



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

COURSE OUTCOMES

**DEPARTMENT
OF
BOTANY**



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

STRUCTURE OF THE SYLLABUS

Program Name	Course	Course code	Course name
B.Sc. Botany	Core I	U20BY101	Phycology, Archegoniate and Paelobotany
B.Sc. Botany	Core Prac. I	U21BY1P1	Major Practical - I
B.Sc. Botany	Core II	U20BY202	Microbiology and Plant Pathology
B.Sc. Botany	Core Prac. II	U21BY2P2	Major Practical - II
B.Sc. Botany	Core III	U20BY303	Plant systematics and Plant Botany
B.Sc. Botany	Core Prac. III	U20BY3P3	Major practical III
B.Sc. Botany	NMEC I	U20BYPE1	Nursery technology Practicals
B.Sc. Botany	Core IV	U20BY404	Plant Systematics and Developmental Botany
B.Sc. Botany	Core Prac. IV	U20BY4P4	Major Practical - IV
B.Sc. Botany	NMEC II	U20BYPE2	Mushroom cultivation
B.Sc. Botany	Core V	U20BY505	Plant physiology, Plant metabolism
B.Sc. Botany	Core VI	U20BY506	Genetics, Evolution and Plant metabolism
B.Sc. Botany	Core Prac. V	U20BY5P5	Major practical -V
B.Sc. Botany	Elective I	U20BY5:1	Biostatistics, Computer Applications and Bioinformatics
B.Sc. Botany	SBEC I	U20BYPS1	Mushroom and Nursery Technology
B.Sc. Botany	Core Project	U20BY5PJ	Project
B.Sc. Botany	Core VII	U20BY607	Ecology and Phytogeography
B.Sc. Botany	Core VIII	U20BY608	Cytology and Molecular Biology
B.Sc. Botany	Core Prac. VI	U20BY6P6	Major Practical -VI
B.Sc. Botany		U20BY6:1	Plant Breeding, Pathology, Protection and Organic Farming
B.Sc. Botany		U20BY6:2	Ethnobotany (Optional)
B.Sc. Botany		U20BYPS2	Molecular and Plant tissue culture Techniques
B.Sc. Botany		U20BYPS3	Plant Wealth for Human Life
B.Sc. Botany	Allied I	U20BYY11	Allied Botany - I
B.Sc. Botany	Allied II	U20BYY22	Allied Botany - II
B.Sc. Botany	Allied I	U20BYY1P2	Allied Practicals



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PHYCOLOGY, ARCHEGONIATE AND PALEOBOTANY

Course code: U20BY101

Credits: 6

Semester: I

Hours/Week: 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Classify the algae, explain their characteristics, interpret the cell structure and its development.	K5	I
CO 2	Identify characters, classify Bryophytes and conclude the developments in Plant from lower to higher plants	K4	II
CO 3	Analyze anatomical structure and evolutionary modification occurred in Pteridophytes.	K4	III
CO 4	Assess the living Gymnosperms and their morpho-anatomical adaptations for development.	K5	IV
CO 5	Interpret plant remains, connections in plant evolution and conserve the linking plant forms from extinction.	K2	V
CO 6	Appraise the adaptations of plants in various habitat and their ecological and economic importance	K5	I - V

PHYCOLOGY, ARCHEGONIATE AND PALEOBOTANY
[CORE PRACTICAL – I]

Course code: U20BY1P1

Credits: 2

Semester: I

Hours/Week:3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Compare and Interpret the different group of Algae and its diversity.	K 4	I
CO 2	Distinguish the various habitat in Bryophytes and their anatomical form.	K 4	II
CO 3	Examine the different types of spore formation, life cycles in Pteridophytic forms and fossilised plants.	K 4	III
CO 4	Discuss the morphological and anatomical structures of various Gymnosperm plant groups.	K4	IV
CO 5	Compare the external and internal characteristics features of selected species.	K 2	V
CO 6	Importance of Plant diversity in maintaining the ecosystem.	K5	I - IV



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CORE II - MICROBIOLOGY AND PLANT PATHOLOGY

Semester : II
Credits : 6

Course Code : U20BY202
Hours/Week: 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Interpret and explain various forms of Microorganisms	K2	I, II, III
CO 2	Classify the structure, functions and various relationship between the microbes	K4	I, II, III
CO 3	Compare and contrast the various types reproductive cycle.	K2	I and III
CO 4	Distinguish the various microbes used in biofertilizer preparation.	K5	IV
CO 5	Identify the causal agent of microbes and control the mechanisms of plant pathogens and diseases.	K3	V
CO 6	Examine the evidences of management and host resistance of diseases.	K4	V

CORE PRACTICAL - II
(Microbiology and Plant pathology)

Semester : II
Credits : 2

Course Code: U20BY2P2
Hours/Week:3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Identify the interaction of microorganisms and analysis of various microorganisms	K3	I - V
CO 2	Understand and application of various microbiological laboratory equipment.	K2	I - V
CO 3	Interpret various fungal organisms and their internal structure and functions	K2	I - V
CO 4	Distinguish the internal structure of pathogenic organisms and their mode of entry into the plants	K4	I - V
CO 5	Evaluate various pathogen and their controls measure	K5	I - V
CO 6	Analyse and preparation of culture medium to isolate the microorganisms	K4	I - V



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ALLIED I: ENVIRONMENTAL BOTANY

Semester: I
Credits: 3

Course Code: U20ESBY1
Hours/Week : 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Interpret the basics of Plant diversity	K2	I
CO 2	Describe the concept of Plant morphology and its Modifications	K2	II
CO 3	Explain various aspects of inflorescence and plant taxonomy	K2	II
CO 4	Discuss the basic concepts of plant Anatomy and plant Embryology	K2	III
CO 5	Analyze the various concepts of Plant physiology	K4	IV
CO 6	Describe the various plant diseases and also plant as ecological indicator.	K4	V

Allied Practical I: ENVIRONMENTAL BOTANY LAB

Semester I
Credits: 2

Code: U20ESBP1
Hours/Week: 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Compare and Interpret the different group of Species diversity.(Plant diversity – Algae, Fungi, Bryophytes, Pteridophyte and Gymnosperms)	K 4	I
CO 2	Distinguish the various habitat in Plants and their Taxonomical form.	K 4	II
CO 3	Discuss the different anatomical structures of various mature plant groups.	K 4	III
CO 4	Examine the different types of Plant functions	K4	IV
CO 5	Importance of Plant pathology (<i>White rust, Citrus canker and Tobacco</i>) Plant specimens for the ecological indicators	K 2	V
CO 6	Understand the importance of plant conservation	K2	I, IV



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ALLIED BOTANY - I

Semester : I
Credits : 4

Course Code : U20BYY11
Hours/Week : 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Classify the character feature and classification of plant diversity (Cryptograms and Phaneograms) and use that to identify species in plant kingdom	K2	I
CO 2	Explain the structure and lifecycle of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms with examples from each group	K 2	I
CO 3	Distinguish the structure and functions of various tissues.	K 4	II
CO 4	Examine the internal structure of Dicot and Monocot leaf, stem and root	K 4	II
CO 5	Determine the various components of male and female gametophyte and mechanism of fertilization	K5	III
CO 6	Determine the mechanism of absorption, transpiration, respiration and mechanism of photosynthesis in plants	K5	IV and V

Allied Botany II

Semester : II
Credits : 4

Course Code : U20BYY22
Hours/Week : 2

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Understand the plant morphology terminologies and identify morphological peculiarities	K2	I
CO 2	Define members of the major angiosperm families by their features and economic importance.	K2	II
CO 3	Evaluate the economic importance of selected angiosperms.	K4	III
CO 4	Make use of the vegetative propagation methods in plants	K3	IV
CO 5	Interpret plant remains, connections in plant evolution and conserve the linking plant forms from extinction.	K2	V
CO 6	Appraise the adaptations of plants in various habitat and their ecological and economic importance	K5	I - V



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ALLIED BOTANY PRACTICAL - I

Semester: I & II
Credits: 3

Course Code: U20BYYP1
Hours/Week: 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Distinguish the external, internal, reproductive structure of cryptogamae and phanerogamae	K4	I
CO 2	Understand and illustrate the structure and arrangement of tissue and morphology of plants	K 3	II
CO 3	Compare the internal structure of leaf, stem and root of dicot and monocot plants	K 4	III
CO 4	Analyse the structure of male and female gametophyte	K 4	IV
CO 5	Formulate taxonomic formula and explain a variety of physiological process	K6	V
CO 6	Explain the methods of vegetative propagation and preparation of rooting and potting medium	K5	VI, VII, VIII

PLANT SYSTEMATICS AND ECONOMIC BOTANY

Semester : III
Credits : 6

Course Code : U20BY303
Hours/Week: 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Distinguish and apply the morphological variation and modifications of the plant parts	K4	I
CO 2	Analyse the floral taxonomy of angiosperms	K4	II
CO 3	Apply the knowledge on identification of plants, its botanical nomenclature, herbariums and its importance	K3	III
CO 4	Apply the knowledge gained in studying the plants belonging to the Polypetalae, Gamopetalae, Monocot families with their economic importance	K3	IV
CO 5	Distinguish different families on their economic importance.	K4	V
CO 6	Identify the general characteristics, morphological variations and modifications of the plant	K3	I - V



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MAJOR PRACTICAL III – PLANT SYSTEMATICS AND ECONOMIC BOTANY
Semester : III
Credits : 2
Course Code : U20BY3P3
Hours/week. : 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Identify the morphological variations and modifications of the plant	K3	I
CO 2	Analyse plant modifications based on ecological adaptation	K4	I
CO 3	Make use of the knowledge in identifying the plants belonging to the Polypetalae family.	K3	II
CO 4	Distinguish the floral characters of different families belonging to the Gamopetalae	K4	II
CO 5	Identify Monocotyledon plants by their characters	K3	II
CO 6	Explain the economic importance of plant and plant parts.	K2	III

NMEC I - NURSERY TECHNOLOGY

Course Code: U20BYPE1
Semester III

Credits: 2
Hours/Week: 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Summarize the basic concepts of Nursery Management.	K2	I
CO 2	Explain with the process of vegetative propagations	K5	I
CO 3	Make use of the <i>in vitro</i> cultivation methods.	K3	II
CO 4	Identify plant multiplication methods and nursery structures.	K3	III
CO 5	Distinguish greenhouse farming, net farming, pot culturing.	K4	IV
CO 6	Identify the methods of harvesting, storage in various plants	K3	V



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Core IV: PLANT ANATOMY AND DEVELOPMENTAL BOTANY

Semester: IV

Credits : 5

Course Code: U20BY404

Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Classify the major types of tissue system and its functions.	K4	I
CO 2	Discuss the theories related with Shoot & Root Apical Meristem.	K6	I
CO 3	Elaborate the developmental process of secondary growth pattern of shoot & Root.	K6	II
CO 4	Discuss the anatomical structure of Anomalies of Monocot and Dicot.	K6	III
CO 5	Compare the structure and development of Micro gametogenesis and Mega gametogenesis.	K4	IV
CO 6	Evaluate the Process of Development of an Embryo, seed structure and apomixes	K5	V

MAJOR PRACTICAL IV – PLANT ANATOMY AND DEVELOPMENTAL BOTANY [CORE PRACTICAL – IV]

Course code: U20BY4P4

Credits: 2

Semester : IV

Hours/Week: 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Take part in hand dissection in Plant Anatomy and observing various tissue system.	K4	I
CO 2	Distinguish various kind of tracheary elements by performing Maceration technique.	K4	II
CO 3	Dissect the plant specimen of Stem, root and Leaf of Dicot and Monocot Plants and compare its anatomical features.	K4	III
CO 4	Dissect out and mount the Pollinium and Dicot Embryo.	K4	IV
CO 5	Analyze the structure of anther and Embryo sac.	K4	V
CO 6	Explain the process of pollination and its mechanisms.	K2	V



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NMEC II -MUSHROOM CULTIVATION

Semester IV
Credits 2

Course Code: U20BYPE2
Hours/Week: 3

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Identify the types of mushrooms-edible and poisonous	K3	I
CO 2	Explain the scope of mushroom cultivation	K2	II
CO 3	Experiment with various cultivation methods	K3	III
CO 4	Distinguish various methods of mushroom cultivation.	K4	IV
CO 5	Select the methods of harvesting, pest management in mushrooms	K3	V
CO 6	Experiment with the process of mushroom cultivation	K3	Practical

Core V: PLANT PHYSIOLOGY AND PLANT METABOLISM

Course Code: U20BY505
Credits : 7

Semester : V
Hour/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Develop an insight to the various plant water relations.	K6	I
CO 2	Discuss the mechanism of Photosynthesis.	K6	II
CO 3	Analyze the mechanism of Respiration and Nitrogen Metabolism	K4	III
CO 4	Evaluate the various growth and development processes in plants	K5	IV
CO 5	Compare the properties, structure and function of Primary and Secondary Metabolites.	K5	V
CO 6	Analyze the mechanism of photosynthesis, respiration, nitrogen metabolism and secondary metabolites	K4	II - V



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CORE VI: GENETICS, EVOLUTION AND PLANT BREEDING

Semester : V

Course Code: U20BY506

Credits :6

Hours/Week: 6

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Evaluate the basic principles of inheritance in plants, allelic and non-allelic gene, linked gene and recombination gene	K5	I
CO 2	Discuss the inheritance of X and Y linked inheritance gene	K6	I and II
CO 3	Construct and modify personal and family pedigree charts.	K6	I and II
CO 4	Analyze crops to express hybrid vigour, Describe the necessity of breeding programs, Imparting knowledge on means of exploiting plants through breeding	K4	III, IV
CO 5	Estimate the necessity of Plant genetic resources, IPR protecting farmers and breeders	K5	V
CO 6	Appraise how humans have flourished due to breeding and domestication of plants	K5	III, IV, V

**MAJOR PRACTICAL: V – PLANT PHYSIOLOGY & PLANT METABOLISM,
GENETICS, EVOLUTION & PLANT BREEDING**

Semester : V

Course Code : U20BY5P5

Credits : 2

Hours/Week : 3

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Experiment with plant cells in relation to water.	K3	I
CO 2	Estimate the amount of sugar & lipid concentration in a given plant tissue.	K5	I
CO 3	Estimate the rate of photosynthesis under various environmental conditions.	K5	I
CO 4	Solve the practical problems in Mendelian Genetics, Gene Interaction & Gene Mapping.	K6	II
CO 5	Demonstrate the life cycle of <i>Drosophila</i>	K2	II
CO 6	Experiment with Hybridization & Emasculation techniques, Evaluate the Pollen viability & germinability	K5	III



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Elective I: BIO -INSTRUMENTATION

Semester: V
Credits: 5

Course Code : U20BY5:2
Hours/Week : 5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Apply the process safety and describe the benefits of process safety to an General Lab safety and to society	K2	I
CO 2	Explain Instrumentation, separation and identification of compounds by electrophoresis technique	K5	II
CO 3	Explain Instrumentation, Working mechanism and Application of PCR.	K4	II
CO 4	Apply the knowledge about the various aspects of Centrifugation and Microscopy for identification, and characterization of compounds	K3	III
CO 5	Explain the varies concepts of chromatography techniques	K5	IV
CO 6	Describe the concept of Spectrophotometry, Tracer techniques	K2	V

ELECTIVE (CAC) : COMPETITIVE BOTANY

Semester : V
Credits :2

Course Code: U20CAC5:1
Hours/Week: 3

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

No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Develop the skill to crack competitive exams in Listening, reading, learning, problem solving and thinking out of Box.	K6	I - V
CO 2	Choose an appropriate sampling scheme and/or experimental design for a given biological question.	K5	I - V
CO 3	Apply an appropriate analytical methods to work out the given biological data.	K3	I - V
CO 4	Demonstrate the necessary skills for biological data management, analysis and graphical presentation.	K2	I - V
CO 5	Discover their ability to reason both inductively and deductively with experimental information and data.	K4	I - V
CO 6	Summarize and interpret the primary literature in botany.	K2	I - V



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SBEC I – MUSHROOM AND NURSERY TECHNOLOGY

Semester : V
Credits : 2

Course Code : U20BYPS1
Hours/Week : 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explain the general information about mushrooms including edible and poisonous mushroom	K5	I
CO 2	Design and develop various technology for mushroom cultivation	K6	II
CO 3	Analyze post harvesting of mushroom and making up recipes using mushroom	K4	III
CO 4	Discuss concepts in nursery technology.	K5	IV
CO 5	Construction of nursery and greenhouse using various technology	K6	V
CO 6	Develop Entrepreneurship skill by understanding the cultivation and development technology for	K6	IV,V

CORE VII- ECOLOGY AND PHYTOGEOGRAPHY

Semester : VI
Credits : 6

Course Code: U20BY607
Hours/Week : 6

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Identify the varying environmental factors and its influence on plants	K3	I
CO 2	Analyze Ecological structure of Plant communities in relation with the Abiotic and Biotic factors	K4	II
CO 3	Differentiate the vegetation types of plant communities	K4	III
CO 4	Apply different methods of vegetation studies to analyze the plant communities	K3	III
CO 5	Classify and correlate the Ecological adaptation of Plants	K5	IV
CO 6	Apply principles of biogeography to predict and explain general characteristics of a plant community	K5	V



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CYTOLOGY AND MOLECULAR BIOLOGY

Semester : VI
Credits : 6

Course Code: U20BY608
Hours/Week:5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Determine the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles	K5	I
CO 2	Discuss the Nucleus, chromosomes and cell divisions	K6	II
CO 3	Explain the multiplication of DNA	K5	III
CO 4	Discuss the process of gene regulation	K6	IV
CO 5	Choose appropriate markers of gene cloning	K6	V
CO 6	Compare the gene modification and importance of wild varieties.	K5	V

Core Practical –VI- ECOLOGY & PHTO GEOGRAPHY, CYTOLOGY & MOLECULAR BIOLOGY

Hours/Week: 3
Course Code: U20BY6P6

Credits: 2
Semester: VI

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1.	Explain the importance of food web and organisms in each level	K2	I
CO 2	Identify the process of ecological succession	K3	I
CO 3	Determine the importance of soil microbes and quality of soil structure	K5	I
CO 4	Explain the important phyto-geographic zones	K2	II
CO 5	Identify the cell inclusions and its functions	K3	III
CO 6	Explain the structure of cell organelle	K2	III



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Elective-II ETHNOBOTANY

Course code: U20BY6:3

Credits : 5

Semester: VI

Hours/Week : 5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Explain the fundamentals of Ethnobotany, life style of ethnic groups and plants used by them	K5	I
CO 2	Explain the methodologies of ethnobotanical studies	K5	II
CO 3	Elaborate the medico-ethnobotanical sources and significances of ethnobotanical practices in India	K6	III
CO 4	Functions of ethnobotany in modern medicines in respect to specific plants, ethnic groups in conservation and forest management	K4	IV
CO 5	Improve ethnobotany as a protecting tool of ethnic groups interest and its legal aspects	K6	V
CO 6	Summarize the role of ethnobotany as a tool of conservation, forest management, medicine, interest of ethnic groups and their legal issues	K6	II - ,V

Elective II: HORTICULTURE AND ORGANIC FARMING

Course code: U20BY6:4

Credits : 5

Semester: VI

Hours/Week : 5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Classify the scope, Climate, soil, water irrigation, propagation methods of horticulture and their implements	K4	I
CO 2	Discuss the principles, methods of indoor and outdoor gardening, Lawn and water garden	K6	II
CO 3	Explain gardening, Bonsai, Floriculture and Hydroponics	K2	III
CO 4	Elaborate organic farming, vermicompost and its advantages	K6	IV
CO 5	Illustrate the cultivation of organic vegetables, fruit crops and layout of kitchen garden	K2	V
CO 6	Importance of horticulture and their methods with organic farming practices	K5	I - V



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Elective III: BIOTECHNOLOGY

Semester: VI
Credits: 5

Course Code: U20BY6:5
Hours/Week: 5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Analyze the applications of plant biotechnology	K4	I
CO 2	Determine various aspects of tissue culture and their applications	K5	II
CO 3	Explain plant biotechnological applications viz., Algal and transgenic crops	K5	III
CO 4	Apply the concepts of Biotechnology in Environmental Management.	K3	IV
CO 5	Analyze the reasons for pollution and choose the method of pollution management.	K5	IV
CO 6	Discuss Ethical Issues, intellectual property management and handling of GMOs.	K6	V

Elective III: NANOTECHNOLOGY

COURSE CODE: U20BY6:6
HOURLY/Week: 5 Hours

CREDITS: 5
SEMESTER: VI

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Explain the scope of nanotechnology and its applications	K2	I
CO 2	Interpret the methods of nanoparticle synthesis	K2	II
CO 3	Apply the nanoparticle synthesis using potential green plants	K3	III
CO 4	Analyse the uses of nanoparticles in the biomedical field.	K4	IV
CO 5	Take part in the works and discussions related to the applications of nanoparticles in agriculture	K4	IV
CO 6	Test for the phytochemicals in biomedical field using the nanotechnology	K4	V



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SBEC II – MOLECULAR AND PLANT TISSUE CULTURE TECHNIQUES

Course Code: U20BYPS2

Credits: 2

Semester: VI

Hours/Week: 3

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Build the concepts and criteria to design, organise, and maintenance of Plant Tissue Culture Laboratory	K6	I
CO 2	Comparing the gene transformation techniques using photographs and videos	K4	II
CO 3	Elaborating sterilization techniques, hands-on media preparation and monitoring the cultures	K6	IV
CO 4	Interpreting, analyzing, and validation of the bio-molecules (DNA and Protein) using the methods and protocols	K5	II
CO 5	Evaluating the direct and indirect methods for performing different micro propagation techniques	K5	III
CO 6	Propose a model of well equipped laboratory be able to develop Entrepreneurship skill with the prior knowledge of ethical values	K6	I - V

SBEC III – PLANTS AND HUMAN WELFARE

Semester : IV

Credits : 2

Course Code : U20BYPS3

Hours/Week : 3

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Construct new patterns of designs in making Bouquets, garlands and hair designs.	K6	I
CO 2	Make use of techniques of Pickle and beverage preparation	K3	II
CO 3	Explain the protocols of making products by using plant fibers.	K2	III
CO 4	Evaluating the application of Medicinal plants in the preparation of Cosmetics, face packs and Herbal products.	K5	IV
CO 5	Create a wealthy product from the Phyto-wastes.	K6	V
CO 6	Develop Entrepreneurship skill by knowing the Aesthetic value, Medicinal value and Commercial value of Plant & its resources.	K6	I, - V



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
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STRUCTURE OF THE SYLLABUS

Program Name	Course	Course Code	Course Name
M.Sc. Botany	Core I	P21BY101	Plant Diversity
M.Sc. Botany	Core II	P21BY102	Plant anatomy, Embryology and Morphogenesis
M.Sc. Botany	Core III	P21BY103	Ecology and Phytogeography
M.Sc. Botany	Core Pra. I	P21BY1P1	Plant diversity Practicals -I
M.Sc. Botany	Core Pra. II	P21BY1P2	Plant Anatomy, Embryology, Morphogenesis and Ecology practical
M.Sc. Botany	Elective I	P21BY1:A	Trends In Agriculture
M.Sc. Botany	Elective I	P21BY1:B	Entrepreneurial Botany
M.Sc. Botany	Core IV	P21BY204	Plant Systematics
M.Sc. Botany	Core V	P21BY205	Cell Biology, Genetics and Molecular Biology
M.Sc. Botany	Core VI	P21BY206	Microbiology and Plant Pathology
M.Sc. Botany	Core Prac.III	P21BY2P3	Plant Systematics
M.Sc. Botany	Core Prac.IV	P21BY2P4	Cell Biology, Genetics, Microbiology and Plant pathology
M.Sc. Botany	Elective II	P21BY2:A	Tidal Forestry
M.Sc. Botany	Elective II	P21BY2:B	Microbial Food processing
M.Sc. Botany	Core VII	P21BY307	Plant Physiology
M.Sc. Botany	Core VIII	P21BY308	Biochemistry, Biophysics and Pharmacognosy
M.Sc. Botany	Core IX	P21BY309	Plant Biotechnology
M.Sc. Botany	Core Prac.V	P21BY3P5	Plant Physiology
M.Sc. Botany	Core Prac.VI	P21BY3P6	Biochemistry, Pharmacognosy and Biotechnology
M.Sc. Botany	Elective III	P21BY4:P	Green Wealth
M.Sc. Botany	Elective III	P21BY4:P	Naturopathy and Traditional Health care
M.Sc. Botany	Core X	P21BY410	Research Methodology
M.Sc. Botany	Elective IV	P21BY4:A	Forestry and Conservation Biology
M.Sc. Botany	Elective IV	P21BY4:B	Green Audit
M.Sc. Botany	Elective V	P21BY4:C	Propagation Techniques
M.Sc. Botany	Elective V	P12BY4:D	Soil less culture
M.Sc. Botany	PROJECT	P21BY4PJ	Project



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CORE PAPER I – PLANT DIVERSITY
(ALGAE, FUNGI, LICHEN, BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS)

Semester: I
Credits : 5

Course Code : P21BY101
Hours / Week: 6

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1	Distinguish and explain characteristics features of Algae and evaluate the life cycle patterns and phylogenetic trends	K4	I
CO 2	Discuss the general characteristics features of Fungi and classify the types of reproduction	K6	II
CO 3	Criticize the general characteristics, origin and evolution of sporophytes of Bryophytes	K5	III
CO 4	Analyze the characteristics of Pteridophytes and justify primitive vascular plants based on the telome theory	K4	IV
CO 5	Analyze the general characteristics and evolutionary modification occurred in Gymnosperms	K4	V
CO 6	Appraise the adaptations of plants in various habitat and their ecological and economic importance	K5	I - V

CORE PAPER- II- PLANT ANATOMY, EMBRYOLOGY AND MORPHOGENESIS

Semester : I
Credits : 5

Course Code: P21BY102
Hours/week : 6

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1	Explain the structure, function, types and theories of meristematic tissues, tissue differentiation and Theories of root meristem	K2	I
CO 2	Interpret the transition to flowering, growth and formation of organs	K5	I
CO 3	Categorize the Wood Structure Types Sapwood, Heartwood	K4	II
CO 4	Evaluate the structure and development of microsporangium	K5	III
CO 5	Determine the various ovule structures and modifications in Angiosperms.	K5	IV
CO 6	Explain the morphogenetic factors, molecular basis of morphogenesis and seed germination	K5	V



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CORE PAPER III: ECOLOGY AND PHYTOGEOGRAPHY

Semester: I
Credits: 4

Course Code : P21BY103
Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explain the Edaphic factors and Topographic factors in relation to the environment	K5	I
CO 2	Evaluate hydrological and water Resource management for future conservation	K4	II
CO 3	Analyze the Biosphere and its interaction with the abiotic factors	K4	III
CO 4	Examine the inter-relationship among organisms in a population and communities.	K4	III
CO 5	Value Phytogeography and its importance in plant distribution	K5	IV
CO 6	Discuss the process for the control of global warming, phytoremediation and disaster management.	K6	V

CORE PRACTICAL I - PLANT DIVERSITY

Semester : I
Credits : 3

Course code : P21BY1P1
Hours/Week: 3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Examine and discriminate the diversified Algae in the Plant Kingdom	K4	I
CO 2	Identify the vegetative and fruiting structures of various fungi and <i>Usnea</i> sp.	K4	II,III
CO 3	Compare the anatomical and morphological structures of Bryophytes plants	K4	IV
CO 4	Differentiate various Pteridophytes and their stellar structures	K4	V
CO 5	Predict the method of fossilization and fossil identification	K2	VI
CO 6	Compare the anatomical and reproductive structures of various Gymnosperms	K4	VII



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CORE PRACTICAL – II

ANATOMY, EMBRYOLOGY, MORPHOGENESIS AND ECOLOGY

Semester: I

Credits : 3

Course code: P21BY1P2

Hours/Week :3

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

CO No	Course Outcomes	Level	Unit
CO 1	Identify the unique anatomical structures in Angiosperms	K3	I
CO 2	Compare and distinguish the anatomical structures of plants	K4	II
CO 3	Conclude on the reproductive structures like anther, pollen, style and stigma	K4	II
CO 4	Evaluate the pollination methods in plants	K5	II
CO 5	Justify the Ecological principles and conclude with reasons	K5	III
CO 6	Apply the parameters of ecological estimation in fields	K3	III

Elective I - TRENDS IN AGRICULTURE

Semester : I

Credits : 4

Course Code : P21BY1:A

Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Evaluate and compare early and traditional farm practices along the riverbanks, Ganges delta and in Southern India especially the farm practices details in sangam literature	K5	I
CO 2	Apply knowledge on self-sufficient agriculture practice which includes irrigation system and methods and the crop rotation methods	K3	II
CO 3	Improve the agriculture production which is based on soil and climatic conditions	K6	III
CO 4	Apply of agriculture concerned with intensively cultivated crops, governing policies, application of fertilizers, contribution of various research institution and organization for the welfare of human around the world	K4	IV
CO 5	Elaborate the knowledge machineries to conserve and minimize water for sustainable agricultural production	K5	V
CO 6	Understand various traditional and modern farm principles and practice involved in agriculture	K5	VI



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Elective I – ENTREPRENEURIAL BOTANY

Semester : I
Credits : 4

Course Code : P21BY1:B
Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explain the policies developed by government for small scale industries	K2	I
CO 2	Make use of the plant products.	K3	II
CO 3	Assess the use of various techniques used in Bonsai, cactus cultivation	K4	III
CO 4	Compare the use of various fertilizers.	K2	IV
CO 5	Explain the mushroom cultivation in detail	K5	V
CO 6	Determine the importance of plant products in economy	K5	II, IV, V, VI

CORE PAPER IV - PLANT TAXONOMY AND SYSTEMATICS

Semester: II
Credit: 5

Course Code : P21BY204
Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Classify the plants systematically using modern taxonomic principles	K4	I
CO 2	Assess various flora, Monographs and publications for the proper identification of Plant	K5	II
CO 3	Examine the morpho-genetic and anatomical variation as taxonomic evidence for the identification of closely related plant species	K4	III
CO 4	Organize the Taxonomic hierarchy of plant species	K3	III
CO 5	Distinguish the plant families with their specific diagnostic features	K4	IV, V
CO 6	Assess the economically important families for the utilization and commercialization	K5	IV, V



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CORE PAPER – V-CELL BIOLOGY, GENETICS AND MOLECULAR BIOLOGY
Semester: II **Course Code: P21BY205**
Credits: 5 **Hours/Week:6**

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO1	Analyze the history of cell, Prokaryotic and Eukaryotic cell structure, Explain the cell organelles.	K5	I
CO 2	Apply the basic principles of inheritance in plants, allelic and non allelic gene, linked gene and recombination gene	K3	II
CO 3	Construct and modify personal and family pedigree charts and discuss the inheritance of X and Y linked inheritance gene	K6	III
CO4	Evaluate the RNA, DNA and Protein synthesized	K5	IV,V
CO5	Analyze the molecular processes	K4	II, IV,V
CO6	Classify the latest concepts of hormonal signaling, senescence, abscission and Apoptosis	K4	IV

Core VI - MICROBIOLOGY AND PLANT PATHOLOGY

Semester : II
Credits : 4

Course Code : P21BY206
Hours/Week: 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO1	Understand and application of microbiology concepts as a diverse area such as Agriculture, environment, medical, food and industries.	K3	I - IV
CO2	Take students to higher level of learning about microbial association with plants	K2	I, II
CO3	Develop basic skills such as culturing, maintaining microbes and safety issues related to handling of microbes	K6	I - IV
CO4	Explain the causal agent of microbes, evidence of management, host resistance of diseases.	K5	V
CO5	Elaborate the various staining procedure of microorganisms	K6	II
CO6	Equip students with skills and techniques related microbiology and pathology, so that can design their own experiment	K6	V, VI



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CORE PRACTICAL- III - PLANT TAXONOMY AND SYSTEMATICS

Semester : II
Credits : 3

Course Code : P21BY2P3
Hours/Week : 3

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

No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Identify the plant families and species by describing their morphological characters and by using taxonomic keys	K3	I
CO 2	Create taxonomic keys for the locally available plant species	K6	I
CO 3	Develop herbarium of plants based on their morphology	K6	I
CO 4	Analyse the adaptations of plants	K4	I
CO 5	Examine the importance of floral adaptations	K5	I
CO 6	Apply the scientific knowledge for plant identification	K3	I

CORE PRACTICAL- IV

CELL BIOLOGY, GENETICS, MICROBIOLOGY AND PLANT PATHOLOGY

Semester : II
Credits : 3

Course Code : P21BY2P4
Hours/Week : 3

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

No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Make use of the cytological knowledge to solve the genetic questions.	K3	I
CO 2	Analyze the cell divisions	K4	I
CO 3	Apply the different genetics problems on sex linked inheritance, Linkage mapping and chromosome mapping	K3	II
CO 4	Evaluate genetic materials such DNA and RNA by using modern technologies.	K5	III
CO 5	Analyze the importance of microbes	K4	IV
CO 6	Explain different plant breeding methods for commercial plantation of crops	K5	V



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ELECTIVE PAPER: II – TIDAL FORESTRY

Semester : II
Credits : 4

Course Code : P21BY2:A
Hours/ Week: 4

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

CO No	Course Outcomes (CO)	Level	Unit
CO 1	Assess the species diversity and its status in wet land	K4	I
CO 2	Compare the past and present status of Mangrove vegetation	K5	II
CO 3	Examine the factors affecting mangrove vegetation and reclamation process to be taken	K5	III
CO 4	Estimate the values of Nutrient enrichment and energy fluxes in Mangroves	K5	IV
CO 5	Evaluate water quality parameters and its influence in Mangrove vegetation	K5	V
CO 6	Elaborate the anthropogenic pressure and pollutants in Mangroves	K6	VI

ELECTIVE PAPER: II – MICROBIAL FOOD PROCESSING

Semester : II
Credits : 4

Course Code : P21BY2:B
Hours/ Week : 4

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1	Explain the interaction between microorganisms and the food environment and factors influencing their growth and Survival	K5	I, III
CO 2	Distinguish the, characters, significance and activities of microorganisms in food	K4	I, II
CO 3	Evaluate the characteristics, food borne, water borne and spoilage microorganisms and methods for their isolation, detection and identification.	K5	III
CO 4	Utilize the microbial quality control programme are necessary in food production and Dairy products	K3	IV, V, VI
CO 5	Explain the effects of fermentation in food production and how it influences the microbial quality and status of the food production	K2	III, V, VI
CO 6	Discuss the rational for the use of standard method and procedure for the microbial analysis of food.	K6	I- VI



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CORE PAPER VII- PLANT PHYSIOLOGY

Semester : III
Credits : 5

Course Code : P21BY307
Hours/Week: 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explain the physiological processes of growth and development and the changes occurred during that processes	K5	I
CO 2	Evaluate the Plant -water relations in water absorption and transpiration.	K5	II
CO 3	Appraise the carbon Metabolic pathways involved in Photosynthesis.	K5	III
CO 4	Relate the integration of Metabolic pathways through Krebs cycle in Respiration.	K2	III
CO 5	Analyse the mechanism of mineral absorption and nitrogen metabolism	K4	IV
CO 6	Examine the physiological processes in Agriculture crop	K5	V

CORE PAPER -VIII – BIOPHYSICS, BIOCHEMISTRY, AND PHARMACOGNOSY

Semester : III
Credits : 5

Course Code : P21BY308
Hours/week : 6

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

CO No	Course Outcomes	Level	Unit
CO 1	Explain the basic physical principles and nature of chemical atoms in relation of biological molecules	K2	I
CO 2	Demonstrate the biopolymers formation and structural configuration	K2	II
CO 3	Classify the Biomolecules based on their nature and function	K4	II
CO 4	Make use of different instruments for scientific researches	K3	III
CO 5	Develop methodology for the utilization and identification of drugs from plants	K6	IV
CO 6	Determine the nature, quality and biological effects of different phytochemical drugs	K5	V



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CORE IX- BIOTECHNOLOGY

Semester : III
Credits : 4

Course Code : P21BY309
Hours/Week : 6

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

CO NO	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Interpret the concepts of genome organization in plants	K2	I
CO 2	Explain the concepts of molecular markers connecting to diversity analysis, phylogenetic relationship and create tools for marker-assisted selection in plant breeding	K5	I
CO 3	Appraise the knowledge about the various aspects of tissue culture and their applications	K5	II
CO 4	Develop suitable techniques/protocol for <i>In vitro</i> culture	K6	II
CO 5	Determine biotechnological techniques and genetic engineering involved in breeding plants	K5	III
CO 6	Explain the concepts of transgenic plants and Application of Biotechnology in Plant improvement, Bioprospecting plants	K5	IV&V

CORE PRACTICAL -V- PLANT PHYSIOLOGY

Semester : III
Credits : 3

Course Code : P21BY3P5
Hours/ Week :3

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Experiment on physiological water properties with plant	K3	I
CO 2	Examine absorption spectrum of photosynthetic pigments	K4	I
CO 3	Estimate the total acidity in CAM plants	K5	I
CO 4	Analyse the activity of Catalase, Amylase & NR in young seeds	K4	I
CO 5	Distinguish the rate of germination under various temperature and salt condition	K4	I
CO 6	Improve the scientific reasoning and ability to interpret experimental data through experiential learning in Physiology	K6	I



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CORE PRACTICAL VI - BIOCHEMISTRY, PHARMACOGNOSY AND PLANT BIOTECHNOLOGY

Semester: III

Credits : 3

Course Code:P21BY3P6

Hours/Week : 3

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1	Experiment with detection of Biomolecules	K3	I
CO 2	Analyse the chromatographic techniques to identify the biomolecules	K4	I
CO 3	Inspect the presence of essential and non-essential substances in a given compound	K4	II
CO 4	Examine the presence of adulterant in the common food substances.	K4	III
CO 5	Explain the basic design and needs for a Plant Biotechnology lab	K5	III
CO 6	Develop synthetic seeds from various plants	K6	III

ELECTIVE: III- GREEN WEALTH

Semester : III

Credits : 3

Course Code : P21BY3:P1

Hours/Week : 6

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

CO No	COURSE OUTCOMES (CO)	LEVEL	UNIT
CO 1	Agree the basic concept of taxonomy, cultivation practices and nutrition values of crops	K5	I
CO 2	Determine the medicinal values of plants	K5	II
CO 3	Make use of the concept of aesthetic value in plants	K3	III
CO 4	Discuss relationship between plants and their environment	K4	IV
CO 5	Develop the entrepreneurship skills using plant products	K6	V
CO 6	Create the skill about the nutritive values and medicinal properties, role of plants as environmental indicators and protectors, aesthetic values in training plants there by developing entrepreneurship skills	K6	I - V



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Core X - RESEARCH METHODOLOGY

Semester : IV
Credits : 4

Course Code : P21BY410
Total Hours : 6

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Elaborate on various kinds of research, objectives of doing research, process, research design and sampling	K6	I
CO 2	Identify and discuss the complex issues inherent in selecting a research problem and implementing a research project	K3	I
CO 3	Explain the importance of selecting appropriate sample and experimental design for studies related to various disciplines of biological sciences	K5	II
CO 4	Explain the basic concepts of biostatistics and interpret for their biological problems	K5	III
CO 5	Discuss the thesis writing, tables and figures	K5	IV
CO 6	Design a Research articles based on various format, manuscript and Judge the Indexing and abstracting	K6	V

Elective IV - FORESTRY AND CONSERVATION BIOLOGY

Semester: IV
Credits: 4

Course Code: P21BY4:A
Hours/Week: 5

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Appraise the knowledge about the various aspects of Forest and its Values	K4	I
CO 2	Describe the various Forest Resources of World and in India	K4	I
CO 3	Apply the methods of afforestation and forest management	K3	II
CO 4	Analyze the usage of resources and its management	K4	III
CO 5	Criticize the available measures for conserving resources	K4	IV
CO 6	Asses Ecotourism within broader cultural, environmental, political and economic dimensions of society. Analyse tourism practices for their implications locally and globally.	K5	V



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Elective IV– GREEN AUDIT

Semester: IV
Credits: 4

Course Code: P21BY4:B
Hours/Week:5

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

CO No	COURSE OUTCOME (CO)	Level	Unit
CO 1	Tell about the ancient history and establishment of the campus and their immediate beneficiaries.	K1	I
CO 2	Examine the Biodiversity abode in the campus especially the flora and fauna with their seasonal variations and develop the aesthetic sense.	K4	II
CO 3	Evaluate the eco climatic conditions prevailing in the campus	K5	III
CO 4	Analyze the campus Ecology and give significant contribution in the maintenance of Plastic-free campus and Green Campus.	K4	IV
CO 5	Formulate major and minor research regarding any Ecological Survey, Quadrat analysis, Identification of species, Preparation of check lists, etc.,	K6	V
CO 6	Summarize the role of campus ecology as a tool of conservation, tree management	K2	I - V

ELECTIVE V – PROPAGATION TECHNIQUES

Semester : IV
Credits : 4

Course Code : P21BY4:C
Hours/Week : 5

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explain the horticultural techniques	K2	I
CO 2	Apply the nurse techniques and develop a garden scientifically	K3	II
CO 3	Explain the use of organic fertilizers and develop it	K5	III
CO 4	Analyze the propagation techniques	K4	IV
CO 5	Examine the use of propagation techniques in other plants	K5	V
CO 6	Apply the techniques in pruning, budding	K3	VI



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ELECTIVE V – SOILLESS AGRICULTURE

Semester : IV
Credits : 4

Course Code : P21BY4:D
Hours/Week : 5

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

CO No	COURSE OUTCOMES (CO)	Level	Unit
CO 1	Explains basics of hydroponics including its importance, history and classification	K2	I
CO 2	Compares the different methods of hydroponics and solid media types	K 4	II
CO 3	Analyzes cropping system of hydroponics with suitable plant selection	K4	III
CO 4	Summarizes the guidelines for measures and management of hydroponics	K2	IV
CO 5	Evaluates various entrepreneurial activities in hydroponics	K5	V
CO 6	Elaborates some hands-on experience related to hydroponics	K5	VI