



**ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN**  
**(Autonomous)**  
**(Re-Accredited with 'A' Grade by NAAC)**  
**(A Government Aided College - Affiliated to Mother Teresa Women's University,**  
**Kodaikanal)**  
**CHINNAKALAYAMPUTHUR (PO), PALANI -624 615.**

## **DEPARTMENT OF BOTANY**



### **SYLLABUS**

**2012-2015**

## CORE PAPER –I ALGAE AND BRYOPHYTES

Credits : 4

Hours : 4

### Unit-I

#### Algae

Algae: Introduction, general characters, classification of algae: general outline proposed by Fritsch; 1935-1945. Economic importance of algae and brief account on ecology of Algae.

### Unit-II

Detailed study of structure and life cycle of the following: *Nostoc*, *Chlamydomonas*, *Oscillatoria*, *Caulerpa* and *Oedogonium*.

### Unit-III

Detailed study of structure and life cycle of the following: *Diatom*, *Sargassum*, and *Polysiphonia*.

### Unit – IV

#### Bryophytes:

Bryophytes: Introduction; general characters; classification of bryophytes (Smith- 1965). Morphology, structure, reproduction and life cycle of the following: *Anthoceros* and *Polytrichum*

### Unit – V

Evolution of sporophyte and gametophyte; ecological aspects and economic importance of Bryophytes; fossil Bryophytes.

#### Practicals:

Study of morphology and anatomy of genera as given in the syllabus

## **Text Books**

1. A Text Book of Botany Singh Pandey and Jain 4<sup>th</sup> Edition Rastogi Publications 2010.
2. College Botany Dr. B.P. Pandey 5<sup>th</sup> Edition S. Chand Co., Pvt. Ltd 2013.
3. College Botany, Gangulee and Kar Vol II. New Central Book Agency Pvt. Ltd 2007.
4. Kumar, H.D. 1988. Introductory Phycology. Affiliated East –West Press Ltd.,

## **Reference Books**

5. Morris, I .1986. An Introduction to the algae .Cambridge University Press, UK.
6. Parihar, N .S.1991. Bryophyta .Central Book Depot, Allahabad.
7. Bryophytes. Puri, P.1980, Atma Ram & Sons .Delhi.
8. .The Biology of Algae, Round, F .E.1986, Cambridge University Press
9. The Structure and Reproduction of The Algae F.E. Fritsch Vol I&II Vikas Publishing House Pvt. Ltd 1975.
10. Text Book of Algae O.P. Sharma .Tata McGraw Hill Publication 1986.
11. The Ecology of Algae F.E. Round Cambridge University Press.1981
12. Modern Approaches to The Taxonomy of Red and Brown Algae. Irvine and Price. Academic Press. INC 1978.
13. Algae B.S. Vashista S. Chand Co., Pvt. Ltd 1983.
14. The Blue Green Algae Fogg, Stewart, Fay & Walsby Academic Press INC 1973.
15. Text Book of Algae J.S. Gupta Oxford and IBH Publishing Co., 1981.
16. Bryophytes Vishista. S. Chand Co., Pvt. Ltd 1986.
17. Bryophytes O.P. Sharma Tata McGraw Hill Publication 2014.
18. Kumar, H.D. 1988. Introductory Phycology. Affiliated East –West Press Ltd.,
19. An Introduction to the algae. Morris, I .1986, Cambridge University Press, UK.
20. Bryophyta, Parihar, N .S.199, Central Book Depot, Allahabad.
21. Bryophytes, Puri, P.1980, Atma Ram & Sons .Delhi.
22. The Biology of Algae, Round, F E.198, Cambridge University Press, Cambridge.

## SEMESTER – I

### CORE PAPER – II, FUNGI, LICHENOLOGY AND PLANT PATHOLOGY

Credits : 4

Hours : 4

#### Unit – I

##### Fungi

Fungi – General characteristics of fungi; Classification (Alexopoulos 1952); Economic importance of fungi and List of fungal diseases caused in plants.

#### Unit – II

Occurrence, structure, reproduction and life cycle of the following: *Albugosp.*, *Saccharomyces* sp, *Pezizasp.*,

#### Unit - III

Occurrence, structure, reproduction and life cycle of the following *Pucciniasp.*, and *Cercosporasp.*;

#### Unit : IV

##### Lichenology

General types, economic importance of lichens. ecology of Lichens – Occurrence, structure and reproduction of *Usnea*

#### Unit : V

##### Plant Pathology

A study of the following plant diseases with special reference to the symptoms, causal organism, disease cycle and control measures.

Fungal disease	-Red rot of Sugarcane
Bacterial disease	- Citrus canker
Viral disease	-Bunchy top of Banana

## **PRACTICALS:**

Study of morphology and anatomy of the genera as given in the syllabus.

### **Text Books**

1. Vashishta B.R. , Botany for Degree students part – II – Fungi, S.Chand -& Co.,
2. A text book of Plant Pathology – A.V.S.S Sambamurthy, I.K. International Publishing House Pvt. Ltd, New Delhi.
3. Chopra, G.L. - A text book of Fungi, S. Nagin& Co ., New Delhi.

### **Reference Books**

4. Alexopoulos , C.J and N.C. Bold – Algae and Fungi, The Macmillan Co , London
5. Gilbert M. Smith – Cryptogamic Botany , Vol –I , Algae and Fungi, New Delhi.
6. Alexopoulos , C.J - Introductory Mycology, John Wiley & Sons, New York.
7. Munkur. B.B - Fungi and plant diseases
8. Singh . R.S. – Principles of plant pathology, Oxford , IBH Publishing Co., New Delhi.
9. Rangaswami. G. – Diseases of crop plants in India
10. The Biology of Lichens - M.E. Hake.
11. Lichens, Ahamed Geon
12. Rangaswamy, G and Mahadevan, A. 1999. Diseases of Crop plants in India (4th edition). Prentice Hall of India Pvt. Ltd., New Delhi.
13. B. P. Pandey. Plant Pathology.

**SEMESTER- I**  
**SBC - BIO FERTILIZERS**

**Credits : 2**

**Hours : 2**

**Unit : I**

Biofertilizers – scope, importance and need, symbiotic bacterial inoculants- Rhizobium - isolation, packing and storage, field applications of inoculants and crop response

**Unit : II**

Non-Symbiotic bacterial inoculants – Azotobacter– isolation ,field application of inoculants, crop response

**Unit : III**

Blue green algae inoculants –isolation , storage –field applications and crop response, Azolla – A green manure cum bio fertilizer – Mass cultivation, field applications and uses

**Unit : IV**

Vesicular and ArbuscularMycorrhizae – Mass cultivation of VAM fungi- isolation and importance, field applications

**Unit : V**

Mycorrhizae – mass multiplication – Role of mycorrhizae in agriculture as organic manures and Green manures.

**Reference Books :**

- Dubey .R.C . 2002 - A Text book of Biotechnology S.Chand and Co , New Delhi.
- Subba Rao N.S. 1988 , Bio fertilizers in agriculture , second edition, Oxford & IBH Publishing Co ,Pvt Ltd , New Delhi.
- Subba Rao .N.S. 1982. Advanced agricultural Microbiology , Oxford & IBH Publishing Co, New Delhi.

## SEMESTER - II

### CORE PAPER-III-PTERIDOPHYTES, GYMNOSPERMS & PALEOBOTANY

Credits : 4

Hours : 7

#### Unit- I

**Pteridophytes:** General characters and classification of Pteridophytes (Sporne, 1965). Stellar evolution in pteridophytes; Homospory, Heterospory, Apospory, Apogamy, Leptosporangiate and Eusporangiate- Definitions only with examples. A detailed study of morphology and structure of *Rhynia*, *Lepidocarpon* and *Lepidodendron*.

#### Unit- II

A detailed study of the morphology, structure, reproduction and life cycle of *Psilotum*, *Lycopodium* and *Gleichenia*.

#### Unit- III

A detailed study of morphology, structure, reproduction and life cycle of *Equisetum* and *Marsilea*.

#### Unit-IV

**Gymnosperms:** General characters of Gymnosperms. Classification of Gymnosperms (Sporne, 1965). A detailed study of morphology and structure of *Williamsonia*, A detailed study of morphology, structure, reproduction and life cycle of *Pinus*, *Cupressus* and *Gnetum*.

#### Unit- V

**Paleobotany:** Geological time scale; fossils and fossilization- kinds of fossils- petrification, cast, impression and compression. Nomenclature of fossil plants. Radiocarbon dating. Contribution of Prof. Birbal Sahni (brief outline).

#### PRACTICALS:

Study of morphology and anatomy of the genera *Psilotum*, *Lycopodium*, *Gleichenia*, *Equisetum*, *Marsilea*, *Pinus*, *Cupressus* and *Gnetum*.

Study of the fossil specimens *Rhynia*, *Lepidocarpon*, *Lepidodendron* and *Williamsonia*



### **Text Books**

1. Vashista, P. C. - Pteridophyta
2. Vashista P. C.- Gymnosperms
3. Pandey .B.P. – *A text book of Botany ( BryophytaPteridophyta& Gymnosperms )*

*S.Chand& Co. NewDelhi*

### **Reference Books**

1. Bhatnagar, S. P. and Moira, A. 1996. Gymnosperms. New age international Pvt. Ltd., New Delhi.
2. Sporne, K. R. - Morphology of Pteridophytes
3. Sharma, O. P. - Text book of Pteridophyta
4. Smith, G. M. - Cryptogamic Botany (Vol. II)
5. Sporne, K. R. - Morphology of gymnosperms, 1965. Hutchinson univ. Asia Publishing House.
6. Arnold, C. A. - An Introduction to Paleobotany
7. GangulyDass and Dutta - College Botany
8. Narayanaswamy, K. N., Rao and Raman, A. 2000 - Outline of Botany Pteridophyta (Vascular Cryptogams)
9. P. C. Vashista, A. K. Shina, Anil Kumar, 2010,S.Chand& Company New Delhi – 110055.

## SEMESTER II

### PRACTICAL PAPER – I

**Algae, Bryophytes, Fungi, Lichenology, Plant Pathology, Pteridophytes,  
Gymnosperms, and Paleobotany**

**Time : 3 Hours**

**Marks : 60**

1. Prepare suitable micropreparations of A,B and C stain and mount in Glycerine .

Draw labelled sketches. Identify giving reasons. Submit the slide for valuation.

(7X3=21)

2. Spot at sight (Genus and group only) D.E.F and G (4X1.5=6)

3. Comment on the etiology of H (4X1=4)

4. Draw sketches write critical notes on and identify giving

reasons I.J.K.L. and M (5X3=15)

5. Comment on 'N' (4X1=4)

6. Record note book (10)

## KEY AND SCHEME FOR VALUATION

1 . Algae, Bryophytes, Pteridophytes, Gymnosperm, materials to be given in **A.B. & C**

**A.** Algae / Fungi, **B.** Pteridophytes, **C.** Gymnosperms

Slide submission – 2 marks      identification - 1 mark

Diagram - 2 marks                      Reasons - 2 marks                      (7X3=21)

2 . Macroscopic specimens prescribed in the syllabus **D.E.F.G.**, ( Algae, Fungi or Lichen, Bryophytes, Pteridophytes and Gymnosperm )

Genus - 1 mark                      Group – ½ mark                      ( 1½X4=6)

3 **.H.** Plant pathology specimen prescribed in the syllabus

Identification – 1 mark      Casual Organism – 1 mark

Diagram – 1 mark                      Two symptoms - 1 mark                      (1X4=4)

4 . Write critical notes

**I,J,K,L,** and **M.** – Cryptogamic slides

**I** – Algae , **J**- Fungi, **K**- Bryophytes , **L**- Pteridophytes, **M**- Gymnosperm

Identification – 1 mark      Diagram – 1 mark      Notes - 1 mark                      (5X3=15)

5 **.N.** Fossil slide

Identification – 1 mark      Diagram – 1 mark      Notes - 2 marks                      (1X4=4)

6 . Record note book

10marks

**SEMESTER-II**  
**SBC -- HERBAL COSMETICS**

**Credits :2**

**Hours :2**

**Unit: I**

Introduction of herbal cosmetics – Need and advantages of Herbal cosmetics – Adverse effect of chemical cosmetics.

**Unit : II**

Face care : Face cleanser, Sun screens, Ache – Pimple cream, Anti- marks lotion- Preparation of Face pack – any two preparation.

**Unit : III**

Skin care : Skin beauty through panchakarma, Turmeric – Milk lotion, Anti-Wrinkle cream , Moisturizing cream, Preparation of Herbal Bathing powder and soaps.

**Unit : IV**

Hair care : Hair oil components and preparation of oil, NeeliBringhadi oil- (Karisalankannithailam) – Amla Hair oil (Ashwini hair oil) – Amaranthus oil (Arsikeeraithailam) – Herbal Shampoo and Hair dyes.

**Unit : V**

Foot care : Preparation of foot cream- sanna, castor oil, turmeric; Megandi decoration on feet.

## Reference Books :

- Faroqi A.A. Sreeramu.B.S. 2005 , cultivation of medicinal and crops
- Asha Ram – 2002 Herbal Indian Perfumes and cosmetics sriSatguru Publications New Delhi.
- Babu .S.S. , Herbal cosmetics Pushkal Publishers.
- Pharmacognosy – SS. Handa and V.K. Kapoor, Second Edition ,publishersVattubhPrakasan, Delhi.
- Pharmacognosy – C.K.Kokate, a.p.durohit and s.r.gokhaletwelth edition – publishers niraliprakashan, pune.
- Text Book of Pharmacognocoy T.E. Wallis 5th edition Publishers CBS publishers and Distributors Delhi.

## SEMESTER-III

### CORE PAPER – IV BIOCHEMISTRY, BIOPHYSICS & BIOTECHNIQUES

**Credits : 5**

**Unit:I**

**Hours :6**

**Biochemistry**

Basic concepts of Biochemistry – Brief account of atoms, bonds - ionic, hydrogen, covalent and co- ordinate, pH and buffer - structure and properties of water.

**Unit : II**

Biomolecules – structure, classification and properties of carbohydrates structure & properties of monosaccharides - glucose, disaccharides - sucrose, polysaccharides – starch,protein – primary, secondary and tertiary structure and properties of proteins, lipids – classification and properties, structure of fatty acid.

**Unit: III**

Enzymes – structure, properties, nomenclature and classification, mechanism of enzyme action, factors affecting enzyme action

**Unit: IV**

**Biophysics**

Laws of thermodynamics, concept of free energy, redox potential, ATP as high energy compound, photobiology - nature of light, solar radiation, absorption and emission spectrum, fluorescence, phosphorescence and bioluminescence.

**Unit: V**

**Biotechniques**

Colorimetry and its use; centrifugation – basic principles, types; chromatography – basic principles, types (Paper); pH meter and its use

## **PRACTICALS:**

1. Preparation of buffers – phosphate and citrate buffer
2. Determination of pH of any three soil samples
3. Determination of pH of lemon and watermelon
4. Qualitative test for carbohydrates, proteins and lipids.
5. Separation of amino acids by paper chromatography
6. Estimation of starch by gravimetric method.
7. Estimation of total free amino acids by ninhydrin reagent method
8. Estimation of total protein by using green grams and cicer seeds.

### **Text Books**

- Power C.B. and G.R Chatwal – Fundamentals of Biochemistry ,S,Chand. & Co, New Delhi.

. \* Jain J.L. Fundamentals of Biochemistry S.Chand & Co New Delhi

### **Reference Books:**

- Conn E.E and Stumpf – outlines of Biochemistry, Wiley Eastern Ltd. Chennai.
- Lehinger A.L. Bio chemistry, Kalyani's New Delhi.
- AmbikaShanmugam – Fundamentals of Biochemistry for medical students – Chennai..
- Carey E.J. – Biophysics – affiliated East –west press P.Ltd. New Delhi.
- Albert .I Lechninger Bioenergetics – W.A Benjamin New York.
- Fuller etal – Biophysics – Concepts and Mechanics
- Dr. Salil Bose – Elementary Biophysics
- Jeyaraman, Kunthala ,M.Lakshmanan M. Gnananam and J.Jeyaraman - Experiments in Microbiology
- HiggimBothams, Chennai
- Jeyaraman Techniques in Biology – A College level study
- Plummer D.T – An introduction to practical Biochemistry , Tata
- Mc.Graw Hill Publishing Co , Bombay.
- Asokan .V. Melvisharam – Biochemistry and Biotechniques

## **SEMESTER-III**

### **NME – GARDENING AND NURSERY MANAGEMENT**

**Sub code :**

**credits : 2**

**Hours : 2**

#### **Unit : I**

Principles – Important features of garden – kitchen garden -plan, layout, cropping pattern and principles of kitchen gardening

#### **Unit : II**

Ornamental – Botanical garden – Components – Trophy ,Topiary , Hedges Edges, Borders, Arches, Lawn making, sunken garden , green house.

#### **Unit: III**

Indoor gardening – hanging pots – bonsai – window boxes – potted plants –water gardening – rockery – flower arrangement

#### **Unit: IV**

Cultivation of vegetables- Brinjal; Cultivation of fruits- Mango; Cultivation of flowers – jasmine, Extraction of jasmine concrete

#### **Unit: V**

Planning and layout of orchards – cultivation methods for fruits crops- cultivation of mango-intercropping, suitable intercrops and principles of intercrops



**Reference Books :**

- Indian Vegetables Uma Shangar - 2013
- Ornamental Gardening ,Hari Krishna – 2012
- Garden Flowers, Vishnu Swarup – 2012
- Fruits , Ranjit Singh – 2013
- Vegetables, Bishvajit – 2013
- Garden , LaeeqFuthehally – ( B.P) – 2013

## SEMESTER-IV

### CORE PAPER- V - PLANT ANATOMY AND PLANT ECOLOGY

Credits: 4

Hours: 4

#### Unit – I

##### Anatomy

Cell wall: ultra structure; pits and their types; plasmodesmata; functions.

Meristems: Classification; characteristics; shoot and root meristems- various theories (Apical cell theory, Histogen theory, Tunica corpus theory and Korper-Kappe theory);

Cambium.

#### Unit-II

Tissues: Simple tissues – parenchyma, collenchyma, sclerenchyma; complex tissues- xylem, phloem. Structure of monocot and dicot leaves; stomata and their types; hydathode and its functions.

#### Unit-III

Primary structure of dicot stem and dicot root; monocot stem and monocot root. – Normal secondary thickenings of Dicot stem and Dicot root

#### Unit-IV

Nodal anatomy– A brief account – Unilacunar Node – Justicia , Trilacunar node – Azadirachta, Multilacunar node – Aralia . Anomalous secondary growth of *Boerhaavia* and *Dracaena*

#### Unit -V

##### Plant Ecology

Study of the plant groups with special reference to their morphological, anatomical and physiological adaptations : Hydrophytes, Xerophytes, Halophytes -Plant succession Hydrosere , Xerosere .

## **PRACTICALS:**

1. Observation and identification of different types of tissues (slides).
2. Observation and study of internal structure of monocot (stem and root) and dicot (stem and root).
3. Observation and study of internal structure of monocot and dicot leaf (slides).
4. Observation and study of anomalous secondary growth in Boerhaavia
5. Observation and study of internal structure of Hydrophytes and Xerophytes

## **Text Books**

1. Vashishta P.C. Plant Anatomy , S. Nagin& Co New Delhi.
2. Venkateswarlu .V. Internal morphology of Angioperms
3. Sharma .P.D. Elements of Ecology, Rastogi Publication, Meerut .
4. Shukla R.S. and P.S. Chandel – plant Ecology and soil science, S.Chand and Co ., New Delhi.

## **Reference Books**

1. Anatomy of seed plants –Katherine Esau. 2<sup>nd</sup> Edition 1965 Wiley New York.
2. Esau's Plant Anatomy: Meristems, Cells, and Tissue of the Plant Body, 3<sup>rd</sup> Edition Author R. F Suan E. Eichhorn. 2006.
3. Plant Anatomy –Fahn. A. 3<sup>rd</sup> Edition 1985. Pergamon Press New York.
4. Comparative Wood Anatomy –Carlquist, S. Springer Science. Publication. 2001
5. Anatomy of Seed Plant V. Singh P.C. Pande and D.K. Jain Rastogi Publications Meerut 1998.
6. College Botany Vol II. B.P Pandey S. Chand and CO., Ltd New Delhi 2011.
7. Plant Anatomy B.P. Pandey S. Chand and Co., Ltd., New Delhi 2009
8. Ambasht .R.S – A Text book of plant Ecology students friends & Co., Varashi
9. A text book of Plant Ecology; R.S. Shukla and P.S. Chandel. 2007, 11<sup>th</sup> Edition. C. Chand and Company Ltd. New Delhi
10. Modern concepts of Ecology; H.D. Kumar, 2007. 8<sup>th</sup> Edition, UBS Publisher's & Distributors Pvt. Ltd. New Delhi.

## SEMESTER-IV

### CORE PAPER – VI CELL BIOLOGY AND EMBRYOLOGY

Credits:4

Hours: 4

#### Unit-I

**Cell Biology:** The ultra structure of plant cell; comparative account of prokaryotic and eukaryotic cell, compound microscope and electron microscope: Plasma membrane – Structure and functions; Chloroplast – Structure, functions and its significances.

#### Unit-II

Mitochondria – Structure and functions; Nucleus – Structure and functions; Chromosomes-shapes and functions- special type of chromosomes – Giant and lamp brush chromosomes. Ribosomes – Origin, Structure and functions

#### Unit-III

Golgi apparatus- Structure and functions- Cell division – Mitosis and meiosis – significance; various stages of cell division progression; cytokinesis;

#### Unit-IV

##### Embryology

Structure and development of microsporangium; microsporogenesis, development of male gametophyte; pollen wall features- megasporangium - types of ovule, nucellus, integument, obturator,

#### Unit –V

Megasporogenesis and development of female gametophyte – monosporic (*Polygonum*), Fertilization: Double fertilization and triple fusion; Endosperm – types–Cellular, Nuclear and Helobial, Ruminant (Haustoria not included) Dicot embryo –eg. *Capsella*, Monocot embryo – *Luzula* -.Polyembryony, Apomixis, Parthenocarpy- (only definitions with examples.)

## **PRACTICALS:**

- 1.Observation and study of T.S of young anther.
2. Observation of ovule types (slides).
- 3.Observation of embryo sac structure (chart).
4. Dissection of dicot embryo (any one stage).
- 5.. Study of endosperm types (slide)
- 6.Observation and study of ultrastructure of cell organelles (chart, slides, models& micrographs).
- 7.Observation of different stages of mitosis in onion root tip squash preparation

## **Text Books**

- 1.Embryology of Angiosperms- S.S. Bhojwani and Bhatnagar, S, P.Vikas Publishing House Pvt Ltd., 2009
2. An Introduction to embryology of angiosperm-P. Maheswari 1963. McCraw-Hill., New York
- 3.Gupta, P. K. 1999. A Text – book of Cell and Molecular Biology. Rastogi Publications, Meerut, India
- 4.Verma P.S. & V.K. Agarwal –cytology, S,Chand& Co , New Delhi

## **Reference Books**

- 1.Freifelder, D.1993. Essentials of Molecular Biology, Jones & Bartlett, Boston.
- 2.DeRobertis& De Robertis. 1990. Cell and Molecular Biology, Saunders College, Philadelphia, USA.
- 3.Elliott WH & Elliott, DC. 2005. Biochemistry and Molecular Biology, 3rd Ed. Oxford University, Oxford.
4. Watson,J.D. 1987. Molecular Biology of Gene. The Benjamin. Gummings publishing co. inc. California
- 5.Hopkins, W. 1988. Molecular biology of the gene. Benjamin publishing Company. California.
- 6.Geoffrey m. Cooper, Robert, E. Hansman. 2007. The cell- A Molecular approach, sinauerAssociates. USA.
- 7.Lee, P. J. 1999. Plant Biochemistry and Molecular Biology, 2nd edition. John Wiley and Sons, New York.

## **SEMESTER-IV- PRACTICAL PAPER – II**

Plant Anatomy, Ecology, Cellbiology, Embryology, Biochemistry, & Bio- Techniques

### **Plant Anatomy**

1. To make suitable micropreparations of the angiospermic materials – Dicot and Monocot stem, root & leaves .
2. To draw labelled sketches of different types of microscope (Compound & Electron)

### **Cell Biology**

3. To smear root tip and identify different stages of mitosis .
4. To smear young anther and identify different stages in meiosis
5. To identify cell inclusions

### **Embryology**

6. To mount embryo ( Tridax, Brassica )
7. To study and write critical notes on permanent preparation showing development of anther, Embryosac and embryo.

### **Biochemistry**

8. Qualitative test for carbohydrates, proteins and fats.
9. Measurement of PH of soil solutions.
10. Preparation of Buffer.
11. Estimation of starch in plant tissue – Gravimetric and Calorimetric.

### **Bio Techniques**

12. Determination of complementary colours and verification of Beer's law
13. Estimation of Sugars in plant tissues – colorimetry
14. Paper chromatography for separation of sugar, Aminoacids, Pigments, Dyes, Circular, Ascending, Column chromatography, separation of pigments.

### **Plant Ecology**

15. Identification of section stems and leaves of Hydrophytic, xerophytic groups.
16. Identification of morphological, ecological and biological interests of ecologically important plants.
17. To maintain a record notebook and to submit it for external valuation

**PRACTICAL PAPER- II-QUESTION PATTERN**  
**Plant Anatomy, & Plant Ecology, Microscopy, Cellbiology, Embryology,**  
**Biochemistry, & Bio- Techniques**

**Time : 3 hours**

**Marks : 60**

1 . Taking lots from the set of experiments. Write the procedure and submit the procedure. Proceed with the experiment, tabulate and interpret the results.

(10 Marks)

2 . Prepare transverse sections of 'A' and B Stain and mount in Glycerine Draw labelled sketches. Identify giving reasons. Submit the slide for valuation

(2X5=10)

3 . Make suitable micropreparations of 'C' Identify atleast any one stage and show it to the examiner for valuation

(5 Marks)

4 . Dissect and takeout the embryo from the material 'D' mount and submit it for valuation

(5 Marks)

5 . Write critical notes on E.F.G. and H

(4X5=20)

6 . Record Note Book

(10 Marks)

## KEY AND SCHEME FOR VALUATION:

1 . Experiments prescribed in the syllabus alone should be given

Experiment setup – 3, Procedure – 4, Tabulation and Interpretation- 3

(10 marks)

2 .**A.** Anatomy materials to be given, **B.** Specimens of ecological interest

Slide submission-2

Identification – 1, Diagram- 1, Reasons- 1

( 2x5=10)

3 . Onion Root tip may be given or Rheo flower buds may be given in **C** identification and submission of slides ( notes need not be written )

(5 marks)

4 . Any suitable materials such as Tridax, or Brassica to be given in **D.** Notes need not be written, submission of slides

( 5 marks)

5 . Critical Notes on

**E** – any cell inclusion

**F** – Electron Photomicrograph of cell organelles.

**G** – Embryology Slide

**H** – Photograph of any one microscope

Identification – 1 mark, Sketch- 2 marks , Notes – 2 marks

( 4x5= 20)

6 .Record Note Book

(10 marks)



**SEMESTER-IV**  
**SBC - MUSHROOM FOR LIVELIHOOD**

**Credits : 2**

**Hours : 2**

**Unit-I**

Introduction: importance, classification and test for identification of mushrooms.

Nutritional and medicinal value of mushrooms.

**Unit-II**

Morphology and characteristics of commonly cultivated edible mushrooms.

- a. *Paddy straw mushroom* (*Pleurotus* sp.)
- b. *Button mushroom* (*Agaricus bisporus*)
- c. *Milky mushroom* (*Calocybe indica*)

Life cycle of a common mushroom (*Agaricus*)

**Unit-III**

Culture Technology: Mushroom cultivation: site selection and construction of mushroom shed, infrastructure facilities, mushroom mother stock culture by tissue culture; preparation of mother spawn and seed spawn; mass cultivation techniques for *Agaricus* and *Pleurotus* mushrooms.

**Unit-IV**

Post-harvest technology: Harvesting and marketing, Preservation and storage of mushrooms. Problems in mushroom cultivation-pest and diseases, weed moulds and their control.

**Unit-V**

Delicious recipes of mushrooms (mushroom soup, pickle and); Economic importance of mushroom.

**Text Books:**

1. Nita Bahl (1996), Handbook of mushrooms. Oxford and IBH publishing co.Ltd. New Delhi.
2. Kapoor, J.N. (1989) Mushroom cultivation, ICAR, New Delhi.

**Reference Books:**

1. Aneja, K.R. 1993. Experiments in microbiology, Plant pathology, Tissue culture and Mushroom cultivation. WishwaPrakshan, Ne
2. Pathak V.N. yadav N. Goor .M. 2000, Mushroom Production and processing technology, Agrobios India Ltd.

## **SEMESTER-V**

### **CORE PAPER-VII-TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY**

**Credits : 5**

**Hours: 6**

#### **UNIT: I**

Plant morphology – modification of tap root system – modification of stem – aerial and underground stem- morphology of leaf : inflorescence types- racemose, cymose, mixed and special types, flowers and fruits – simple, aggregate and multiple fruits.

#### **UNIT : II**

Binomial Nomenclature – Herbarium technique – classification – Bentham & Hooker; ICN and its role. Botanical Survey of India (BSI) – Modern approaches - Chemo Taxonomy and Digital Taxonomy

#### **UNIT : III**

Study of following families with special reference to morphology of the modified plant parts and plants of economic importance

\* Annonaceae, \* Rutaceae , \* Caesalpinaceae , \* Cucurbitaceae , \* Apiaceae

#### **UNIT : IV**

Study of following families with special reference to morphology of the modified plant parts and plants of economic importance

\* Rubiaceae, \*Asclepiadaceae, Lamiaceae , Amaranthaceae , Euphorbiaceae .

#### **UNIT : V**

Study of following families with special reference to morphology of the modified plant parts and plants of economic importance

\* Orchidaceae \* Arecaceae \*Poaceae

#### **ECONOMIC BOTANY :**

Study of economically important plants of the above mentioned families with a special reference to the morphology of their uses.; Study of the extraction, chemical constituents, and uses of the following - Coffee, - Rubber

## **PRACTICALS:**

- \* Diversity of Angiosperms: Morphology of Angiospermic plants.
- \* Taxonomy: Taxonomic study of plants belonging to the families as per the syllabus (only dicot families given for identification in practical examinations).
- \* Field visits: Botanical study tour for 3 or 4 days to be undertaken for covering various natural habitats and one or two single day collection trips.
- \* Submission herbarium: Submission of 15 herbarium sheets along with tour/trip report and field note book.
- \* Economic Botany: Study of the morphology and structure of useful parts of the plants mentioned in and herbarium sheets and collection of samples of plants.
- \* Ethnobotany: Listing of the medicinal practices of one or two tribes.

## **Text Books**

1. Plant Taxonomy O.P. Sharma.2007 Data McGraw-Hill Publishing Company New Delhi.
2. Introduction to Taxonomy of Angiosperms 2011 B.K. Verma PHI Learning Pvt. Ltd New Delhi.
3. Taxonomy of Angiosperms V. Singh, Dr. V. Singh & Dr. D.K. Jain Second Edition 2010. Rastogi Publications Meerut India.

## **Reference Books**

4. Plant Systematics 2004. Singh Oxford & IBH Publishing Co., Pvt., Ltd. New Delhi.
5. Advanced plant Taxonomy A.K. Mondal. New Central Agency Pvt. Ltd., 2009. New Delhi.
6. College Botany Vol. I. B.P. Pandey. S. Chand and Co., Ltd. New Delhi. 2011
7. Systematic Botany Bharathi Bhattacharyya 2009. Narosa Publishing House. India.
8. Modern Plant Taxonomy Dr. N.S. SubrahmanyamVikas Publishing House Pvt. Ltd New Delhi
9. Economic Botany – Pandey, B.P. and Anita. S. Chand and Co., Ltd. New Delhi. 2009.
10. Economic Botany of the Tropics – Kochar, S.L. (2000). Macmillan India Pvt. Ltd.
11. The useful Plant s of India – CSIR Publications (1986) and Information Directorate, New Delhi.
12. Economic Botany – Sharma (1996) Tata McGraw Hill Co., Ltd.

## **SEMESTER-V**

### **CORE PAPER-VIII- GENERAL MICRO BIOLOGY**

**Credits : 4**

**Hours: 6**

#### **Unit: I**

Introduction to microbiology - definition and scope of microbiology, viruses – general characteristics, structure and multiplication of TMV and bacteriophage, transmission of viruses, symptoms and control of rabies and AIDS

#### **Unit : II**

Food microbiology – microbial flora of food – food poisoning and food infection; industrial manufacture of ethanol; antibiotics – penicillin, vitamin B12; aminoacids- glutamic acid; production of SCP, industrial effluent .

#### **Unit : III**

Soil microbiology –soil microorganism the rhizosphere microorganisms – organic matter decomposition, humus, functions of humus; microbial degradation of cellulose .

#### **Unit : IV**

Microbiology of domestic water – microbiology of drinking water, municipal water and sewage water – brief account of sewage treatment process; determination of sanitary quality; chemotherapy and control of micro organisms through antibiotics

#### **Unit : V**

Immunology – basic principle of immunology, structure of antigen and antibody and their reaction; types of immunology –antigen , antibody - definition, types Ag- Ab reaction – types of immunosystem, human immune system, immunization schedule (WHO)

## **PRACTICALS:**

### **Microbiology:**

1. Calibration of Microscope.
2. Sterilization techniques & Types.
3. Preparation of Basal medium – solid agar and broth
4. Preparation of agar plates, agar slants and agar deep tubes.
5. Isolation and culturing techniques of microbes – streak plate and pour plate methods.
6. Simple staining of bacteria.
7. Gram's staining of bacteria.

### **Text Books :**

1. Anathanarayayan and Panikaer's Text book of Microbiology ,ArtiKapil Publishing  
orentBlackswan – 2013
2. A Text book of Immunology, RashmiA.Joshi -2013
3. General Microbiology vol- I – Powar -2010
4. General Microbiology vol –II – Powar – 2010

### **Reference Books:**

5. Pelczar, M.J (Jr), Chan, E.C.S and Krieg, N. R (1986). Morphology. Tata McGraw Hill  
Publishing Company Ltd, New Delhi.
6. Scheigel, H. S (1986). General Microbiology, (6<sup>th</sup> edition). Cambridge University  
press, London.
7. Sharma, P.D. Microbiology (2<sup>nd</sup> edition). Rastogi Publication, Meerut.
8. Aneja, K. K. (1996). Experiments in Microbiology, Plant Pathology, Tissue Culture  
and Mushroom Cultivation, WishwaPrakashan, New Delhi.
9. Purohit, S. S. (1999) Microbiology Fundamentals and Applications, (6<sup>th</sup> Edition).  
Agrobios (India), Jodhpur.
10. Dubey and Mageshwari – Text Book of Microbiology. Schand& Co. Ltd.

**SEMESTER-V**  
**CORE ELECTIVE-I- PLANT BIOTECHNOLOGY**

**Credits : 5**

**Hours : 5**

**Unit : I**

Biotechnology – Definition, scope & importance . Techniques used in Biotechnology – Methods used in direct gene transfer – Vector mediated gene transfer Electroporation & Microinjection , Isolation of DNA, Principles of PCR – Application and uses, DNA Finger printing Techniques in Biotechnology.

**Unit : II**

Recombinant DNA technology vectors, cosmid , transposans- Definitions Agrobacterium and genetic engineering in plant – Ti plasmids – Incorporation of TDNA into DNA Human health care .

- a) Insulin , b) Human growth hormone c)Antibiotics d) vaccines

**Unit : III**

Plant tissue culture – Culture techniques types of medium Regeneration of plants Root culture, Anther culture, Role of tissue culture technology in crop improvements. Artificial seeds

**Unit : IV**

Transgenic plants – Definition Transgenic plants for herbicide, pest, fungi, and viral resistance . Biological control of pathogens & weeds through genetically engineered microbes – B, Thuringiensis

**Unit : V**

Plant Biomass – Definition composition of biomass, Biomass energy conversion, Bioenergy- Biofuels, Biodiesel , Role of genetically recombinant microbes in pollution control – Pseudomonas. Intellectual property Rights

**Text Books :**

- Dr. Sathyanarayana .U 2008 Biotechnology , I- Edition 2005 , Kolkata
- Gupta P.K. 1994 , Elements of Biotechnology, Rastogi and Co ., Meerut ,India.
- R.C. Dubey 2007 A Textbook of Biotechnology, S. Chand and Company Ltd, Ram nagar, New Delhi

**Reference Books:**

- Drivedi .P. 2004 Plant Tissue Culture, Scientific Publishers, India .
- Jagadand .S.N. 1995 .Environmental Biotechnology, Himalaya Publishing house. Mumbai.
- Jagdand .S. N. 2006 .Gene Biotechnology, Himalayan Publishing house , Mumbai
- Elements of Biotechnology – P. K. Gupta, Rastogi publications, Meerut



**SEMESTER-V**  
**CORE ELECTIVE-II- HORTICULTURE**

**Credits : 5**

**Hours : 5**

**Unit : I**

Horticulture-scope and divisions – Botanical garden-components. Botanical gardens of the world, Botanical gardens of India- Orchard cultivation-soil management practices, intercropping, principles and suitable intercrops; Training –principles and methods; pruning-special pruning techniques and uses; fruit set and unfruitfulness, fruit drop

**Unit : II**

A brief account of methods of vegetative propagation- cutting, layering, grafting; manures-organic manures; fertilizers-types and methods of application; irrigation-systems of irrigation

**Unit : III**

Gardening – Landscape gardening, Lawn making, Rockery, Hanging pots, Bonsai, Water garden,flower arrangement- cut flowers (Only examples), and Ika-bana

**Unit: IV**

Cultivation of vegetables- Brinjal; Cultivation of fruits- Mango; Cultivation of flowers – jasmine, Extraction of jasmine concrete

**Unit V**

Growth regulators in horticulture; plant protection measures – control of insect pests; Kitchen Garden- principles, plan, layout, cropping pattern and significance.

### **Text Books**

1. Ornamental Horticulture – Vishnu Sworup
- 2 .Introduction to Horticulture – Kumar. N Rohini agency, Nagercoil
3. Home Gardening – Trivedi
4. Horticulture – Manibhussan Rao
- 5.Fundamentals of Horticulture – Hatmann and Kestr

### **Reference Books**

6. Edmond etal – Fundamental of Horticulture Tata Mc. Graw Hill Publishing Co, Bombay.
7. Brelt – Planing your garden
8. Gopala Swami Ienger .K.S. – Complete gardening
9. Percy Lancaster – Gardening in India ,Rekha Printing ,New Delhi.
10. Vegetables – Choudhury .
- 11.A Guide on vegetable culture – Veeraghavanathan and others
- 12.Manithbhusan Rao – Horticulture
13. Roy Genders – Miniature Roses
14. Heliyer – Gardener’s Golden Treasury
15. Introduction to spices plantation crops medicinal and aromatic plants

**SEMESTER-VI**  
**CORE PAPER-IX- PLANT PHYSIOLOGY**

**Credits : 4**  
**Hours : 6**

**Unit: I**

**Water relations in plants** -Absorption of water :Imbibitions, Diffusion, Osmosis, plant cell as osmotic system, plasmolysis, significance and practical application, soil water. Mechanism of waterabsorption.**Ascent of sap:** Mechanism – Brief mention of vital theories – physical force theories – transpiration pull and cohesion theory only;  
**Waterloss :** Transpiration - definition, and types, cuticular, stomatal and Lenticular, Mechanism of Stomatal movement, Significance of transpiration – Other methods of loss of water -Guttation

**Unit : II**

**Mineral nutrition**-Hydroponics, Role of Macro & Micro Nutrients & Deficiency Symptoms-Mineral salt Absorption – Carrier Concept ;**Photosynthesis :**Mechanism – recent views on light Reaction – Photosynthesis unit – Emerson Effect – Two photosystem – Electron Transport chain – Photophosphorylation – cyclic and non- cyclic –Dark reaction – carbon fixation C<sub>3</sub> and c<sub>4</sub> pathways . Kranz anatomy. Crassulacean acid metabolism –CAM pathway

**Unit : III**

**Respiration :**Various aspects of respiration – Respiratory quotient – It's significance Respiratory substrates – Relation between aerobic and anaerobic respiration, Mechanism of Respiration : Glycolysis – Kreb's cycle . Terminal Oxidation – Electron Transport and Oxidative phosphorylation – Photorespiration.

**Unit : IV**

**Nitrogen Metabolism-** Sources of Nitrogen – N<sub>2</sub> fixation – Symbiotic and Non symbiotic, Nitrate reduction- amino acid synthesis and protein synthesizing machinery in plants.

## **Unit : V**

**Physiology of flowering** : Theories and concept of Photoperiodism and Vernalization – Role of Phytochromes – Seed Dormancy – causes and methods of breaking seed dormancy. **Circadian Rhythms** – Biological clock – characteristics and significance .

### **PRACTICALS:**

1. Determination of osmotic pressure.
2. Factors affecting permeability of membrane.
3. Determination of rate of transpiration,
4. Separation of chloroplast pigments by paper chromatography .
5. Determination of rate of photosynthesis under variable CO<sub>2</sub> concentrations.
6. Determination of rate of photosynthesis under various light intensities.
7. Measurement of respiration (Ganong's respiroscope).
8. Determination of water absorption/transpiration ratio.

### **Text Books**

1. Kochhar, P.L. and Krishnamurthy, H.N. 1989. Plant Physiology. Atmaram & Sons, New Delhi.
2. Jain, V.K. 1995. Fundamentals of Plant Physiology. S. Chand & Co. New Delhi.
3. Hopkins, W.G (1995) Introduction to Plant Physiology. John Wiley & Sons Inc. New York, USA.
4. Salisbury, F.B and Ross, C.W. 1992. Plant Physiology (4<sup>th</sup> Edition) Wadsworth Publishing Co. California, USA.
5. Devlin and Witham, F.H. 1999. Plant Physiology. 4<sup>th</sup> Edition, CBS Publishers and Distributors, New Delhi.
6. Noggle, G.R. and Fritz, G.J. 2010. Introductory Plant Physiology. 2<sup>nd</sup> Prentice Hall of India, New Delhi.
7. Verma, S.K. 1995. A Textbook of Plant Physiology and Biochemistry. Chand & Company Ltd, New Delhi.
8. Mukherji S and A.K. Ghosh. 1996. Plant Physiology. Tata McGraw Hill Publishing Company Ltd, New Delhi.
9. Subhash Chandra Datta. 1994. Plant Physiology. Wiley Eastern Ltd, New Delhi.
10. Sinha, R.K. -2007, Modern Plant Physiology, Narosa Publishing House, New Delhi.

## SEMESTER-VI

### CORE PAPER-X- GENETICS AND MOLECULAR BIOLOGY

Credits : 4

Hours : 6

#### Unit –I

**Genetics:** Mendel's Experiments- Law of Segregation, Law of Independent assortment, Law of Dominance, back cross and test cross; Gene interaction: Allelic interaction - Incomplete dominance and Lethal gene action; Non allelic interaction-Complementary genes, Dominant epistasis, Recessive epistasis, Multiple alleles with reference to ABO blood groups.

#### Unit : II

Linkage and crossing over with example – theories explaining mechanism of cross over – significance of cross over ; Mutation (Spontaneous and induced mutations), Physical and chemical mutagens); Genetic code; Brief outline of Chromosomal aberrations .Application of Mutation & Polyploidy in crop improvement

#### Unit : III

Mechanism of sex determination in lower plants- *Melandrium*, *Sphaerocarpos* and Bacteria; sex determination in higher plants, sex reversal; Extra Chromosomal inheritance in plants. Male sterility in Maize – Plastids inheritance in plants

#### Unit :IV

**Molecular Biology** :DNA structure and types of replication, Mechanism of replication; RNA types, structure and function; Proof for DNA as genetic material

#### Unit : V

Genetic regulation – Induction and Repression, Genetic regulation in prokaryotes, Operon concepts – lac operon, Modern concepts of gene- One gene –one enzyme hypothesis.

## **PRACTICALS :**

Simple problems on the following aspects: Monohybrid cross, Test cross, Incomplete dominance and Dominant epistasis.

### **Text Books**

1. Genetics, verma P.S. Chand and Co ., New Delhi
2. Molecular Biology and Genetic Engineering –P.K. Gupta

### **Reference Books**

3. Principles of Genetics – Eighth edition - Gardner, Simmons and Snustad (1991) John Wiley & Sons, Inc., Newyork
4. Cytogenetics, Evolution and Plant Breeding- R.S. SHUKLA and P.S.CHANDEL (1988) S.Chand& Company (Pvt) Ltd, New Delhi.
5. A Textbook of Cytology, Genetics and Evolution-Third edition -P.K. GUPTA (1979) Rastogi Publications, Meerut, India.
6. Fundamentals of Cytogenetics and Genetics- Mahabal Ram (2010) PHI Learning Private Limited, New Delhi.
7. Genetics: Classical to Modern-First Edition- P.K.Gupta, (2007) Rastogi Publications, Meerut , India.
8. Principles of Genetics- S.B. Basu M. Hossain (2006), Books & Allied (P) Ltd, Kolkata.

## SEMESTER-VI

### CORE ELECTIVE – III - HERBAL MEDICINE AND HUMAN WELFARE

**Credits : 5**

**Hours : 5**

#### **Unit : I**

Pharmacognocny definition – A general survey of different systems of medicine – Indian system of Medicine , Siddha , Ayurvedha, Homeopathy, and Unani system – future of pharmocognocny

#### **Unit : II**

A systematic study of crude drugs with reference to their vernacular name, family and uses; Drugs obtained from **roots**(Rauwolfia, citrullus); Drugs obtained from **underground stem** (Garlic, Ginger); Drugs obtained from **Bark**(Cinnamon, Cinchona); Drugs obtained from **stems & woods**(Ephedra, Catechu) ; Drugs obtained from **Leaves**(Adhatoda, Aloe )

#### **Unit : III**

A systematic study of crude drugs with reference to their vernacular name, family and uses; Drugs obtained from **flowers**(Safron, clove); Drugs obtained from **fruits** (Emblica, cumin); Drugs obtained from **seeds**(Cardamom, Fenugreek); Drugs from all parts of plants(Neem, phyllanthus)

#### **Unit : IV**

A brief account of the following ;Drugs acting on the central nervous system (CNS) - Drugs used in the disorders of the gastro intestinal track - Cardio vascular drugs - Anticancer drugs .

#### **Unit : V**

Cultivation, description, composition medical properties and uses of the following;  
-Ricinusand Citrus

**Text Books**

1. Pharmacognosy – C.K.Kokate, a.p.durohit and s.r.gokhaletwelth edition – publishers niraliprakashan, pune.

**Reference Books**

1. Pharmacognocny – George Edward Trease and William Charles Evans Twelth Edition, publishers – English Language book society – BaclliereTindall.

2. Pharmacognocny – Varro E. Tylar Linn. R. Brady and James E.RobbersNineth Edition publishers – lar and Fabiger – Philidelphia

3. Pharmacognocny and pharmacotherapeuticsvol- I &vol – II R.S. Satoskar and S.D. Bhandarkar Thirteenth Edition – Revised Publishers – Popular Prakashan, Bombay.

4. Pharmacognosy – SS. Handa and V.K. Kapoor, Second Edition ,publishersVattubhPrakasan, Delhi.



**SEMESTER-VI**  
**PRACTICAL PAPER – IV**

**Plant physiology, genetics and molecular biology Plant Physiology**

To set up the following experiments and explain the working with suitable diagrams, observations and interpretations.

- 1 . Imbibition – Dilatometer and Direct weight method.
2. Measurement of water potential charadov's method.
3. Determination of osmotic pressure – plasmolysis method.
4. Rate of transpiration – Ganong's photometer method under different conditions.
5. Rate of Photosynthesis – Hydrilla experiment of Willmott's bubbler method using different colour filters.
6. Rate of Photosynthesis in different concentrations of Bicarbonate (bubble method)
7. Extraction and separation of photosynthesis pigments by paper chromatography.
8. Respiration- Determination of RQ of different germination seeds using ganong's respiration.

**Experiments set up – demonstration only**

- 1 . Root pressure , 2. Suction due to transpiration , 3. Farmer's Photometer Ganong's respiroscope, 4. Anaerobic respiration , 5. Fermentation , 6. Evolution of heat during respiration, 7. Light's half leaf experiment, 8. Mohl's half leaf experiments,
9. Measurement of growth using lever auxanometer

**Genetics and molecular Biology**

- \* To work out simple genetic problems in Mono hybrid and Di hybrid ratios
- \* To write explanatory notes on the Photographs / models / specimens.

**SEMESTER-VI**  
**PRACTICAL PAPER – IV- QUESTION PATTERN**  
**Plant physiology, Genetics and Molecular Biology**

**Time : 3 hours**

**Max : 60 marks**

- 1 . Taking a lot, ask for requirement, write the procedure, set up experiment and perform analysis or measurements as indicated (15 marks)
2. Solve the genetic problems **A** and **B** ( 10 marks)
3. Identify and write critical notes on **C D E F** and **G** ( 5X5 =25)
4. Record Note Book ( 10 marks)

## **Syllabus for Environmental Studies for Undergraduate Course for all branches- from 2014 onwards**

### **Unit: I - The multidisciplinary nature of environmental studies**

- Definition, scope and importance
- Need for public awareness

### **Unit: II - Natural resources**

- Renewable and non – renewable resources
- Natural resources and associated problems
  - a. Forest resources : Use and over - exploitation, deforestation, timber extraction, mining, dams and their effects on forest and tribal people.
  - b. Water resources : Use and over -utilization of surface and ground water.
  - c. Mineral resources : Use and exploitation, environment effects of extracting and using mineral resources .
  - d. Food resources : World food problems, changes caused by agriculture and overgrazing, fertilizer pesticide problems,
  - e. Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate sources.
  - f. Land resources : Land as a resource, Land degradation, and degradation.
- Role of an individual in conservation of natural resources

### **Unit: III - Eco –system**

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids

### **Unit: IV - Biodiversity and its conservation**

- Introduction : Definition
- Hotspots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity .

### **Unit:V - Environmental pollution**

- Definition
- Causes, effect and control measures of
- a).Air pollution
- b).Water pollution
- c).Soil pollution
- d). Noise pollution
- Solid waste management : causes,effect and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution

### **Unit: VI-Environment**

- From unsustainable to sustainable development
- Water conservation, rain water harvesting, watershed management
- Environmental ethics: issues and possible solutions .
- Climate change,global warming,acid rain, ozone layer depletion,

### **Unit: VII - Human population and the Environment**

- Population explosion family welfare programme
- Environment and human health
- Women and child welfare
- Role of information technology in environment and human health

### **Unit: VIII**

- Visit to a local area to document environmental assets- river /forest / grassland / hill/ mountain.
- Visit to a local polluted site – Urban /Rural/ Industrial / Agriculture

### **Text Book :**

1. N.Arumugam and V.Kumaresan, 2005. Environmental studies, Saras Publications, Kanyakumari.

### **Reference Books:**

2. D.K. Asthana, MeeraAsthana, 2006, A Text Book of Environmental Studies (For Undergraduate studies ), S.Chand and Company Ltd. New Delhi.
3. V.DhulasiBirundha ,2006 Environmental Studies, Allied Publications,Chennai.
4. K.S.Kanagasabai,2005. Environmental studies, RaSee Publications, Madurai.
5. R.Kannan, P.BadriSrimanNarayan , Environmental Studies, NGM, Publications,Pollachi.
6. A.Thagamani, ShyamalaThagamani, 2003. A Text book of Environmental Studies, Pranav Syndicate ,Sivakasi

## SEMESTER- VI

### NON MAJOR ELECTIVE (NME) -HERBAL THERAPEUTICS

Credits : 2

Hours : 2

#### Unit : I

Pharmacognocny- definition – A general survey of different systems of medicine – Indian system of Medicine , Siddha , Ayurvedha, Homeopathy, and Unani system – future of pharmacocognocny

#### Unit : II

A systematic study of crude drugs with reference to their vernacular name, family and uses; Drugs obtained from **root**(Rauwolfia ); Drugs obtained from **underground stem** (Ginger); Drugs obtained from **Bark**(Cinnamon); Drugs obtained from **stem& wood**(Ephedra) ; Drugs obtained from **Leaves**(Adhatoda)

#### Unit : III

A systematic study of crude drugs with reference to their vernacular name, family and uses; Drugs obtained from **flower**(Safron)

#### Unit :IV

Drugs obtained from **fruit**(Emblica); Drugs obtained from **seeds** (Cardamom ); Drugs from all parts of plants(Neem )

#### Unit :V

Anti cancerdrugs: Definition – Biological source and medicinal uses of twoimportant anticancer plants–*Vinca* and*Gloriosa*

**Text Books**

1. Pharmacognosy – C.K.Kokate, a.p.durohit and s.r.gokhaletwelth edition – publishers niraliprakashan, pune.

**Reference Books**

1. Pharmacognocny – George Edward Trease and William Charles Evans Twelth Edition, publishers – English Language book society – BaclliereTindall.

2. Pharmacognocny – Varro E. Tylar Linn. R. Brady and James E.RobbersNineth Edition publishers – lar and Fabiger – Philidelphia

3. Pharmacognocny and pharmacotherapeuticsvol- I &vol – II R.S. Satoskar and S.D. Bhandarkar Thirteenth Edition – Revised Publishers – Popular Prakashan, Bombay.

4. Pharmacognosy – SS. Handa and V.K. Kapoor, Second Edition ,publishersVattubhPrakashan, Delhi.