MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Botany
(Choice Based Credit System)
(with effect from the academic year 2023-2024 onwards)

Semester-VI				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	CORE	PLANT PHYSIOLOGY AND BIOCHEMISTRY		4
III	CORE	GENETICS AND PLANT ECOLOGY		4
III	CORE	PLANT PHYSIOLOGY AND BIOCHEMISTRY – PRACTICAL		2
III	CORE	GENETICS AND PLANT ECOLOGY – PRACTICAL		2
III	ELECTIVE	HORTICULTURE AND PLANT BREEDING / NATURAL RESOURCE MANAGEMENT/ FORENSIC BOTANY		3
III	ELECTIVE	PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY/ FORESTRY/ COMPUTER APPLICATION IN BOTANY		3
IV	NAAN MUDHALVAN			2
V		EXTENSION ACTIVITY (NSS, NCC, SPORTS)		1

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA$<$ 5.0

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Learning Objectives

- To know about plant water relationships
- To understand the mechanism of transpiration and translocation
- To conceptualize the **processes** of photosynthesis and respiration
- To know importance , functions and applications of growth hormones
- To familiarize with the structure and function of various biomolecules

Unit I

PHYSIOLOGY

WATER RELATIONS: Water relations—imbibition, diffusion, osmosis and plasmolysis; mechanism of water absorption – active and passive, Ascent of sap – path, Mechanism – Transpiration pull and cohesion theory.

Unit II

Transpiration – types. Opening and closing of stomata- mechanisms and theories and significance. Translocation of solutes – path, mechanism - Munch mass mass flow hypothesis

Unit III

PHOTOSYNTHESIS:

Photosystems. Light reaction: Electron transport system - Cyclic and non cyclic. Dark reaction - C3 cycle, C4 cycle,

RESPIRATION

Types, Glycolysis, Krebs Cycle, Oxidative phosphorylation.

Unit IV

GROWTH: Growth – Growth curve, plant growth regulators - auxins, gibberellins and cytokinins, - Practical applications. Photoperiodism and Vernalization.

Unit V

Classification, properties and biological role of carbohydrates, proteins and lipids. Enzyme – properties, classification, nomenclature of enzymes, mode of enzyme action.

Recommended Texts

1. Singh, J.S., Singh, S.P., Gupta, S. 2006. Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
2. Sharma, P.D. 2010. Ecology and Environment. Rastogi Publications, Meerut, India.8th edition.

3. Krishna Iyer.V.R. 1992. Environmental protection and legal defence. Sterling Publishers Pvt. Ltd.,
4. Shukla, R.S and Chandel, PS.1990. Plant Ecology, S.Chand & Co. Pvt. Ltd.,
5. Krishnamurthy, K.V. 2003. An advanced text book on Biodiversity - Principle and Practice. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Sharma, P.D. 2009. Ecology and Environment, Rastogi Publications.

Reference Books

1. Odum, E.P. 2005. Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
2. Wilkinson, D.M. 2007. Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.
3. Kumar,H.D. 1990. Modern concepts of Ecology, Vikas Publishing House Pvt. Ltd.,
4. Smith,W.H. 1981. Air pollution and forest : Interactions between air contaminants and forest ecosystems.
5. Vickery, M.L. 1984. Ecology of Tropical plants, John Wiley and Sons.
6. Melchias, G., 2001. Biodiversity and Conservation, Science Publishers Inc. USA.
7. Asthana, D.K and Meera Asthana. 2006. A text book of Environmental studies. S.Chand and Company Ltd. New Delhi.
8. Brian Groombridge. 1992. Global Biodiversity, Chapman and Hall, UK.
9. IUCN. 1985. The World Conservation Strategy, IUCN, Switzerland. 10. Ambasht, R.S. 2017. A textbook of plant ecology 15ed (pb 2019). CBS Publishers Distributors.

Web Resources

1. https://www.kobo.com/us/en/ebook/plant-ecology-3.
2. https://www.worldcat.org/title/plant-ecology/oclc/613206385
3. https://books.google.co.in/books/about/Plant_Ecology.html?
4. https://www.kopykitab.com/Plant-Ecology-by-Agrawal-AK-And-Deo-PP5.
5. http://www.freebookcentre.net/Biology/Ecology-Books.html
6. https://www.amazon.in/Plant-Ecology-Ernst-Detlef-Schulze/dp/354020833X
7. https://www.tandfonline.com/toc/tped20/current (Plant Ecology and Diversity)
8. https://link.springer.com/journal/11258 (Plant Ecology)

GENETICS AND PLANT ECOLOGY

Learning Objectives

- To relate Mendelian genetics and laws of inheritance
- To know phenomenon of gene interaction
- To familiarize with the structure of chromosome and aberration types
- To know about concepts of ecology
- To understand the organization of ecosystem and flow of energy

UNIT I

GENETICS

Mendelian genetics – monohybrid, dihybrid crosses. Laws of Mendel, Reciprocal cross – Back cross and Test cross. Incomplete dominance - Mirabilis jalapa. Lethal gene action in Maize

UNIT II

Interaction of factors – Complementary genes, Supplementary genes, duplicate genes. Extra nuclear inheritance and its significance - Male sterility in corn, Maternal inheritance – Plastid Inheritance in Mirabilis jalapa.

UNIT III

Chromosome theory of linkage, crossing over, Mutation-types and significance. chromosomal aberration – addition, deletion, inversion, duplication and translocation

UNIT IV

ECOLOGY

Vegetation – Quantitative structure of plant communities - Methods of study of vegetation (Quadrat and transect).

Ecological classification of plants: Morphological and anatomical adaptations in plants. (Hydrophytes and Xerophytes)

UNIT V

Ecosystem - Structure, food chains and food web, energy flow in an ecosystem. Types of ecosystems: pond, forest and grassland. Ecological pyramids

Recommended Texts

1. Noggle and Fritz. 1976. Introductory Plant Physiology, Prentice Hall, New Delhi.
2. Pandey, SN and Sinha, BK. 1989. Plant Physiology, Vikas Publishing House Ltd., New Delhi.
3. Robert M. Devlin. 1970. Plant Physiology, East West Press, New Delhi.
4. Westhoff, P. 1998. Molecular Plant Development from Gene to Plant. Oxford University Press, Oxford, UK. Jain, JL. 1979. Fundamentals of Biochemistry, Chand & Co. Ltd., New Delhi.
5. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi.
6. Conn, E and Stumpf, PK. 1979. Outline of Biochemistry Niley Easdtern Ltd., New Delhi.
7. Metz, E.T. 1960. Elements of Biochemistry. V.F & S (P) Ltd., Bombay.
8. Verma,V. 2008. Textbook of plant Physiology, Ane's student edition, New Delhi.

Reference Books

1. Buchanan, B.B., Gruissem, W and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, Maryland, USA.
2. Dennis, D.T., Turpin, D.H., Lefebvre, D.D and Layzell, D.B. (Eds) 1997. Plant Metabolism (second edition). Longman Essex, England.
3. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
4. Hooykaas, P.J.J., Hall M.A and Libbenga, K.R. (eds). 1999. Biochemistry and Molecular Biology of Plant Hormones, Elsevier, Amsterdam, The Netherlands.
5. Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.
6. Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones (second edition). Springer-Verlag, NewYork, USA.
7. Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology (second edition), Academic Press, San Diego, USA.
8. Salisbury, F.B and Ross, C.W. 1992. Plant Physiology (4th edition). Wadsworth Publishing Co., California, USA.
9. Singhal, G.S., Renger, G., Sopory, S.K., Irrgang, K.D and Govindjee. 1999. Concepts in Photobiology: Photosynthesis and Photo morphogenesis. Narosa Publishing House, New Delhi.
10. Taiz, L and Zeiger, E. 1998. Plant Physiology (2nd edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
11. Thomas, B and Vince-Prue, D. 1997. Photoperiodism in Plants (second edition). Academic Press, San Diego. USA.

Web Resources

1. https://www.kobo.com/us/en/ebook/biochemistry-and-molecular-biology-of-plants
2. https://www.amazon.in/Plant-Biochemistry-Hans-Walter-Heldt-ebook/dp/B004FV4RS6
3. https://www.kobo.com/us/en/ebook/plant-biochemistry
4. https://www.kobo.com/us/en/ebook/a-textbook-of-plant-physiology-1
5. https://www.amazon.in/Advances-Plant-Physiology-P-Trivediebook/dp/B01JP5L0YA
6. https://www.crcpress.com/Plant-Physiology/Stewart-Globig/p/book/9781926692692
7. https://www.amazon.com/Introduction-Plant-Physiology-William-Hopkins-ebook/dp/B006R6I850

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY PRACTICAL

Learning Objectives

- To study plant water relations and membrane permeability
- To demonstrate rate of photosynthesis and respiration
- To carryout experiments related with separation of compounds
- To carry out estimation of important biomolecules
- To learn about structure of nucleic acids and enzyme action through models and charts

PRACTICALS

PHYSIOLOGY EXPERIMENTS

1. Determination of water potential by plasmolytic method.
2. Determination of rate of Imbibition in different kinds of seeds
3. Study of rate of photosynthesis under different wavelengths (red, green & blue) of light.
4. Determination of rate of respiration of different respiratory substrates.

Demonstration

1. Tissue tension
2. Suction due to transpiration
3. Ganong‘s Light screen experiment
4. Fermentation – Kuhn‘s Tube experiment

Spotters: Growth curve, Growth hormones

BIOCHEMISTRY

Experiments

1. Estimation of Sugar Anthrone method
2. Estimation of Starch - I2 – KI Method
3. Estimation of Protein – Lowry method

Spotters: Models for enzyme action – Lock and key, Induced fit

Recommended Texts

1. Sharma, P.D. 2017. Ecology and Environment- Rastogi Publication, Meerut.
2. Bhojwani, S.S and Razdan, M.K. 1996. Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Jackson, S.A., Kianian, S.F., Hossain, K.G and Walling, J.G. 2012. Practical laboratory exercises for plant molecular cytogenetics. In Plant Cytogenetics (pp. 323-333). Springer, New York.
4. Plummer, D. 1988. An introduction to Practical Biochemistry, Tata McGraw–

Hill Publishing Company Ltd., New Delhi.
5. Palanivelu, P. 2004. Laboratory Manual for analytical biochemistry and separation techniques, School of Biotechnology, Madurai Kamaraj University, Madurai.
6. Jayaraman. J. 1981. Laboratory Manual in Biochemistry. Whiley Eastern Limited, NewDelhi.
7. Bendre, A.M. and Ashok Kumar, 2009. A textbook of practical Botany. Vol.I & II. Rastogi Publication. Meerut. 9th Edition.

Reference Books

1. Mick Crawley. 1996. Plant Ecology, 2nd Edition Wiley-Blackwell.
2. Gamborg, O.L and G.C. Phillips (eds). 1995. Plant cell, tissue and organ culture. Springer Lab Manual.
3. Glick, B.R and J.E. Thompson. 1993. Methods in Plant Molecular Biology and Biotechnology. CRC Press, Boca Raton, Florida.
4. Bala, M., Gupta, S., Gupta, N.K and Sangha, M.K. 2013. Practicals in plant physiology and biochemistry. Scientific Publishers (India).
5. Wilson, K and J. Walker (Eds). 1994. Principles and Techniques of Practical Biochemistry (4th Edition) Cambridge University Press, Cambridge.
6. Bendre, A.M and Ashok Kumar. 2009. A textbook of practical Botany. Vol.I & II. Rastogi Publication. Meerut. 9th Edition.
7. Manju Bala, Sunita Gupta, Gupta, N.K. 2012. Practicals in Plant Physiology and Biochemistry. Scientific Publisher.

Web resources

1. https://www.amazon.com/Practical-plant-ecology-beginners-communities/dp/B00088FDQK
2. https://www.amazon.in/Practical-Biotechnology-Plant-Tissue-Culture/dp/8121932009
3. https://www.elsevier.com/books/molecular-biology-techniques/carson/978-0-12-815774-9
4. https://www.amazon.in/Practical-Physiology-Biochemistry-Sunita-Sangha/dp/9386102633
5. https://www.amazon.in/Practical-Biochemistry-Muriel-Wheldale-Onslow/dp/1107634318

GENETICS AND PLANT ECOLOGY - PRACTICAL

Learning Objectives

- To solve problems in Mendelian ratios
- To demonstrate mechanism of crossing over, mutations and male sterility
- To familiarize with the methods of studying vegetation
- To study morphological adaptation of plants in different habitats
- To identify internal adaptive characters of plants in different habitats

PRACTICALS

GENETICS

Genetic problems - test cross, back cross, incomplete dominance and interaction of genes.

Photographs / Charts

1. Male sterility in Corn –
2. Maternal Inheritance
3. Crossing over- single and double crossing over
4. Mutation- Addition, Deletion, Duplication

Ecology

1. Analysis of herbaceous vegetation by using Quadrat method
2. Study of morphological and anatomical adaptations of locally available hydrophytes, xerophytes.

   Hydrophytes : Nymphaea, Hydrilla

   Xerophytes : Nerium, Casuarina

Recommended Texts

1. Sharma, P.D. 2017. Ecology and Environment- Rastogi Publication, Meerut.
2. Bhojwani, S.S and Razdan, M.K. 1996. Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Jackson, S.A., Kianian, S.F., Hossain, K.G and Walling, J.G. 2012. Practical laboratory exercises for plant molecular cytogenetics. In Plant Cytogenetics (pp. 323-333). Springer, New York.
4. Plummer,D.1988.AnintroductiontoPracticalBiochemistry,TataMcGraw–HillPublishing CompanyLtd.,New Delhi.
5. Palanivelu,P.2004.LaboratoryManualforanalyticalbiochemistryandseparationtechniques,SchoolofBiotechnology,MaduraiKamarajUniversity,Madurai.
6. Jayaraman.J.1981.Laboratory Manual in Biochemistry. Whiley Eastern Limited, NewDelhi.
7. Bendre,A.M. and Ashok Kumar, 2009. A textbook of practical Botany. Vol.I & II. Rastogi Publication. Meerut. 9th Edition.

Reference Books

1. Mick Crawley. 1996. Plant Ecology, 2nd Edition Wiley-Blackwell.

2. Gamborg, O.L and G.C. Phillips (eds). 1995. Plant cell, tissue and organ culture. Springer Lab Manual.
3. Glick, B.R and J.E. Thompson. 1993. Methods in Plant Molecular Biology and Biotechnology. CRC Press, Boca Raton, Florida.
4. Bala, M., Gupta, S., Gupta, N.K and Sangha, M.K. 2013. Practicals in plant physiology and biochemistry. Scientific Publishers (India).
5. Wilson, K and J.Walker (Eds).1994. Principles and Techniques of Practical Biochemistry (4th Edition) Cambridge University Press, Cambridge.
6. Bendre, A.M and Ashok Kumar. 2009. A textbook of practical Botany. Vol.I & II. Rastogi Publication. Meerut. 9th Edition.
7. Manju Bala, Sunita Gupta, Gupta, N.K. 2012. Practicals in Plant Physiology and Biochemistry. Scientific Publisher.

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1. https://www.amazon.com/Practical-plant-ecology-beginners-communities/dp/B00088FDQK
2. https://www.amazon.in/Practical-Biotechnology-Plant-Tissue-Culture/dp/8121932009
3. https://www.elsevier.com/books/molecular-biology-techniques/carson/978-0-12-815774-9
4. https://www.amazon.in/Practical-Physiology-Biochemistry-Sunita-Sangha/dp/9386102633
5. https://www.amazon.in/Practical-Biochemistry-Muriel-Wheldale-Onslow/dp/1107634318

Elective: ***HORTICULTURE AND PLANT BREEDING / NATURAL RESOURCE MANAGEMENT/ FORENSIC BOTANY***

HORTICULTURE AND PLANT BREEDING

Learning Objectives

- To gain an understanding of the fundamentals of horticulture and techniques needed to grow and maintain plants.
- To develop skills plant propagation methods
- To know about the components of a garden
- To provide an over view of plant breeding
- To impart knowledge on importance of plant breeding

UNIT I

Scope, importance and divisions of horticulture. Gardening: Definition and objectives; different types of gardening – Formal, informal and kitchen garden.

UNIT II

Propagation methods: Cutting – root, stem and leaf; Layering – ground and air

layering, grafting– tongue and approach grafting; Budding – T budding and Patch budding; Vegetative propagules - bulb, sucker, corm.

UNIT III

Garden components: Lawn, Hedges, Edges, Rockery, Topiary, water garden, Bonsai and Hanging basket.

UNIT IV

Nature, Scope and Objectives of Plant Breeding; Plant introduction- selection methods (pureline and mass), Hybridization techniques, Heterosis breeding,

UNIT V

Mutation Breeding: Procedure and practices, Mutagens, Gamma Garden, Breeding for disease resistance.

Recommended Texts

1. Hartmann, H.T and D.E. Kester. 1989. Plant propagation – principles and practices. Half of India. New Delhi.
2. Bose, T.K and Mitra and Sadhu. 1991. Propagation of tropical and subtropical horticultural crops. Naya Prakash.
3. Singh, S.P. 1989. Mist propagation Metropolitan book Co., New Delhi.
4. Chadha, K.L. 1986. Ornamental horticulture in India ICAR, Krishi Bhavan, New Delhi.
5. Bose, T.K and Mukharjee, D. 1977. Gardening in India. Oxford & IBH Pub., Co., Calcutta.
6. Gopalswamy Iyyangar. 1970. Complete gardening in India, Kalyan Printers, Bangalore.
7. Rangaswami, G and Mahadevan, A. 1999. Diseases of Crop Plants in India (4^{th} edition). Prentice Hall of India Pvt. Ltd., New Delhi

Reference Books

1. Arditti, A. 1977. Orchid biology, Gornell Univ., Press. Ithaca.
2. Bailey, S. 1971. Perpectual flowering carnation, Fabner and Fabner, London.
3. Laurie, A., Kiplingr, D.D and Nelson, K.S. 1968. Commercial flower forcing. Mc Graw-Hill Book, London.
4. Cumming, R.W. 1964. The chrysanthemum Book. D.Van., Nostrand Inc.
5. Biswas, T.D. 1984. Rose growing – Principles and Practices – Assoc., Pub., Co., New Delhi.
6. Hartman, H.T and Kester, D.E. 1989. Plant propagation. Printice Hall Ltd., New Delhi.
7. Abraham, A and Vatsala, P. 1981. Introduction to Orchids. Trop. Bot. Garden, Trivandrum.
8. Bose, T.K and Yadav, L.P. 1989. Commercial flowers. Naya Prakash, Calcutta.
9. Mc Daniel, G.L. 1982. Ornamental horticulture. Reston Publ., London.
10. Helleyer, A. 1976. The Collingridge Encyclopedia of gardening Chartwell Book, Inc., New Jercy.

Web Resources

1. https://www.kopykitab.com/Precision-Horticulture-by-Archarya-SK
2. https://www.ebooks.com/en-us/subjects/science-horticulture-ebooks/423/
3. http://www.agrimoon.com/horticulture-icar-ecourse-pdf-books/
4. https://www.worldcat.org/title/handbook-of-horticulture/oclc/688653648
5. https://cbseportal.com/ebook/vocational-books-horticulture
6. http://www.digitalbookindex.org/_search/search010agriculhortigardena.asp

ELECTIVE: ***PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY/ FORESTRY/ COMPUTER APPLICATION IN BOTANY***

PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY

Learning Objectives

- To know the importance and scope of biotechnology
- To familiarize with the tools and techniques in biotechnology
- To recognize plant tissue culture technique as important means of invitro propagation
- To know about genetic code and protein synthesis
- To familiarize with DNA replication and gene regulation.

UNIT I

Biotechnology – definition, history and scope. Application of plant biotechnology in Agriculture - Biofertilizers, Biopesticides. Medicine – Antibiotics (Penicillin) Recombinant vaccines, insulin.. Environment – Bioremediation and Biofuel.

UNIT II

Vectors; plasmid, bacteriophage, viral vectors, cosmids. Restriction enzymes. Recombinant DNA technology, gene transfer – indirect method, Agrobacterium mediated gene transfer. Direct method – Biolistic method..

UNIT III

Plant tissue culture - introduction, scope and importance, concept of totipotency, aseptic techniques in plant tissue culture. Composition of media, types of media, sterilization, explant preparation and inoculation. Callus induction and micro-propagation. Synthetic seed technology

UNIT IV

Genetic code and its features. Protein synthesis: Transcription. Enzymology – RNA polymerase – classes of RNA molecules and post transcriptional modifications, Translation.

UNIT V

Molecular mechanism of DNA replication. DNA damage and repair .Gene regulation in Prokaryotes – *lac* operon and *trp* operon.

Naan Mudhalvan
BOTANY FOR COMPETITIVE EXAMINATION

Objectives:

- The basic Principles of Botany to the students which are vital role for facing competitive examinations.

UNIT – I

Basics of the Plant Kingdom; Diagnostic features of Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms - Economic importance of these groups.

UNIT – II

Basics of Angiosperm Taxonomy: A brief account of Natural systems of classification (Bentham and Hooker‘s system) and Phylogenetic system of classification (Engler and Prantl‘s system) Binomial Nomenclature. A Brief account of the following Families and their Economic Importance – Fabaceae, Cucurbitaceae, Poaceae.

UNIT – III

Medicinal Importance: Zingiber officinale, Ocimum sanctum, Azadirachta indica, Phyllanthus niruri, Andrographis paniculata and Acalypha indica.

UNIT – IV

Basics of Plant physiology: Basics of Absorption of Water, Transpiration, Photosynthesis, Respiration. Ecosystem: Concept, processes and component: Types of ecosystems – Aquatic and Forest.

UNIT – V

An Introduction to Genetics - Mendelism, Monohybrid cross and Dihybrid Cross. Biofertilizers - Importance of biofertilizers: Azolla - Importance, mass production and application. Panchagavya - Importance, preparation and application of Panchagavya.

REFERENCES

1. Bhattacharya, Hait, Ghosh. 2014. A Text Book of Botany-(Volume:2), New Central Book Agency (P) Ltd, Kolkata.
2. Pandey S.N, Misra, S.P, Trivedi, P.S- 2012. A Text Book of Botany – Vikas Publishing House Pvt Ltd, Noida
3. Soni, N.K and Vandana soni-2010 Fundamentals of Botany (Volume 1,2,3) Tata Mc Graw Hill Education Private Limited, New Delhi
4. Yoganarasimhan.2000 Medicinal Plants of India Cyber media, Bangalore.
5. Miller, C.E. and Turk, L.M., 2002, Fundamentals of soil Science, Biotech Books, Delhi.