

*Placed at the meeting of  
Academic Council  
held on 26.03.2018*

**APPENDIX - BQ**  
**MADURAI KAMARAJ UNIVERSITY**  
*(University with Potential for Excellence)*

**B.Sc., BOTANY (Semester)**  
**Revised Syllabus**  
**(With effect from the Academic year 2018-2019 onwards)**  
**SCHEME OF EXAMINATION AND REGULATIONS**

**1. INTRODUCTION OF THE PROGRAMME:**

B.Sc., Botany degree course is a wonderful branch of natural sciences. It includes the comprehensive study of the diversity of plant kingdom i.e., it focuses on various groups of flowering and non-flowering plants, vascular and non-vascular plants, Prokaryotic plants and Eukaryotic Plants, extinct and living plants, their structure, function, life cycle, economic importance and applied aspects needed for current situation.

**2. Eligibility for admission:**

A pass in +2 examination minimum conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Botany, Zoology, Chemistry subjects compulsory (or) any other examination accepted by the syndicate, as equivalents thereto are eligible to join the course.

**2.1 Duration of the Course : 3 Years**

**2.2. Medium of Instruction : English / Tamil**

**3. OBJECTIVES :**

The syllabus for B.Sc., Botany degree under semester system has been designed on the basis of choice based credit system, which is a 'student centered' and 'application oriented' approach for the benefit of the students of affiliated colleges of this university. It will come into effect from June 2018 onwards.

**4. OUTCOME OF THE PROGRAMME :**

After the completion of B.Sc., Botany degree course, a student may go for higher studies like M.Sc., Botany / Biology / Forest Science / Bio-Technology etc.,

Student may appear for civil service examinations. Student might obtain a degree in education and get an opportunity to serve in school as a teacher. Student may also appear for Group – I Services of Tamil Nadu.

With the knowledge acquired the botany graduates may go for self employment in the field of Mushroom Cultivation, Landscape Gardening, Horticulture business like Farm Management & Post Harvest Production Technology.

Above all, the student is fortunate enough to love and live with the communion of nature.

Students are brought to the natural habitat of primitive plant by means of educational tour programmes.

Apart from this for applied and skill based paper to learn the skills the student are brought to the nearby industries and research lab related to the topic.

#### **5. CORE SUBJECT PAPERS :**

- 1. Core – I Algae, Fungi, Lichens and Bryophytes**
  - 2. Core – II Pteridophytes, Gymnosperms & Paleo Botany**
  - 3. Core – III Cell Biology and Angiosperm embryology**
  - 4. Core – IV Plant anatomy and Micro techniques**
  - 5. Core – V Taxonomy of Angiosperms**
  - 6. Core – VI Plant Ecology & Phytogeography**
  - 7. Core – VII Bio Chemistry & Bio Techniques**
  - 8. Core- VIII Bio Physics & Plant Physiology**
  - 9. Core - IX Genetics & Evolution**
  - 10. Core – X Microbiology**
- 

#### **6. List of Skill based papers:**

- |                       |   |
|-----------------------|---|
| <b>1. Paper – I</b>   | <b>Biofertilizers, Biopesticides and Organic farming,</b> |
| <b>2. Paper – II</b>  | <b>Horticulture and plant breeding</b>                    |
| <b>3. Paper – III</b> | <b>Post Harvest Technology of Crops</b>                   |
| <b>4. Paper – IV</b>  | <b>Mushroom cultivation technology</b>                    |
| <b>5. Paper – V</b>   | <b>Plant biotechnology and bio informatics</b>            |
| <b>6. Paper – VI</b>  | <b>Herbal technology</b>                                  |
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#### **7. List of Non Major Elective Papers:**

- 1. Paper – I Mushroom Cultivation**
- 2. Paper – II Plant utility and exploitation**

#### **Allied Botany :**

- 1. Paper – I Plant diversity**
- 2. Paper – II plant ecology & applied botany**
- 3. Paper – III Taxonomy, Embryology of angiosperm & medicinal botany**
- 4. Paper – IV Plant physiology & horticulture**

## 8. UNITIZATION

Each paper is divided into 5 units. For core papers (total 60 hours) each unit has to be taught for 12 hours and for skill based, non major elective, environmental studies and value education papers (total 30 hours) each unit has to be taught for 6 hours.

## 9. Pattern of Semester Examinations

The course consists of SIX semesters. For the Theory papers of I/III/V semesters, examinations are held in NOVEMBER/ DECEMBER and for II/IV/VI semesters in APRIL/MAY months.

For Practical papers examinations are usually held in MARCH/ APRIL

## 10. Scheme for Internal Assessment:

Test	10 Marks (average of the best two tests)
Assignment	5 Marks
Seminar/ Group discussion	5 Marks
Peer-Team –Teaching*	5 Marks
Total	25 Marks

\*A minimum of 10% of the syllabus of all subjects shall be through the peer-team-teaching method by appropriate allocation of teaching hours

## 11. External Exam

External Examination –Maximum 75 marks

## 12. QUESTION PAPER PATTERN:

The Internal and External marks for the theory paper are 25 and 75 respectively.

### Details of Internal (25 Marks)

1. The pattern for internal valuation may be two tests – 15 marks each – Average 15 marks
2. Two assignments : 5 marks each – Average 5 marks
3. Peer team teaching = 5 marks
4. Third test may be allowed for absentees of any one of the two tests.

### Details of External (75 marks):

The pattern of question paper will be as follows

**Time : 3 Hours**

**Max. marks = 75**

### SECTION – A

#### Question No. 1 to 10 ( Multiple Choice)

**10 x 1 = 10 Marks**

1. Two question from each unit
2. Four choices of answers in each question
3. No answer should be “None of these”

### SECTION – B

1. Answer all questions choosing either (a) or (b). **5 x 7 = 35 Marks**
2. Answer not exceeding two pages.
3. One question from each unit
  11. (a) or (b)
  12. (a) or (b)
  13. (a) or (b)
  14. (a) or (b)
  15. (a) or (b)

### SECTION – C (3 x10 marks = 30 marks)

#### Question No.16 to 20 (Descriptive type)

1. Answer any three out of five.
2. Answer not exceeding four pages.
3. One question from each unit.

#### PRACTICAL:

The internal and external marks for practical paper are 40 and 60 respectively.

#### Internal : (40 Marks)

1. Internal test – Model practical exam = 20 Marks. (Follow the question paper pattern given in the syllabus and scale down the marks to 20.)
2. Continuous assessment – 20 Marks.

#### External : (60 Marks)

Detailed question paper pattern is included in the syllabus.

### 13. SCHEME FOR EVALUATION:

The University constitutes a panel of examiners on the basis of seniority. The senior most teacher shall act as the Chairman of valuation board. There shall be Chief examiners and Additional examiners under him. Each Chief examiner shall revalue 50% of papers valued by additional examiners. The Scheme of Valuation will be strictly adhered.

Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

### 14. PASSING MINIMUM

#### Guidelines regarding pass minimum:

To get a pass, a student should fulfill the following conditions:

#### UG Courses:

##### A) Theory:

1. 35% of the aggregate (External + Internal).
2. No separate pass minimum for internal.
3. 27 marks out of 75 is the pass minimum for the external.

B) Practical:

1. 35% of the aggregate (External + Internal).
2. No separate pass minimum for internal.
3. 21 marks out of 60 is the pass minimum for the external.

#### 14.1. Classification

1. Those candidates who secure 75% and above marks shall be declared as passed in First Class with distinction
2. Those candidates who secure 60% and above marks shall be declared as passed in First Class
3. Those candidates who secure 50% and above but less than 60% marks shall be declared as passed in Second Class
4. Those candidates who secure less than 50% shall be declared as passed in Third Class

#### 5. MODEL QUESTION :

##### Question Model – Theory – Micro Biology

Time : 3 hours

Max : 75 marks

#### Section – A (10 x 1 = 10 Marks)

#### Choose the correct answer :

1. Who discovered Bacilli?  
a) Robert Koch  
b) Winogradsky  
c) Louis Pasteur  
d) Iwanowski
2. Bacterial cell membrane is made up of \_\_\_\_\_  
a) Protein    b) Fat    c) Cellulose    d) Chitin
3. Bacteriophage consists of \_\_\_\_\_  
a) Carbon and Nitrogen    b) DNA    c) Nucleoproteins    d) Proteins only
4. A device which regulates the growth rate of the organism by regulating the concentration of an essential nutrient is \_\_\_\_\_  
a) Chemostat    b) Turbidostat    c) Autoclave    d) Calorimeter
5. Technique which is adopted for the isolation of microorganisms from soil is \_\_\_\_\_  
a) Streak plate    b) Spread plate    c) Pour plate    d) Plate count
6. CFU stands for \_\_\_\_\_  
a) Cell Forming Unit    b) Colony Forming Unit  
c) Cell Mass Forming Unit    d) Cell Activity Forming Unit

7. MIC stands for \_\_\_\_\_
- a) Microbial Inhibitory Concentration
  - b) Minimal Inhibitory Concentration
  - c) Molecular Inhibitory Concentration
  - d) Macro Inhibitory Concentration
8. Mushroom is \_\_\_\_\_
- a) Fine green threads
  - b) Edible fruit body of fungus
  - c) A bryophyte without root
  - d) Flowering plant
9. Chemical additives uses as preservative of food \_\_\_\_\_.
- a) Benzoic Acid
  - b) Sulphuric Acid
  - c) Hydrochloric acid
  - d) Teichoic Acid
10. Trickling filter is related to \_\_\_\_\_.
- a) Sewage treatment
  - b) Mushroom cultivation
  - c) Pasteurization
  - d) Sterilization

**SECTION – B (5 X 7 = 35 MARKS)**

**Answer all questions, choosing either (a) or (b).**

11. (a) Write about the structure of bacterial cell wall (OR)  
(b) Note down the formation of capsule and its function
12. (a) Draw and explain the bacterial growth curve. (OR)  
(b) Describe the reproduction of bacteriophage
13. (a) Write about the spread plate and pour plate technique (OR)  
(b) Write about the media preparation technique.
14. (a) Write about the source and structure of Penicillin (OR)  
(b) Explain the Nutritional types of Bacteria.
15. (a) Write a shorts note on Trickling Filter (OR)  
(b) Describe the various Microflora of milk

## SECTION C (3 x 10 = 30 Marks)

Answer any three questions. Not exceeding four pages

16. Describe the structure and functions of flagella with a neat diagram. Classify bacteria based on its flagella.
17. Outline the Bergey's classification of bacteria.
18. Write in detail about gram staining technique.
19. Write about the various disinfectants.
20. Describe the various tests for the detection of coliform bacteria in water.

### 6. TEACHING METHODOLOGY:

Usual chalk and talk method is followed. The real plant specimen is brought to the class room and shown to the student to explain its nature and morphology.

Apart from this seminar, Group Discussion, Peer Team Teaching and Peer Group Learning are practiced in the class room.

Teaching aids like Bio Visual Charts are also used in the classroom, Nowadays Computer Aided Instructions, Teaching with Mobile phones, E-learning, Smart Class Room Practices with Power Point Presentations are also followed.

### 7. &

### 8. List of Text Books and Reference Books

Mentioned below the each paper

### 9. Re-totaling and Revaluation Provision

Students may apply for re-totaling and revaluation after declaration of result within 15 days

### 10. Transitory provision 3 + 3

The candidates who are admitted to B. Sc Botany course before the academic year 2018-19 shall be permitted to appear for the examinations under the old regulations for a period of three years and thereafter they have to appear in the examinations as per the existing regulations.

### 11. Websites where study materials, video lessons and text books can be downloaded:

- 1) <https://www.sceltamushrooms.com/cultivation-and-harvesting>
- 2) <https://www.fs.fed.us/wildflowers/ethnobotany/medicinal/index.shtml>
- 3) <https://www.botanical-online.com/medicinalplants.htm>
- 4) <https://www.botany.org/bsa/careers/bot-spec.html>
- 5) <http://www.isaaa.org/resources/publications/pocketk/23/default.asp>

- 6) <http://www.biologydiscussion.com/ecology/phytogeography-climate-vegetation-and-botanical-zones-of-india/6925>
- 7) <http://www.biologyreference.com/A-Ar/Anatomy-of-Plants.html>
- 8) <https://www.cbd.int/gti/taxonomy.shtml>
- 9) <https://www.biodiversitylibrary.org/ia/introductiontoem00mahe#page/7/mode/1up>
- 10) <https://www.sciencedirect.com/journal/plant-physiology-and-biochemistry>
- 11) <https://www.omicsonline.org/biopesticides-and-biofertilizers-ecofriendly-sources-for-sustainable-agriculture-2155-6202.1000e112.php?aid=15840>
- 12) [https://learn.org/directory/category/Agricultural\\_Studies/Plant\\_Sciences/Agricultural\\_and\\_Horticultural\\_Plant\\_Breeding.html](https://learn.org/directory/category/Agricultural_Studies/Plant_Sciences/Agricultural_and_Horticultural_Plant_Breeding.html)
- 13) [https://www.researchgate.net/publication/315835335\\_Post\\_Harvest\\_Technology\\_of\\_Horticultural\\_Crops](https://www.researchgate.net/publication/315835335_Post_Harvest_Technology_of_Horticultural_Crops).

This will come into effect from the academic year 2018 – 2019 (for those who joining the first semester of the course in July 2018 and afterwards).

<b>Semester – I</b>					
<b>Part</b>	<b>Paper</b>	<b>Study component</b>	<b>No.of Course</b>	<b>Credit</b>	<b>Hours per week</b>
I	I	Tamil/Other Language	1	3	6
II	I	English	1	3	6
III	Core – I	Algae, Fungi, Lichens and Bryophytes	1	4	4+2(P)
	Allied Subject – I	Chemistry Theory – I	1	2	4+2(P)
IV	Skill based – I	Biofertilizers, Biopesticides and Organic Farming	1	2	2
	Skill based – II	Horticulture and Plant Breeding	1	2	2
		Non-Major Elective – I	1	2	2
		<b>Total</b>	<b>7</b>	<b>20</b>	<b>30</b>
<b>Semester II</b>					
I	II	Tamil/Other Language	1	3	6
II	II	English	1	3	6
III	Core – II	Pteridophytes, Gymnosperms & Palaeobotany	2	4+2	4+2(P)
	Practical – I	Includes theory core papers I & II			
	Allied Subject – I	Chemistry Theory II Chemistry Practical I	2	4+1	4+2(P)
IV	Skill based – III	Post Harvest Production Technology of Crop Plants	1	2	2
	Skill based – IV	Mushroom cultivation Technology.	1	2	2
		Non-Major Elective – II	1	2	2
		<b>Total</b>	<b>9</b>	<b>23</b>	<b>30</b>



<b>Semester III</b>					
I	III	Tamil / Other Language	1	3	6
<b>Part</b>	<b>Paper</b>	<b>Study component</b>	<b>No.of Course</b>	<b>Credit</b>	<b>Hours per week</b>
II	III	English	1	3	6
III	Core III	Cell Biology and Angiosperm Embryology	1	4	4+2(P)
	Allied Subject –I	Chemistry Theory – III	1	4	4+2(P)
	Allied Subject - II	Zoology Theory – I	1	4	4+2(P)
		<b>Total</b>	<b>5</b>	<b>18</b>	<b>30</b>
<b>Semester IV</b>					
I	IV	Tamil / Other Language	1	3	6
II	IV	English	1	3	6
III	Core IV	Plant Anatomy and Microtechniques	2	4+2	4+2(P)
	Practical II	Includes Theory – Core Papers III & IV			
	Allied Subject I	Chemistry Theory IV	2	4+1	4+2(P)
		Chemistry Practical II			
	Allied Subject II	Zoology Theory II	2	4+1	4+2(P)
	Zoology Practical I				
		Extension Activities NSS/NCC/Sports		<b>1</b>	
		<b>Total</b>	<b>8</b>	<b>23</b>	<b>30</b>
<b>Semester – V</b>					
III	Core V	Taxonomy of Angiosperms	3	12	12+8(P)
	Core VI	Plant Ecology and Phytogeography			
	Core VII	Biochemistry and Biotechniques			
	Allied Subject II	Zoology Theory III	1	4	4+2(P)
IV	Skill Based V	Plant Biotechnology and Bioinformatics	1	2	2
		Environmental Studies	1	2	2
		<b>Total</b>	<b>6</b>	<b>20</b>	<b>30</b>

Semester VI					
Part	Paper	Study component	No.of Course	Credit	Hours per week
III	Core VIII	Biophysics and Plant Physiology	6	12+	12+8(P)
	Core IX	Genetics and Evolution			
	Core X	Microbiology			
	Practical Paper III	Includes Theory Core Papers V			
	Practical Paper IV	Includes Theory Core Papers VI & VII			
	Practical Paper V	Includes Theory Core Papers VIII, IX & X			
	Allied Subject II	Zoology Theory – IV	2	4+1	4+2(P)
		Zoology Practical – II			
	Skill Based VI	Herbal Technology	1	2	2
		Value Education	1	2	2
		<b>Total</b>	<b>11</b>	<b>36</b>	<b>30</b>

#### No. of Papers / Hours / Credits

Language Part I Tamil – Theory – 4 papers / 24 Hours / 12 Credits

Language Part II English – Theory – 4 papers / 24 Hours / 12 Credits

Core Paper – Theory – 10 Papers + Practical – 5 Papers = Total = 15 Papers

64 Hours / 59 Credits

Allied Subject – I – Theory – 4 Papers + Practical – 2 Papers = Total = 6 Papers

24 Hours / 18 Credits

Allied Subject – II – Theory – 4 Papers + Practical – 2 Papers = Total = 6 Papers

24 Hours / 18 Credits

Skilled Electives – Theory – 6 Papers / 12 Hours / 12 Credits

Non-Major Elective Theory – 2 Papers / 4 Hours / 4 Credits

Environmental Studies Theory – 1 Paper / 2 Hours / 2 Credits

Value Education Theory – 1 Paper / 2 Hours / 2 Credits

Extension Activities 1 / 1 Credit

Course – 46 / Hours – 180 / Credit - 140

## **I-YEAR – FIRST SEMESTER**

### **CORE PAPER-I ALGAE, FUNGI, LICHENS AND BRYOPHYTES**

#### **OBJECTIVES :**

On successful completion of the course the student will be able to

- describe the structure and reproduction of different groups of lower plants.
- understand the diversity, complexity and economic value of Algae, Fungi, Bryophytes and Lichens

#### **ALGAE:**

##### **Unit I**

General Characters of Algae - Classification of Algae based on Fritsch - brief account on thallus structure and variations - Economic importance of Algae, Bio diesel from Micro algae  
Structure and life history of **Oscillatoria, Chlamydomonas, Sargassum and Polysiphonia.**

#### **FUNGI**

##### **Unit II**

General Characters and classification of fungi based on Alexopoulos and Mims – Economic importance of fungi  
Structure and reproduction of **Saccharomyces, Rhizopus, Aspergillus and Puccinia.**

#### **Lichens**

##### **Unit III**

General Characters – types, structure and reproduction of USNEA – Economic important of Lichens

#### **Bryophytes**

##### **Unit IV**

General Characters – Classification based on Rothmaler.  
Structure and life history of **Marchantia and Polytrichum.**

#### **Plant Pathology**

##### **Unit V**

Introduction – Robert Koch's Postulates – Host, Casual organism, symptoms and control measures of **Citrus Canker, Tikka Disease, Bunchy Top of Banana.**

#### **References :**

1. Bhatia K.M., 1994. Treatise of algae. S. CHand & Co, New Delhi.
2. Fritsch, F.E., 1945. The structure and reproduction of the Algae volume II & Vikas Publication, New Delhi.

3. Pandey, B.P., 2004 College Botany – Algae, Fungi and Bryophyta Vol I, S, Chand & Co., P.,Ltd, Ram Nagar, New Delhi.
4. Parihar N.S., 1980. An introduction to Bryophytes Vol I, Central book Depot, Allahabad.
5. Sharma, O.P., 1986, Textbook of algae. Tata McGraw – Hill Publishing Company Ltd., New Delhi.
6. Singh R.N., 1961. Role of blue green algae, Indian council of agricultural research, New delhi.
7. Smith G.M., 1955 Cryptogamic Botany volume II, Tata Mc Graw-Hill publishing company Ltd- New Delhi.
8. Vashishta 1993. Botany for Degree Students; Bryophyta S. Chand & Co. New Delhi,
9. Vashishta B.R. 1999. Algae-S. Chand & Co Ltd., New Delhi.
10. Alexopoulos C.J.Introductory Mycology – John Wiley & Skons N.York
11. Chopra, G.L. – A Text book of Fungi. Nagin & Co., N.Delhi.
12. Pandey et.al, Biofuels from Algae.
13. Biomass and Biofuels from Microalgae David Mohan Mani, Micheal A. et al.
14. Microalgae Bio Diesel by Elumalai.

**Note :**

Field visit to study marine algal habitat – nearby seashore area Kanyakumari, Rameshwaram & Bryophyte habitat – nearby hill stations in rainy season.

To visit TNAU Plant pathology department.

**SKILL BASED SUBJECT**

**PAPER – I**

**BIOFERTILIZERS, BIOPESTICIDES & ORGANIC FARMING**

Sub Code :

**OBJECTIVES :**

On successful completion of course the student will be able to

- relate the various microbes used as biofertilizers and biopesticides
- Identify their role in the maintenance of soil fertility
- Illustrate various methods of mass cultivation of biofertilizers and composting methods.

**Unit I**

Introduction of Biofertilizers – types – symbiotic Bacterial Biofertilizers – Rhizobium – Nodulation – N<sub>2</sub> fixation – Mass cultivation of Rhizobium – field application.

## Unit II

Non-symbiotic bacterial Biofertilizers Azotobacter – Mechanism of N<sub>2</sub> fixation.

## Unit III

Algal Biofertilizers – Blue green Algae – Nostoc – Mechanism of N<sub>2</sub> fixation in Heterocystous BGA. Mass cultivation of BGA – Fungal Biofertilizers – VAM fungi – uses, mass cultivation and field application.

## Unit IV

Biopesticides – Bacterial and viral Biopesticides – Mechanism of action and uses – Advantages of Biopesticides.

## Unit V

Organic farming – various practices – Advantages – Composting – Vermi composting – Panchakavya preparation and application.

## Reference

1. Dubey, R.C., 2007. Biotechnology. S. Chand & Co., New Delhi.
2. Gupta, P.K., 1999. Elements of biotechnology, Rastogi publication, Meerut.
3. Sathyanarayana, U., 2008. Biotechnology, Books and Allied pvt.Ltd. Kolkatta
4. Singh, R.M., 1961. Role of Blue green algae in Nitrogen economy of Indian agriculture. ICAR, New Delhi.
5. Venkatraman, G.S., 1973. Algal biofertilizers add Rice cultivation ICAR, New Delhi.

Note :

To visit biofertilizers production unit and organic farms – compost, vermi-compost production unit.

## **SKILL BASED PAPER-II**

### **HORTICULTURE AND PLANT BREEDING**

Sub Code :

## **HORTICULTURE :**

### **Objectives:**

On the successful completion of the course the student will be able to,

- Know various aspects of horticulture
- Develops skills in horticultural practices & techniques
- Learn to construct Kitchen garden, Orchard, Ornamental garden.

## **UNIT I**

Horticulture and its importance – Division of Horticulture – Layout and planning of kitchen garden – roof garden – Preparations of Pot mixture – Propagation by seed, cutting

(stem, leaf, root), Layering (simple, air layering) grafting (Approach and Bud grafting) cultivation practices of Brinjal.

## **UNIT II**

Planning and layout of orchards – Training and pruning practices – Cultivation practices, soil, irrigation and harvesting of Mango.

## **UNIT III**

Landscape gardening and its components – Lawn, Hedges, Rockery, Topiary, edges and water garden cut flower production

Cultivation practices, soil, irrigation and harvesting of Jasmine.

## **UNIT IV**

Plant Breeding and its objectives - Historical account - Brief account on selection methods (Mass, Pureline and clonal selection)

Hybridization procedure.

## **UNIT V**

Hybridization techniques adapted in Rice - Hybrid vigour - Role of Mutation in Plant Breeding.

## **References**

1. Allard R.W., 1960. Principles of Plant Breeding, John Wiley. New York.
2. Choudhry, H.K., 1988. Introduction to Principles of Plant Breeding. Oxford & IBH Publishing Co. Pvt Ltd., New Delhi
3. Edmond et al., 1987. Fundamentals of Horticulture, Tata McGraw Hill Publishing Co., Mumbai
4. Kumar. N., 1986. Introduction to Horticulture, Rohini Agency, Nagarcovil.
5. Shukla R.S. and Chandel P.S., 2004. Cryptogenetics, Evolution and Plant Breeding. S. Chand & Co., Ltd. New Delhi.

## **Note:**

Field visit to Jasmine cultivation, orchards (Mango) and theme park, TNAU Depts, Botanical gardens and ornamental gardens compulsory.

**II SEMESTER**  
**Core Paper II**  
**Pteridophytes, Gymnosperms and Paleobotany**

Sub Code :

**OBJECTIVES :**

On successful completion of the course the students will be able to

- differentiate the diversity of lower vascular plants.
- interpret the complexity of Cryptogams & Paleobotany
- illustrate the economics importance of pteridophytes and gymnosperms.

**Unit I**

Pteridophytes – General characters – Classification based on Smith – structure and life history of **Psilotum and Lycopodium**.

(Need not study the developmental aspects)

**Unit II**

Structure and life history of **Equisetum and Marsilea**.

(Need not study developmental aspect).

Economic importance of pteridophytes.

**Unit III**

Gymnosperms – General characters and classification according to chamberlin.

Structure and life history of **Pinus**.

(Need not study development aspects)

**Unit IV**

Structure and life history of **Gnetum**

(Need not study developmental aspects)

Economic importance of gymnosperms.

**Unit V**

Paleobotany – General characters and classification of geological era – Brief study of the methods of formation of fossils – Brief study of the following types of fossils.

- a) **Rhynia**
- b) **Lepidodendron**
- c) **Lyginopteris**
- d) **Lepido carpon**

**References:**

1. Sporne. K. R. – Morphology of Pteridophytes.
2. Pandey.B.P. Atexbook of Botany (Bryophyta, Pteridophyta & Gymnosperms)
3. Parihar, N.S. An Introduction to Embryophyta Vol II (Pteridophytes)
4. Chopra, G.L. Gymnosperms.
5. Sporne.K. R. – The Morphology of Gymnosperms.
6. Shukla and Misra – Essentials of Palaebotany.

**Note :**

Study Tour to be conducted to show the natural habitat of Pteridophytes and gymnosperms – nearby hill stations Ooty / Kodaikanal & Courtalam/ western ghats

**SKILL BASED PAPER III  
POST HARVEST TECHNOLOGY OF CROPS**

Sub Code :

**OBJECTIVES:**

On successful completion of this course the students will be able to

- produce fruit products like Jam, Jelly, Squash, Syrup etc.,
- extract essential oils from spice crops.
- produce herbal cosmetics from medicinal and aromatic plant.

**Unit I (Product from fruit crops)**

Fruits and fruit products.. methods of storage of fruits – preservation of fruits – commercial preparation fruits juices, syrup, jam, jelly & squash. Natural and chemical preservatives.

**Unit II (Products from vegetable crops)**

Vegetable products – storage of vegetables – onion & tomato – commercial preparation of pickles, tomato catsup, canned peas, ginger and garlic paste – amla product – pickles and juice.

**Unit III (Product for oil yielding plants)**

Extraction procedure and uses of – edible oil – coconut oil & gingili oil & rice bran oil. Non-edible oil – lemon and lemon grass oil and Eucalyptus oil

**Unit IV (Products from Loose Flowers)**

Perfumes - extraction procedure of jasmine perfume Preparation of kulkandhu and room freshener.



## **Unit V (Products from Aromatic & Medicinal Plants)**

Extraction procedure and uses of Pelargonium, Pyrethrum, Chrysanthemum, Vitex, Indian Tulip and Aloe Vera

### **References:**

1. Dr. N. Kumar, Introduction to Horticulture, Oxford & IBH Publishing Co., New Delhi.
2. Desrosier N.W., and Desrosier J.N., The Technology of Food Preservation, CBS Publishers & Distributors, New Delhi, 1987, 4<sup>th</sup> Edition.
3. Hill F. Albert, Economic Botany, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi 1979.
4. Cruess W.V. Commercial fruit and vegetable products (2011) Agrobios (India), Jodhpur
5. Singh.N.P. (2007), Fruit and vegetable preservations –Oxford Book Company, Jaipur.
6. Rajarathnam. S. and Ramteke R.S., advances in presentation and processing technology of fruits and vegetable.
7. Ponnuswami V. et.al (2014), Meidcal Herbs and Herbal Cure, Jeya Publication House, Delhi.
8. Board N.P.C.S, Handbook on fruits, vegetables & food processing with canning and preservation, Asia Pacific Business Press inc, Delhi (2012)
9. Viridi.M.S., and Malviya.S (2007), Aromatic Plants and essential oils, Associated Publishing Company, New Delhi.
10. Shankaraswamy (2015), Comprehensive Post Harvest Technology of Flowers, Medicinal & Aromatic Plants, Jeya Publishing House, New Delhi.

Note :

Visit to food processing industries, perfume industries, oil industries in and around Madurai

## **SKILL BASED PAPER IV MUSHROOM CULTIVATION TECHNOLOGY**

Sub Code:

### **OBJECTIVES :**

On successful completion of the course the students will be able to :

- Cultivate three types of edible mushrooms.
- Understand the utility of plant waste and animal waste.
- Develop the skills of spawn production and mushroom recipe.

## **Unit I**

Mushroom Introduction – Historical account – Product status of Mushroom cultivation in India. Nutritive value of various kinds of substrates used for Mushroom cultivation.

## **Unit II**

Spawn production methods – factors affecting spawn production – storage of spawn.

Cultivation of oyster Mushroom.

## **Unit III**

Button Mushroom cultivation – Pests and diseases affecting mushroom and their control measures.

## **Unit IV**

Cultivation of milky mushroom – storage and preservation methods of mushroom.

## **Unit V**

Some common recipes of Mushroom (Mushroom Gravy, Mushroom Soup, Mushroom Briyani, Mushroom Pakkoda)

Importance of Mushrooms in medicines.

## **Reference**

1. Nita Bahl., 1998, Hand Book on Mushrooms. Oxford & I B H Publisher, New Delhi.
2. Musthusingam, A.D. & Yesuraj, 1999. Mushroom Cultivation culture. TNAU Publication, Madurai.
3. Suman, B.C. & V.P.Sharma, 2005. Mushroom cultivation and uses “Agrobios (India) Jodhpur – 342 002.
4. Kumaresan, K. 2007 . Biotechnology, Saras Publications, Nagercoil.

Note :

Visit to nearby mushroom cultivation farm and TNAU plant pathology departments.

### III SEMESTER

#### CORE PAPER III – CELL BIOLOGY AND ANGIOSPERM EMBRYOLOGY

Sub Code:

#### OBJECTIVES :

On successful completion of the course, the student will be able to:

- differentiate Eukaryotic and Prokaryotic organization of all
- describe the cellular organelles and inclusions.
- identify the stages of Mitosis and meiosis
- illustrate the structure and function of reproductive organs and changes associated with seed development.

#### Unit I (CELL BIOLOGY)

Prokaryotic and Eukaryotic organization – Brief study of structure and functions of plant cell organelles – Chloroplast, Mitochondria, Endoplasmic reticulum, Golgi complex, Lysosome and Plasma membrane (Unit membrane model).

#### Unit II

Non-living inclusions – Cystolith, Rhaphides, Druses, Storch, oil granules – Structure of Nucleus and chromosome – cell division stages of mitosis and meiosis – events in cell cycle – Watson and Crick model of DNA.

#### ANGIOSPERM EMBRYOLOGY

#### Unit III

Structure and development of Microsporangium and male gametophyte – Structure and development of megasporangium – Structure of ovule and its types – female gametophyte (Monosporic – Polygonum type).

#### Unit IV

Double fertilization and Triple fusion – Development of Dicot embryo (Capsella type) Development of Monocot embryo (Lyzula type) Endosperm and its types (Haustoria development not included). Partherrocarphy.

#### Unit V

Somatic hybridization – ovule culture – Anther and pollen culture – Embryo culture.

#### Reference Books:

1. DeRobertis et al – Cell Biology, WB Saunders Co, London.
2. Verma & Agarwal – Cytology, chand & Co. N. Delhi
3. Maheswari. P, Introduction to the embryology of angiosperms
4. Bhojwami. S.S. & S.P.Bhaatnagar – Embryology of Angiosperms.

**SEMESTER IV  
CORE SUBJECT**

**PAPER IV – PLANT ANATOMY AND MICROTECHNIQUES**

Sub Code :

**OBJECTIVES :**

On successful completion of the course, the student will be able to

- understand the organization of Meristem, Tissues and relate them to their function.
- describe the primary, secondary and Anamalous growth in root and stem.
- take C.S, L.S and under staining procedure of tissues.
- relate the anatomical modifications to the habitat.

**PLANT ANATOMY**

**Unit I**

Plant cell wall-Primary, Secondary, Ultra structure

- Chemistry of cell wall – simple and bordered pits, Tissues-
- Meristems, classification, shoot apex, Tunica corpus theory,
- Root apex: Histogen theory-Quiescent centre.

**Unit II**

Simple and Permanent tissues-Parenchyma, Collenchyma and Sclerenchyma-structure composition and function. Complex permanent tissues. Xylem and phloem – structure, composition and function of the same Primary structure of monocot root and stem.

**Unit III**

Normal secondary thickening in dicot stem, dicot root, anomalous  
Secondary thickening in stems of Boerhaavia, Achyranthes and Dracaena.  
Localisation of secondary metabolites.

**Unit IV**

Leaf anatomy – dicot leaf – dorsi-ventral leaf (Hibiscus) Monocot leaf (Grass) Nodal Anatomy-Unilacunar node (Jysticia), trilacunar node (Azadirachta), Multilacunar node (Aralia)

**Micro technique**

**Unit V**

Micro techniques-Fixatives-fixation of plant materials, Dehydration, Infiltration, sectioning, staining and mounting-maceration technique – and whole mount preparation. Preparation of permanent slides.

## Reference Books

1. Kaatherine, Esau: Plant anatomy, Wiley Eastern Pvt/Ltd, N.Delhi.
2. Vashista, P.C.Plant anatomy, S.Nagin & Co, N.Delhi.
3. Donald Alexander Johnson: Plant microtechnique, tat Mc.Graw Hill, N.Delhi

**SEMESTER V**  
**CORE SUBJECT**  
**PAPER V – TAXONOMY OF ANGIOSPERMS**

**Sub Code :**

### OBJECTIVES:

On successful completion of the course, the student will be able to

- explain the principles of systematic.
- describe the distinctive features of selected families.
- recall the economic value of the plants in the cited families.

### Unit I

Taxonomy and its significance.

Systems of classification-Artificial, Natural and Phylogenetic

- a) Linnaeus system of classification
- b) Bentham and Hoocker's system of classification – Merits and demerits

### Unit II

Brief account of the principles of nomenclature. Nomenclature rules - Binomials, Typification, Effective valid publication Conserved names and new names of eight families – author citation.

Herbarium techniques and its importance.  
Botanical survey of India and its functions.

### Unit III

Study of the following families with special reference to morphology of medicinal plant parts and economic importance.

### Unit IV

Study of the following families with special reference to morphology of medicinal plant parts and economic importance.

Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Acanthaceae, Verbenaceae and Lamiaceae.

Amaranthaceae, Orchidaceae, Cannaceae, Commelinaceae, Araceae and Poaceae.

## Reference Books

1. George H.M. Lawrence – Taxonomy of vascular plants, Oxford and IBM Publishing on New Delhi.
2. Singh V and J. Jain, Taxonomy of angiosperms, Rasstogi publication, Meerut.
3. Vasista P.C. Taxonomy of angiosperms S. Chand and company, New Delhi.
4. Pandey, B.P. Taxonomy of angiosperms S. Chand and company, New Delhi.
5. Ramasami, S.N. Taxonomy, Maruthi book depot, Hyderabad.
6. Sharma. O.P. Plant taxonomy, Tata Mac Graw Hill and co, New Delhi.
7. Kocher S.L. Economic botany in the tropics, Macmillan India Ltd, New Delhi.
8. Hill-Economic botany Tata Mac Graw Hill publishing co, Ltd.
9. Henry-A.N. Chandrabose, -An aid to the international code of botanical Nomenclature, today and tomorrow's printed nomenclature and publishers.

Note :

Visit to nearby Taxonomically important area - Ooty, Kodaikanal, Courtalam, Alagar Hills – to collect Herbarium specimen and submit report.

## CORE PAPER VI

### PLANT ECOLOGY AND PHYTOGEOGRAPHY

Sub Code :

#### OBJECTIVES:

On successful completion of the course the student will be able to

- understand the concept of Ecology and components of ecosystem.
- identify different ecological groups.
- Know ecological succession different aspects of phytogeography, Biogeochemical cycle and remote sensing of vegetation.

#### Plant Ecology

##### Unit I

Introduction – Definition – Historical background, Ecology and its relation to other sciences – Scope of ecology.

Soil Erosion and conservation

Biotic factors – Positive and negative interactions.

##### Unit II

Study of the following groups with special reference to their morphological, anatomical and physiological adaptations.

- a) Hydrophytes    b) Xerophytes    c) Halophytes

### Unit III

Units of vegetation – plant formation – plant association and plant consociation – Ecological succession – Hydro and Litho - Ecological field study – methods and techniques (Transect method, Quadrat and point frame method).

### Phytogeography

### Unit IV

Principles of Phytogeography – A brief account of continental drift – Endemism – Age and area hypothesis. Phytogeographic regions of India – Vegetation of Tamil Nadu.

### Unit V

Biogeochemical cycle – Sedimentary cycle – phosphorous and Sulphur cycle – Life forms – **Raunkiaer's life** form – Classification – Productivity primary productivity – measurement of primary productivity by harvest method and oxygen measurement method – Remote sensing of vegetation photo interpretation.

### Reference Books :

1. Odum E.P. Fundamental of Ecology W.B. Sounder Colondon.
2. Ambast R.S. A Text book of Plant Ecology Students Friends Co, Varanashi.
3. Sharma P.D. Element of Ecology- Rastogi Publications.
4. H.D. Moderu concepts of Ecology Vikas Publications, New Delhi.
5. Shukla R.S. and P.S. Chandel – Plant Ecology and soil science S.Chand and Co.
6. Bhatia and Sharma – A on Plant Ecology, Pradeep Publications, Jalendhur.
7. Stanley A. Caim. F, Fundamentals of Plant Geography – Hazper and New York.
8. Sundara Rajan. S, (2016) College Botany Vellure – 2, Himalaya Publishing, Delhi, Ph.300-304.

## CORE PAPER VII – BIOCHEMISTRY AND BIOTECHNIQUES

Sub. Code :

### OBJECTIVES :

On successful completion of the course, the students will be able to

- acquire deep knowledge on structure and functions of Biomolecules.
- develop skills in the use of techniques and methodology relevant to research project.
- relate the concepts and designs of metabolic reactions in biological systems.

## BIOCHEMISTRY

### Unit I

Definition and scope

Basic concepts of atoms, molecules and types of Bonding in

biomolecules  
Isomerism-types, structural-stereo and optical  
Carbohydrates : Nomenclature, definition and classification  
Monosaccharides : Glucose  
Disaccharides : Classification and structure-Maltose & sucrose  
Polysaccharides : Structure and classification-starch.

## **Unit II**

### **Amino acids**

Classification based on polarity and electrical charge, structure and properties of amino acids.

Proteins : Classification based on composition, solubility, shape and function

Structure Primary – Peptide bond, N and C terminals, Secondary – types of Bonding in secondary structure. Tertiary-types of bonding in tertiary structure physical and chemical properties of proteins.

## **Unit III**

**Enzymes** : Nomenclature, classification and properties, Mechanism of enzyme action (Lock and key induced fit model) factors affecting enzyme activity (substrate, pH and temperature).

**Lipids** : Classification of lipids, saturated and unsaturated fatty acids – Cholesterol,

**Simple lipids** : fats and oils.

**Compound lipids** : Phospholipids

**Derived lipids** : Steroids, (with an example each)

## **Biotechniques**

### **Unit IV**

Basic principles and application of colorimetry, pH metry, centrifugation Basic principles-types, chromatography – Basic principles-types (Paper and Column chromatography)

## **Reference Books**

1. Conn E.E. and P.K.Stumpf-Outlines of Biochemistry, Wiley Eastern Ltd, Chennai.
2. Lehninger A.I/-Biochemistry, Kalyani Publishers, New Delhi.
3. Lubert Stryer-Biochemistry, CBS Publishers, New Delhi.
4. Power C.B. and GR.Chatwal-Fundamentals of Biochemistry S.Chand & Co., New Delhi.
5. Jain J.L.-Fundamendals of Biochemistry S.Chand & Co., New Delhi.



6. Jeyaraman, Kunthala, M.Lakshmanan, M.Gnanam and J.Jeyaraman = Experiments in Microbiology, Higgin Bothams, Chennai.
7. Jeyaraman.J-Laboratory manual in Biochemistry, Wiley Eastern Ltd, Chennai.
8. Jeyaraman.J-Techniques in Biology-A College level study-Higgin
9. Plummer D.T.-An Introduction to practical biochemistry, Tata Mc Graw Hill publishing Co, Bombay.
10. Veerakumari.I-Biochemistry, MJP Publishers, Chennai.
11. Keith Wilson and Kenneth H.Goldizg-Principles and Techniques of Practical Biochemistry, Cambridge University press, Foundation books.,

**SKILL BASED SUBJECT**  
**PAPER V – PLANT BIOTECHNOLOGY AND BIO-INFORMATICS**  
**Sub Code :**

**Objectives :**

On successful completion of the course the students will be able to

- define the principles and applications of plant biotechnology
- describe the process involved in genetic engineering and plant tissue culture
- understand the basic concepts of Bioinformatics.

**Unit I**

Restriction endonucleases – types – cleavage patterns, DNA ligase, cloning vectors – plasmids eg:-pBR 322, phage vectors (bacteriophage) and Agrobacterium tumifaciens.

Ti plasmid as a vector for higher plant systems. cDNA library, genomic library, techniques and applications of Southern blotting, Polymerase chain reaction.

**Unit II**

Integration of the DNA into the plasmid and phage vector, introduction of the vector into a suitable host, cloning of insulin gene. GM plants-Bt cotton

**Unit III**

Fermentation technology-Batch culture – fermenter structure and types – Ethanol production, penicillin production.

**Unit IV**

Different media used in tissue culture, composition of MS medium propagation of crop plants by tissue culture, protoplast culture, artificial seeds, Application of tissue culture in agriculture and horticulture.

## Unit V

### Bioinformatics :-

Databases and tools-Biological database 'NCBI' model-primary and Secondary databases-sequence analyzing tools – BLAST – proteomics and tools Homology modeling (concept only), Docking-Target-drug.

### Reference

1. Dubly. R.C.(1999) A Text book of Biotechnology
2. Gubta.P.K.(1998) Elements of Bioten
3. Sathyanarayana.U. (2008) Biotechnology
4. Razhan.M.K.(2003) Introduction to Plant tissue culture.
5. Arthur. M.L.(2005) Introduction to Bioinformatics (Ed 2), Oxford University Press, New York.
6. Dubey. R.C.(2013) A Text book of Biotechnology, S.Chand & Company Pvt. Ltd., New Delhi – 55.

## CORE PAPER VIII – BIOPHYSICS AND PLANT PHYSIOLOGY

Sub Code :

### Objectives:

On successful completion of the course, the student will be able to

- Understand the mechanism of respiration
- relate the role of movement of water and minerals in plants.
- explain the mechanism and role of Photosynthesis.
- relate the role of phytohormones on growth and development of plants.

### Unit – I

#### Biophysics:

Laws of thermodynamics : first and second law

Concept of free energy, ATP as high-energy compound-chloroplast and Mitochondrial bioenergetics.

Photo physiology: Light-characteristics and absorption - Light emission-Fluorescence, Phosphorescence and Bioluminescence

#### Plant Physiology

#### Unit II

Absorption of water: Imbibition, Diffusion, Osmosis, Plasmolysis, - Mechanism of water absorption

Ascent of sap - Mechanisms and theories,

Transpiration - Types of transpiration – stomatal, cuticular and Lenticular

- Significance of transpiration- Mechanism of stomatal Transpiration - factors Affecting Transpiration.

Guttation and exudation

### **Unit III**

Photosynthesis – Photosynthetic unit – Two Photo systems – recent views on light reactions – Electron transport chain – Photophosphorylation : Cyclic, Non-cyclic, Dark reaction-carbon fixation-C3, C4, CAM pathways.

Translocation of path of transport-evidence, mechanism of translocation-Organic solutes theories-pressure flow hypothesis, cytoplasmic streaming and electro osmosis.

### **Unit IV**

Respiration – Respiratory substrates – types of respiration – aerobic and anaerobic respiration, Mechanism and significance of respiration – Glycolysis and Kreb's cycle, electron transport and oxidative Phosphorylation and Photorespiration.

Nitrogen metabolism- Source of nitrogen – methods of nitrogen fixation – metabolism Symbiotic and nonsymbiotic - Nitrogen cycle

### **Unit V**

Physiology of flowering – Photoperiodism – definition and concepts Phytochrome-theories, vernalization and devernialization and practical applications.

Plant growth hormones: Auxins, gibberllins, cytokinins, abscisic acid ethylene-location physiological role.

Seed dormancy, circadian rhythms.

### **Reference Books**

1. Dr.Salil Bose – Elementary Biophysics.
2. Fuller et al – Concepts and mechanics.
3. Jain V.K.Fundamentals of Plant Physiology.
4. Robert M.Devlin – Plant Physiology.
5. Casey, E.J.Biophysics.
6. Bidwell R.G.S.Plant Physiology – Macmillian Publishing Co.,
7. Mohan P. Arora (2011) Biophysics, Himalaya Publishing House.
8. Sundara Rajan. S, (2016) College Botany – Plant Physiology and Molecular Biology, Vol IV, Himalaya Publishing House, New Delhi.

## CORE PAPER IX – GENETICS AND EVOLUTION

Sub Code :

### OBJECTIVES:

On successful completion of the course, the students will be able to

- understand various aspects of inheritance, DNA, RNA and mutation.
- appreciate the wonders of genes and its expression.
- relate various theories of evolution such as Darwinism, Lamarkism etc.,

### Genetics

#### Unit I

A brief account of Mendel's laws of heredity – Mono and dihybrid Crosses – Test cross. Interaction of genes – Non-epistatic simple gene interaction Comb, type in fowls – Complementary genes (9:7) Multiple alleles with reference to ABO blood group in man – Polygenic inheritance with reference to Ear size in Maize.

#### Unit II

Linkage and crossing over-significance, Determination of sex in plants. Extrachromosomal inheritance. Gene mutations – induced and spontaneous. Mutagens.

#### Unit III

DNA as genetic material DNA-structure and DNA replication. RNA-types, structure and functions, mechanism of biosynthesis of proteins. Operon concept.

#### Unit IV

Eucaryotic genome organization with reference to Arabidopsis thaliana-Human genome project-golden rice. Bacterial genetics – Transformation, Transduction and Conjugation.

### Evolution

#### Unit V

Historical account. Theories of Evolution – Darwinism, Lamarkism, Weismannism and Hugo de Vries.

### Reference Books

1. Burns, G.W.1980 – The Science of Genetics, Collier acillan, New Yark.
2. Gardnet, E.J.Simmons and Snustad, D.P.1985 – Principles of Genetics. Edition 8, John Wiley & Sons, New Yark.
3. Verma P.S.and V.K.Agarwal 1991, S.Chand & Co, New Delhi.

## CORE PAPER X - MICROBIOLOGY

Sub Code :

### OBJECTIVES:

On successful completion of the course, the student will be to

- describe and differentiate various types of microbes.
- explain the structure, reproduction, growth, multiplication of bacteria and virus.
- categorize the techniques used in identification, isolation and control of microbes.
- understand various factors of microbial food spoilage and food and milk preservation methods.

### Unit I

Contributions to microbiology by Anton Van Leeuwenhock, Louis Pasteur, Robert Koch. Morphology of Bacteria: size, shape, arrangement, fine structure, cell wall, pili, plasma membrane, mesosome, capsule, flagella, endospore.

### Unit II

Outlines of Bergey's bacterial classification, Reproduction of Bacteria-Binary fission, Budding and fragmentation, Growth: Growth curve, measurement of growth, Nutritional types of Bacteria -Bacteriophage : structure and multiplication.

### Unit III

Methods in Microbial-culture, media preparation, sterilization, inoculums. Inoculation: pure culture-spread plate, pour plate and streak plate Staining Technique: simple and differential (Gram's)

### Unit IV

Disinfectants, Antibiotics-source, structure and mode of action of penicillin and its derivatives, streptomycin. Single cell protein.

### Unit V

#### Applied Microbiology

Tests for detection of coliform bacteria in water-sewage treatment-Oxidation pond-trickling filter, spoilage of food and preservation methods, Microflora of milk - maintenance of quality of milk, pasteurization.

### Reference Books

1. Power, C.B. and M.E.Daginawala-General Microbiology Vol-I and Vol-II.
2. A.S.Rao. Introduction to Microbiology.
3. P.D.Sharma-Microbiology and plant pathology.
4. G.Schelyal-General Microbiology.
5. Anna and Joshua-Microbiology.

### Note :

Visit to food processing industries, milk projects, micro biology lab of MKU / TNAU, Clinical lab and Pasteur institute, Cunnoor.

## SKILL PAPER – VI - HERBAL TECHNOLOGY

Sub Code :

### OBJECTIVES :

On successful completion of the course the student will be able to

- Understand different systems of medicines like Allopathy , Siddha, Ayurveda and Unani etc.,
- Identify different sources of drugs from plants.
- relate drugs acting on different systems of human body.

### Unit I

Pharmacognocny – Definition, A general survey of different systems of medicines – Indian systems of medicine – Siddha, Ayurveda and Unani systems – Future pharmacognicy, Homeopathy.

### Unit II

A Systematic study of crude drugs with reference to their vernacular name, family, preparations and uses.

1. Drugs obtained from roots – Rauwolfia.
2. Drugs obtained from underground stem – Garlic
3. Drugs obtained from Bark – Chinnamon
4. Drugs obtained from Stems & Woods – Ephedra
5. Drugs obtained from Leaves – Aloe

### Unit III

1. Drugs obtained from flowers – saffron
2. Drugs obtained from fruits – Emblica
3. Drugs obtained from seeds – Cardamom
4. Drugs from all parts of plants – Phyllanthus

### Unit IV

A brief account of following - Drugs acting on the CNS – Drugs used in the disorders of gastro intentional track.

Cardio-vascular drugs – Digitalis purpurea. Anticancer drugs – Vinca rosea.

### Unit V

Cultivation, composition, medical properties and uses of citrus.

## Reference

1. Pharmacognosy – A.Roseline – MJP – Publishers – Chen
2. Medicinal plants by Soma Sundaram.
3. Medicinal plants – Prohit et al.
4. Agrawal S.S, Paridhavi. M, (2007), Herbal Drug Technology, Universities Press Pvt Ltd., Hyderabad.
5. Ponnuswami. V, et.al (2014) Medicinal Herbs and Herbal Cure, Jeya Publishing House, Delhi.
6. Muzumdar B.C, Principles and Practices of Herbal Garden (2006), Daya Publishing House , Delhi.

### **FIRST YEAR – II SEMESTER**

### **BOTANY MAJOR PRACTICAL – PAPER – I**

### **ALGAE, FUNGI, LICHENS, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS, PALEO BOTANY and PALNT PATHOLOGY**

### **(Core Paper I & II)**

Sub Code :

## Objectives:

On successful completion of the course the student will be able to

- identify different types of lower plants – Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms.
- prepare suitable microslides of selected life forms in Algae and Fungi.
- microscopically observe Lichens, Plant Pathology specimen and Fossils Specimens

## Syllabus

1. To make suitable temporary micropreparation of the types prescribed in Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany.
2. To observe and identify the microscopic and macroscopic specimens at sight and write illustrated and explanatory notes on them.
3. To observe and identify the Fossil Slides in the Syllabus
4. To maintain observation note and submit for external valuation.
5. To submit report on study tour and field trip.

## Question Pattern

Time : Three Hours

Max.Marks = 100

1. Make suitable temporary micro preparation of A, B, C and D. Submit the slides for valuation. Draw diagram and give reasons.

4 x 10 = 40 Marks

- |   |                  |
|---|------------------|
| 2. Identify, draw diagrams and write critical note on E,F,G,H,I and J | 6 x 5 = 30 Marks |
| 3. Identify and write geological era, notes and draw or K.            | 1 x 4 = 4 Marks  |
| 4. Comment on the etiology of L                                       | 1 x 6 = 6 Marks  |
| 5. Observation note book with tour report                             | 20 Marks         |
|   | Total 100 marks  |

(Note : Scale down to 60 marks)

**Key and scheme of valuation of paper I**

1. A, B, C and D. Algae, Bryophytes, Pteridophytes and Gymnosperms materials to be given.(Slide -5/Diagram -2/Identification -1 & Reason-2).
2. E, F, G, H and J. Algae, Fungi, Lichen, Bryophytes, Pteridophytes and Gymnosperms. (Diagram - 2/Identification - 1 & Reason - 2)
3. K Fossil slide (Identification -1 Geological era - 1 Diagram - 2)
4. L Specimens of plant pathology including in the syllabus

**Second Year – IV Semester  
BOTANY MAJOR PRACTICAL – PAPER – II  
(Core Paper III & IV)**

Cell biology, Angiosperm embryology, Plant Anatomy and Micro techniques

Objectives :

On completion of the course, the student will be able to

- understand the organization of tissues
- identify the stages of mitosis and meiosis
- prepare permanent slides & understand straining procedures

**Syllabus**

1. To squash onion root tip / Smear young anther and identify stages of Mitosis or Meiosis.
2. To identify cell inclusions and organelles.
3. To dissect and mount the embryo (Tridax) at least two stages.
4. To identify the stages of microsporogenesis.
5. To observe ovule types



6. To take transfers sections of normal and anomalous structures of plant material (stem, leaf, root and nodal section)
7. Preparation of permanent slides
8. Micro techniques demonstration only
9. Maintain observation notebook

### Question Pattern

Time : Three Hours

Max.Marks = 100

1. Make suitable temporary micro preparation of A & B. Identify, Draw diagrams and give reasons. Submit the slide for valuation. 2 x 10 =20 marks
2. Make squash / smear the material given in C. Identify two stages and give reasons. 10 marks
3. Write critical notes on D, E, F, G, H & I 6 x 5 = 30 marks
4. To Dissect and display any one of the stages of embryo given in J 10 marks
5. Submission of two permanent slides 10 marks
6. Submission of record notebook 20 marks

**Total**

**100 marks**

**Note : (Scale down to 60 marks)**

### **Key and Scheme of Valuation**

1. A & B – Anatomy material – Stem / Leaf/ Root / Node. Slide – 5 marks / diagram – 2 marks, reasons – 3 marks. (2 x 10=20 marks)
2. Onion root tip (or) Anther – 2 stages - identification – 4, Diagram -3, Notes – 3 (10 marks)
3. Sportex D, E, F, G, H, I, J, K and L (D.E – Cell Biology, F, G – Anatomy, H & I – Embryology. (Identification – 1, Diagram – 2, Notes – 2) (5 x 6 = 30 Marks)
4. Submission of two embryo stages. J- Slide – 5, Notes – 5 (10 Marks)
5. Submission of two permanent slides. (2 x 5 = 10 marks)
6. Submission of record notes (20 marks)

**PRACTICAL – PAPER – III**  
**Third year - Sixth Semester**  
**TAXONOMY OF ANGIOSPERMS**

**Objectives:**

On successful completion of the course, the students will be to

- identify local plant pieces
- describe the distinctive features of selected families
- recall the economic value of the plants in the cited families

**Syllabus**

1. To refer Angiosperm plants to their respective families by giving reasons.
2. To describe plant in technical terms, draw diagrams construct the floral diagram and give the floral formula.
3. To identify at sight the Angiosperm specimens from the local flora or from herbarium.
4. To attend field work under the supervision for a minimum period of three days to acquaint with the flora of the same and prepare 20 Herbarium plants.
5. To maintain an observation notebook and submit for external valuation

**Question Pattern**

**Time : 3 hours**

**Max. Marks -100**

1. Refer specimen “A” and “B” to its respective family, giving reasons. (Sketches not required)  
2 x 10 = 20 marks
2. Describe specimen “C” in technical terms, Draw labeled sketches of floral parts including L.S. of the flower. Construct the floral diagram and write the floral formula.  
1 x 20 = 20 marks
3. Write the species, genus, family name and economic importance of the given specimen D, E, F, G & H  
5 x 4 = 20 marks
4. Submission of herbarium (20 numbers) 20 marks
5. Submission of observation note book 20 marks

Total 100 marks

(Note : Scale down to 60 marks)

**Key and scheme of valuation :**

1. A and B Families Prescribed in the syllabus  
as a whole 2 x 10 = 20 marks
2. C- Plant included in the syllabus (Technical Description - 6 marks, Diagram – 9 marks, Floral Diagram - 3 marks, Floral formula – 2 marks)  
20 marks
3. D, E, F, G and H : Species Name – 1, Genus Name – 1, family name – 1 mark,  
economic importance – 1. 5 x 4 = 20 marks  
(G from herbarium, others from local flora)
4. Herbarium 20 Nos. 20 marks
5. Observation note books 20 marks

**PRACTICAL – PAPER – IV**

**Third Year - Sixth Semester**

Core Paper – VI & VII

Plant Ecology, Phytogeography, Bio-Chemistry and Bio-Techniques

**Objectives :**

On successful completion of the course, the student will be able to

- understand the concept of ecology and study of vegetation.
- acquire a deeper understanding of the structure and function of bio-molecule
- operate various machines like calorimeter, pH meter etc.,

**Syllabus**

1. Estimation of starch in plant tissue, potato and rice by calorimeter and gravimetric meters.
2. Determination of complementary colours and verification of Beer's law.
3. Separation of sugars and amino acids by paper chromatography.
4. Quadrat and Transect methods of studying vegetation in the field.

**Question Pattern**

**Time : 3 hours**

**Max. Marks -100**

1. Taking a lot from the set of experiments. Submit the procedure, tabulate and calculate frequency %, density and abundance. 1x 20=20 marks
2. Taking a lot from the set of experiments. Submit the procedure, proceed with experiment, tabulate and interpret the results. 1x20=20 marks
3. Write critical notes on A,B,C,D,E,F,G,H 8X5=40 marks
4. Submission of record note book 20 marks

**Total - 100 marks , Scale down to 60 marks**

### **Key and scheme of valuation :**

1. Any one Quadrat / transect method.  
Procedure – 5, tabulation – 5, frequency density, abundance – 5, interpretation – 5 marks. 20 marks
2. Experiments prescribed in Bio-chemistry syllabus – procedure – 5, experiment – 5, result – 5, interpretation – 5 marks. 20 marks
3. Spotters from Plant ecology, Phytogeography, Bio-chemistry and Bio-techniques. A,B,C, D,E,F,G and H 8 x 5 40 marks
4. Submission of record note 20 marks

**Practical Paper V**  
**Core Paper 8, 9 and 10**  
**Biophysics, Plant Physiology, Genetics, Evolution and Microbiology**  
**Syllabus**

1. To study probability by coin tossing.
2. To work out simple genetic problems in monohybrid, dihybrid crosses.
3. To study polygenic inheritance of quantitative traits in plants such as length of pods, number of seeds in fruits and to explain and interpret the observation in graphs.
4. To set up the following experiments and explain the working with suitable diagrams, observation and interpretations.
  - a) Measurement of Water potential – Chardakov's method.
  - b) Determination of osmotic pressure – Plasmolysis method.
  - c) Rate of transpiration – Ganong's photometer method under different conditions.
  - d) Rate of Photosynthesis – Using Willmont's bubbler method.
  - e) Separation of Photosynthetic pigments using paper chromatography.
5. Experiments setup demonstration only
  - a) Thistle funnel osmoscope and potato osmoscope
  - b) Farmer's photometer
  - c) Ganong's respiroscope
  - d) Fermentation – Kuhne's tube
  - e) Mohl's half leaf experiment
  - f) Measurement of growth by Auxanometer
  - g) Phototropism
  - h) Geotropism
6. Microbiology practicals
  - a) Sterilization methods
  - b) Preparation of media
  - c) Isolation of Microbes from soil & water using serial dilution technique
  - d) Staining Bacteria – simple & gram staining
  - e) Standard Analysis of water for the presence of Coliform bacteria

7. Visit to Microbiology institutes.
8. To maintain and submit observation note books for external valuation.

### Question Pattern

Time : Three hours

Max.Marks:100

1. Solve the genetic problem A & B 2 x 5 = 10 marks
2. Find out the mean, median, mode and standard deviation of the given sample, explain and interpret your observation with graph. - 10 marks
3. Taking a lot, write procedure, do the physiology experiment and interpret the data. - 10 marks
4. Write the procedure, strain the bacteria C by gram methods. Submit the slide for valuation. - 10 marks
5. Demonstrate the dilution plate technique to estimate the bacteria in D and write the procedure - 10 marks
6. Prepare the hanging drop of the material E and submit the slide for valuation. - 10 marks
7. Identify, draw diagrams and write notes on F, G, H & I - 20 marks
8. Submission of observation notebook - 20 marks

**Total marks = 100 , scale down to 60 marks**

#### Key and scheme of valuation

1. A and B as a whole 2 x 5 - 10 marks
2. Mean – 1, Median – 1, Mode – 1, Standard Deviation – 3, Tabulation and graph – 4  
(leaf length / fruit length) - 10 marks
3. Procedure – 3, Conducting experiment – 3, Results and interpretation – 4. - 10 marks
4. Any bacterial culture straining procedure – 5, slide -5 - 10 marks
5. Soft drink / Milk / Soil, procedure-5, demonstration-5 - 10 marks
6. Any bacterial broth / curd, slide -5, procedure -5 - 10 marks
7. F – Genetics, G – Evolution, H = Physiology,  
I = Microbiology 4 x 5 - 20 marks
8. Observation notebook - 20 marks

### BRANCH V B.SC., BOTANY ANCILLARY REVISED SYLLABUS (CBCS)

This will come into effect from the academic year 2018-19 (i.e., for those who joined the first semester of the course in July 2018 and afterwards)

## **THEROY PAPERS**

Semester III	: Paper – I - Plant Diversity
Semester IV	: Paper – II Plant Ecology & Applied Botany
Semester V	: Paper – III Taxonomy, Embryology of Angiosperms & Medicinal Botany
Semester VI	: Paper – IV Plant Physiology & Horticulture

## **PRACTICAL PAPERS**

Semester I&II	: Practical- I	- Paper I & II
Semester III&IV	: Practical-II	- Paper III & IV

## **SYLLABUS**

### **Ancillary Botany Theory Paper 1- Plant Diversity**

### **(Algae, Fungi, Bryophytes, Pteridophytes and Gynosperms)**

**Sub Code :**

#### **Objectives:**

On successful completion of the course the student will be able to

- Understand the basics & general characters of various groups of lower plants
- Study the Structure and life cycle of lower plants
- Impart knowledge on the economic importance of lower plants

#### **Unit I: Algae**

Introduction, general characters & economic importance of Algae;  
Structure and life cycle of **Oscillatoria, Oedogonium, Sargassum**

#### **Unit II: Fungi**

Introduction, general characters & economic importance of Fungi;  
Structure and life cycle of **Aspergillus & Puccinia**.

#### **Unit III: Bryophytes**

Introduction, general characters & economic importance of Bryophytes  
Structure and life cycle of **Funaria**.

#### Unit IV: Pteridophytes

Introduction, general characters & economic importance of Pteridophytes  
Structure and life cycle of **Selaginella**

#### Unit V: Gymnosperm

Introduction, general characters & economic importance of Gymnosperm  
Structure and life cycle of **Pinus**.

#### References

1. Chopra, R.N. and Kumara, P.K. (1988). *Biology of Bryophytes*. Wiley Eastern Ltd., New Delhi.
2. Rashid, A. (1998). *An Introduction to Bryophyta*. Vikas Publishing House (P) Ltd., New Delhi.
3. Sharma, O.P. (1990). *Textbook of Pteridophyta*. MacMillan India Ltd., New Delhi.
4. Sharma, O.P. (1997). *Gymnosperms*. Pragati Prakashan, Meerut.
5. Smith, G.M. (1955). *Cryptogamic Botany Vol. II Bryophytes and Pteridophytes* (2 Edn.). Tata McGraw-Hill Publishing Co., New Delhi.
6. Vashishta, B.R., Sinha, A.K. and Singh, V.P. (2008) *Botany for Degree Students: Algae*. S. Chand & Company Ltd., New Delhi.
7. Vashishta, B.R. (1990). *Botany for Degree Students: Fungi*. S. Chand & Company Ltd., New Delhi. 8.

#### Activities:

- -Visit to Kanyakumari, Rameswaram and CMFRI – Mandapabam for Algal study & submit the report.
- To visit nearby Field & Hill stations (like, Alagar Hills, Ooty, Kodaikanal, Munnar, Kurangani etc.,) to see the habitat of Bryophytes, Pterodophytes and Gymnosperms & submit the report.
- To visit nearby TNAU departments to see mushroom cultivation, tissue culture laboratory, bio-fertilizer production, to learn vegetative cutting methods like layarage, grafting etc., & submit the report.

#### Ancillary Botany Theory Paper-2 Plant Ecology & Applied Botany

Sub Code :

#### Objectives:

On successful completion of the course the student will be able to

- Understand the concept of Plant Ecology, Plant adaptations, Vegetation of Tamil Nadu.
- Learn the techniques of Mushroom Cultivation and Plant Tissue Culture
- Know biofertilizers, mycorrhiza and organic farming

## **Unit I: Plant Ecology**

Introduction, concept & terminology; Plant adaptations – morphological, anatomical & physiological adaptations of hydrophytes, xerophytes, halophytes; Vegetation of Tamilnadu; Methods of studying vegetation – quadrat.

## **Applied Botany**

### **Unit II: Mushroom Cultivation**

Introduction, nutritive value, importance; cultivation of white button mushroom (*Agaricus* sp.) – spawn preparation - preservation of mushroom.

### **Unit III: Plant Tissue Culture**

Introduction, basic requirements for tissue culture laboratory, basic tissue culture techniques & applications of plant tissue culture.

### **Unit IV: Biofertilizers**

Biofertilizers – Definition, kinds of microbes as biofertilizers, Rhizobium-legume Symbiotic association, Mycorrhiza – VAM association.

### **Unit V: Organic Farming**

Methods of compost preparation & Biodiesel production from *Jatropha*.

## **References**

1. Kumar, H.D. (1992). *Modern Concepts of Ecology* (7th Edn.). Vikas Publishing Co., New Delhi.
2. Arumugam, N. (1994). *Concepts of Ecology* (Environmental Biology). Saras Publications, Nagercoil, Tamilnadu.
3. Alice, D., Muthusamy and Yesuraja, M. (1999). *Mushroom Culture*. Agricultural College, Research Institute Publications, Madurai. 3.
4. Marimuthu, T. (1991). *Oyster Mushroom*. Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
5. Nita Bhal (2000). *Handbook on Mushrooms Vol. I and II* (2nd Ed.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Pathak, V.N. and Yadav, N. (1998). *Mushroom Production and Processing Technology*. Agrobios, Jodhpur.
7. Tripathi, D.P. 2005. *Mushroom Cultivation*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Kalyan Kumar De. (1997). *Plant Tissue culture*. New central Book Agency, Calcutta.
9. Kumar, H.D. (1991). *A Textbook on Biotechnology*. East west press, New Delhi.
10. Parihar, P. (2014). *A Textbook of Biotechnology*. Argobios Publications, Jodhpur
11. Purohit, S.S. (2003). *Agricultural Biotechnology*. Agrobios Publications, Joshpur.
12. Varma, A. and Hock, B. (1995). *Mycorrhiza*. Springer–Verlag, Berlin.
13. Yaaco Vokan (1994). *Azospirillum/Plant Associations*. CRC Press, Boca Raton, FL.



**Ancillary Botany Theory Paper-3 -Taxonomy, Embryology of Angiosperms &  
Medicinal Botany**

**Objectives:**

On successful completion of the course the students will be able to

- Know systems of classifications, merits and demerits.
- Understand the systematic of the selected families of the flowering plants with their economic importance.
- Learn the medicinal important plants with their systematic treatment.
- Understand the key aspects of embryology of Angiosperms

**Unit I:**

Introduction to basic morphology – Bentham and Hooker classification – Merits and demerits.

**Unit II:**

A detailed study of the following families with their economic importance –

Annonaceae, Rutaceae, and Ceasalpinaceae,

**Unit III:**

A detailed study of the following families with their economic importance –

Asclepiadaceae, Lamiaceae, Euphorbiaceae & Poaceae

**Unit IV:**

Medicinal Botany: Study the systematic position, common names, description of individual plant, Morphology of useful part and curative properties of following plants:

*Aegle marmelos, Azadirachta indica, Ocimum sanctum, Coriandrum sativum Phyllanthus niruri and Gloriosa superba*

**Unit V:**

Embryology – Structure and development of anther, microsporogenesis & male gametophyte - Structure, development of ovule & megasprogenesis, female gametophyte (*Polygonum* type of embryosac development), Fertilization, Structure of embryo – Dicot and Monocot.

**References**

1. Agarwal, O.P. (2014). *Organic Chemistry Natural Products, Vol. II*. Krishna Prakashan Media (P) Ltd., Meerut
2. Bhojwani, S.S. and Bhatnagar, S.P. (2000). *The Embryology of Angiosperms* (4<sup>th</sup> Edition). Vikas Publishing House (P) Ltd., UBS Publisher's Distributors, New Delhi.

3. Chopra, R.N., Badhuvar, R.L. and Gosh, G. (1965). *Poisonous Plants of India*. CSIR Publications, New Delhi.
4. Chopra, R.N., Chopra, I.C., Handa, K.L. and Kapur, L.D. (1994). *Indigenous Drugs of India*. IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Gamble, J. S. and Fisher, C.E.C. (1915-1938). *Flora of the Presidency of Madras*. Adlard & Son Ltd., London
6. Maheswari, P. (1985). *An Introduction to the Embryology of Angiosperms*. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
7. Mathew, K.M. (1988). *Flora of the Tamilnadu Carnatic*. Rapinat Herbarium, Tiruchirappalli.
8. Nair, N.C. and Henry, A.M. (1983). *Flora of Tamil Nadu, India*. Botanical Survey of India.
9. Pandey, B.P. (1997). *Taxonomy of Angiosperms*. S. Chand & Company Pvt. Ltd., New Delhi.
10. Sharma. O.P. (2007). *Plant Taxonomy*. Tata McGraw–Hill Publishing Co., New Delhi.
11. Somasundaram, S. (1997). *Medicinal Botany (Maruthuva Thavaraviyal)* (Tamil Medium Book). Elangovan Publishers, Tirunelveli.
12. Srivastava, A.K. (2006). *Medicinal Plants*. International Book distributors, Dehradun.

### **Ancillary Botany Theory Paper- 4 Plant Physiology & Horticulture**

#### **Objectives:**

On successful completion of the course the students will be able to

- Understand the metabolic activities of plants
- learn the horticultural practices, tools and manures.
- relate the kitchen garden and ornamental garden.
- study the importance of horticultural crops and their propagation methods

#### **Plant Physiology**

##### **Unit I:**

Absorption of Water - imbibition, diffusion, osmosis, plasmolysis, site of absorption, mechanism – active & passive & factors; Ascent of Sap -path and mechanism; Transpiration (Water Loss) - types, functions, mechanism & factors; Photosynthesis- Structure of chloroplast, Mechanism - Light and Dark reaction ( $C_3$  &  $C_4$  cycle only) & factors.

##### **Unit II:**

Respiration- Structure of Mitochondria, Mechanisms of respiration - Glycolysis and Krebs' cycle, Electron transport system & factors. Plant Growth Regulators – Auxins, Gibberellins, Cytokinins, Abscisic acid and Ethylene

## **Horticulture**

### **Unit III:**

Introduction, Basic requirements, kinds of manures, Methods of vegetative Propagations, Cuttge, Layerage and Graftage.

### **Unit IV:**

Planning and Layout of Kitchen Gardening & Orchard; Indoor gardening & Hanging pots.

### **Unit V:**

Bonsai, Rockery and Methods of storage of Fruits.

## **References**

1. Jain, V.K. (1990). *Fundamentals of Plant Physiology*. S. Chand & Co., New Delhi.
2. Pandey, S.N. (1991). *Plant Physiology*. Vikas Publishing House (P) Ltd., New Delhi.
3. Kumar, N. (1997). *Introduction to Horticulture*. Rajalakshmi Publications, Nagercoil.
4. Edmond, J.B., Musser, A.M. and Andrews, F.S. (1951). *Fundamentals of Horticulture*. McGraw-Hill Book Company, Inc., New York.

### **Note :**

Field visit to TNAU department to see horticultural practices, Bonsai, Rockery, Orchards maintenance.

## **B.Sc., Botany Ancillary Syllabus (Practical)**

### **I- Year – Second Semester**

#### **Paper I – Plant diversity, Plant Ecology and Applied Botany Syllabus**

1. Micro preparation of plants mentioned in plant diversity part of the syllabus.
2. Section cuttings and submission of slides-Selaginella and Pinus.
3. Spotters – Identification of specimens or slides from Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms include in the syllabus.
4. Section cutting and mounting plant materials of ecological importance (Such as Nerium, Bryophyllum, Nymphaea, leaves and other available materials)
5. Maintenance of observation notebook and submission of the same during practical examination.

**B.Sc., Botany Ancillary Practical  
(Question Pattern)**

**Paper I Plant diversity, Plant Ecology & Applied Botany**

**Time : 3 Hrs**

**Max.Marks : 100**

1. Take T.S. of specimen A. Identify, draw labeled sketch giving reasons. Submit slide for valuation 10 Marks
2. Make suitable micro preparation of B and C. Identify, draw labeled sketches giving reason. Submit slides for valuation.  $2 \times 10 = 20$  Marks
3. Identify, draw sketches and write notes on spotters D, E, F, G, H, I, U and K.  $8 \times 5 = 40$  Marks
4. Comment on the ecological adaptations of the plant L and M  $2 \times 5 = 10$  Marks
5. Observation note book = 20 Marks

(Note : Scale down to 60 marks)

**Key for Botany Ancillary Practical – I**

1. A- Angiosperm material - Stem, leaf of Hydrophytes or Xerophytes prescribed in the syllabus (Slide = 5, Diagram = 2 Description = 3)
2. (B & C) Vegetative. Materials from plant diversity (Pteridophyte and gymnosperm) for each material (Slide = 5, Diagram=2, Description=3)
3. E, F and G, H, I – [Permanent slides or museum specimens of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms]. J & K – Applied Botany (for each one Identificaiton = 1, Diagraph=2 and Description = 2)
4. L & M – Xerophytes or Hydrophyte or a mangrove plant or plant part [Identification = 1, diagram = 2, Description=2]
5. Observation note book – 20 marks

## **B.Sc., Botany Ancillary Syllabus (Practical)**

### **II- Year – Forth Semester**

#### **Paper II – Taxonomy, Embryology of angiosperms, Medicinal Botany, Plant physiology and Horticulture**

##### **Syllabus**

1. To make dissections using dissection microscope of the floral parts of angiospermic plants and to make drawing to bring out the salient feature [floral diagram also expected] to learn to mount the floral parts on a given slide.
2. To assign the given plants to its natural order giving reasons.
3. To describe plants in technical terms.
4. Identification of medicinal plants and record their morphological features.
5. Identification of sections of anther and ovule.
6. Propagation methods of horticulture plants – Cuttage, Layerage and Graftage.
7. Demonstration of techniques of Horticulture.
8. To describe simple setups in plant physiology (Evolution of oxygen – photosynthesis, Light screen experiment, Mohl's half leaf experiment.)
9. To maintain an observation notebook and to submit it for external valuation.

##### **(Question Pattern)**

**Time : 3 hours**

**Max. Marks : 100**

1. Refer specimen A to its family giving reasons. 10 Marks
2. Describe B in Technical terms. Draw labeled sketches including L.S of flower. Submit L.S. of the flower for valuation. 15 Marks
3. Identify and write notes on Botanical name, common name and medicinal value of C, D, E & F (No sketches required) 4 x 5 = 20 Marks
4. Identify and write notes on G. 5 Marks
5. Demonstrate the Horticultural technique (any one method) assigned to you [H] and write the procedure for the same. 10 Marks
6. Identify and write note on I, J & K 3 x 5 = 15 Marks
7. Comment on the physiology set up L 5 Marks
8. Observation notebook. 20 Marks

Total = 100 marks (Note : Scale down to 60 marks)

##### **Key and Scheme of valuation:**

1. A- Angiosperm materials of any family prescribed in the syllabus  
As a whole = 10 marks

2. B – Any Angiosperm specimen. (Included in the syllabus) (Description- 5, L.S-2, other diagrams – 5, Floral diagram – 2, Floral formula – 1)  
15 marks
3. C, D, E & F – Medicinal plants prescribed in the syllabus.  
(Botanical and common names 1 +1, Note – 3) 4 x 5 = 20 marks
4. G. Embryology slides section of Anther and Ovule (Description – 3, Diagram – 2)  
5 marks
5. Horticulture – (Demonstration – 5, Procedure – 5) 10 marks
6. I and J – Horticulture, K – Physiology. (Identification – 1, Diagram – 2, Notes – 2)  
3 x 5 = 15 marks
7. Any Physiological setup (Identification – 1, Diagram – 2, Notes – 2)  
5 marks
8. Observation note book 20 marks

**UG DEGREE**  
**NON – MAJOR ELECTIVE**  
**I Year – I Semester**  
**Paper -1 : Mushroom Cultivation**

**Unit I**

Historical background, Distribution of edible mushroom in India  
Present status of mushroom cultivation in India. General characters of Mushroom.

**Unit II**

Edible mushroom, Non edible mushroom.  
Nutritional value and importance of mushrooms.  
Mushrooms as Medicine, Recipes of mushroom.

**Unit III**

Spawn production methods, factors affecting spawn production – storage of spawn.

**Unit IV**

Substrates used in mushroom cultivation.  
Cultivation methods and Harvesting.  
Ex : Button mushroom and Milky mushroom.

**Unit V**

Cultivation Methods and Harvesting of Oyster mushroom - Ganoderma, Pests and diseases affecting mushroom and their control measures.

**References:**

- 1) Nita Bahl., 1998. Hand Book on Mushrooms. Oxford & I B H, Publishers, New Delhi.
- 2) Muthusamy, A.D & Yesuraju., 1999. Mushroom culture. TNAU Publication. Madurai.
- 3) Suman, B.C & V.P.Sharma ., 2005. Mushroom cultivation and uses ‘Agrobios (India) Jodhpur – 342 002.
- 4) Kumarsesan.K., 2007. Biotechnology, Saras Publications, Nagercoil.

**UG DEGREE**  
**NON – MAJOR ELECTIVE**  
**First Year – II Semester**  
**Paper II – Plant utility and exploitation**

**Unit I**

Origin of cultivated plants, Vavilov's, centre's of origin.

**Unit II**

Plants as sources for food, fodder, fibres, spices, Beverages.

**Unit III**

Drugs, narcotics, insecticides, timber, gums, resins and dyes.

**Unit IV**

Plant as sources of Latex, cellulose, starch and their products, perfumery

**Unit V**

Importance of Ethno botany in India context. Energy plantation, Botanical gardens and Herbaria.

**Reference :**

1. Hill, A.F., 1983. Economic Botany. Tata Mc Graw-Hill Publishing company Ltd., New Delhi.
2. Chopra., et al., 1956. Glossary of India Medicinal plants. CSIR, New Delhi.
3. Pandey, B.P., 2000. Economic Botany. S. Chand & Co., Ltd.. New Delhi.
4. Pandey, B.P., 2007. Taxonomy of Angiosperms. S.Chand & Co., Ltd., New Delhi.