



**PERIYAR  
UNIVERSITY**  
**PERIYAR PALKALAI**  
**NAGARSALEM -**  
**636011**

**DEGREE OF BACHELOR OF SCIENCE**  
*CHOICE BASED CREDIT SYSTEM*

*Syllabus for*

**B.SC. BOTANY**

**(SEMESTER PATTERN )**  
**(For Candidates admitted in the Colleges affiliated**  
**to Periyar University from 2021-2022 onwards)**



## DEFINITION

### PROGRAMME:

“Programme” means core degrees offered in various disciplines.

### COURSE:

“Course” refers to the courses offered under the degree programme spread over the complete Programme of study as under.

- Part I** - Refers Foundation “Tamil/other languages” offered under the programme.
- Part II** - Refers Foundation “Communicative English” offered under the programme.
- Part III** - Refers “the core subjects” related to the programme concerned including Practicals.
- Part III Allied** - Refers “Allied subjects” offered as allied, which is interdisciplinary in nature but related to the programme.
- Part III Electives** - Includes “Core/Elective subjects” related to the core subjects of the programme concerned.
- Part IV**
  - (i)** - “Non-Major Electives” means option is being given to students who do not come under the above two categories (i & ii).
  - (ii)** - Skill based subject means the courses offered under the programme related to Advanced Skill acquisition for industrial application for which a separate Diploma will be awarded along with the Degree.
  - (iv)** - “Foundation Course” means courses offered as
    - 1) Environmental Studies ( 1<sup>st</sup> year)
    - 2) Value Education - Yoga (1st year)
    - 3) Professional English for Life
    - 4) science
- Part V** - “Extension Activities” means all those activities which form part of NSS/NCC/Sports/YRC and other co and extracurricular activities.

## B.Sc. BOTANY

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A detailed explanation of the above with relevant credits are given under “Scheme of Examination along with Distribution of Marks and Credits”

### **Duration of the Course:**

Currently for the undergraduate programme the duration of study is THREE years. The course of the degree of Bachelor of Science shall consist three academic years divided into six semesters. Practical examinations will be at the end of even semesters. These regulations apply to the regular course of study in approved institutions of the University.

### **Credits:**

Means the weightage given to each course of study (subjects) attributed by the experts of the Board of Studies concerned.

### **Credit System:**

Means, the course of study under this pattern, where weightage of credits are spread over to different semesters during the period of study and the Cumulative Grade Point Average will be awarded based on the credits earned by the students. The following are the total credit points:

For Undergraduate Programme (Three years) : 148

### **AIM AND SCOPE OF THE COURSE:**

1. To acquire knowledge in different areas of plant science.
2. The topics included in different units of different papers would enable the students to develop technical skills in Basic Botany and its applied branches.
3. Skill based subjects like Mushroom Technology, Horticulture, Plant Tissue Culture, Agriculture Microbiology, Plant Breeding and Plant utilization as food, Medicoethnobotany and Seed Technology have been included in order to provide opportunities in employment and research in Government and Private Organizations.
4. The above courses also provide foundation for entrepreneurship.
5. Practicals included in the syllabus will improve the skills of the students in Microscopic techniques, Observations, Drawing and Physiological and Ecological Laboratory techniques.

**ELIGIBILITY FOR ADMISSION:**

Candidate for admission to the first year of the degree of Bachelor of Science Course shall be required to have passed the Higher secondary examination (Academic or vocational stream with Botany/Biology along with Chemistry under higher secondary board of examination Stream) conducted by the Government of Tamil Nadu or an Examination accepted by the Syndicate, Subject to such conditions may be prescribed therefore shall be permitted to appear and qualify for B.Sc degree examination in Botany.

**DURATION OF THE COURSE:**

The course for the degree of Bachelor of Science shall consist of three academic years divided in to six semesters. Each semester consists of 90 working days.

**PASSING MINIMUM:**

The candidate shall be declared to have passed the examinations if he /she secures not less than 40 marks.

**DISTRIBUTION OF MARKS:**

**THEORY**

University examination	= 75 marks
Internal assessment	= 25 marks

**INTERNAL ASSESSMENT STRUCTURE:**

Test	= 15 marks
Assignments	= 05 marks
Attendance	= 05 marks
Passing minimum for Internal Assessment	= 10 marks

Passing minimum of University examinations = 30 marks

**PRACTICALS**

University Examinations	= 60 marks
Internal Assessment	= 40 marks

**INTERNAL ASSESSMENT STRUCTURE:**

Submission - 10 Marks Test - 10 Marks Attendance - 5 Marks Total - 40 Marks

Submission	= 10 marks
Test	= 10 marks
Regularity in Practical	= 10 marks
Continues assessment	= 10 Marks
Passing minimum for internal assessment	= 10 marks
Passing minimum for University examinations	= 30 marks

**CLASSIFICATION OF SUCCESSFUL CANDIDATES:**

- Candidates who secure not less than 60 % of the aggregate marks in the whole examinations shall be declared to have passed the examinations in First class.
- Candidates who secure above 50 % and below 60 % shall be declared to have passed the examinations in Second class.
- Other successful candidates who secure below 50% shall be declared to have passed the examination in Third class.

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## B.Sc., BOTANY

### Course Structure (CBCS)

B.Sc BOTANY COURSE STRUCTURE FROM THE YEAR 2021-2022 ONWARDS

Sem	Part	Course	Code	IntHrs	Credit	Exam Hrs	Marks		
I	I	Language paper I		6	3	3	25	75	100
	II	Communicative English paper I		6	3	3	25	75	100
		Professional English I		6	4	3	25	75	100
	III	Core Course I (Plant Diversity I)	20UBO01	5	5	3	25	75	100
		Core Course II (Major Practical I)	20UBOP01	3	( Practical Assessment and credit carried to II sem Core Course II)				
		First Allied -I		4	3	3	25	75	100
		First Allied –I Practical		3	Practical Assessment and credit carried to II sem Allied Course II				
	IV	Environmental Studies		1					
	IV	Value Education		2	2	3	25	75	100
		TOTAL		36	20				600
II	I	Language paper II		6	3	3	25	75	100
	II	Communicative English paper II		6	3	3	25	75	100
		Professional English II		6	4	3	25	75	100
	III	Core Course III (Plant Diversity II)	20UBO02	5	3	3	25	75	100
	III	Core course II ( Major Practical I)	20UBOP01	3	3	3	40	60	100
	III	First Allied -III		4	4	3	25	75	100
	III	First allied –I (Practical)		3	3	3	40	60	100
	IV	Environmental Studies		1	2	3	25	75	100
	IV	SBEC I Mushroom Technology	20UBOS01	2	2	3	25	75	100
				36	27				800
III	I	Language paper III		6	3	3	25	75	100
	II	Communicative English -III		6	3	3	25	75	100
	III	Core course –IV (Plant Diversity III)	20UBO03	4	4	3	25	75	100
	III	Core course V ( Major Practical II)	20UBOP02	3	3	( Practical Assessment and credit carried to IV Sem Core Course V)			
	III	Second Allied –I		4	4	3	25	75	100
	III	Second Allied practical II		3		( Practical Assessment and credit carried to IV Sem Second allied II)			
	IV	SBEC –II (Horticulture)	20UBOS02	2	2	3	25	75	100
	IV	NMEC-I (Mushroom Culture)	20UBON01	2	2	3	25	75	100
					21				600
IV	I	Language paper IV		6	3	3	25	75	100
	II	Communicative English -IV		6	3	3	25	75	100
	III	Core course –VI (Anatomy &Embryology of Angiosperms)	20UBO04	4	4	3	25	75	100
	III	Core course V ( Major Practical II)	20UBOP02	3	3	3	25	75	100
	III	Second Allied –II		4	4	3	25	75	100
	III	Second Allied Practical II		3	3	3	25	75	100
	IV	SBEC –III (Plant Tissue Culture)	20UBOS03	2	2	3	25	75	100
	IV	NMEC-II Herbal Botany	20UBON02	2	2	3	25	75	100
		Internship Programme: Landscaping and Ornamental Gardening, Organic Farming, Waste Recycling and Vermicomposting, Mushroom Production, Nursery Techniques							

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		of Horticultural Plants, Preservation of Fruits and Vegetables,							
		<b>TOTAL</b>		30	24			800	
V	III	Core course VII (Morphology & Taxonomy of Angiosperms)	20UBO05	5	5	3	25	75	100
	III	Core course VIII (Cell Biology)	20UBO06	5	5	3	25	75	100
	III	Core course IX (Genetics)	20UBO07	5	5	3	25	75	100
	III	Core course X (Major Practical III)(Core course VII, VII& IX)	20UBOP03	3	( Practical Assessment and credit carried to VI Sem Core Course X)				
	III	Core course XI ( Major Practical IV) (Core course X, XI & XII)	20UBOP04	3	( Practical Assessment and credit carried to VI Sem Core Course XI)				
	III	Major Elective course I (Plant Biotechnology )	20UBOE01	5	5	3	25	75	100
	IV	SBEC-IV – (Agricultural Microbiology)	20UBOS04	2	2	3	25	75	100
	IV	SBEC-V-(Plant Breeding &Plant utilization as food)	20UBOS05	2	2	3	25	75	100
		<b>TOTAL</b>		30	24				600
VI	III	Core course XII (Plant Physiology)	20UBO08	5	5	3	25	75	100
	III	Core course XIII (Plant Ecology and Plant Geography)	20UBO09	5	5	3	25	75	100
	III	Core course XIV (Plant Protection)	20UBO10	5	5	3	25	75	100
	III	Core course X (Major Practical III) (Core course VII, VII & IX)	20UBOP03	3	4	4	25	75	100
	III	Core course XI ( Major Practical IV) (Core course X, XI & XII)	20UBOP04	3	4	4	25	75	100
	III	Major elective course (Biochemistry )	20UBOE02	5	5	3	25	75	100
	IV	SBEC VI- Medicoethnobotany	20UBOS06	2	2	3	25	75	100
	IV	SBCE VII- Seed Technology	20UBOS07	2	2	3	25	75	100
	IV	Extension Activities		1					
		<b>TOTAL</b>		30	32				800
		<b>GRAND TOTAL</b>			148				4200

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## B.Sc., BOTANY

PU- B.Sc., Botany (College), 2021-22/5 Credit /5hrs/week/75hrs/ I SEM

### SEMESTER -I

CORE COURSE-I SUBJECT CODE: 21UBO01  
PLANT DIVERSITY –I  
(ALGAE & BRYOPHYTES)

#### **ALGAE**

##### **UNIT I**

**15 hrs**

General characteristics of algae. Evolutionary trends in algae. Classification (F.E. Fritsch) of algae.

Habit and habitats of freshwater, marine and soil algae.

Pigmentation and Reserve food in algae.

Economic importance of Algae – Agar-Agar, Carrageenan, Single cell protein(SCP)- Chlorellin, Algae in sewage Disposal , Algae as Food and Fodder, Diatomite.

Significant contributions of important phycologists (F.E. Fritsch, T.V. Desikachary, M.O.P.Iyengar).

##### **UNIT II**

**15hrs**

A detailed study of Structure, Reproduction and life cycle of the following algae genera:

*Cyanophyceae: Oscillatoria, Anabaena,*

*Chlorophyceae: Chlamydomonas, Volvox and Oedogonium*

*Chlorophyceae: Caulerpa, Chara,*

##### **UNIT III**

**15hrs**

A detailed study of Structure, Reproduction and life cycle of the following algae genera:

*Xanthophyceae: Vaucheria*

*Bacillariophyceae: Cyclotella,*

*Phaeophyceae: Sargassum*

*Rhodophyceae: Gracilaria*

#### **BRYOPHYTES**

##### **UNIT IV**

**15hrs**

Bryophytes-General characteristics. Occurrence, Distribution and Classification (Rothmaler, 1951) of Bryophytes.

A detailed study of the Structure, Reproduction and life cycles of the following genera – *Marchantia*

##### **UNIT V**

**15hrs**

A detailed study of the Structure, Reproduction and life cycles of the following genera *Porella, Anthoceros* and *Polytrichum*.

Evolution of sporophytes of Bryophytes. Economic importance of Bryophytes.

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### **PRACTICAL: 3hrs /Week**

1. Micro preparation and detailed microscopic analysis of vegetative and reproductive parts of the following Algae -*Oscillatoria, Anabaena, Chlamydomonas, Volvox, Oedogonium, Caulerpa, Chara, Vaucheria, Cyclotella, Sargassum* and *Gracilaria*.
2. Micro preparation and detailed microscopic analysis of vegetative and reproductive parts of the following Bryophytes –*Marchantia, Porella, Anthoceros* and *Polytrichum*.
3. Study the Economic importance of Algae (Spotter-Agar-Agar, Carrageenan, SCP (*Spirulina*) - *Chlorellin*, Gelling agent (*Ulva*), Fodder (*Sargassum*) - Diatomite.

### **ALGAE**

#### **Text Books**

Annie R, Kumaresan V & Arumugam N (2014). Algae and Bryophytes. Saras Publication; I Edition, Nagercoil, Tamilnadu.

Kumar, HD (1999). Introductory Phycology. 2<sup>nd</sup> edition. Affiliated East-West Press Pvt. Ltd. Delhi.

Pandey, BP (1994). Algae. S. Chand & Company Ltd. New Delhi.

Sharma, OP (2011). Algae. Tata McGraw Hill Education Private Ltd. New Delhi.

Vashishta, BR, Sinha AK, and Singh, VP (2011). Botany for Degree Students-Algae. S. Chand Pub. New Delhi

#### **References**

Bold, HC & Wynne, MJ (1985). Introduction to the Algae. Prentice Hall of India. New Delhi.

Chapman, VJ & Chapman DJ. The Algae. Macmillan Publication. New York.

Fritsch, FE (1945). Structure and reproduction of Algae. Cambridge University press. Cambridge, UK.

Lee, RD (2008). Phycology 4<sup>th</sup> Edition, Cambridge University Press, New York.

Round, FE (1984). The Ecology of Algae. Cambridge University Press.

### **BRYOPHYTES**

#### **Text Books**

Parihar, NS (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

Sharma, OP (2013). Bryophytes. McGraw Hill education (India) Pvt. Ltd. New Delhi.

Vashishta, PC (1999). Bryophyta. S. Chand & Company, New Delhi.

Vashishta, & Sinha AK (2011). Bryophytes. S. Chand & Company Ltd. New Delhi.

#### **References**

Cavers, F (1971). The interrelationship of Bryophyta. Dawsons of Pall Mall, London

PremPuri (1981). Bryophytes: Morphology, Growth and differentiation. Atma Ram and Sons, New Delhi.

Rashid, A (1998). An Introduction to Bryophyta. Vikas Pub. Ltd. New Delhi.

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Smith, AJE (1982). *Bryophyta: Ecology*. Chapman and Hall. London.

Watson, EV (1968). *British Mosses and Liverworts*. Hutchinson and Co., London.

Watson, EV (1970). *Structure and life of Bryophytes*. Hutchinson and Co., London.

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PU- B.Sc., Botany (College), 2021-22/ 5 Credit /5hrs/Week/75hrs/II SEM  
SEMESTER –II  
CORE COURSE –III SUBJECT CODE: 21UBO02  
PLANT DIVERSITY –II  
(FUNGI, LICHENS, BACTREIA AND VIRUSES)

**FUNGI**

**UNIT I** **15hrs**

A study of the general characteristics and mode of life of fungi: Vegetative organization, nutrition, asexual reproduction, sexual reproduction, Heterothallism and Parasexuality. Life cycles in Fungi-Haplontic, Diplontic and haplodiplontic. Classification of fungi (C.J. Alexopoulos and Mims, 1979). Economic importance of Fungi.

**UNIT II** **15hrs**

Detailed study of occurrence, Morphology, Reproduction, Lifecycle and Economic importance of the following genera:

*Oomycetes: Albugo,*  
*Hemiascomycetes: Saccharomyces,*  
*Plectomycetes: Aspergillus/ Eurotium,*  
*Pyrenomycetes: Neurospora,*  
*Discomycetes: Peziza.*

**UNIT III** **15hrs**

Detailed study of Occurrence, Morphology, Reproduction, Life cycle and Economic importance of the following genera:

*Teliomycetes: Puccinia,*  
*Hymenomycetes: Polyporus and*  
*Deuteromycetes: Cercospora*

**LICHENS AND VIRUSES**

**UNIT IV** **15hrs**

Lichens: General characteristics, Occurrence, Distribution, Classification, Reproduction and Economic importance of Lichens.

Detailed study of *Usnea*.

Viruses: General characters of Plant viruses.

General structure with special reference to viroids and prions;

General account of Bacteriophages –Cyanophages, Mycophages. Reproduction of T4 phage

**BACTERIA**

**UNIT V** **15hrs**

Bacteria – Major characteristics, Occurrence, Distribution, Classification of Bacteria.

Morphology of Bacterial cell – Ultra structure of Bacterial cell.

Mode of nutrition in bacteria – Photosynthetic and chemosynthetic.

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Growth and Reproduction in Bacteria.  
Wall-less forms (mycoplasma)  
Economic importance of bacteria.

### **PRACTICAL: 3hrs /Week**

1. Micro preparation and Detailed microscopic analysis of Vegetative and Reproductive Parts of the following Fungi- *Albugo*, *Saccharomyces*, *Aspergillus*, *Neurospora*, *Peziza*, *Puccinia*, *Polyporus* and *Cercospora*.
2. Micro preparation and detailed microscopic analysis of vegetative and Reproductive Parts of the *Usnea*.
3. Study of viruses, viroids and prions using electron micrographs (photographs).
4. Study of Structure of Bacteria using permanent slides / photographs.
5. Economic importance of fungi: Yeast, antibiotic- Penicillin, Wood rotting- *Polyporus*, edible fungi: *Agaricus*.
6. Economic importance of bacteria: Lactobacillus

### **Fungi**

#### **Text Books**

Alexopoulos, CJ & Mims, CW (1979). Introductory Mycology. Wiley Eastern Ltd., New Delhi.

Dube, HC (1990). An Introduction of Fungi. Vikas Publication House Ltd. New Delhi.

Dube, HC (1983). Introduction of Modern Mycology. Blackwell Science Pb. Oxford.

Sharma, OP (2011). Fungi and allied microbes. The McGraw –Hill, New Delhi.

Sharma, PD (2003). The Fungi. Rastogi Publications, Meerut.

#### **References**

Burnett, J.H. (1971). The fundamentals of Mycology. ELBS Publication, London

Bessey, E.A (1979). Morphology and Taxonomy of fungi. Vikas publishing House Pvt. Ltd. New Delhi.

Mehrotra, RS & Aneja, KR (1990). An Introduction to Mycology. New Age International Pub. New Delhi.

Sundararajan, S (2004). Practical manual of fungi. Anmol Publications Pvt. Ltd New Delhi.

Webster, J (1970). Introduction to fungi. Cambridge University Press. London.

### **LICHENS**

#### **References**

Dharani Dhar Awasthi (2000). A Handbook of Lichens. Vedams eBooks (P) Ltd. New Delhi.

Hale, ME. (1983). The Biology of Lichens. Edward Arnold, London.

Muthukumar, S & Tarar, JL (2006). Lichen Flora of Central India. Eastern book Corporation. New Delhi.

Nash, TH (1996). Lichen Biology. Cambridge University Press, London.

### **BACTERIA**

#### **Text Books**

Pelzer, MJ, Chan, ECS and Krieg, NR .(1983). Microbiology. Tata MaGraw Hill

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## **B.Sc., BOTANY**

Publishing House, New Delhi

Power and Dagainwala. (1994). General Microbiology. Himalayan publishing House, New Delhi

Sharma, PD (1992). Microbiology. Rastogi & Co., Meerut

Tauro, P, Kapoor, KK & Yadav, KS (1996). An Introduction to Microbiology. New age International Pvt. Ltd. Pub. New Delhi.

### **References**

Stainer ,RY, Adelberg, EA & Ingram, JL (1978). General Microbiology. Mac Millan & Company. London .

## **VIRUSES**

### **Text Books**

Biswas, SB & Biswas, A(1997). An introduction to viruses. 4<sup>th</sup> Ed. Vikas pub. House Pvt. Ltd. New Delhi.

### **References**

Cooper, J.J. (1995). Viruses and the environment. (2nd ed) Chapman & Hall, London.

Nayudu, M.V. (2008). Plant viruses. Tata McGraw-Hill Education. New Delhi.

Mandahar, C.I. (1987). Introduction to plant viruses, S. Chand & company, Pvt. Ltd. New Delhi.

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## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/ 2 Credit /2hrs/Week/30hrs/II SEM

SEMESTER- II

**SKILLED BASED ELECTIVE COURSE – I: SUBJECT CODE: 21UBOS01**  
**MUSHROOM TECHNOLOGY**

### **UNIT I** **6 hrs**

Introduction - history of mushroom technology.

Scope of edible mushroom cultivation.

Types of edible mushrooms available in India - temperate mushroom, sub-tropical mushroom and tropical mushroom.

Detail study of *Pleurotus citrinopileatus*, *Agaricus bisporus*.

### **UNIT II** **6 hrs**

Pure culture - preparation of medium (PDA and Oatmeal agar medium).

Sterilization.

Preparation of test tube slants to store mother culture.

Culturing of *Pleurotus* mycelium on Petri plates.

Preparation of mother spawns in saline bottle and polypropylene bag and their multiplication.

### **UNIT III** **6hrs**

Cultivation Technology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hood, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house), water sprayer, tray, small polythene bag.

Mushroom bed preparation - paddy straw, sugarcane trash.

Factors affecting the mushroom bed preparation - Low cost technology.

### **UNIT IV** **6 hrs**

Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, pappads), drying, storage in salt solutions.

Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

Medicinal values of mushrooms

### **UNIT V** **6 hrs**

Food Preparation: Types of foods prepared from mushroom; Soup, Cutlet, Omelets, Samosa, Pickles, Curry.

Value added products of mushroom- mushroom soup powder, mushroom biscuit, mushroom nuggets, mushroom ketchup, candy, murabba, chips etc.

Research Centers - National level and Regional level.

Cost benefit ratio - Marketing in India and abroad, Export Value.

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## **B.Sc., BOTANY**

### **References:**

Manjit Singh, Bhuvnesh vijay, Shwet kamal, GC Wakchaure (Eds.) 2011. Mushrooms- cultivation, marketing and consumption. Directorate of Mushroom research, ICAR, Chambaghat, Solan , HP-173213.

Marimuthu, T, Krishnamoorthy, AS, Sivaprakasam, K & Jayarajan, R (1991). Oyster Mushrooms. Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

Nita Bahl (1984-1988). Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

Swaminathan, M. (1990). Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., Bangalore.

Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications. New Delhi.

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## B.Sc., BOTANY

PU- B.Sc., Botany (College), 2021-22/4Credit /4hrs/Week/60hrs/III SEM

SEMESTER –III

CORE COURSE –IV, SUBJECT CODE: 21UBO03

PLANT DIVERSITY- III

(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

### **UNIT I** **10 hrs**

Pteridophytes: General characteristics

Classification (Reimers 1954).

Sporangial organization – Homospory, Heterospory and seed habit.

Apospory and Apogamy.

Stellar evolution.

Ecological and economic importance of Pteridophytes

### **UNIT II** **10 hrs**

Morphology, Anatomy, Reproduction and life cycle of *Lycopodium*, *Selaginella*, *Equisetum*.

### **UNIT III** **10 hrs**

Morphology, Anatomy, Reproduction and life cycle of *Gleichenia*, *Adiantum* and *Marsilea*

### **UNIT IV** **15 hrs**

Gymnosperms-General Characteristics,

Classification(Pilger and Melchior,1954).

Morphology, anatomy and reproduction of *Cycas* and *Pinus*.

Economic importance.

### **UNIT V** **15hrs**

Gymnosperm and Paleobotany:

Detailed study of the *Gnetum*.

Paleobotany – Geological time scale, Radiocarbon dating

Fossilization process.

Brief study of the following fossils: *Lepidodendron*, *Lepidocarpon*, *Calamites*, *Williamsonia*.

### **PRACTICAL 3HRS /Week**

1. Study of the Habit, TS of leaf and Stem, Morphology of Reproductive structures of following Pteridophytes: *Lycopodium*, *Selaginella*, *Equisetum*, *Gleichenia*, *Adiantum* and *Marsilea*

2. Study of the Habit, TS of leaf and stem, Morphology of Reproductive structures of following gymnosperm genera *Cycas*, *Pinus* and *Gnetum*.

3 Study the following fossil members: *Lepidodendron*, *Lepidocarpon*, *Calamites*, *Williamsonia* through permanent slides/photographs.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

### **Text Books**

Pandey et al., (1998). A Text Book of Botany Vol. II. S. Chand & Co. Ltd.

Pandey.B.P.(1977). A Text book of Bryophyta, Pteridophyta and Gymnosperms. K.Nath and Co., Meerut.

Parihar.N.S.(1977). An introduction to Embryology. Vol-II. Pteridophyta and Gymnosperms. K.Nath and Co, Meerut.

Shukla.A.C and Misra.S.P 1982 Essentials of Palaeobotany, Vikas publishing house Pvt Ltd., Delhi.

Vasishta BR, Sinha AK & Anilkumar. (2005). Botany for degree students: Pteridophytes. S Chand, New Delhi.

Vashishta. P.C (1972). Botany for Degree Students, Vol IV-Vascular Cryptogams (Pteridophyta), S.Chand & Co Pvt Ltd.

Vashista.P.C. (1976). Gymnosperms, S.Chand & Co Pvt Ltd, 1976.

Vasishta PC, Sinha AK & Anilkumar. (2005). Botany for degree students: Gymnosperms. S Chand and Company Ltd., New Delhi.

### **References**

Arnolds, C.A.(1947). An Introduction to Paleobotany, McGraw Hill Book Co., New York.

Chamberlin, C.J. (1934). Gymnosperms: structure and Evolution. Chicago reprinted 1950. New York.

Eames, A.J.(1936). Morphology of lower vascular plants. Tata McGraw Hill Publishing Co., New Delhi.

Rashid, A. (1976). An Introduction to Pteridophytes. Vikas Publishing House, New Delhi.

Shukala, A.C and Sharma. M.(1992). Plant fossils. A link with the past, Birbal Shani Institute of Paleobotany, Lucknow, India.

Smith, G.M. (1935). Cryptogamic Botany. Vol-III, Tata McGraw Hill Publishing Co., New Delhi.

Sporne, KR. (1975). The Morphology of Pteridophytes, Hutchinson & Co., London.

Sporne, KR. (1967). The Morphology of Gymnosperms, Hutchinson & Co., London.

Sporne, K.R.(1991).The Morphology of Gymnosperms. B.I. publications Pvt., Mumbai

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/2 Credit /2hrs/Week/30hrs/III SEM

### **SEMESTER –III**

#### **SKILLED BASED ELECTIVE COURSE –II, SUBJECT CODE: 21UBOS02**

#### **HORTICULTURE**

#### **UNIT I**

**6hrs**

Fundamentals of Horticulture: Definition, Branches, Importance and Scope.

Classification of Horticultural Crops: fruits and vegetables.

Gardening: Definition, objectives and scope - different types of gardening- Formal, informal and kitchen garden.

#### **UNIT II**

**6hrs**

Plant propagation: Cutting, layering, Budding and grafting. Selection and significance of Stock and scion.

Role of plant growth regulator in Horticulture: Induction of Rooting, flowering, Fruit set, Fruit development.

#### **UNIT III**

**6hrs**

Soil bed preparation, Potting, Repotting, Weeding, Pruning, Topiary.

Lawn making: Types of lawn grasses, maintenance of lawn.

Hedge plant and its importance.

#### **UNIT IV**

**6hrs**

Floriculture: Importance and Scope of Floriculture.

Commercial Floriculture: Production and packaging of cut flowers

Flower arrangements; Methods to prolong vase life

Cultivation of Important cut flowers (*Chrysanthemum, Jasmine, Rose*).

Ikebana.

#### **UNIT V**

**6hrs**

Ornamental gardens: Flowering annuals; Herbaceous, perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms.

Ornamental garden: Green House, Water garden, Rockery.

Bonsai techniques.

#### **HORTICULTURE**

#### **Text Books**

Chadha, KL (2003). Hand book of Horticulture. ICAR Publication , New Delhi

Edmond Musser & Andres (1994). Fundamentals of Horticulture. McGraw Hill Book Co. New Delhi.

Kumar, N (1997). Introduction to Horticulture. Rajalakshmi Pub. Nagercoil.

Manibhushan Rao, K. Text book of Horticulture. Macmillan India Ltd.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

### **References**

Randhava, GS (1973). Ornamental Horticulture in India. Today and Tomorrow Printers and Publishers, New Delhi.

Williams, CN, Uzo, JO & Peregrine, WTH (1991). Vegetable production in Tropics. Longman Scientific & Technical, Essex (UK).

Yawalkar, K.S. (1961). Vegetable crops of India. Agri-Horticultural Publishing House, Dharmapath, Nagpur.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/2 Credit /2hrs/Week/30hrs/III SEM

### **SEMESTER- III**

#### **NON – MAJOR ELECTIVE COURSE –I SUBJECT CODE: 21UBON01**

#### **MUSHROOM CULTURE**

#### **UNIT I**

**6hrs**

Introduction, History. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Pleurotus citrinopileatus*, *Agaricus bisporus*.

#### **UNIT II**

**6hrs**

Pure culture: Preparation of Medium (Potato dextrose and Oatmeal Agar medium), Sterilization culturing of *Pleurotus* mycelium on test tube Slants, Petri plate. Preparation of mother spawns in saline bottle and poly propylene bag. Substrate for spawn preparation (cereal grain, coir pith)

#### **UNIT III**

**6hrs**

Cultivation Technology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology.

#### **UNIT IV**

**6hrs**

Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, pappads), drying, storage in salt solutions. Nutrition - Proteins -amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content – Vitamins

#### **UNIT V**

**6 hrs**

Food Preparation: Types of foods prepared from mushroom. Research Centre - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

#### **References**

Marimuthu, T, Krishnamoorthy, AS, Sivaprakasam, K & Jayarajan R (1991). Oyster Mushrooms. Department of Plant Pathology, TNAU, Coimbatore.

Swaminathan, M. (1990). Food and Nutrition. Bappco. The Bangalore Printing and Publishing Co. Ltd., Bangalore - 560018.

Tewari, & Pankaj Kapoor, SC (1988). Mushroom cultivation. Mittal Publications. New Delhi.

Nita Bahl (2009). Hand book on Mushrooms. Oxford & IBH Publishers. New Delhi.

Tripathi, DP (2005). Mushroom Cultivation. Oxford & IBH Publishers. New Delhi.

Muthusamy, AD & Yesuraja, I (1999). Mushrooms Culture. TNAU Publishers New Delhi.



# PERIYAR UNIVERSITY, SALEM – 636011

## B.Sc., BOTANY

### PRACTICALS

#### ANATOMY OF ANGIOSPERMS

1. Study of simple and complex tissues by using permanent slides.
2. Study of primary structure and sectioning of Dicot stem, root, leaf, Monocot stem, root and leaf.
3. Normal secondary thickening in Dicot stem and root.
4. Anomalous secondary structures –*Nyctanthes*, *Boerhaavia Dracaena* and *Beta vulgaris*. (Permanent slides)
5. Stomatal types: Anomocytic, Anisocytic, Paracytic, Diacytic and Graminaceous. (Peel out From leaf).

#### EMBRYOLOGY OF ANGIOSPERMS

1. Structure of Anther (Young and Mature from *Datura* or *Cassia* flower )
2. Types of ovules: Anatropous, Orthotropous, Circinotropous, Amphitropous, Campylotropous. (Permanent slides).
3. Stages in Microsporogenesis and Megasporogenesis (Permanent slides onion flower Bud).
4. Structure of Male gametophyte and Female gametophyte (Permanent Slides/photographs).
5. Dissection of embryo and observe the globular and Heart shape
6. Structure of Endosperm. Nuclear (Coconut water) cellular endosperm (Cucumber seed) Ruminant (fruit of *Areca catechu*)

### ANATOMY

#### Text Books

Pandey B.P., (2015)(Edn.) Plant Anatomy S. Chand Publ. New Delhi.

Pijushroy,(2010). Plant Anatomy, New central Book Agency, Pvt. Ltd, New Delhi.

Vashista P.C (1984). *Plant Anatomy* –Pradeep publication , Jalandhar

#### References

Cutter, E.G. (1970). Plant Anatomy: Experimental and interpretation. Edward, Arnold Pub. Ltd., London.

Cutter, E.G. (1971). Plant Anatomy, Edward Arnold Pub. Ltd., London.

Cutter, E.G. (1978). Plant Anatomy, Experimental and Interpretation. Edward Arnold Pub. Ltd., London.

Esau, K.(1960). Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.

Esau, K.(1977). Anatomy of seed plants. Wiley Eastern Publication, New Delhi.

Fahn, A.(1989). Plant Anatomy. Macmillan Publication (P) Ltd, Singapore.

Coutler E.G (1969) *Plant Anatomy-Part1 Cells and Tissues* –Edward Arnold London.

### EMBRYOLOGY

#### Text Books

Bhatnagar, SP, Dantu, PK and Bhojwani, SS. (2014).The Embryology of Angiosperms 6<sup>th</sup> Edition Vikas Publishing House. Delhi.

Bhojwani, SS. and Bhatnagar, SP. (2011). The Embryology of Angiosperms.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

5<sup>th</sup> Edition, Vikas Publishing House, Delhi.

Pandey, AK. (2000). Introduction to Embryology of Angiosperms. 1<sup>st</sup> Edition: CBS; New Delhi.

Maheswari, P. (1976). An introduction to the Embryology of Angiosperms. TATA McGraw-Hill Publishing Co., Ltd., New Delhi.

### **References**

Johri, BM (1984). Embryology of Angiosperms. Springer-Verlag.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/2 Credit /2hrs/Week/30hrs/IV SEM

SEMESTER –IV

SKILLED BASED ELECTIVE COURSE -III      SUBJECT CODE: 21UBOS03

PLANT TISSUE CULTURE

### **UNIT I**

**6hrs**

Introduction to Plant Tissue culture- Historical background.

Principle – Polarity, Symmetry and Totipotency, Morphogenetic Centres of origin and organization-differentiation–dedifferentiation and re-differentiation; vascular differentiations.

Laboratory organization, Tools and techniques, methods of sterilization. Laboratory contaminants- it's control and measures.

### **UNIT II**

**6hrs**

Media and Culture Preparation: Role of Micro and Macro nutrients, Vitamins and carbon source in tissue culture, Media preparation- pH, Temperature, Solidifying agents. Maintenance of cultures. Environmental Conditions. Explants selection.

### **UNIT III**

**6hrs**

Types of culture - Cell, tissue and organ culture – Callus induction, subculture and maintenance. Isolation of single cells, selection and types of cells. Cell suspension cultures -Batch, continuous. Synchronization of suspension culture.

### **UNIT IV**

**6hrs**

Somatic hybridization and cybridization. Organogenesis -anther culture and production of haploids- somatic embryogenesis –synthetic seed production-cryopreservation – Gene conservation Bank.

### **UNIT V**

**6hrs**

Application of tissues and Cell culture: Micro propagation, Clonal propagation. Production of genetically variable plants – Resistance to herbicides, insecticides, virus and other diseases.

Production of secondary metabolites – Alkaloids.

### **Text Books**

Dubey, R.C., (2001). A text book of biotechnology. S. Chand & Co., New Delhi.

Gupta, P.K. (1994). Elements of Biotechnology. Rastogi Publications, Meerut.

Ignacimuthu, S.J.(2003). Plant Biotechnology. Oxford & IBH Publishing, New Delhi.

John Jothi Prakash, E. (2005). Outlines of Plant Biotechnology. EmkayPb., New Delhi.

Kalyankumar De,( 2008). Plant tissue culture.New Central Book Agency, Calcutta.

Sathyaranayana BN and Verghese DB (2007). Plant tissue culture- Practices and new experimental protocols, ILK Publ. New Delhi.

### **References**

Bhojwani, S.S. & Razdan, M.K. (2004). Plant Tissue Culture, Read Elsevier India Pvt. Ltd.

**PERIYAR UNIVERSITY, SALEM – 636011**

**B.Sc., BOTANY**

Dix, P.J. (1990). Plant cell line and selection. VCH Publ.

Islam, A.S. (1996). Plant tissue culture. Oxford & IBH Publ. Purohit S.S. (2010). Plant tissue culture , Student edition, Jodhpur.

Hammond, J.C. McGarvey and V. Yusibov, (2009). Plant Biotechnology, Springer Verlag. New York.

# PERIYAR UNIVERSITY, SALEM – 636011

## B.Sc., BOTANY

PU- B.Sc., Botany (College), 2021-22/2 Credit /2hrs/Week/30 hrs./VSEM

SEMESTER –IV  
NON –MAJOR ELECTIVE –II SUBJECT CODE: 21UBON02  
HERBAL BOTANY

**UNIT I** **6hrs**  
Herbal medicines: History and scope – Indian system of medicines – Siddha, Ayurvedha and Unani systems.  
Classification of Crude drugs.

**UNIT II** **6 hrs**  
Organized drugs –Drugs obtained from Wood – *Ephedra*.  
Drugs obtained from Barks– *Cinchona* .  
Drugs obtained from Roots and Rhizomes – *Catheranthus*, *Rauwolfia* and *Ginger*.

**UNIT III** **6hrs**  
Drugs obtained from leaves -*Aloe vera*, *Gymnema sylvestre*,*Ocimum sanctum*.  
Drugs Obtained from Flower –*Syzygium aromaticum*.  
Drugs from fruits –*Coriandrum sativum*.  
Drugs from Seed –*Strychnos nux vomica*.  
Plants and Herbs– *Bacopa monnieri*, *Andrographis paniculata*

**UNIT IV** **6 hrs**  
Pharmacological action of plant drugs-action on the autonomic nervous system, central nervous system(*Mucuna pruriens*, *Withania somnifera*)  
Heart, muscle, Blood vessels (*Terminalia arjuna*, *Azadirachta indica*).  
Gastro-intestinal tract (*Curcuma longa*, *Foeniculum vulgare*)

**UNIT V** **6 hrs**  
Collection of crude drugs-Harvesting of crude drugs-  
Drying of crude drugs (Natural drying and artificial drying)  
Garbling-packing of crude drugs  
Storage of crude drug.  
Marketing.  
Drug adulteration.

### Text books

John Jothi Prakash, E. (2003).Medicinal Botany and Pharmacognosy. JPRPub, Vallioor, Tirunelveli.  
Gokhale SB Kokate CK & Purohit AP (1995). Pharmacognosy.NiraliPrakashan,Pune.  
Prajapathi, Purohit, Sharma and Kumar. (2003). A Hand book of Medicinal plants.  
Agrobios Publications, Jodhpur.  
Kumar,NC ( 1993). An Introduction to Medical Botany and Pharmacognosy.  
Chopra RN,Nayar SL andChopra IC(1956). Glossary of Indian medicinal plants. CSIR, New Delhi.

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## **B.Sc., BOTANY**

### **References**

Kanny, Lall, Dey and Raj Bahadur, (1984). The indigenous drugs of India, International Book Distributors.

Sivarajan VV and Balachandran Indra (1994). Ayurvedic drugs and their plant source.

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**B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VSEM

**SEMESTER –V**  
**CORE COURSE – VII SUBJECT CODE:21UBO05**  
**MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS**

<b>UNIT I</b>	<b>10 hrs</b>
The plant body (Parts). Root types and Modification. Stem – Types Aerial and underground Stem modification. Leaf: Morphology; Types; Venation; Phyllotaxy.	
<b>UNIT II</b>	<b>15hrs</b>
Inflorescence: Racemose types - Cymose types - Special type. Morphology of flower- Flower as modified-shoot detailed structure of flowers-floral parts-their arrangement, Relative position, symmetry, Aestivation and placentation types- Floral Diagram and Floral Formula. Fruits: Types and classification	
<b>UNIT III</b>	<b>15hrs</b>
Aim, Scope and Significance of taxonomy System of Classification- Artificial (Linnaeus), Natural system (Bentham and Hooker) and Phylogenetic (Engler and Prantl) Angiosperm Phylogeny Group system 2009(APG IV) (Introduction only). Only outline of Classification with merits and Demerits need be indicated. Plant nomenclature- Binomial, ICBN/ICN - Principles-Rule of priority and author citation. Type concept. Herbarium technique- Preparation of herbarium, their preservation. Important herbaria, Flora and uses.	
<b>UNIT IV</b>	<b>20 hrs</b>
Detailed study of families: Study the following families of Bentham and Hooker's system with special reference to their morphological and floral characters. Special attention should be given to common and economically important plants within the families, Annonaceae, Capparidaceae, Rutaceae, Leguminosae (Mimosaceae, Caesalpiniaceae and Fabaceae), Myrtaceae, Cucurbitaceae, Apiaceae,	
<b>UNIT V</b>	<b>20 hrs</b>
Detailed study of families: Study the following families of Bentham and Hooker's System w.s.r.t. their morphological and floral characters. Special attention should be given to common and economically important plants within the families:Apocynaceae, Asclepiadaceae, Verbenaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Liliaceae, Poaceae.	

**PRACTICAL 3hrs /Week**

1. Describe the plant parts with suitable plants- Technical term habit, habitat form....types

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of leaves, with leaf shape, margin, texture, modification of leaf.

2. Study the Types and modification of root and stem with suitable example

Identify the following inflorescence and fruits:

(a) Inflorescence - Simple raceme, Spike, Corymb, Head, simple cyme, Cyathium And Hypanthodium.

(b) Fruits

3. Floral formula from floral description.

1. Identify the families mentioned in the syllabus by noting their vegetative and floral Characters.

2. Students must describe the floral parts, draw the L.S., floral diagram and write the floral formula of at least one flower from each family

4. Study the products of plants mentioned in the syllabus of economic botany with Special reference to the morphology, botanical name and family.

5. Prepare **herbarium of 15 plants** with field notes (internal assessment).

6. Conduct field trips for a minimum of 3 to 5 days under the guidance of a teacher and Submit field report.

### Text Books

Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I-IV), Central Book, Dept., Allahabad.

Heywood VH. (1967). Plant Taxonomy, Edward Arnold , London.

Jeffery C. (1982 ). An introduction to Plant Taxonomy, J& A Churchill Ltd., London.

Sivaraajan VV(1989). Introduction to Principle of Plant Taxonomy, Oxford and IBH, New Delhi.

Pandey BP(1997). Taxonomy of Angiosperms , S.Chand & Co., New Delhi.

Singh, V. & Jain, KK (1989). Taxonomy of Angiosperms – Rastogi, Meerut.

Vashista, PC (1990). Taxonomy of Angiosperms – S.Chand & Co., New Delhi.

Sharma, O.P. (1996). Plant Taxonomy. TATA McGraw Hill, New Delhi.

Gurcharan Singh. (2016). Plants Systematics 3 edition.CRC Press.

### References

Hutchinson, J. (1973). The Families of Floweing plants , Oxford University press, London.

Gamble,J.S , Fisher,L.E.F.(1967). The Flora of The presidency of madras (Vol-III) BSI, Calcutta.

Davis , P.H and Heywood ,V.M. (1965). Principles of Angiosperm Taxonomy, Oliver and Boyd Edinburgh.

Mathew, K.M. (1983). The Flora of Tamil Nadu Carnatic, The Rapinat Herbarium, Trichy.

Simpson MG(2006). Plant systematics, Elsevier Academic Press, USA.

Takhtajan, AL. (1969). Flowering Plants – Origin and dispersal – Oliver & Boyd.

Gangulee HC Das KS and Datta CT (1964). College Botany –Vol I , Basant Panchami , Calcutta.

Narayanaswamy RV and Rao,KN(1976) . Outline of botany . S .Viswanthan printer and publisher ,Chennai.

Heywood VH (1967). Plant Taxonomy. London: Edward Arnold.

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**B.Sc., BOTANY**

Hill AF 1982. Economic Botany.: Mc Graw Hill, New York.

IJain SK and Rao RR (1976). A hand book of field and herbarium technique. Today and tomorrow's Publishers, New Delhi.

Jeffery C (1968) An Introduction to Plant Taxonomy, J and A Churchill. London.

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**B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VSEM

**SEMESTER –V**  
**CORE COURSE – VIII SUBJECT CODE 21UBO06**  
**CELL BIOLOGY**

**CYTOLOGY**

**UNIT I**

15hrs

History and Development of cell biology.

Techniques of Cell Biology: Purification of cells and their parts. Cell separation and culture, flow cytometry, Fractionation of cell contents, Tracing cellular molecules with radioactive isotopes and antibodies.

Cell as a unit of structure and function;

Characteristics of prokaryotic and eukaryotic cells

**Unit II**

15hrs

Ultra structure of a Plant cell.

Cell wall Chemistry, structure and function of Plant cell wall.

Plasma membrane. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis

**Unit III**

15hrs

**Endomembrane system:** Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing;

Smooth ER and lipid synthesis, export of proteins and lipids;

Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus;

Ribosome; Lysosomes

Cellular inclusions- Starch grains, Aleurone grains, Inulin Crystals, Raphides and Cystoliths.

**Unit IV15 hrs**

**Cell organelles**

**Nucleus:** Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus.

**Chloroplast and mitochondria:** Structural organization; Function; Semi-autonomous nature of mitochondria and chloroplast.

**UNIT V**

15hrs

Chromosomes –Morphology, Structure of Polytene, Lampbrush and B-chromosomes. Nucleic acid –Structure and types of DNA and RNA, Nucleosomes. Replication-DNA.

RNA Structure and types. Cell division– Amitosis, mitosis and meiosis.

Gene regulation – Lac operon.

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## **B.Sc., BOTANY**

### **PRACTICAL 3hrs /week**

1. To observe the plant cell structure with onion epidermal peel out.
2. Study of the photomicrographs of cell organelles
3. Microscopic view of cell organelles in plant cells – Chloroplast ( Hydrilla leaf)
4. Starch grains (potato), Aleurone grains (wheat), Inulin Crystals(potato), Raphides (Petiole–Colacasia/Nymphaea) and Cystoliths–(leaf peel out -Ficus/Momordica).
5. Study the polytene and lamp brush chromosome structure through photograph
6. Identification of different stages of mitosis by using squash and smear techniques – Onion Root tip.

### **Text Books**

Rastogi, SC (1992). Cell biology. Tata McGraw-Hill, New Delhi.  
Sundararajan ,S (2000). Cytology. Anmol publication (P) Ltd, New Delhi.

### **References**

Dyansager,V.R (1986).Cytology and Genetics. Tata McGraw-Hill.,New Delhi.  
Freifelder, D.(1993). Essentials of Molecular Biology. Jones & Bartlett, Boston.  
Karp,G (1995).Cell and Molecular Biology. John Wiley and Sons.,New York.

**PERIYAR UNIVERSITY, SALEM – 636011**  
**B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-225Credit /5hr/Week/75/VSEM

**SEMESTER –V**

**CORE COURSE IX SUBJECT CODE:21UBO07**

**GENETICS and PLANT BREEDING**

**GENETICS**

**UNIT I**

**15hrs**

Mendelian genetics – Mendel's laws of inheritance –Monohybrid, Dihybrid Cross. Incomplete dominance and Complementary interaction of genes, Epistasis and lethal alleles.

Multiple alleles- general account: ABO blood group in man.

**UNIT II**

**15hrs**

Linkage and crossing over,

Cytological basis of crossing over, mapping of genes on chromosomes, Sex linkage in *Drosophila* (Eye color) and Humans (color blindness).

Cytoplasmic inheritance (Plastid inheritance- , Mitochondria- male sterility in maize)

**UNIT III**

**15hrs**

Sex determination in plants.

Mutations.

Chromosome aberrations- deficiencies, duplications, inversions, translocations.

Polyploid types- aneuploids, euploids and allopolyploids.

Population genetics- Hardy – Weinberg principle.

**PLANT BREEDING**

**UNIT IV**

**15hrs**

Plant Breeding: Historical aspect of plant breeding. Objectives of plant breeding.

Breeding Methods: Plant introduction - Types and procedures

Centers of diversity and origin of cultivated plants Vavilov's centres of origin.

Acclimatization.

Selection methods, (pure line, clonal and mass)

**UNIT V**

**15 hrs.**

Hybridization: Types and procedure of hybridization.

Heterosis, Hybrid vigour. Somatic hybridization.

Anther culture and its Role in plant breeding.

Role of mutation and polyploidy in plant breeding.

**PRACTICAL 3hr /Week**

1. Simple problems of monohybrid and Dihybrid ratios and factor interaction
2. Construction of chromosome map – three point test cross.
3. Demonstration of Hybridization technique.

**Text Books**

**PERIYAR UNIVERSITY, SALEM – 636011**  
**B.Sc., BOTANY**

Verma, P.S. & V.K. Agarwal, 2003, Genetics. S. Chand & Co.Ltd., New Delhi

**References**

Lewin (2007). Gene IX. Jones and Barlett Pub.ISBN. 0 7637 5222 3  
Brown, T.A.(2006). Genomes 3, Garland science, New York.  
Gupta, PK.(2002).Genetics. Rastogi publishers, Meerut.  
Meyyan RP (2000) genetics , Saras Publication, Nagercoil.  
Strickberger,M.W(1999).Genetics. Prentice Hall of India Pvt Ltd., New Delhi.  
Singh. B.D (2000).Fundamentals of Genetics. Kalyani Publishers, NewDelhi.  
Mirta, S (1994).Genetics- A Blue print of life. Tata McGraw Hill,New Delhi.

**PLANT BREEDING**

**Text Books**

Chauduri, HK. (1971). Elementary Principles of Plant Breeding, Oxford and IBH Co., New Delhi.  
Singh BD (2002). Plant Breeding. Kalyani Publishers, Ludhiana.  
Gupta SK (2010). Practical Plant Breeding. Second ed., Agrobios (India) Jodhpur.  
Allard RW (1960). Principles of Plant Breeding. John Wiley and Sons, Inc.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/V SEM

**SEMESTER –V**

**MAJOR ELECTIVE COURSES I – SUBJECT CODE:21UBOE01**

**PLANT AND ENVIRONMENTAL BIOTECHNOLOGY**

### **UNIT I**

**15hrs**

Biotechnology – History, scope and significance.

Recombinant DNA technology. Role of Restriction enzymes.

Cloning vectors – Plasmid, Cosmids, Bacteriophages. Transposons.

Applications of Genetic Engineering.

### **UNIT II**

**15hrs**

Gene transfer in plants - Aims, strategies for development of transgenic plants.

Direct gene transfer methods- Electroporation, Lipofection and Microinjection.

Indirect gene transfer- *Agrobacterium* mediated gene transfer.

Advantages and disadvantages of transgenic plant

### **UNIT III**

**15hrs**

Techniques and application of biotechnology – Polymerase chain reaction: Principle and Application of PCR and RTPCR.

–DNA Sequencing – Sanger's method.

Introduction and application of molecular marker's –brief account DNA finger printing and Bar coding of plants.

### **UNIT IV**

**15hrs**

Genes of agronomic interest and transgenic crops: Golden rice, Bt cotton and Bt brinjal.

Disease resistance.

Biosafety and bioethics of transgenic plants.

Enhancement of shelf life of flowers and fruits.

### **UNIT V**

**15 hrs**

Environmental Biotechnology: Biodiversity and conservation.

Waste management - Solid waste; waste water, Biogas and phytoremediation(only outline).

Industrial biotechnology- Bioethanol, Food biotechnology –SCP.

Improved food and food products

### **Text Books**

Kumaresan, V(2009). Biotechnology. Saras Publications, Nagercoil,

Dubey, RC (2004). A text book of Biotechnology. 3<sup>rd</sup> Ed.S.Chand & Co. New Delhi.

Gupta, PK.(2004). Elements of Biotechnology. 1st ed. Rastogi publications – Meerut.

Purohit, SS.(2005). Biotechnology Fundamentals & Applications. 3<sup>rd</sup> Ed. Mrs. Saraswathi Purohit for student Edition, India.

Razdan, MK (2008) Introduction to plant tissue culture.2<sup>nd</sup> ed. Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.

**References**

Brown TA (2006). Gene cloning and DNA analysis. Blackwell scientific publishers  
Prime rose SB, Twyman RM & old RW (2001). Principle of gene manipulation; an  
Introduction to genetic engineering. 6<sup>th</sup> Ed Blackwell oxford.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-2122 Credit /2hr/Week/30hr/V SEM

**SEMESTER –V**

**SKILL BASED ELECTIVE COURSE -IV SUBJECT CODE: 21UBOS04**

**AGRICULTURAL MICROBIOLOGY**

### **UNIT I**

**6hrs**

General characterization – Soil microflora- Bacteria, Fungi, Actinomycetes, Algae and Phosphate solubilizing bacteria.

Rhizosphere and non rhizosphere concept.

Role of Rhizosphere microorganisms in soil fertility.

### **UNIT II**

**6hrs**

Nitrogen cycle in nature- biological N<sub>2</sub> fixation.

Symbiotic and non-symbiotic bacteria.

*Rhizobium* and *Azospirillum* -Isolation, Mass Production and Field application.

### **UNIT III**

**6hrs**

*Azotobacter* - Isolation, Mass production and Field application.

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, Blue green algae and *Azolla* in rice cultivation.

### **UNIT IV**

**6hrs**

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of AM – isolation and inoculum production of AM, and its influence on growth and yield of crop plants.

### **UNIT V**

**6hrs**

Organic farming- green manuring and organic fertilizers, recycling of biodegradable municipal, agricultural and industrial wastes- Biocompost making methods, types and methods of vermicomposting- field application.

### **References**

Dubey, RC (2005). Text book of Biotechnology S.Chand& Co, New Delhi.

Kumaresan, V(2005). Biotechnology, Saras Publications, New Delhi.

John Jothi Prakash, E (2004). Outlines of Plant Biotechnology. Emkay Publication, New Delhi.

Sathe, TV (2004). Vermiculture and Organic Farming. Daya publishers.

Subha Rao, NS (2000). Soil Microbiology, Oxford & IBH Publishers, New Delhi.

Vayas,SC, Vayas, S. and Modi, HA (1998). Bio-fertilizers and organic Farming Akta Prakashan, Nadiad.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/ 2Credit /2hrs/Week/30hr/SEM

### **SEMESTER V**

**SKILL BASED ELECTIVE COURSE – V SUBJECT CODE: 21UBOS05**

#### **BIOLOGICAL TECHNIQUES AND COMPUTER APPLICATION**

#### **UNIT I**

**6hrs**

Basic principles of Light microscopes. Compound microscope, Phase contrast microscope, Scanning and Transmission Electron microscopes. Micrometry-Principle and Applications of Stage and Ocular micrometer. Haemocytometer.

#### **UNIT II**

**6hrs**

Micro technique – preparation for microscopic observation – Whole mount, Smears, Squash, sections.

Microtomy: Fixation, Dehydration, Infiltration, Embedding, Sectioning.

Microtome's – Types- Principles and operating mechanisms of Rotary Microtome.

Stains and Staining techniques - Preparation of following stains: Safranin, Cotton blue in lactophenol, Acetocarmine, Methylene blue and Crystal violet.

#### **UNIT III**

**6hrs**

Centrifugation: Principles, components, mechanism and application of clinical, Refrigerated and ultra-centrifuges.

Chromatography: Basic principles, types – Paper, Column, Thin layer.

Principle and Application of pH meter, Colorimetry and Spectrophotometer.

#### **UNIT IV**

**6hrs**

Biostatistics – Statistics data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean, Standard deviation, ANOVA, SPSS.

#### **UNIT V**

**6hrs**

Computer application in the Art of Scientific Presentation-Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references.

Microsoft word for assignment and project work.

Microsoft excel for tabular and graph work.

Microsoft Power Point Presentation for preparing slides

Poster presentation.

#### **Text Books**

Patki L.R, Bhalchandra B.L, Jeevaji I.H.(1987). An introduction to Microtechnique, S.Chand and company (Pvt) Ltd, New Delhi.

Marimuthu, R. (2008). Microscopy and Microtechnique. MJP Publishers, Chennai.

Wilson K, Walker, J. (1994 ). Principle and techniques of practical biochemistry,4<sup>th</sup>ed) Cambridge University Press, Cambridge.

Palanivelu P (2013). Analytical Biochemistry and Separation techniques , 20<sup>th</sup> century publications ,Palkalainage, Madurai.

Khan, I.A., and Khannum, A., (1994). Fundamentals of Biostatistics, Vikas Pub., Hyderabad

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

Sundar Rao P.S.S and Richard J(2011) introduction to Biostatistics and research methods , PHI learning private LtD , New Delhi.

Department of Foundation Course, “Computer Literacy”, St. Joseph’s College, 2017.

### **References**

Johansen, DA (1940). Plant Microtechnique, TATA McGraw Hill Book Co., Ins., New Delhi.

Peter Gray (1964). Hand book of Basic Microtechnique. McGraw Hill Pub, New York.

Steven Ruzin (2005). Plant Microtechnique and Microscopy. Oxford University Press, London.

Cooper.TG (1991). The Tools of Bio-chemistry, John Wiley & sons, London.

Dey P.M. and Harborne,JB (2000). Plant Biochemistry Harcourt Asia Pvt. Ltd.

Plummer DT (2003). An introduction to practical Biochemistry. 3rd Edn. Tata McGraw Hill Publishing Company Ltd. New Delhi.

Zar, JH (1984). Biostatistics Analysis, Prentice Hall International, England Cliffs, New Jersey.

Alexis Leon, “Introduction to computers”, Vikas Publishing House Pvt. Ltd., New Delhi, 2008. 2. Alexis Leon and Mathew Leon, “Introduction to computers with Ms Office 2000”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2005.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VI SEM

**SEMESTER –VI**  
**CORE COURSE – XI     SUBJECT CODE :21UBO08**  
**PLANT PHYSIOLOGY**

### **UNIT I** **15hrs**

Plant water relations- Diffusion, imbibition, osmosis, OP, DPD, TP, WP.  
Absorption of water and Mineral – Active absorption and passive absorption.  
Ascent of sap.  
Transpiration – types, mechanism of stomatal movement.  
Factors affecting transpiration. Guttation.  
Role of macro and microelements.

### **UNIT II** **15hrs**

Photosynthesis- Photosynthetic pigments - Concept of photosynthetic unit – Emerson s enhancement effect – Stages of photosynthesis – light reactions – cyclic and non-cyclic photophosphorylation. Calvin cycle. C4 and CAM pathway. Photorespiration (Brief study only). Factors affecting photosynthesis.

### **UNIT III** **15hrs**

Respiration – Aerobic and Anaerobic respiration. Glycolysis, Krebs cycle, Electron transport System. Oxidative phosphorylation. Factors affecting respiration.

### **UNIT IV** **15hrs**

Nitrogen Metabolism: nitrogen fixation- nitrification and denitrification. Nitrate assimilation- Synthesis of amino acids - Reductive amination and Transamination. Stress physiology –Definition - water stress, salt.

### **UNIT V** **15Hrs**

Plant Growth regulators – Types of plant hormones – Auxins, Cytokinins, Gibberellins, Abscisic acid, Salicylic acid and Ethylene. Photomorphogenesis- Phytochrome – photoperiodism. Vernalization. Senescence. Plant movements.

### **PRACTICAL 3Hrs /Week**

1. Determination of DPD by using Rheo leaf /Onion leaf
2. Effect of temperature on Membrane permeability
3. Effect of chemical on Membrane permeability
4. Calculation of stomatal index and stomatal frequency of a mesophyte and a Xerophyte
5. Effect of light on transpiration using Ganong'spotometer
6. Separation of plant pigments by paper chromatography.
7. To study the effect of light intensity on Photosynthesis by using Wilmott's bubbler
8. To study the effect of and concentration of  $\text{CO}_2$  on Photosynthesis by using Wilmott's bubbler

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

9. Measurement of rate of respiration in germinating seed using Simple Respiroscope
10. Measurement of rate of respiration in flower buds using Simple Respiroscope

### **Text Books**

Pandey, SN and Sinha, BK (2001). Plant Physiology. Third revised edition, Vikas publishing House Pvt. Ltd, New Delhi

Devlin, RM (1974). Plant Physiology, Affiliated East West Press Pvt. Ltd

Noggle, GR. and Fritz, GJ (1976). Introductory Plant Physiology, Prentice - Hall, India.

Jain ,VK (2007). Fundamentals of plant physiology , S. Chand & Compamy ltd, New Delhi.

Nobel, PS (1970). Introduction to Biophysical Plant Physiology. W. H. Freeman and Company, San Francisco

Verma, V(2008).Text book of plant Physiology, Ane's student edition, New Delhi.

Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

### **References**

Beevers, L (1976). Nitrogen metabolism in plants. William & Sons Ltd. London.

Bray, CM (1983). Nitrogen Metabolism in Plants. Longman.

Kramer, PJ (1969). Plant and soil water relationship- A Modern Synthesis.

Salisbury, F B and Ross, CW (1986). Plant Physiology. Third edition, CBS Publishers and Distributors, New Delhi

Levitt (1972). Responses of plants to environmental stress. Academic press, New York.

Bidwell RGS (1979). Plant Physiology, Mac Millan Publishing Company. New Delhi.

Taiz, L and Zeiger, E (1991). Plant physiology. The Benjamin/Cummings Publishing company, Inc., California, New York.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/ 5Credit /5hr/Week/75hr/VISEM

**SEMESTER –VI**  
**CORE COURSE – XII      SUBJECT CODE: 21UBO09**  
**PLANT ECOLOGY AND PLANT GEOGRAPHY**

**UNIT I** **15hrs**  
Approaches to the study of ecology- autecology and synecology. Plant environment: climatic, edaphic and biotic factors.

**UNIT II** **15hrs**  
Ecosystem concept: Ecosystem components (Abiotic and Biotic) –Autotrophs, Heterotrophs. Ecosystem function: Ecological pyramids. Productivity of ecosystem - Primary Productivity –Gross primary productivity -Net primary productivity-Net productivity- Secondary productivity. Food chain. Food web. Biogeochemical cycling: Cycling of carbon, nitrogen and Phosphorous. Pond ecosystem.

**UNIT III** **15hrs**  
Succession – Types of Succession. Process of Succession - Nudation - migration -Ecesis aggregation - competition -Reaction –climax. Hydrarch and Xerarch succession. Ecological group of plants – Hydrophytes, Mesophytes, Xerophytes, parasites, epiphytes and halophytes.

**UNIT IV** **15hrs**  
Environmental pollution- introduction, definition;  
Air pollution- air pollutants, types, sources, effect of air pollution on plants and humans, control measures.  
Water pollution-water pollutants, types, sources, impact. Control measures.  
Eutrophication.  
Soil Pollution- causes, sources, solid waste, biodegradable, non-biodegradable, waste dumps, municipal waste, Agrochemical management of solid waste, Composting, e – waste.

**UNIT V** **15hrs**  
Definition, Concept, Scope and significance of phytogeography.  
Phytogeographical zones of India.  
Vegetational types in Tamilnadu.  
Hotspots – Endemic distribution, Age and Area Hypothesis.  
Continental drift theory. Conservation – *Insitu* and *Ex situ*.

### **PRACTICALS 3Hrs/ Week**

1. Study of the morphological and structural adaptation of locally available hydrophytes, Mesophytes, xerophytes to correlate to the particular habitat.
2. Determination of Dissolved oxygen in water
3. Determination of dissolved carbon di oxide in water.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

### **Text Books**

Sharma, P.D (2009).Ecology and Environment. Rastogi Publications.

Shukla, R.S. &P.S. Chandel (1991) : Plant Ecology & Soil Science. S.Chand & Co., New Delhi

Vasishta, P.C, 1979 Plant Ecology. Vishal Publication.

Verma, V,A 1981 Text Book of plant Ecology. Emkay Publication.

Sharma, J.P.2004 Environmental Studies. Laxmi Publications (P) Ltd. New Delhi.

### **References**

Ambasht RS (1978). The Book of Plant Ecology. Students friends Co.

Willings WD (1964 ).Plants and Ecosystem. Wasworti Publishing Co.

Daubenmire RF (1973). Plant and Environment. John Willey.

Gopal B and Bhardwaj (1979). Elements of Ecology. Vikas Pub. House Pvt. Ltd.

Cain SA (1944). Foundations of Plant Geography. Harper & Brothers, N.Y.

Mani MS (1974). Ecology &Biogeography of India. Dr. W. Junk Publishers, The Hague

Good, R. (1997). The Geography of flowering Plants (2ndEdn.,) Longmans, Green & Co., Inc., London & Allied Science Publishers, New Delhi-495pp.,

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VI SEM

SEMESTER –VI

CORE COURSE –XIII SUBJECT CODE:21UBO10

PLANT PROTECTION

### **UNIT I**

**15 hrs**

Types of insects causing damage to crop. Nature and classification of plant nematodes.

Damage to crops of India by Insects, Nematodes, Rodents, Fungi, Bacteria and viruses- a general outline.

### **UNIT II**

**15 hrs**

Types of plant diseases and causal agents. A general account of preventive measures of plant diseases including plant protection and quarantine measures. Legislations in plant protection, seed certification, weed control.

### **UNIT III**

**15 hrs**

Study of symptoms, etiology and control measures of the following diseases: damping off of seedling, bud rot of coconut, black rust of wheat, blast of paddy, smut of maize, Tikka disease of groundnut.

### **UNIT IV**

**15 hrs**

Characteristic features of plant pathogenic bacteria. General symptoms of bacterial diseases. Survival and spread of bacterial plant pathogens. Insect transmission of bacteria. Study of symptoms, etiology and control measures of the following diseases: Soft rot of Vegetables, Bacterial blight of rice, canker disease of citrus, ring rot of potato.

### **UNIT V**

**15 hrs**

Nature of Plant Virus. Transmission of plant viruses. Causal organism, symptoms, control measures of Viral diseases: Tobacco Mosaic, Bunchy top of banana, Mosaic disease of Lady's finger, Leaf Mosaic of Tapioca.

General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl

### **PRACTICAL**

1. Collection and study of diseased plant materials.
2. Study of fungal, bacterial and viral diseases mentioned in the syllabus.
3. Handling of plant protection appliances (Dusters, sprayers, and other appliances.)
4. Preparation of 5 herbarium sheets of Pathology – specimens studied

### **Text Books**

Chaudhury and Majid, (1954).Hand Book of plant protection. Department of Agriculture, Government press, Shillong, Assam.

Agros, GN (1997) Plant Pathology (4th ed.) Academic Press.

Bilgrami KH. and Dube HC (1976). A textbook of Modern Plant Pathology. International Book Distributing Co. Lucknow.

Mehrotra, RS (1980). Plant Pathology – TMH, New Delhi.

Pandey, BP. (1999). Plant Pathology-Pathogen and Plant diseases. Chand & Co. New

**PERIYAR UNIVERSITY, SALEM – 636011**  
**B.Sc., BOTANY**

Delhi.

Rangaswami, G (1999). Disease of Crop plants of India. Prentice Hall of India Pvt. Ltd.  
Sharma PD(2004). Plant Pathology. Rastogi Publishers.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VI SEM

SEMESTER –VI

MAJOR ELECTIVE COURSE – II SUBJECT CODE: 21UBOE02

### **BIOCHEMISTRY**

#### **UNIT I**

**15hrs**

Atomic structure of elements. Bonding: Covalent and non-covalent bonds - Hydrogen bond, Van der Waal's forces. Structure and properties of water, Acids and Bases - pH and Buffer system.

#### **UNIT II**

**15hrs**

Carbohydrates: Structure and properties of Mono - Disaccharides , polysaccharides. Chemical structure and function of starch and cellulose.

#### **UNIT III**

**15hrs**

Amino acids: Basic structure & properties (physical and chemical); function, Essential and standard amino acids. Proteins: structure-peptide bond -solubility and composition. The peptide bond- primary structure- secondary structure- tertiary structure -quaternary structure–function of protein

#### **UNIT IV**

**15hrs**

Enzymes: Nomenclature, classification -mechanism and regulation of enzyme action, enzyme kinetics, factors affecting enzymeaction .

#### **UNIT V**

**15hrs**

Lipids - structure of simple lipid and compound lipid (phospholipids and glycolipids), fatty acids- saturated and unsaturated fatty acids-Secondary carbon metabolism and the metabolites: Polyphenolics - Terpenoids and Alkaloids.

#### **Text Books**

Rastogi , S.C ( 2003). Outlines of Biochemistry , CBS Publishers &Distributors , New Delhi

Stryer, L., (1988). Biochemistry, WH Freeman & Co., NY.

Jain J.L. *et al.*,(2008). Fundamentals of Biochemistry, Chand ,New Delhi.

Conn et al.( 2005) . Outlines of Biochmistry 5/Ed, Wiley&Sons Pvt. Ltd.

Satyanaryana U, Chakrapaani U, (2006). Biochemistry, Books and Allied (P)Ltd.

#### **References**

Apps *et al.*, (1992). Biochemistry. ELBS.

Caret et al., (1993). Inorganic, Organic and Biological Chemistry, WMC Brown Pub. USA.

Nelson D.L, Cox M.M.(2005). Lehninger Principle of Biochemistry, W.H. freeman and Company, New York.

Rawn, D. (1989). Biochemistry, Neil Patterson.

Zuley G.L., (1998).Biochemistry, Wm.C .Brown Publishers USA.

PU- B.Sc., Botany (College), 2020-21/ 2 Credit /2hrs/Week/30 hrs/SEM

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/5Credit /5hrs/Week/75hrs/VI SEM

### **SEMESTER –VI**

**SKILL BASED ELECTIVE COURSE –VISUBJECT CODE :21UBOS06**  
**MEDICO- ETHNO BOTANY**

#### **UNIT I**

**6hrs**

History. Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences - Definition and Scope- Ayurveda, Siddha and Unani medicine; History and concept. Classification of natural drugs, (Alphabetical, Morphological, Taxonomical, Chemical and Pharmacological)

#### **UNIT II**

**6hrs**

Ethnobotany – definition, scope and objectives. Major and minor ethnic groups in South India and their Ethnobotanical and Ethnobiological heritage. Ethnomedicines. Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management). Mythology and conservation of ecosystems. Conservation of selected plant species: sacred groves. Ethnobotanical field methods.

#### **UNIT III**

**6hrs**

Role of ethnobotany in modern Medicine-Medico-ethnobotanical sources in India; Significance of the following plants in ethnobotanical practices (along with their habitat and morphology) a) *Azadirachta indica* b) *Ocimum sanctum* c) *Vitex negundo* d) *Gloriosa superb* e) *Tribulus terrestris* f) *Pongamia pinnata* g) *Cassia auriculata* h) *Indigofera tinctoria*.

Role of ethnobotany in modern medicine with special example *Rauvolfia serpentina*, *Trichopus zeylanicus*, *Artemisia*, *Withania*.

#### **UNIT IV**

**6hrs**

Drugs obtained from leaves - *Aloe vera*, *Gymnema sylvestre*, *Ocimum sanctum*.

Drugs Obtained from Flower-*Syzygium aromaticum*.

Drugs from fruits - *Coriandrum sativum* .

Drugs from Seed *Strychnos nux vomica*-

Plants and Herbs- *Bacopa monnieri*, *Andrographis paniculata*

#### **UNIT V**

**6hrs**

Collection of crude drugs-Harvesting of crude drugs-Drying of crude drugs (Natural drying and Artificial drying)-Garbling- packing of crude drugs-Storage of crude drug. Marketing.

Drug adulteration. Drug evaluation: Chemical and Biological. Phytochemical investigations. Quality control of herbal drugs. Role of NMPB, AYUSH and CDRI.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

### **Text Books**

Gokhale SB, Kokate, CK and Purohit, AP (2003). Pharmacognosy. Nirali Prakashan, Pune.

Arumugam, K.R. and Murugesh, N (1990). Text book of Pharmacognosy. Sathya Publishers, Chinnalapatti (Tamilnadu) 624 201.

### **References**

Amruth, (1996) The Medicinal plants Magazine (All volumes) Medicinal plant Conservatory Society, Bangalore.

Bhattacharjee, SK (2004). Hand Book of Medicinal plants. Pointer Publishers, Jaipur.

Handa SS and Kapoor V K (1993). Pharmacognosy. Vallabh Prakashan, New Delhi.

Harbourne, JB (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rdedition). Chapman and Hill Co., NewYork.

Jain, (2001). Medicinal plants. National Book Trust, New Delhi.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-2122 Credit /2hrs/Week/30hrs/VI SEM

### **SEMESTER –VI**

**SKILL BASED ELECTIVE COURSES -VIIISUBJECT CODE: 21UBOS07**  
**SEED TECHNOLOGY**

#### **UNIT I**

**6hrs**

Floral biology.Seed formation.Seed morphology and structural details of Dicot (Castor) and Monocot (Paddy) seeds. Roles and goals of seed technology, importance of quality seeds in agriculture, characteristics of quality seed.

#### **UNIT II**

**6hrs**

Seed sampling – Method of sampling – Seed Purity – Seed Germination – Methods of Seed Germination using paper, Sand or soil – Standard Germination Test. Seed dormancy.

#### **UNIT III**

**6hrs**

Seed viability – Topographical tetrazolium or T2 test embryo excision method. Seed moisture – Importance – methods of moisture determination- basic methods.

#### **UNIT IV**

**6hrs**

Certified seed production of the following: Paddy, groundnut and cotton.

#### **UNIT V**

**6hrs**

Seed certification – objectives – fundamental concepts of seed certification – sources and classes of seed: Breeder's seed, certified seed. Seed analysis – Tagging of seedlings – field standards.

#### **References:**

Agarwal, R.L. Seed Technology Oxford and IBH Publishing Co. Pvt. Ltd.,  
Bewley J.D. and Black M (Edn) 1985 – Seed Physiology of development and germination. Plenum Press, New York.  
Kowsowsky. Seed Biology. Vol. I, Vol. II and Vol. III. Academic Press, New York.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/4 Credit /4hrs/Week/60hrs/SEM

### **FIRST ALLIED COURSE – I SUBJECT CODE :21UBOA01 THALLOPHYTES, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS, PLANT PHYSIOLOGY AND ECOLOGY.**

**UNIT I** **12 hrs**  
Thallophytes: Algae: general characters. Study of the structure and life cycle of the following genera-*Oscillatoria*, *Oedogonium*, *Sargassum* and *Polysiphonia*.  
Fungi: General Characters. Study of the structure and life cycle of the following genera *Albugo*, *Penicillium* and *Agaricus*. Economic importance of fungi

**UNIT II** **12hrs**  
A general study of Bacteria and viruses. Economic importance of bacteria.  
Bryophytes: General Characters. Study of the structure and life cycle of *Marchantia*.

**UNIT III** **12hrs**  
Pteridophytes and Gymnosperms: Structure and lifecycle of *Lycopodium* and *Cycas*.

**UNIT IV** **12 hrs**  
Plant Physiology: Osmosis, absorption of water. Photosynthesis-Light reaction, Calvin cycle. Transpiration– types, mechanism of stomatal movement.  
Nitrogen cycle.  
Hormones (Auxins only).

**UNIT V** **12 hrs**  
Plant Ecology: Factors affecting vegetation - climatic, edaphic and biotic. Morphological and anatomical adaptations in Hydrophytes and Xerophytes

### **Text books**

Fuller HJ and Tripp O. (1949). College Botany, Henry Holt & Co.  
Ganguly AK (1975) General Botany Vol I (1971) & Vol II, The New Book Stall, Calcutta.  
Rao, K.. Krishnamurthy, KV and Rao GS (1979). Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras.  
Palaniappan, S. (1985) . Thavaraviyal Thunaippaadam (Tamil), Mohan Padippagam, Chennai.  
Pandey BP (1986). Text Book of Botany (College Botany) Vol I and II, S.Chand and Co. New Delhi.  
Rasool SK and Sekar T (2002). Allied Botany, Popular Book House, Chennai -15.

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22/4 Credit /4hrs/Week/60hrs/SEM

### **ALLIED BOTANY**

#### **FIRST ALLIED COURSE – II SUBJECT CODE: 21UBOA02**

EXTERNAL MORPHOLOGY, TAXONOMY OF ANGIOSPERMS, CYTOLOGY,  
GENETICS, ANATOMY AND EMBRYOLOGY.

#### **UNIT I**

**12hrs**

Morphology of Plant: Plant and its parts. Structure and function of Root and Stem. Leaf and its parts. Phyllotaxy. Types of leaf – simple and compound. Terminology with reference to leaf description. Inflorescence - Racemose, Cymose, Special types. Terminology with reference to flower description.

#### **UNIT II**

**12hrs**

Taxonomy: Bentham and Hooker's system of classification. Study of the following families and their economic importance - Leguminosae, Cucurbitaceae, Rubiaceae, Asteraceae, Euphorbiaceae and Poaceae.

#### **UNIT III**

**12hrs**

Cytology: Ultra structure of plant cell and brief outline of cell wall, Plasma membrane, Endoplasmic reticulum, Mitochondria, Chloroplast, Nucleus. Cell division - Mitosis and Meiosis. Genetics-Mendel's law. Mono and dihybrid cross.

#### **UNIT IV**

**12hrs**

Anatomy: Meristem. Simple permanent tissues - Parenchyma, Collenchyma, Sclerenchyma. Complex permanent tissues - Xylem and Phloem.

Primary structure of Dicot stem, Dicot root and Dicot Leaf. (Mesophytic only)

#### **UNIT V**

**12hrs**

Embryology - Structure and development of anther, male gametophyte. Structure and development of ovule and female gametophyte (Polygonum type). Fertilization. Structure and development of dicot embryo (*Capsella* type).

#### **PRACTICAL**

1. To describe in technical terms plants belonging to any of the families prescribed and Identify the family.
2. To identify the plant family and morphology of the parts used for the following plant Specimens.
  1. *Arachis hypogea* - Ground nut
  2. *Dolichos biflorus* - Horse gram
  3. *Cicer arietinum* - Bengal gram

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## B.Sc., BOTANY

4. *Pisum sativum* - Pea
5. *Phaseolus mungo*– Blackgram
6. *Phaseolus radiatus*– Greengram
7. *Tamarindus indica* - Fruit
8. *Abrus precatorius* - Seed
9. *Acacia concinna*– Soapnut
10. *Luffa aegyptiaca* -Fibrous skeleton of the fruit
11. *Cucumis sativus* - Fruit
12. *Coffea arabica* - Seeds
13. *Ixora* - Flower
14. *Cinchona officinalis* - Plant
15. *Musa Paradisica* – Fruit
16. *Phoenix sylvestris*-Date fruit
17. *Areca catechu*-Nut
18. *Cocos nucifera*-Kernal

  

3. To make suitable Micropreparations, describe and identify materials of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms prescribed.
4. To describe simple experimental set-up in plant physiology section of the syllabus.

### Text books

Fuller HJ and Tippo O. (1949). College Botany, Henry Holt & Co.

Ganguly AK (1975) General Botany Vol I (1971) & Vol II, The New Book Stall, Calcutta.

Rao, K.. Krishnamurthy, KV and Rao GS (1979) Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras.

Palaniappan, S. (1985) . Thavaraviyal Thunaippaadam (Tamil) Vol I and II, Mohan Padippagam, Chennai.

Pandey B.P, 1986, Text Book of Botany (College Botany) Vol I and II, S.Chand and Co. New Delhi.

Rasool SK and Sekar T (2002). Allied Botany, Popular Book House, Chennai -15.

**PERIYAR UNIVERSITY, SALEM – 636011**

**B.Sc., BOTANY**

**B.Sc., BOTANY MAJOR AND ALLIED BOTANY THEORY QUESTION**

**PAPER MODEL.**

**B.Sc., Degree Examination, APRIL / NOVEMBER 20\_\_**

**Time: 3 hrs.**

**Max. Marks: 75**

**Part - A: (15 x 1 = 15 marks)**

**Answer all the questions.**

**Choose the correct answer**

**(Three questions from each unit)**

Q.No. 1- Q.No. 15

**Part – B (2x5 = 10 marks )**

**Answer any TWO questions**

Q.No. 16. - UNIT-I

Q.No. 17. - UNIT-II

Q.No. 18 - UNIT-III

Q.No. 19. - UNIT-IV

Q.No. 20. - UNIT-V

**Part – C (5x10 = 50 marks)**

**Answer all the questions.**

**All Question carry equal marks. Each answer should not exceed 500 words.**

Q.No. 21.a (or) B - UNIT-I

Q.No. 22.a (or) B - UNIT-II

Q.No. 23.a (or) B - UNIT-III

Q.No. 24.a (or) B - UNIT-IV

Q.No. 25.a (or) B - UNIT-V

# **PERIYAR UNIVERSITY, SALEM – 636011**

**B.Sc., BOTANY**

PU-B.Sc., Botany (College), 2021-22

## **MODEL QUESTION PAPER**

**B. Sc., Botany Degree Examination**

(For Students Admitted from the Academic Year 2021 – 2022 onwards under CBCS Pattern)

### **CORE COURSE – II. MAJOR PRACTICAL I SUBJECT CODE 21UBOP01**

**(Covering the core courses I &III)**

**(ALGAE, BRYOPHYTES, FUNGI, LICHENS, BACTERIA, VIRUSES)**

**Time : 3 hrs.**

**Maximum: 60 Marks**

**Practical: 50 Marks**

**Record : 10 Marks**

1. Cut transverse section of A, B and C. Stain and mount in glycerin. Identify giving reason. Draw diagrams. Leave the slides for valuation. (7X3=21)
2. Draw diagrams and write notes of interest on D, E, F, and G. (4X4=16)
3. Name the genus, group and morphology of given part of H , I, and J. (Diagrams not Necessary) 3X3=9
4. Identify and write notes on economic importance of K, L, and M. 2X2=4

#### **Key**

A - Algae

B - Fungi

C - Bryophytes

(Preperation-2, Identification -1, Diagram -2, Reason -2) (7X3=21)

D - Algae- slide

E - Fungi- slide

F - Bryophyte-slide

G - Lichens- fruit body Bacteria/ Viruses- electron micrograph

( Identification -1, Diagram -1 , Reason -2) (4X4=16)

H - Algae

I - Fungi

J - Bryophytes

(Genus 1, Group 1, Morphology 1) (3X3=9)

K – Algae/Fungi

L- Bacteria/Viruses

(identification 1, importance 1) (2X2=4)

# **PERIYAR UNIVERSITY, SALEM – 636011**

**B.Sc., BOTANY**

PU-B.Sc., Botany (College), 2020-21

## **MODEL QUESTION PAPER**

**B. Sc., Botany Degree Examination**

**((For Students Admitted from the Academic Year 2021 – 2022 onwards under CBCS Pattern)**

**CORE COURSE – V. SUBJECT CODE :21UBOP02**

**MAJOR PRACTICAL II**

**(Covering the core courses IV&VI)**

**(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY; ANATOMY & EMBRYOLOGY  
OF ANGIOSPERM)**

**Time : 3 hrs.**

**Maximum: 60 Marks**

**Practical: 50 Marks**

**Record : 10 Marks**

1.Cut transverses sections of A, B and C. Stain and mount in glycerin. Identify giving Reasons. Draw diagrams. Leave the slides for valuation. (4X6=24 marks)

2.Make a suitable micro preparation of D. Identify giving reasons. Draw diagrams. Leave the Slides for valuation. (6 marks)

3.Dissect and mount any one of the stages of the given material E. (Diagram and notes not necessary) (4Marks)

4.Name the genus, group and morphology of given part of F and G. (2X3=6marks)

5.Write notes on H, I, J, K and L . (5X2=10marks)

### **KEY**

A. Angiosperm – Anatomy – Vegetative part.

B. Pteridophyte – Anatomy – Vegetative part.

C. Gymnosperm - Anatomy – Vegetative part.

(Preparation 2, Identification 1, Diagram 1, Reason 2)

D. Reproductive part – Pteridophyte (or) Gymnosperm.

(Preparation 2, Identification 1, Diagram 1, Reason 2)

E. Embryo – dicot – Tridax - 4 mark.

F. (Slide -3, Identification-1)

F&G. Macroscopic –Pteridophyte (or) Gymnosperm.

(Genus 1, Group 1, Morphology 1) (2X3=6mark)

H, I, J, K and L. Permanent slides (Anatomy, Embryology, Pteridophytes,

Gymnosperms, Fossil slides) (Identification 1, Reason 1) (5X2=10)

# **PERIYAR UNIVERSITY, SALEM – 636011**

## **B.Sc., BOTANY**

PU-B.Sc., Botany (College), 2021-22 onwards

### **MODEL QUESTION PAPER**

B. Sc., Botany Degree Examination

(For Students Admitted from the Academic Year 2021 – 2022 onwards under CBCS Pattern)

#### **CORE COURSE – XIV. SUBJECT CODE :21UBOP03**

#### **MAJOR PRACTICAL III**

**(Covering the core courses VII ,VIII&IX)**

**MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS,  
CELL BIOLOGY, GENETICS, AND PLANT BREEDING)**

**Time: 3 hrs.**

**Maximum: 60 Marks**

**Practical : 45 Marks**

**Record: 10 Marks**

**Herbarium: 5 Marks**

1. Refer A and B, to their respective families. Point out the characters on which the identification is based at each level. (Diagrams not necessary) (2X4=8 Marks)

2. Make acetocarmine preparation of C (Squash) any one stage. draw diagram. 4 Marks

3. Describe D in Technical terms. Draw diagrams of the floral parts only. Construct the floral Diagram. Give the floral formula 5 Marks

4. Construct the chromosome map with the data provided E 5 Marks

5. Solve the given genetic problem F and G (2X4=8 Marks)

6. Spot at sight H and I (2X2=4 Marks)

7. Write the name of the genus, species, family and morphology of the useful parts of J and K – (4X2=8 Marks)

8. Briefly describe the plant breeding technique in spotter L 3 Marks

#### **Key**

A&B-Family - 2X4=8 marks

C-Onion root tip - preparation =3 marks , diagram -1 marks -4 marks

D-Plant with flowers –preparation -1 marks, Floral diagram – 2 marks, Floral formula -2 marks - 5 marks

E-Chromosome map - 5 marks

F&G-Genetic problems - 2X3 = 8 marks

H&I-Cytology spotter - Identification -1 marks, Reason -1 2X2=4 marks

J& K -Morphological parts- Genus -1mark, Species -1 marks, family-1mark, Morphology -1 mark

L- Any Plant breeding technique- - 3 marks

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**B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22 onwards

## **MODEL QUESTION PAPER**

**B. Sc., Botany Degree Examination**

(For Students Admitted from the Academic Year 2021 – 2022 onwards under CBCS Pattern)

### **CORE COURSE – XV.SUBJECT CODE :21UBOP04**

#### **MAJOR PRACTICAL IV**

**(Covering the core courses XI, XII & XIII)**

**(PLANT PHYSIOLOGY, PLANT ECOLOGY AND PLANT GEOGRAPHY,  
PLANT PROTECTION)**

**Time: 3 hrs.**

**Maximum: 60 Marks**

**Practical : 50 Marks**

**Record: 10 Marks.**

1. Outline the procedure, apparatus and materials required for investigating the physiological Problem.A, assigned. Set up the experiment. Tabulate the data obtained and report the Results. Leave the set up for valuation. (16marks)
2. Based on morphological and anatomical characters, assign, B and C to their respective probable habitats. Draw suitable diagrams. Submit slides for valuation. 2X8=16
3. Identify the causal organism of the diseased material 'D'. and 'E'. Draw diagrams. Describe the symptoms and list the control measures. (2X8=16)
4. Comment on 'F' 2 Marks

#### **Key**

A- Physiology - Materials – 2 marks, Procedure-4, Setup – 4 marks, Spot Viva- strictly pertained to the concerned physiology experiment- 2 marks-Result - 4marks

B&C Ecology material –preparation -2 marks , identification -1 mark ,Diagram-2 reason -3 marks

D, E, - Any disease in the syllabus - Name disease – 1marks, Causative organism – 1 marks, Symptom-2 Control measure – 2 marks, diagram –2marks )

G- Plant protection appliances – 2 marks

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**B.Sc., BOTANY**

PU- B.Sc., Botany (College), 2021-22

**MODEL QUESTION PAPER**

(For Students Admitted from the Academic Year 2021 – 2022 onwards under CBCS Pattern)

**B.Sc., BOTANY ALLIED PRACTICAL  
SUBJECTCODE: 21UBOAP01**

**Time : 3 hrs.**

**Maximum: 60 Marks**

**Practical : 50 Marks**

**Record : 10 Marks**

1. Refer A&B to their families giving reasons (Diagrams not necessary) 10 Mark
2. Identify the plant, family and morphology of the parts used for C, D, E, F and G. 15 mark
3. Cut transverse section of H & I. Stain and mount in Glycerin. Identify giving reasons. Draw diagrams. Submit the slides for valuation. 10 mark
4. Write critical notes on J, K, L, M, N, O. Draw diagrams. 12 mark
5. physiology Experiment P 3 mark

**KEY**

1. For A and B - Any 2 plants prescribed in the syllabus.  
Reasons 3, Identification -2  $2 \times 5 = 10$  mark
- 2 For C, D, E, F and G - any 5 specimens given in the practical syllabus.  $5 \times 3 = 15$  Mark
4. For H and I – Slide -2 Identification -1 Reasons – 2  $2 \times 5 = 10$  mark
4. Notes 1, Diagram 1 for J, K, L, M, N, O  $2 \times 6 = 12$  mark
5. Physiology Experiment P 3 Mark

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