III : Interrelationships of algae, fungi and bacteria in the Environment.

(10 hours)

Unit IV : Pollution - their causes and consequences. Indicator algae.

(15 hours)

Unit V : Oxidation ponds, sewage disposal and management.

(15 hours)

PRACTICALS :

(30 hours)

1. Analysis of different water types
2. Identification of common algae of water bodies

Reference Books :

1. Goldman C.R. and Alexander – Limnology
2. Libeck, Environmental Engineering Handbook Vol.I
3. Welch P.S 1952, Limnology
4. Welch P.S Limnological Methods
5. Welzel 1975, Limnology Saunbers
6. Witton 1975, River Ecology, University of California Press
7. Hutchinson, 1975, Introduction to Limnological Botany.
8. Bronmark, C. and Hansson, L.-A. (2005) The biology of lakes and ponds (2nd edition) OxfordUniversity Press.
9. Giller, P.S. and B. Malmqvist, B. (1998) The biology of streams and rivers, Oxford University Press.

I YEAR: SEMESTER II: MAJOR PAPER IV

BRYOPHYTES AND PTERIDOPHYTES

UPB/CT/2004 Theory : 4 hours/week

Credits - 4 Practicals : 2 hours/week

Objectives: This course provides knowledge on classification; structure, reproduction & comparative account of selected genera of Bryophytes and Pteridophytes besides giving an overview. Students are also introduced to the economic importance of these primitive groups of plants.

Bryophytes:

Unit I : General characters, classification (Reimer, 1954) ; Economic importance of Bryophytes. **(15 hours)**

Unit II : Structure and reproduction of a. *Marchantia*, b. *Polytrichum* (no developmental studies) **(15 hours)**

Pteridophytes :

Unit III: General characters, classification (Reimer, 1954). Economic importance of Pteridophytes. **(10 hours)**

Unit IV : Stellar evolution ; Apogamy and Apospory. Homospory and Heterospory. **(10 hours)**

Unit V : Structure and reproduction of a) *Lycopodium*, b) *Dicranopteris*, c) *Marsilea* (no developmental studies) **(10 hours)**

PRACTICALS: Detailed study of the genera included in the theory.

REFERENCES:

1. Srivatsava H.N. 2004. Bryophytes , Pradeep publications.
2. Pandey B.R. 1977. A text book of botany, Pteridophytes and Gymnosperms K.Nath & Co.
3. Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany. 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. Thakur, A. K. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.
6. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany - Pteridophyta (Vascular Cryptogams). S. Chand & Company Ltd, New Delhi.
7. Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. Botany for Degree Students: Algae. 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. S. Chand & Company Ltd, New Delhi.
10. Rashid, A 1976. An Introduction to Pteridophyta Vikas Publishing House Pvt. Ltd., New Delhi

**II YEAR: SEMESTER III: MAJOR PAPER V
GENERAL MICROBIOLOGY**

UPB/CT/3005
Credits – 4

Lecture : 4hrs/week
Practical : 2hrs/ week

Objectives: This course provides information on major groups of microbes, their distribution, structure, metabolism, reproduction and their economic importance. The laboratory exercises will train students in learning basic microbiological techniques.

Unit I : Introduction, Major group of Microbes (Protists, Cyanobacteria, Fungi, and Viruses).
(10 hours)

Unit II: Structure of Bacteria, Nutritional types – Autotrophs and Heterotrophs. Respiration – aerobic and anaerobic. **(20 hours)**

Unit III : Bacterial reproduction & sexuality: Asexual – Fission, Budding, And Endospores. Sexual – Transformation & Conjugation. **(10 hours)**

Unit IV : Economic importance of Bacteria. Role in decay & decomposition, soil fertility, and Industry. **(10 hours)**

Unit V : Viruses: Tobacco Mosaic Virus (TMV), Bacteriophages – Structure & Reproduction of T₄ Bacteriophage. **(10 hours)**

PRACTICALS

I. Individual experiments: (30 hours)

1. Preparation of bacterial smear & fixation of suspension
2. Gram staining of bacteria
3. Hanging drop mount method

II. Photographs, models, specimens, tools, instruments, microbial products, medium & Antimicrobial agents.

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|------------------|--------------------------|
| a) Root nodule | h) Inoculation chamber |
| b) Bacteriophage | i) Autoclave |
| c) Cavity slide | j) Quebec colony counter |
| d) Cheese | |
| e) Curd | |
| f) Antibiotics | |
| g) Compost | |

Reference books:

1. Mckane, L. and K. Judy. 1996. Microbiology – Essentials and Applications. McGraw Hill, NewYork.
2. Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, PlantPathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
3. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi
4. Thakur, A. K. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes andCryptogams. S. Chand & Company Ltd, New Delhi.
5. Tortora G J, Funke B R, Case C L, (2008), Microbiology: An Introduction, 8th edn. Benjamin Cummings
6. Stanier R Y, Adelberg E A and Ingrahm J L,(1991), General Microbiology, 5th edn, Mac Millan Press Inc.
7. Pelczar Jr, M J, Chan E C S, Krieg N R, (1986), Microbiology: An Application Based Approach, 5th edn. McGraw-Hill Book Company, NY
8. Prescott L, Harley J P, and Klein D A, (2008), Microbiology, 7th edn. Wm C. Brown - McGraw Hill, Dubuque, IA.
9. Atlas R M, (1997), Principles of Microbiology. 2nd edn., Wm. C. Brown Pub., Iowa, USA.
10. Biswas S B, Biswas A, An Introduction to Viruses, 3rd ed., (1984), Vani Educational Books, New Delhi
11. Dimmock N J, Easton A J, Leppard K N, (2007) Introduction to Modern Virology, 6th edn. Blackwell Publishing
12. Frazier W C and Westhoff D C (1988), Food Microbiology, 4th edn. McGraw-Hill BookCompany, NY.
13. Jay J M, (2000), Modern Food Microbiology, 6th edn. Aspen Publishers, Inc. Gaithersburg, Maryland

II YEAR: SEMESTER III: MAJOR PAPER VI

ANATOMY OF ANGIOSPERM AND EMBRYOLOGY

UPB/CT/3006Theory : 4 hours/week

Credits - 4 Practicals : 2 hours/week

Objective: This paper provides the basics and wider knowledge on structure and reproduction of various forms coming under Gymnosperm, Anatomy and Embryology and the Evolutionary trends in plants.

Anatomy:

Unit I : Anatomy of Dicot and Monocot stem and Root. Secondary growth in dicot stem and root.

(15 hours)

Unit II : Anomalous secondary growth in *Nyctanthes*, *Boerhaavia* and *Dracaena*. Anatomy of leaf – Dicot and Monocot, Isobilateral and Dorsiventral - Stomatal studies.

(15 hours)

Embryology:

Unit III : Development of anther- microsporangium – megasporangium- male gametophyte. (10 hours)

Unit IV : Development of ovule- megasporogenesis-female gametophyte- *Polygonum*, *Allium* and *Peperomia* types.

(10 hours)

Unit V: Endosperm-types, development and function. Embryogeny-development of embryos in dicot and monocot. (10 hours)

Practicals: (30 hours)

Anatomy :

Primary and Secondary structure of Dicot and Monocot stem and root

Embryology :

Slides-Development of anther, development of gametophyte and types of endosperm

Reference Books:

1. Maheswari. P. (1991), An introduction of Embryology of Angiosperms. Tata – McGraw Hill Publishing Co Ltd.
2. Bhojwani, S.S. and Bhatnagar, S.P. (1987), Embryology of Angiosperms. Vikas Publication house Pvt. Ltd.
3. Bhojwani, S. S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.
4. Esau, K. 1971. Anatomy of Seed Plants. John Wiley and Son, USA.
5. Johri, B. M. 1984. Embryology of Angiosperms. Springer-Verlag, Berlin.
6. Shukla. R. S. and Chandel P.S. (1988), Cytogenetics, Evolution and Plant breeding. S.Chand& Co.
7. Gopalakrishnan T.S., Sambasivaiah and Kamalakara Rao A. Organic evolution. Himalaya Publishing house.
8. Eams A.J. and Mac Daniel. An Introduction to Plant Anatomy. TMH Edition. Tata MC. Graw Hill Publishing Co.Ltd. Bombay - New Delhi.
9. Pande, B.P. 1979. Plant Anatomy. S. Chand & Co, Ram Nagar, New Delhi.

II YEAR: SEMESTER IV: MAJOR PAPER VII

GYMNOSPERMS, PALEOBOTANY AND EVOLUTION

UPB/CT/4007
Credits - 4

Theory : 4 hours/week
Practicals : 2 hours/week

Objectives: This course provides knowledge on classification; structure, reproduction & comparative account of selected genera of Gymnosperms and Paleobotany besides giving an overview.

Gymnosperms

Unit I: General characteristics. Classification of Gymnosperms (Pilger Melchior 1954) **(10 hours)**

Unit II : Detailed study of morphology, structure and reproduction in *Cycas* and *Gnetum* (no developmental studies). **(15 hours)**

Paleobotany

Unit III: Fossils and ideal conditions for fossilization, kinds of fossils- Compressions, impressions, coal ball, casts, molds, petrification, pseudofossil. **(10 hours)**

Unit IV : Importance of paleobotany, Dr. Birbal Sahani. Geological time scale. Brief study of the following fossils - *Lepidodendron*, *Calamites*. **(15 hours)**

Evolution:

Unit V : Origin of life- Chemosynthetic theory on the origin of life. Variation in nature - Analysis of variation, source of variation (mutation, recombination, Adaptation & selection) **(10 hours)**

PRACTICALS: Detailed study of the genera included in the theory. **(30 hours)**

REFERENCES:

1. Gupta, M.N. 1972. The Gymnosperms (2nd Edn) Shiva Lal Agarwala & Co, Agra.
2. Vashista, 1976. Gymnosperms, S.Chand& Co.
3. Srivatsava, H.N. 2005.Gymnosperms, Pradeep publications.
 4. Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany. S. Chand & Company Ltd, New Delhi.
 5. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany for Degree Students: Gymnosperms. S. Chand & Company Ltd, New Delhi.
 6. Sporne, K. R. 1965. Morphology of Gymnosperms. Hutchinson Co., Ltd., London.
 7. Bhatnagar S.P. and A. Moitra 1996. Gymnosperms, New age International publishers (p) Ltd. New Delhi.
 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.

II-Year: Semester IV: Paper-VIII

CELL BIOLOGY

UPB/CT/4008 Lecture : 4 hours/week
Credits – 4

Practicals : 2 hours/week

Objective: This paper provides wider knowledge on structure and functions of various cell organelles and genome.

Unit I : Introduction, Cell organization Prokaryotic and Eukaryotic, Ultrastructure and functions of Cell Wall (Middle lamella, Primary wall, Secondary wall).
(10 hours)

Unit II: Occurrence, structure, function and origin of Plasma membrane, Endoplasmic Reticulum, Golgi bodies, Lysosomes, Ribosomes, Mitochondria, Plastids – Chloroplast.
(20 hours)

Unit III : Microtubules, Cytoskeleton (microfilament), flagella, Cilia microbodies (Glyoxysomes, Peroxisomes, Sphaerosomes,), vacuole. Non-living cell inclusions.

(12 hours)

Unit IV : Nucleus, nuclear membrane, chromosomes, euchromatin, heterochromatin, giant chromosomes- polytene and lampbrush.

(10 hours)

Unit V : Cell cycle, cell division : types - mitosis and meiosis, cytokinesis.

(8 hours)

Practicals: **(30 hours)**

1. Photomicrographs of cell organelles.
2. Mitosis- Squash(using onion root tip).

References:

1. Fukui, K. and S. Nakayama. 1996. Plant Chromosomes: Laboratory Methods. CRC Press, BocaRaton, Florida.
2. Harris, N. and K. J. Oparka. 1994. Plant Cell Biology: A Practical Approach. IRL Press at University Press, Oxford. UK.
3. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd., New Delhi.
4. Sharma, A. K. and A. Sharma. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harwood Academic Publishers, Australia.
5. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding. S. Chand & Company Ltd., New Delhi.
6. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.

III-Year: Semester-V: Paper-IX

GENETICS AND BIOSTASTICS

UPB/CT/5009

Lecture : 4 hours/week

Credits – 4

Practicals : 2 hours/week

Objectives: To understand the transfer of hereditary characters. To gain knowledge on basic measures & methods in applied biological studies.

Genetics:

Unit I : Mendelian genetics - Monohybrid , Dihybrid, Testcross and Backcross Ratio. Deviations allelic & Nonallelic, Gene interactions. Polygenic Inheritance and Pseudoalleles.

(10 hours)

Unit II : Sex determination in Plants, Cytoplasmic Inheritance (eg. Male sterility in Corn), Extra Nuclear Inheritance - Plastid Inheritance in *Mirabilis*. Sex linked Inheritance - Colour Blindness, Hemophilia, Hypertrichosis.

(12 hours)

Unit III : Multiple alleles, Chromosome theory of Inheritance. Linkage, Crossing over, Chromosome Mapping. Mutation–Gene and Chromosomal.

Polyploidy - Euploidy, Aneuploidy – Syndromes -

Klinefelter's, Down's and Turner's Syndrome. Mutagenic agents and its Significance.

(20 hours)

Unit IV : DNA finger printing, germplasm storage, gene therapy, DNA probe, genomic library. Population genetics-Hardy Weinberg principle.

(8 hours)

Biostatistics:

Unit V : Measures of Central Tendency : Mean – Median – Mode, Measures of Dispersion: Quartile Deviation – Mean Deviation – Standard Deviation ; Test of significance : Chi-Square Test.

(10 hours)

PRACTICALS:

(30 hours)

1. Genetic problems – Test cross, Back cross and Allelic Interactions.
2. Gene Mapping – Three point test cross.
3. Models / Photographs – DNA replication and Repair.
4. Biostatistical problems: Mean, Median, Mode, Standard deviation Chi-square test.

REFERENCES :

1. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd., New Delhi.
2. Strickberger, M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company.
3. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
4. Verma, P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi
5. Levin R.P 1962, Genetics Reinhart and Winston.
6. Mitra S 1994, Genetics, A Blue Print of Life Tata McGraw Hill, New Delhi.
7. Strickberger M.W 1990, Genetics III Education Mcmillan Publishing Ltd Singapore.
8. Sundararaj DD and G.Thulsidas 1967, Introducaiton to Cytogenetics and Plant Breedings, Popular book Report, Chennai.
9. Rangaswami R.A 1995, A Text Book of Agricultural Statistics. New Age International Publications.
10. Winter P.C, G.I. Hickey and H.L.Fletcher 1999, Instant Notes in Genetics, Viva Books Ltd, Chennai.
11. Sinha and Sunitha Sinha 1985, Cytogenetics, Plant Breeding and Evolution, Vani Educational Books.

III YEAR : SEMESTER V: PAPER – X

TAXONOMY OF ANGIOSPERMS & ECONOMIC BOTANY

UPB/CT/5010 Theory: 4hours/week

Credits - 4Practicals:2 hours/week

Objectives: To create awareness about biodiversity, Characteristic features of families, Economic importance and Medicinal value of plants.

Unit - 1: Taxonomy and its importance, Herbarium techniques. Citation of authors , binomial nomenclature, I.C.B.N. and Taxonomic hierarchy.

(12 hours)

Unit -II: Categories of classification – Artificial (Linnaeus), Formal (Bentham & Hooker), Modern & Phylogenic (Cronquist) only outline classification needed – Merits and Demerits.

(12 hours)

Unit -III: A detailed study of the range of characters of the following families and the economic importance in these families. Dicotyledons – *Annonaceae*, *Rutaceae*, *Leguminosae*, *Cucurbitaceae*, *Asteraceae*, *Asclepiadaceae* & *Apocynaceae*.

(12 hours)

Unit-IV: A detailed study of the range of characters of the following families and the economic importance in these families. Monochlamydeae - Euphorbiaceae, Amaranthaceae. Monocotyledonae - Orchidaceae & Poaceae.

(12 hours)

Unit -V: Food plants –cultivation and milling of cereals – rice, sugar- cultivation, harvesting and extraction. Fibre-types extraction and use of cotton (*Gossypium*). Beverages – harvesting and preparation of coffee and tea. Rubber –extraction and processing of *Hevea braziliensis*.

(12 hours)

PRACTICALS:

(30 hours)

1. Hierarchy and technical description of plants of above families.
2. Economic importance of plant products.
3. 20 Herbarium sheets
4. Field visit

REFERENCE BOOKS:

1. Rashtra Vardhana. 2009. Economic Botany. Sarup Book Publishers Pvt. Ltd., New Delhi, First Edn.
2. Hill, A.F, 1952. Economic Botany; A Textbook of Useful Plants and Plant Products. McGraw-Hill Book co., Inc., New York, Second Edn.
3. Thompson, H.C, 1949. Vegetable Crops. McGraw- Hill Book co., Inc., New York, Fourth Edn.
4. Pandey, B.P., 1990. Economic Botany, S. Chand & Company Ltd. New Delhi. Fourth Edn.
5. Verma, V.A, 1980. Textbook of Economic Botany, *Emkay Publications, New Delhi*, Third Edn.
6. Maheshwari P. & Singh, 1965. U. Dictionary of Economic plants in India. I.C.A.R. NewDelhi.
7. Heywood, V. H. 1965 . Plant Taxonomy. ELBS , London.
8. Heywood, V. H. and D. M. Moore (Eds). 1984. Current Concepts in Plant Taxonomy. Academic Press, London.
9. Jeffrey, C. 1982. An Introduction to Plant Taxonomy. CambridgeUniversity Press, Cambridge. London.
10. 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.
11. Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold, London.
12. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.

III YEAR: SEMESTER V: PAPER XI

MOLECULAR BIOLOGY

UPB/CT/5011

Theory : 4 hours/week

Credits - 4 Practicals : 2 hours/week

Objectives: To understand about the Genetic material. To gain knowledge on basic techniques in Gene manipulation and Recombinant technology.

Unit I : Nature and function of genetic materials-DNA- structure and replication-RNA-types and DNA repair. **(12 hours)**

Unit II: Protein synthesis-Transcription, translation, genetic code evidence of triplet nature of code.

(12 hours) Unit III : Gene regulation in prokaryotes-lac-operon and try-p-operon as bio-synthetic system, autoregulation and feed back inhibition.

(12 hours)

Unit IV : Genetic engineering – aims of Genetic Engineering, Techniques of Gene Manipulation. Recombinant Technology, Outline of Cloning – Plasmid, Cosmid, Vectors.

(12 hours)

Unit V : Genetic manipulation of eukaryotic cells. Alkaloid production, Vaccine productions, Luminescent plants, Protein Sweetener, Conversion of Photosystems C₃ to C₄.

(12 hours)

Practicals:

Photos/Models/Charts/ equipment/chemicals

(30 hours)

- a) Steps in Gene cloning
- b) DNA – replicaion and repair
- c) Protein synthesis
- d) Agrobacterium

REFERENCE :

1. Branden, C. and Tooze, J. 1998. An Introduction to Protein Structure. Garland.
2. Karl Drlica, 1992. Understanding DNA and Gene Cloning. John Wiley & Sons, second edition, 1992.
3. Benjamin Lewin, 1997. Genes VI. OxfordUniversity Press.
4. Bruce, A., Dennis, B., Lewis, J., Martin, R., Keith, R. and James, D.W. (1994). Molecular Biology of the Cell. Third Edition. Garland Publishing , Inc. New York
5. Verma, P. S. and Agarwal, V. K. (2008). Cell Biology, Genetics,Molecular Biology, Evolution and Ecology. S. Chand and Company Limited, New Delhi.

IIIYEAR: SEMESTER V: PAPER XII

PLANT ECOLOGY AND ENVIRONMENTAL BIOTECHNOLOGY

UPB/CT/5012
Credits - 4

Theory: 4hours/week
Practicals: 2hours/week

Objectives: This paper provides information on the role of environmental factors on vegetation, importance of conservation and various biotechnological methods.

Unit I: Scope and various branches of ecology. Environmental factors and their influence on vegetation. Climatic Factor, Edaphic Factor, Biotic Factor & Topographic factor.

(12 hrs)

Unit II: Community dynamics: Plant Succession: Types – stages, Hydrosere, Xerosere. Adaptations in Xerophytes, Hydrophytes, Mesophytes, Halophytes and Epiphytes.

(12hrs)

Unit III: Basic Principles of Phytogeography: Vegetational types of India – Tropical rain forest, mangrove vegetation, Scrub jungle, deciduous forest and grasslands.

(12hrs)

Environmental biotechnology:

Unit IV: Conservation Ecology: Soil erosion and conservation, Afforestation, Social forestry, Agroforestry, seed banks, culture collection. A brief account of national and international agencies of conservation – IUCN, WWF

(12hrs)

Unit V: A brief note on the following: Biomass and Biofuel (Biogas- Characteristics, production, selection of feed stock, methanogens, uses of biogas), sewage treatment, Bioremediation, Biomining, Biosorption.

(12hrs)

PRACTICALS:

(30 hours)

1. Study of morphological and structural adaptations of locally available hydrophytes, xerophytes, mesophytes, halophytes and epiphytes.
Hydrophytes: *Nymphaea*, *Hydrilla*
Xerophyte: *Nerium*, *Casuarina*
Mesophytes: *Tridax*
Halophytes: *Avicennia*, *Rhizophora*
Epiphyte: *Vanda*
2. Map of Phytogeographical regions of India
3. Field trips to places for study and observation of vegetational types prescribed in the syllabus.

REFERENCES:

1. Kumar, H.D. 1990 Modern concepts of Ecology. VikasPublishingHouse Pvt.Ltd.
2. Odum, E.P. 1983. Basic Ecology. Holt-Saunders International Editions.
3. Smith, W.H. 1981. Air pollution and forest: Interactions between air contaminants and forest ecosystems.
4. Kumaresan. 2005. Biotechnology. Saras publication.
5. Dubey. 1993. Biotechnology. S.Chand and Co.Pvt.Ltd.
6. Bhatia and Sharma. 1991. Plant ecology. Pradeep publication.
7. Khitoliya, R. K. 2007. Environmental Pollution – Management and Control for Sustainable Development. S. Chand & Company Ltd., New Delhi.
8. Kormondye, E. 1989. Concepts of Ecology (3rd Ed.). Printice Hall of India, New Delhi
9. Kothari, A. 1997. Understanding Biodiversity: Life, Sustainability and Equity: Tracts for the Times. 11. Orient Longman Ltd., New Delhi.
13. Michael, S. 1996. Ecology. OxfordUniversity Press, London.
14. Mishra. D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd.,New Delhi.
15. Odum, E. P. 1983. Basics of Ecology. Saunder’s International Students Edition, Philadelphia.
16. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Crptogams, Cell Biology and Genetics. S. Chand & Company Ltd., New Delhi.
17. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.
18. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding.S. Chand & Company Ltd., New Delhi.
19. Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.

III YEAR: SEMESTER V: CORE ELECTIVE PAPER- I

HERBAL MEDICINE

UPB/CE/5001

Credit 5 Theory : 5 hrs/week

Objectives: The course provides the student an opportunity to explore the medicinal value of Indian Plants.

Unit I: Importance of herbal drugs in Indian system of medicine (Ayurveda, Siddha, Unani, Homeopathy) and Aromatherapy, Pharmacological terms – Antidote, Antipyretic, Antiseptic, Antitumor, Cardiotonic, Carminative, Diuretic, Laxative, Narcotic, Refrangent.
(12Hrs)

Unit II: Classification of natural drugs-Morphological, Taxonomical, Therapeutical and chemical (Alkaloids, Glycosides, Lipids, Volatile oil, Tannins, Vitamins, Resins and Carbohydrates).
(12Hrs)

Unit III: Herbal preparations (one example for each) Lehium, Suranam , Kashayam & Thailam. Collection & processing of crude drugs for marketing.
(12Hrs)

Unit IV: Study of systematic position & medicinal value of plants -
Root- *Rauvolfia serpentina* & *Withania somnifera*
Rhizome- *Curcuma longa* & *Zingiber officinale*
Bark- *Cinchona calisaya* & *Cinnamomum zeylanicum*
Whole plant- *Azadirachta indica* & *Phyllanthus niruri*
(12Hrs)

Unit V: Study of systematic position & medicinal value of plants -
Leaf- *Aloe vera* & *Ocimum sanctum*
Flower- *Crocus sativus* & *Hibiscus rosa-sinensis*
Fruit- *Coriandrum sativum* & *Emblica officinalis*
Seed- *Ricinus communis* & *Trigonella foenum-graecum*
(12Hrs)

REFERENCE

1. Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh, Mahendra Pal Singh, Dehradun.
2. Joshi, S. G. 2000. Medicinal Plants. Oxford and IBH, New Delhi.
3. Kokate, C. and Gokeale – Pharmacognacy - Nirali Prakashan, New Delhi.
4. Lad, V. 1984. Ayurveda – The Science of Self-healing. Motilal Banarasidass, New Delhi.
5. 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.
6. Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.

III YEAR: SEMESTER VI: PAPER XIII

PLANT PATHOLOGY

UPB/CT/6013
Credits - 4

Theory : 4 hours/week
Practicals : 2 hours/week

Objectives: The course provides the student an opportunity to explore various types of Diseases, causal organism, Defense Mechanism in plants and control measures.

Unit I : Introduction, Principles of Plant Pathology, Disease causing organisms : Fungi, Bacteria, Viruses, Mycoplasma, MLO, Nematodes and Insects.
(12 hours)

Unit II : Mechanism of infection : Penetration and Colonisation. Host parasite relationship : Types of parasitism, Physiological specialization.
(12 hours)

Unit III: Pathogen factors – enzymes, toxins. Host factors – Defence mechanism.
(10 hours)

Unit IV: 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 h) Bunchy top of Banana.
(14 hours)

Unit V : Plant protection - Prevention; Eradication - Chemical, Biological, Genetical-breeding, Hybridization - Immunization. Disease forecast.
(12 hours)

PRACTICALS: **(30 hours)**

Examination of all Plant Diseases as in Unit IV.

REFERENCES

1. Agrios, G. N. 1978. Plant Pathology. Academic Press.
2. Bilgrami, K. S. and Dube, H. C. 1976. A text book of Modern Plant Pathology. Vikas Publishing House (Private) Ltd.
3. Dube. H. 1978, A Text Book of Fungi, Bacteria and Viruses, Vikas Publications.
4. Mc Kane. L and Judy, K. 1996, Microbiology, Essentials and Application. McGraw Hill Publications.
5. Wheeler B. E. J. 1992, An Introduction to Plant Diseases, Oxford and IBH.
6. Singh R.S. 1975. Plant Diseases, Oxford and IBH.
7. Rengasamy G. Diseases of Crop Plants of India, Prentice Hall.

III YEAR: SEMESTER VI: PAPER XIV

PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS

UPB/CT/6014

Credits – 4

Lecture : 4 hours/week

Practicals : 2 hours/week

Objectives: To provide physicochemical organization & functional aspects of plants.

Plant Physiology :

Unit I : Photosynthesis - Photophosphorylation (Cyclic & Noncyclic). Pigment system- Red drop & Emersons Enhancement effect. Quantasomes. Light energy : Chlorophyll, absorption spectrum, action spectrum, Fluorescence, Phosphorescence, Quantum Yield, Quantum requirement. Dark reaction – Calvin cycle (C3 cycle), Hatch-Slack pathway (C4 cycle). Differences between C3 & C4 plants. Blackmans law of limiting factor. Photorespiration - C2 cycle.

(12 hours)

Unit II : Respiration -: Aerobic and anaerobic – Glycolysis ,Krebs cycle-Mitochondria- electron transport system, oxidative phosphorylation, respiratory quotient. Pasteurs effect.

(12 hours)

Unit III: Nitrogen Metabolism: Importance of nitrogen in plant life, conversion of nitrate to ammonia by plants - Nitrogen fixation -Abiological and biological - nitrogen fixing organisms, legume – *Rhizobium* – symbiosis - synthesis of amino acids - reductive and transamination. Growth Hormones – Plant growth regulators (auxins, gibberellins, cytokinins, ethylene and abscisic acid)- Practical applications.

(12 hours)

Biochemistry

Unit IV : Enzymes : Nomenclature & Classification - Chemistry of Enzymes – Properties of Enzymes - Mechanism of Enzyme action - Factors affecting enzyme activity. Michaelis constant. Coenzymes: Introduction, salient features of coenzymes, mechanism of coenzyme action and Classification of coenzymes (NAD, FAD,CoA, ATP and TPP).

(12 hours)

Bio physics

Unit V : Law of Thermodynamics - Enthalpy - Entropy - Free energy - Bioenergetics- ATP Formation and breakdown in living system - Mitochondrial and Chloroplast bioenergetics. Bioluminescence - types, Mechanism and function.

(12 hours)

PRACTICALS:**(30 hours)**

Experiments to be performed and recorded by students

1. Absorption spectrum of chloroplast.
2. Absorption spectrum of carotenoid.
3. Absorption spectrum of anthocyanin.
4. Determination of pigments in flower petals.
5. Study of rate of photosynthesis under different light intensities
6. Study of rate of photosynthesis under different wave lengths (red and blue) of light.
7. Comparison of rate of respiration of different respiratory substrates.
8. Determination of RQ using respirometer
9. Demonstration of fermentation.
10. Separation of chlorophyll by paper chromatography.
11. Separation of amino acids by paper chromatography.
12. Activity of enzyme oxidase. .
13. Activity of enzyme catalase.
14. Activity of enzyme amylase.
15. Activity of enzyme dehydrogenase.
16. Activity of enzyme peroxidase.

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. Lewin, B. 1994. Genes V. Oxford University Press., Oxford.
4. Lewin, B. 2002. Genes VII. Oxford University Press., Oxford.
5. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
6. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
7. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.

III YEAR: SEMESTER VI : Paper XV

PLANT BIOTECHNOLOGY & BIOINFORMATICS

UPB/CT/6015

Theory : 4 hrs/week

Credits - 4

Practicals : 2 hours/week

Objectives: This paper provides knowledge on tissue culture, protoplast, genetic engineering and fermentation technology & bioinformatics.

Unit I : Introduction to Biotechnology – Definiton and Scope. Plant cell and Tissue culture – Totipotency, Nutrient medium, MS Medium, Sterilization, Inoculation and Maintenance of culture.

(12 hours)

Unit II : Protoplast isolation, purification and regeneration. Protoplast fusion - Somatic hybrids, Somoclonal embryos, Synthetic seeds

(12 hours)

Unit III : Organ culture – Micropropagation – Root and Shoot culture and its uses. Basic Structure & Culture of anther, pollen, ovule & Embryo.

(12 hours)

Unit IV : Fermentation technology: Introduction, Microbial growth, Types of cultures – Batch culture, Continuous culture, Fermentor designs and operations. Biofuel - Ethanol production and its applications. Bacterial SCP, Bacterial Biofertilizers - Mass cultivation of *Rhizobium*, *Azotobacter*, *Azospirillum*.

(12 hours)

Unit – V: Bioinformatics: Introduction to Bio-informatics; NCBI-Entrez, DDBJ, Swiss prot., Prosite; Basics of proteomics & genomics; Sequence analyses.

(12 hours)

Practicals:

(30 hours)

1. Preparation of different nutritive media for PTC – preparation of explant – callus culture.
2. Bio – fertilizers – *Rhizobium*, *Azotobacter* & *Azospirillum*.
3. Materials – photographs – charts – models.
4. Algorithms-Bioinformatics

References:

1. Dubey, R.C. 1993. A text book of biotechnology. S. Chand & Co. Ltd. New Delhi.
2. Kumerasan. 2004. A text book of biotechnology. Saras publications.
3. Kumar, H.D. 1993. A text book of biotechnology. East West Affiliated Press Ltd. New Delhi.
4. Ignacimuthu, S. 1996. Basic Biotechnology, Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.
5. Narayanan, P. 2006. Bioinformatics. New age international publisher.

6. Janarthanan, S & Vincent, S. 2007. Practical Biotechnology.
7. Bhojwani, S.S. and M.K. Razdan. 1993. Plant Tissue Culture: Theory and Practice. Elsevier Science Publications, Netherlands.
8. Chawla, H.S. 2003. Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Lewin, B. 2007. Genes IX. Oxford University Press, Inc., New York.
10. Singh, B.D. 1998. Biotechnology. Kalyani Publications, New Delhi.
11. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
12. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi.
13. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India) Private Limited, Hyderabad.
14. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
15. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.

III YEAR: SEMESTER VI: PAPER XVI

BIOINSTRUMENTATION

UPB/CT/6016

Lecture : 4 hours/week

Credits – 4

Practicals : 2 hours/week

Objectives: To impart knowledge on basic principles and functioning of Bioinstruments

Unit I : Microscopy – Basic principles and functions of light Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM).
(12 hours)

Unit II : Microscopic preparations: Preparation of Whole Mount, and Maceration – Fixatives (FAA & Carnoy's fluid), Stains (Haematoxylin & Toluidine blue) Microtomy : Working procedure - Preparation of wax block, Sectioning, Dehydration and Staining methods.
(12 hours)

Unit III : Basic principles and applications of - Colorimeter, Spectrophotometer, pH meter, Centrifuge (Table top Centrifuge and Ultracentrifuge).
(12 hours)

Unit IV : Chromatography - Basic principles –Types of chromatography (Paper Chromatography, Gas Chromatography and Thin Layer Chromatography).
(12 hours)

Unit V : Hands on training in computer: MS word document, MS Excel – Tabulation; Line graph and Histogram: Power point presentation.
(12 hours)

PRACTICALS: (30 hours)

1. Maceration
2. Detailed study of instruments included in theory.
3. Preparation of Word document, Excel, Powerpoint – (Algorithm).

REFERENCES:

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

III YEAR: SEMESTER VI: CORE ELECTIVE PAPER II

HORTICULTURE AND PLANT BREEDING

UPB/CE/6002 Lecture : 4 hours/week

Credit 4

Practical : 2 hours/ week

Objective: To Create knowledge on Ornamental plants and Garden techniques.

UnitI: Horticulture: Significance-branches in horticulture-basic principles of landscape gardening-a brief knowledge of annuals, biennials and perennials with reference to ornamental gardens.

(12 hrs)

UnitII : Garden components: Lawn – hedges –edges – rockery – topiary- Lilly pond and green house.

(12 hrs)

UnitIII : Types of pots and containers-potting media-potting on,repotting – Manure. Indoor garden: Potted plants- Terrarium, hanging basket, bonsai culture. Cut flowers – preservation-vase life-flower arrangement – fresh – Ikebana.

(12 hrs)

UnitIV :Propagation:Cutting – layering – grafting – transplanting- Bulbs,corm,seedlings,tubers and large trees. After care of plants-pruning, mulching, staking and weeding.

(12 hrs)

Unit –V : Plant breeding – Methods of Crop improvement – Selection (Pure line, mass, clonal) Hybridization, Introduction and acclimatization and Mutationbreeding.

(12 hrs)

NOTE: Visit to garden under the guidance of teacher

REFERENCES:

1. Acquaah ,G. 2002. Horticulture principles and practices. 2nd Ed – Pearson Education (Singapore) Pvt. Ltd.
2. Ashman, M.A. and Puri. G. 2002. Essential soil science. Blackwell publishing.
3. Bose, T.K. Maiti, R.G. Dhua, R.S. and Das, P. 1999. Floriculture and Landscaping. Naya Prokash, Calcutta.
4. Chardha K.C. & Pareek (1993) Advance in Horticulture, Vol: 1 - XII Malhotra Publishing House, New Delhi - India.
5. Edmond. J.B. Senn. T.L. Andrews - F.S. and Halfacre. R.G. (1988) Fundamental of Horticulture, Tata McGraw - Hill Publishing Company Ltd., New Delhi-110 006.
6. Prasad. S and KumarU. (1999) Principal of Horticulture, Agrobotanica, 4E/176 J.N. Vyasagar, Bikaner, India-334 003.
7. Ervin L. Denisen.1979. Principles of Horticulture. MacMillan Publishing co, Inc. New York.
8. Janik, J. 1972. Horticultural Science. W.H. Freeman & Company, San Francisco.
9. Kumar, N.1994. Introduction to Horticulture, Rajalakshmi Publication, India.

