



HOLY CROSS COLLEGE (AUTONOMOUS)

Affiliated to Bharathidasan University
Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirappalli - 620002.

PG AND RESEARCH DEPARTMENT OF BOTANY
Programme: B.Sc. Botany

PO No.	Programme Outcomes <i>Upon completion of the B.Sc. Degree Programme, the graduate will be able to</i>
PO-1	Obtain quality education in the basic areas of Botany
PO-2	Acquire practical skills to gather information, assess, create and execute new ideas to develop entrepreneurial skills
PO-3	Receive training in pedagogy, research skills and methodology
PO-4	Develop a local, regional, national and international perspective and be competent enough in the area of plant science, genetic engineering and nanotechnology
PO-5	Learn to respect and conserve nature and the environment
PO-6	Identify the angiosperms by applying keys
PO-7	Learn the basic principles of food science

PSO No.	Programme Specific Outcomes <i>Upon completion of these courses the student would</i>
PSO-1	Acquire academic excellence with an aptitude for higher studies, research and to meet competitive exams
PSO-2	Become aware about plant diversity and its conservation through plant tissue Culture
PSO-3	Obtain Knowledge in the internal structure and functions of various plant components, inheritance of characters and techniques of plant breeding
PSO-4	Apply statistical skills and analyze the biological data
PSO-5	Acquire knowledge on traditional herbal plants for common ailments and aware of nutritive plant foods
PSO-6	Obtain Knowledge through taxonomical studies will help them to emerge as fundamental taxonomists
PSO-7	Acquire knowledge on food preservation, food additives and food laws
PSO-8	Analyse the phytoconstituents of plants and plant drug adulteration

Course Title		MAJOR CORE 1- PLANT DIVERSITY – I	
Code		U15BO1MCT01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the thallus organization in algae.	PSO-1, PSO-3	R, U
CO-2	Describe the structure, reproduction and life cycles of various algae.	PSO-1, PSO-3	R, U
CO-3	Discuss the techniques related to the cultivation of freshwater algae.	PSO-1	U
CO-4	List the salient features of the main classes of fungi.	PSO-1	R
CO-5	Describe the morphology and reproduction of the various genera of fungi.	PSO-1, PSO-3	U
CO-6	Discuss the cultivation and identification methods of fungi	PSO-1	U
CO-7	Explain the classification and different types of lichens	PSO-1	R, U
CO-8	Summarize the economic importance of lichens	PSO-1	U
CO-9	Develop the employability skills by cultivating the algae and fungi	PSO-1	C

Course Title		A1 ALLIED OPTIONAL PAPER I – BIODIVERSITY CONSERVATION AND MANAGEMENT	
Course Code		U15BO1AOT01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the types of biodiversity, biosphere reserves and botanical gardens	PSO-1, PSO-3	R, U
CO-2	Describe the biodiversity assessment and inventory programme and methods for species identification and classification.	PSO-1, PSO-3	R, U
CO-3	Explain the conservation of biodiversity and national and international initiatives and organizations.	PSO-1	U
CO-4	Describe the biodiversity informatics, biodiversity databases and biodiversity registers.	PSO-1	R
CO-5	Discuss the global biodiversity information System, biodiversity data management project and bioethics.	PSO-1, PSO-3	U

Course Title		A2 - ALLIED OPTIONAL PAPER II - MUSHROOM CULTIVATION	
Course Code		U15BO1AOT02	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the life cycle of common edible mushrooms.	PSO-1, PSO-3	R, U
CO-2	Describe the construction of mushroom cultivation sheds.	PSO-1, PSO-3	R, U
CO-3	Explain the cultivation practices of mushrooms and their nutritive values	PSO-1	U
CO-4	Describe the Post harvest technologies of mushrooms.	PSO-1	R
CO-5	Discuss the scenario of mushroom cultivation and scope.	PSO-1, PSO-3	U

Course Title		MAJOR CORE 2- PLANT DIVERSITY – II	
Course Code		U15BO1MCT02	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the classification, structure and reproduction of the main classes of bryophytes.	PSO-1, PSO-3	R, U
CO-2	List the economic importance of bryophytes.	PSO-1	R
CO-3	Classify the pteridophytes by their characteristic features	PSO-1	U, Ap
CO-4	Describe the stellar evolution, types of fossils, geological time scale	PSO-1, PSO-3	R, U
CO-5	List the economic importance of pteridophytes	PSO-1	R
CO-6	Discuss the salient features of Gymnosperm morphology	PSO-1, PSO-3	U
CO-7	Illustrate the reproductive characters of important genus of gymnosperm	PSO-1, PSO-3	R, U
CO-8	Explain the significance of important genus of fossil gymnosperm	PSO-1	R, U
CO-9	Develop the Employability skills by learning the life cycle patterns of Bryophytes, Pteridophytes and Gymnosperms	PSO-1	C

Course Title		MAJOR CORE 3- PRACTICAL-1 PLANT DIVERSITY – I & II	
Course Code		U15BO2MCP03	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify important algal forms by their morphological and anatomical features	PSO-1, PSO-3	R, U
CO-2	Describe the morphology and reproduction of the various genera of fungi.	PSO-1, PSO-3	R
CO-3	Illustrate the structure and reproduction in lichens	PSO-1, PSO-3	U
CO-4	Observe and identify the morphological structure of bryophytes	PSO-1, PSO-3	R, U
CO-5	Identify the permanent slides of bryophytes	PSO-3	R
CO-6	Describe the morphology, anatomy and reproductive structures of Pteridophytes	PSO-1, PSO-3	U
CO-7	Examine the germination of spores in ferns	PSO-1, PSO-3	R, U
CO-8	Illustrate the morphological and anatomical structures of gymnosperms	PSO-1, PSO-3	R, U
CO-9	Develop the practical skills by observing the morphological, anatomical and reproductive structures of plant diversity	PSO-1	C

Course Title		MAJOR CORE 4 – CELL BIOLOGY, BIostatISTICS AND BIOINFORMATICS	
Course Code		U15BO3MCT04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the cell theory, ultra structure of plant cell and its organelles.	PSO 1, PSO 3	R, U
CO-2	Explain the cell cycle and types of cell division.	PSO 1, PSO 3	R, U
CO-3	Discuss the changes in the chromosome.	PSO 1, PSO 3	R, U
CO-4	Explain the structure of genetic material and the mechanism of DNA replication.	PSO 1, PSO3	R, U
CO-5	Calculate the mean, median, mode, standard deviation and standard error.	PSO 1, PSO 4	R, U
CO-6	Describe the bioinformatics basics and its application in biology.	PSO 1 PSO 4	R, U
CO-7	Develop the Employability skills by understanding the ultra structures of plant organelles, collection and interpretation of data and applications of biological database	PSO-1	C

Course Title		MAJOR ELECTIVE 1 – MICROBIOLOGY AND PLANT PATHOLOGY	
Course Code		U15BO3MET01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Classifies microbe based on morphological characters	PSO 1, PSO 5	R, U
CO-2	Describes the structure, nutrition and reproduction of bacteria and viruses	PSO 1, PSO 5	R
CO-3	Analyze the quality of milk and fermented foods	PSO 1, PSO 3, PSO 6	U
CO-4	Explain cultivation and purification of single cell protein.	PSO 1, PSO3	R
CO-5	Relate the uses of microbes with reference to beverages, antibiotics, vaccines & tanning	PSO 1, PSO 5	R,U
CO-6	Illustrate the disease cycle of bacterial and fungal pathogens of plants.	PSO 1 PSO 6	U
CO-7	Develop the employability skills by learning the structure, reproduction and applied aspects of microbes	PSO-1	C

Course Title		MAJOR ELECTIVE 1 –FOREST RESOURCES & THEIR UTILIZATION	
Course Code		U15BO3MET01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the properties of wood	PSO 1, PSO 5	R, U
CO-2	Describes the economic importance of wood	PSO 1, PSO 5	R
CO-3	Analyze the sources of fibres and fodders	PSO 1, PSO 3, PSO 6	U
CO-4	Explain the sources, properties and uses of Oils, Waxes & rubber	PSO 1, PSO3	R
CO-5	Explain the sources, properties and uses of tannin, dye, resin and gums	PSO 1, PSO 5	R,U

Course Title		ALLIED COMPULSORY 4 – PAPER I- PLANT DIVERSITY, TAXONOMY, ANATOMY, EMBRYOLOGY, ECOLOGY AND PHYSIOLOGY	
Course Code		U15BO3ACT04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall and relate the general characters of algae and fungi	PSO 1, PSO 3	R, U
CO-2	Explain the life cycle patterns of bryophyte and pteridophytes	PSO 1, PSO 3	U
CO-3	Compare the reproductive patterns of cryptogamic plants	PSO 1, PSO 3	U, An
CO-4	Outline the internal structure of dicot plants	PSO3	R, U
CO-5	Explain the developmental process of dicot embryo	PSO 1, PSO 3	U
CO-6	Compare and contrast the floral characters of different families	PSO 1 PSO 6	U, An
CO-7	Explain the photosynthetic system of plants	PSO 1	U
CO-8	Explain the respiration process of plants.	PSO 1	U
CO-9	Develop the employability skills by understanding the basic and fundamental concepts of various branches of botany	PSO-1	C

Course Title		MAJOR CORE 5 - ANATOMY, EMBRYOLOGY AND SEED TECHNOLOGY		
Course Code		U15BO4MCT05		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the tissue systems, structure of stomata, sclereid, raphide and laticifers.	PSO 1 PSO 3	R, U	
CO-2	Describe the structure of root, shoot and nodal types of dicot plants.	PSO 1 PSO 3	R, U	
CO-3	Illustrate the structure of anther.	PSO 1 PSO 3	R, U	
CO-4	Discuss the microsporogenesis and megasporogenesis.	PSO 1 PSO 3	R, U	
CO-5	Discuss the types of pollination, endosperm and embryo.	PSO 1 PSO 3	R, U	
CO-6	Explain the process of fertilization.	PSO 1 PSO 3	R, U	
CO-7	Describe the structure of monocot and dicot seed.	PSO 1 PSO 3	R, U	
CO-8	Explain the reserve food, longevity and viability.	PSO 1 PSO 2 PSO 5	R, U	
CO-9	Discuss the concept of seed certification, inspection and legislation.	PSO 1 PSO 2 PSO 5	R, U	
CO-10	Develop the employability skills by learning the anatomical features of different parts of plant and developmental stages of reproductive parts of plant	PSO-1	C	

Course Title		MAJOR CORE 6 – PRACTICAL 2 – CELL BIOLOGY, BIostatISTICS, ANATOMY, EMBRYOLOGY AND SEED TECHNOLOGY		
Course Code		U16BO4MCP06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Describe the structure of cell organelles, and identify the stages of mitotic and meiotic division.	PSO 1 PSO 3	R, U	
CO-2	Calculate the mean, median, mode, standard deviation	PSO 1 PSO 3	R, U	
CO-3	Describe the structure of stomata, root, shoot and nodal types of dicot plants	PSO 1 PSO 3	R, U	
CO-4	Describe the microscopical study of epidermal hairs, sclereids, raphides, cystolith and starch grains.	PSO 1 PSO 3	R, U	
CO-5	Illustrate the structure of anther.	PSO 1 PSO 3	R, U	
CO-6	Describe the embryosac, endosperm and embryo.	PSO 1 PSO 3	R, U	
CO-7	Describe the structure of monocot and dicot seed.	PSO 1 PSO 3	R, U	
CO-8	Examine the seed germination and viability tests.	PSO 1 PSO 2	R, An	
CO-9	Develop the practical skills by illustrating the ultra structure of plant cell organelles, cell division, structure of anther, embryo sac, endosperm, embryo and examine the seed testing and calculate the central tendency and deviation	PSO-1	C	

Course Title		ALLIED CORE 5 – PAPER II – BIOPROSPECTING AND PLANT BIOTECHNOLOGY	
Course Code		U15BO4ACT05	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the cultivation practices, economic products and uses of various plants	PSO 1	R, U
CO-2	Explain the method of cultivation of paddy to increase the yield into manifold	PSO 1	R, U
CO-3	Analyze the sources and uses of vegetables, fruits, fibre, wood and rubber	PSO1, PSO 5	U, An
CO-4	Explain the extraction methodology of various phytoconstituents	PSO1, PSO 5	U, An
CO-5	Summarize the sources, extraction and uses of different plant products	PSO1, PSO 5	R, U
CO-6	Utilize the biotechnological methods to develop plants using <i>in vitro</i> propagation	PSO1, PSO 2	U, Ap
CO-7	Develop the employability skills by understanding the utilization of plants as food, medicine and cosmetics	PSO-1	C

Course Title		ALLIED COMPULSORY 6 – PAPER III– PRACTICAL PAPER – I PLANT DIVERSITY, ANATOMY, EMBRYOLOGY, TAXONOMY OF ANGIOSPERM, PLANT PHYSIOLOGY, ECOLOGY, BIOPROSPECTING AND PLANT BIOTECHNOLOGY	
Course Title		U15BO4ACP06	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall, relate and explain the general characters of algae and fungi, the life cycle patterns of bryophyte and pteridophytes	PSO 1, PSO 3	R, U
CO-2	Outline and explain the internal structure of dicot plants, the developmental process of dicot embryo	PSO 1, PSO3	R, U
CO-3	Compare and contrast the floral characters of different families	PSO 1 PSO 6	U, An
CO-4	Explain the photosynthetic system of plants and the respiration process of plants.	PSO 1	U
CO-5	Explain and Utilize the, economic products and uses of various plants, biotechnological methods to develop plants using <i>in vitro</i> propagation	PSO 1 PSO 2	U, Ap
CO-6	Develop the practical skills by observing the basic structure and life cycle patterns of plant diversity and morphological and anatomical features of higher plants	PSO-1	C

Course Title		MAJOR CORE -7 GENETICS AND PLANT BREEDING	
Course Code		U15BO5MCT07	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the laws of Mendel in classical genetics and deviations from Mendelian ratios.	PSO 1	U
CO-2	Describe the complementary factor, epistasis and duplicate factor.	PSO 1	R
CO-3	Discuss linkage, crossing over and sex determination.	PSO 1 PSO 3	U
CO-4	Explain the concepts of cytoplasmic inheritance and mutation	PSO 1 PSO 3	U
CO-5	Evaluate the significance of Hardy Weinberg law.	PSO 1 PSO 3	U
CO-6	Paraphrase the conventional methods of plant breeding.	PSO 1 PSO 3	U
CO-7	Summarise the types of polyploidy	PSO 3	,U
CO-8	Describe the role of organizations involved in plant improvement.	PSO 3	R
CO-9	Develop the employability skills by understanding Mendel's ratios and deviation, linkage and crossing over and the conventional methods of plant breeding	PSO-1	C

Course Title		MAJOR CORE – 8 MORPHOLOGY, TAXONOMY OF ANGIOSPERMS AND ETHNOBOTANY		
Course Code		U15BO5MCT08		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Differentiate the morphological variation of the plant parts	PSO 1 PSO 6	R, U	
CO-2	List the importance of botanical nomenclature	PSO 1 PSO 6	R	
CO-3	Indicate the importance of herbariums	PSO 1 PSO 6	U	
CO-4	Outline the classification of Bentham and Hooker and others	PSO 1 PSO 6	R	
CO-5	Illustrate the salient features of plants belonging to the families Annonaceae to Apiaceae	PSO 1 PSO 6	An	
CO-6	Distinguish the plants belonging to the families rubiaceae to poaceae	PSO 1 PSO 6	U	
CO-7	Correlate relationship and human and plants	PSO 1 PSO 5	R, An	
CO-8	Evaluate the origin and application of traditional medicine system	PSO 1 PSO 5	U	
CO-9	Develop the employability skills by understanding the vegetative and floral characters of angiosperms and their economic values, ethnobotanical applications and traditional medicine	PSO-1	C	

Course Title		MAJOR CORE – 9 PHARMACOGNOSY	
Course Code		U15BO5MCT09	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Define the types of natural drugs	PSO 1 PSO 5	R, U
CO-2	Explain the collection and processing of crude drugs.	PSO 1 PSO 5	U
CO-3	Summarize and analyse the phytoconstituents of therapeutic values of plant drugs	PSO 1 PSO 8	U, An
CO-4	Analyse the drug adulteration	PSO 1 PSO 8	An
CO-5	Lists the indogenous traditional drugs	PSO 1 PSO 5	R
CO-6	Explain the medicinal properties of traditional drug	PSO 1 PSO 5	R, U
CO-7	Discuss the various plants as technical products	PSO 1 PSO 5	R, U
CO-8	Describe the plants as pharmaceutical aids	PSO 1 PSO 5	R, U
CO-9	Develop the employabilty by learning the classification, constituents, collection, processing and uses of crude drugs obtained from various plant parts.	PSO-1	C

Course Title		MAJOR CORE 10 – PRACTICAL III GENETICS, PLANT BREEDING, MORPHOLOGY, TAXONOMY OF ANGIOSPERMS, ETHNOBOTANY AND PHARMACOGNOSY		
Course Code		U15BO5MCP10		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the laws of Mendel in classical genetics and deviations from Mendelian ratios.	PSO 1 PSO2	R, U	
CO-2	Describe the morphological variation of the plant parts	PSO 1 PSO 2	U	
CO-3	Illustrate the salient features of plants belonging to Polypetalae.	PSO 1 PSO 2	U	
CO-4	Illustrate the salient features of plants belonging to Gamopetalae.	PSO 1 PSO 2	U	
CO-5	Illustrate the salient features of plants belonging to Monocotyledons.	PSO 1 PSO 3	U	
CO-6	Analyse the drug adulteration	PSO 1 PSO 3	An	
CO-7	Evaluate the origin and application of traditional medicine system	PSO 5 PSO 6	R	
CO-8	Describe the medicinal properties of traditional drug	PSO 5 PSO 6	R, U	
CO-9	Develop the practical skills by learning problems in genetics with examples, technical description of vegetative and floral parts of various families and basic aspects of pharmacognosy	PSO-1	C	

Course Title		MAJOR ELECTIVE – 2 FOOD AND NUTRITION		
Course Code		U15BO5MET02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Distinguish the different classes of food.	PSO 1 PSO 6	R, U	
CO-2	Summarize the functions of food	PSO 1 PSO 7	U,An	
CO-3	Describe the nutritive value and sources of food products	PSO 1 PSO 5	U	
CO-4	Discuss the various methods of food preservation	PSO 1 PSO 5	R, U	
CO-5	Classify the toxic substances in food and food adulteration	PSO 1 PSO 7	An	
CO-6	Describe the different types of food additives	PSO 1 PSO 5	R, U	
CO-7	Discuss the role of International & National Agencies	PSO 1 PSO 5	R, U	
CO-8	Develop the employability skills by learning the various aspects of foods, their nutritive value, preservation, processing, food-adulteration, laws and standards	PSO-1	C	

Course Title		MAJOR ELECTIVE – 2 HORTICULTURE AND INTEGRATED PEST MANAGEMENT	
Course Code		U15BO5MET05	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the importance of Horticulture	PSO 1 PSO 6	R, U
CO-2	Describe the concept, importance and classification of plant diseases	PSO 1 PSO 7	U,An
CO-3	Explain the morphological, structural & biochemical defense mechanisms in plants	PSO 1 PSO 5	U
CO-4	Describe the causative organism, symptoms, etiology & control measures of the bacterial and viral diseases	PSO 1 PSO 5	R, U
CO-5	Explain the chemical & Biological methods of pest control.	PSO 1 PSO 7	An

Course Title		NON MAJOR ELECTIVE 1 – FOOD SCIENCE AND TECHNOLOGY	
Course Code		U15BO5NMT01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	List the major classes of food, and their nutrients.	PSO 1	R, U
CO-2	Differentiate types of cooking.	PSO 1	U, An
CO-3	Explain the loss of nutrients during cooking.	PSO 1 PSO 7	U
CO-4	Classify the types of food additives .	PSO 1 PSO 7	U
CO-5	List the different role of international agencies.	PSO 1 PSO 7	R, U
CO-6	Summarize various methods of food preservation	PSO 1 PSO 7	U
CO-7	Discuss food preservation techniques in various food preparation	PSO 1 PSO 7	U, Ap
CO-8	Develop the entrepreneur skills by learning the nutritive values of food, processing and preservation of food	PSO-1	C

Course Title		MAJOR CORE 11 – PLANT PHYSIOLOGY AND BIOCHEMISTRY		
Course Code		U15BO6MCT11		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the concept of water and mineral absorption in plant system and their role.	PSO 1 PSO 3	R, U	
CO-2	Explain the various pathways involved in respiration and photosynthesis	PSO 1 PSO 3	R	
CO-3	Differentiate C ₃ and C ₄ cycle	PSO 1 PSO 3	U, An	
CO-4	Explain CAM plants and factors affecting photosynthesis	PSO 1 PSO 3	R	
CO-5	Illustrate the mechanism of biological nitrogen fixation, nitrogen cycle, plant growth regulators and its applications related to various physiological activities.	PSO 1 PSO 3	An	
CO-6	Outline the structure of an atom	PSO 1 PSO 3	U	
CO-7	Explain the structure, properties and biological significance of carbohydrates	PSO 1 PSO 3	R, U	
CO-8	Describe the significance of aminoacids and proteins	PSO 1 PSO 3	U	
CO-9	Discuss the importance of enzymes, vitamins and alkaloids	PSO 1 PSO 3	U	
CO-10	Develop the employability skills by learning the fundamentals of plant physiology and biochemistry	PSO-1	C	

Course Title		MAJOR CORE 12 - PLANT TISSUE CULTURE, GENETIC ENGINEERING AND NANOTECHNOLOGY		
Course Code		U15BO6MCT12		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Discuss the tissue culture techniques in micro propagation of rare and medicinal plants	PSO 1 PSO 2	U	
CO-2	Describe the alternative techniques for mass propagation	PSO 1 PSO 2	R	
CO-3	Distinguish the tools and techniques adopted in production of transgenic plants	PSO 1 PSO 2	U,	
CO-4	Explain the production of recombinant hormone, vaccine	PSO 1 PSO 2	U	
CO-5	Enumerate the role of GMOs in the field of medicine, agriculture and bioremediation.	PSO 1 PSO 2	R	
CO-6	Summarize the basics of nanotechnology and its role in agriculture, medicine and environment	PSO 1 PSO 2	U	
CO-7	Develop the employability skills by understanding the basic and recent trends of plant tissue culture, recombinant DNA technology and nanotechnology	PSO-1	C	

Course Title		MAJOR ELECTIVE 3 – INSTRUMENTATION AND BOTANICAL TECHNIQUES	
Course Code		U15BO6MET03	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the principle and working mechanism of light microscope	PSO 1 PSO 3	R, U
CO-2	Describe the ocular and stage micrometer	PSO 1 PSO3	R, U
CO-3	Explain the working principles and applications of Colorimeter and pH meter	PSO 1 PSO 3	U
CO-4	Describe the working principle of Dialysis and chromatography centrifuge	PSO 1 PSO 3	R,U
CO-5	Explain the botanical techniques, microtomy, and staining for preparing permanent slides	PSO 1 PSO 3	R, U
CO-6	Describe the basics techniques of DNA and protein studies and also localization of carbohydrates, proteins and lipids	PSO 1 PSO 2	U
CO-7	Develop the employability skills by understanding the botanical techniques, working principles and applications of biological instruments	PSO-1	C

Course Title		MAJOR ELECTIVE 3 – PLANTS IN HUMAN HEALTH CARE	
Course Code		U15BO6MET06	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the energy value of carbohydrates	PSO 1 PSO 3	R, U
CO-2	Describe the importance of pulses in Human nutrition	PSO 1 PSO3	R, U
CO-3	Explain the nutritive and fibre value of greens and vegetables	PSO 1 PSO 3	U
CO-4	Describe the Nutritive and antioxidant value of fruits	PSO 1 PSO 3	R,U
CO-5	Explain the Medicinal values of plants and its products	PSO 1 PSO 3	R, U

Course Title		MAJOR CORE -13 PRACTICAL IV PLANT PHYSIOLOGY, BIOCHEMISTRY, PLANT TISSUE CULTURE, GENETIC ENGINEERING AND NANOTECHNOLOGY		
Course Code		U15BO5MCP13		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Describe the mechanism of water absorption, plasmolysis, and transpiration.	PSO 1 PSO 3	R, U	
CO-2	Determine the respiration rate by Ganong's respiroscope and the quality of light on photosynthesis.	PSO 1 PSO 3	R	
CO-3	Identify the plant pigments by various separation techniques.	PSO 1 PSO 3	U, An	
CO-4	Calculate the quantity of primary and secondary metabolites of plant by standard procedures.	PSO 1 PSO 3	An	
CO-5	Demonstrate the working principle of dialysis, centrifuge and colorimeter.	PSO 1 PSO 3	An	
CO-6	Describe the preparation of medium, sterilization and inoculation of explants and incubation.	PSO 1	R	
CO-7	Develop the employability and practical skills by learning the experiments on plant physiology, preparation of solutions on biochemistry and plant tissue culture techniques	PSO-1	C	

Course Title		NON MAJOR ELECTIVE 2 - HERBAL REMEDIES		
Course Code		U15BO6NMT02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Write the scope and importance of herbal medicine	PSO 1 PSO 5	R, U	
CO-2	Discuss the importance of Indian system of medicine.	PSO 1 PSO 5	R, U	
CO-3	Explain the alternate herbal remedies for common ailments.	PSO 1 PSO 5	U	
CO-4	Relate the skin, hair care and uterus problems by natural ways.	PSO 1 PSO 5	U, An	
CO-5	Design the herbal garden.	PSO 1 PSO 5	U, Ap	
CO-6	Demonstrate the herbal preparations.	PSO 1 PSO 5	U, An	
CO-7	Develop the practical skills by learning herbal medicine, home remedies for common ailments and designing the herbal garden	PSO-1	C	

Course Title		SBE- 3 BOTANICAL SKILLS FOR CHEMICAL SCIENCES (THEORY CUM LAB) FOR CHEMISTRY STUDENTS		
Course Code		U17BO3SBT03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the basic organization in plants	PSO 1	R, U	
CO-2	Illustrate the structure of dicot root and stem	PSO 1 PSO 3	U	
CO-3	Explain the basic Physiological function of plants	PSO 1 PSO 3	R, U	
CO-4	Explain the steps involved in production of protein rich organism	PSO 1 PSO 2	U	
CO-5	Bring out the salient features of tissue culture techniques in micro propagation	PSO 1 PSO 2	U, An	
CO-6	Develop the practical skills by learning the fundamental organization of plants and cultivation of protein rich products to become an entrepreneur	PSO-1	C	

Course Title		SBE- 4 BOTANICAL SKILLS FOR PHYSICAL SCIENCES (THEORY CUM LAB) FOR PHYSICS STUDENTS	
Course Code		U17BO5SBT04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the basic organization plants	PSO 1	R, U
CO-2	Illustrate the structure of dicot root and stem	PSO 1 PSO 3	U
CO-3	Explain the basic Physiological function of plants	PSO 1 PSO 3	R, U
CO-4	Explain the steps involved in production of protein rich organisms	PSO 1 PSO 2	U
CO-5	Bring out the salient features of tissue culture techniques in mico propagation	PSO 1 PSO 2	U, An
CO-6	Develop the practical skills by learning the fundamental organization of plants and cultivation of protein rich products to become an entrepreneur	PSO-1	C

Course Title		SBE – 5 TECHNIQUES IN BOTANY	
Course Title		U15BO6SBP05	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the preparation of different chemical solution	PSO 1	U, Ap
CO-2	Demonstrate the methods of measuring plant parts and histochemical localization of phytochemicals	PSO 1 PSO 8	U, An
CO-3	Explain the method of microtome sectioning	PSO 1 PSO 3	U, AP
CO-4	Describe the isolation and identification of DNA	PSO 1 PSO 3	U, AP
CO-5	Evaluate the statistical data through SPSS	PSO 1 PSO 4	U, An
CO-6	Develop the employability and practical skills by learning the preparation of solutions, measurement of plant organs using micrometer, microtome sectioning, electrophoretic techniques, application of statistical data and bioinformatics	PSO-1	C

Programme: M. Sc. Botany with specialization in Plant Biotechnology

PO No.	Programme Outcomes <i>Upon completion of the M. Sc. Degree Programme, the post graduate will be able to</i>
PO-1	Obtain quality education in the advanced areas of Botany
PO-2	Acquire practical skills in plant diversity and its related subjects
PO-3	Write and formulate research projects/translate the research data into research p Projects and further to publicize it
PO-4	Competant enough to face the competitive exams at national /state level (UGC-NET, CSIR/ SET etc.)and acquire academic excellence with an aptitude for higher studies and research
PO-5	Develop Scientific tools to formulate phyto drugs to fulfill the needs of the society and to respect and conserve nature and the environment
PO-6	Identify the angiosperms by applying keys and obtain technical skills for start –up programme

PSO No.	Programme Specific Outcomes <i>Upon completion of these courses the student would</i>
PSO-1	Apply the acquired scientific knowledge to give solutions to lead a healthy life, protect the environment, energy need, safety, nutritious food, good environment, clean water, air and phytomedicines
PSO-2	Become aware about plant diversity, development, anatomical, molecular mechanism, inheritance characters, mechanism of physiological functions, biomolecular structure, changes and their consequences and recent techniques
PSO-3	Develop entrepreneurship skills in various fields like microbial techniques,cultivation of medicinal plants, identification of plants, cultivation of biofertilizers, mushrooms, handling of instruments and research skills through the projects
PSO-4	Carryout the field work, research projects individually and prepare herbal medicines for common ailments and traditional nutritive food
PSO-5	Design and carryout the biological experiments and to interpret data to give meaningful solution and recommendations
PSO-6	Apply and correlate the relationship between plant physiology, Biochemistry, Biotechnology, Biophysics and Biometrics
PSO-7	Become aware of environmental issues, environmental laws and applications of remote sensing in environmental studies

Course Title		MAJOR CORE 1- PHYCOLOGY, MYCOLOGY AND PHYTOPATHOLOGY	
Course Code		P15BO1MCT01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the classification, thallus organisation and life cycle patterns of various classes of algae.	PSO 1,2	R
CO-2	Describe the symbiotic association, nitrogen fixation and water bloom toxicity in algae.	PSO 2	R
CO-3	Explain and classify ecology, structure, mode of reproduction and life cycle pattern of fungi.	PSO 2	R, U
CO-4	Draw, explain nutrition, parasexuality, heterothallism, physiology of reproduction, sex hormones	PSO 2	R, U
CO-5	Classify the mycorrhizae and write the economic importance of fungi	PSO 6	An, R
CO-6	Explain the various kinds of plant diseases and pathogenesis	PSO 1	R
CO-7	Describe the defense mechanisms in plants.	PSO 1	R
CO-8	Explain the physiological activities of diseased plants.	PSO 1	R
CO-9	Develop the employability skills by cultivating the algae and fungi	PSO-1	C

Course Title		MAJOR CORE 2- BRYOLOGY, PTERIDOLOGY & GYMNOSPERMOLOGY	
Course Code		P15BO1MCT02	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the classification of Bryophytes and their economic importance	PSO 2	An
CO-2	Compare the gametophytes and sporophytes, spore dispersal mechanism of major classes of Bryophytes	PSO 2	U
CO-3	Compare gametophytes and sporophytes and life cycle patterns of major classes of Pteridophytes	PSO 2	U
CO-4	Relate the evolutionary significance of major classes of pteridophytes	PSO 4	U
CO-5	Describe the evolutionary significance of major classes of Gymnosperms.	PSO 4	R, U
CO-6	Explain the economic importance of Gymnosperms	PSO 2	R,U
CO-7	Compare the morphology, reproduction and phylogeny of major classes of Gymnosperms	PSO 2	An,U
CO-8	Discuss the evolution of gametophytes in gymnosperms	PSO 4	R,U
CO-9	Develop the Employability skills by learning the life cycle patterns of Bryophytes, Pteridophytes and Gymnosperms	PSO-1	C

Course Title		MAJOR CORE 3- PLANT ANATOMY, DEVELOPMENTAL BIOLOGY AND MORPHOGENESIS	
Course Code		P15BO1MCT03	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the apical organization of root and stem	PSO 2	An
CO-2	Compare the basic organization of xylem and phloem	PSO 2	An
CO-3	Relate the structure and function of wood	PSO 2	An
CO-4	Explain the basic structure and functions of pollen grains	PSO 4	U
CO-5	What are the methods used to overcome sexual incompatibility	PSO 4	R, U
CO-6	Describe the various types of endosperm and embryo	PSO 2	R,U
CO-7	Discuss the basics of genesis of various tissues	PSO 2	An,U
CO-8	Explain the role of nucleus and cells in differentiations	PSO 2, PSO 4	R,U
CO-9	Develop the Employability skills by learning theories and application of different fields of Botany Plant Anatomy, Developmental Biology and Morphogenesis	PSO-1	C

Course Title		MAJOR CORE 4- GENERAL MICROBIOLOGY	
Course Code		P15BO1MCT04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the structure of different types of microbes	PSO 1, 3	R
CO-2	Compare the multiplication methods of various microorganisms	PSO 3	U
CO-3	Illustrate the staining methods used for the identification of bacteria	PSO 1, 3	R, U
CO-4	Explain the interaction of soil microbes	PSO 1, 3	R, U
CO-5	Discuss the role of microbes in organic matter decomposition	PSO 1,3, 6	An, R
CO-6	Examine the adverse effect of air borne microbes in human health	PSO 1, 3	R
CO-7	List the microbes in food and dairy products.	PSO 1, 3	R, An
CO-8	Discuss the microbial diversity in milk and milk products	PSO 1, 3	R
CO-9	Explain food borne infections and industrial production of vinegar	PSO 1, 3	R, U
CO-10	Develop the Employability skills by learning the diversity of microorganisms and to understand their relationships with soil, water and air	PSO-1	C

Course Title		MAJOR CORE 5 –PRACTICAL – I PLANT DIVERSITY, PHYTOPATHOLOGY, PLANT ANATOMY, DEVELOPMENTAL BIOLOGY AND GENERAL MICROBIOLOGY	
Course Code		P15BO1MCP05	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Examine, dissect out, identify, draw, and explain the structure of important algal forms	PSO 2	R, U, An
CO-2	Examine, dissect out, identify, draw, and explain the structure of important fungal forms	PSO 2	R, U, An
CO-3	Categorize, identify, draw and explain the plant disease.	PSO 2	R, U, An
CO-4	Examine, dissect out, identify, draw, and explain the structure of important Bryophytes and pteridophytic forms	PSO2	R,U,An
CO-5	Examine, dissect out, identify, draw, and explain the structure of important Gymnosperm and fossils forms	PSO2	R,U,An
CO-6	Identify and draw the radial longitudinal and tangential longitudinal structure of wood	PSO 2	R,U
CO-7	Examine the effect of growth substances on pollen germination, tube growth and viability.	PSO 2	R,U
CO-8	Analyse the growth pattern of Bacteria and Fungi	PSO 2	R,U,An
CO-9	Examine water quality and milk quality	PSO 2	R,U
CO-10	Develop the practical skills by understand, dissect out, identify structure of different algal and fungal forms and to identify and study the different plant diseases	PSO-1	C

Course Title	MAJOR CORE 6 INHERITANCE BIOLOGY AND MOLECULAR BIOLOGY		
Course Code	P15BO2MCT06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Differentiate gene interaction, gene regulation in prokaryotes and eukaryotes.	PSO 1,2,	An, R
CO-2	Explain the environmental effects and gene expression.	PSO 1,7	R,U
CO-3	Describe the microbial genetics,population genetics.	PSO 1, 2	R, U
CO-4	Outline the genetic mechanisms of evolution	PSO 1, 2	R, U
CO-5	Illustrate the forms of DNA	PSO 1, 2	U
CO-6	Explain the chromosomal protein, C – value paradox and advances in the study of hereditary material	PSO1, 2	U
CO-7	Describe the mechanism of DNA replication and mutation	PSO 1, 2	R, An
CO-8	Explain the mechanism of transcription, translation and protein targeting – signal hypothesis	PSO 1, 2	R
CO-9	Develop the Employability skills by understanding the gene interaction, regulation of gene action, Microbial genetics, population genetics, genetic mechanism of evolution, molecular biology and DNA replication, transcription and translation	PSO-1	C

Course Title		MAJOR CORE 7 PLANT BIOTECHNOLOGY	
Course Code		P15BO2MCT07	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the plant tissue culture techniques to produce clones	PSO 1,2,	An, R
CO-2	Explain the commercial production of secondary metabolites.	PSO 1,7	R, U
CO-3	Explain the importance of protoplast and cytoplasm in biotechnology	PSO 1, 2	R, U
CO-4	Evaluate the significance of transgenic crops	PSO 1, 2	R, U
CO-5	Explain and apply the molecular pharming to produce commercial products.	PSO 1, 2	U, A
CO-6	Explain the principles of genomics and proteomics and their molecular mechanisms	PSO1, 2	U
CO-7	Discuss the Phytochrome action and signal transduction.	PSO 1, 2	R, An
CO-8	Summarize phosphoinositide signaling in plants.	PSO 1, 2	R
CO-9	Develop the Employability skills by understanding various plant tissue culture techniques, transgenic plants and molecular pharming and the principles of proteomics and genomics	PSO-1	C

Course Title		MAJOR CORE 8 ENVIRONMENTAL BIOTECHNOLOGY, CONSERVATION OF RESOURCES AND REMOTE SENSING	
Course Code		P15BO2MCT08	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Classify the renewable and non-renewable resources	PSO 1 PSO 7	R, U
CO-2	Define the types of natural resources, their uses and impact of their degradation	PSO 1 PSO 7	R
CO-3	Enumerate environmental pollution, environmental monitoring and abatement	PSO 1 PSO 7	U
CO-4	Analyse the soil and water samples.	PSO 1 PSO 7	R, An
CO-5	Compare the ex-situ and in-situ conservation of biodiversity	PSO 1 PSO 7	U
CO-6	Outline the social issues of environment	PSO 1 PSO 7	U
CO-7	Summarize the application of remote sensing in environmental issues	PSO 1 PSO 7	R, U
CO-8	Describe the role of national and international agencies in environmental monitoring and conservation of natural resources.	PSO 1 PSO 7	U
CO-9	Develop the Employability skills by learning the natural resources, environmental pollution and monitoring	PSO-1	C

Course Title		MC 9 PRACTICAL – II INHERITANCE BIOLOGY, MOLECULAR BIOLOGY, PLANT BIOTECHNOLOGY, ENVIRONMENTAL BIOTECHNOLOGY AND REMOTE SENSING	
Course Code		P15BO2MCP09	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Analyse the F2 and test cross progeny data and percentage of crossing over	PSO 1,2,	An, U
CO-2	Describe and analyse simple problems involving multiple gene inheritance, gene sequence and map distances	PSO 1,2	An,U
CO-3	Analyse the mitotic and meiotic cell division	PSO1.,2	An, U
CO-4	Produce the clones through plant tissue culture techniques	PSO 5,6	R, U, An
CO-5	Explain and Produce the plants commercially through organogenesis and varients from somatic embryogenesis	PSO 5,6	R, U, An
CO-6	Explain and isolate and culture the protoplast and design the synthetic seeds from somatic embryos for conservation.	PSO 5, 6	R, U, An
CO-7	Analyse the soil and water samples	PSO 1 PSO 7	R, An
CO-8	Summarize the application of remote sensing in environmental issues	PSO 1 PSO 7	R, U
CO-9	Develop the practical skills by understand, analyze the genetic problems,molecular techniques, basic techniques of plant tissue culture and analysis of water quality	PSO-1	C

Course Title		NON MAJOR ELECTIVE I PLANTS AND HUMAN WELFARE	
Course Code		P15BO2NMT01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	List the importance of lower and higher plants.	PSO 2	R, U
CO-2	Discuss the cultivation methods of lower and higher plants.	PSO 2 PSO 3	R, U
CO-3	Explain the cultivation and processing of different crops and their uses	PSO 2 PSO 3	U
CO-4	Discuss the role of plants in medicine	PSO 3 PSO 4	R, U
CO-5	Explain the importance of biofertilizer and biopesticides.	PSO 2 PSO 3	U
CO-6	Lists the industrial products obtained from plants.	PSO 4 PSO 6	U
CO-7	Develop the Employability skill by understanding the importance of plants as food, medicine and also in agriculture, industry and forest	PSO-1	C

Course Title		MAJOR CORE-10 ANGIOSPERM SYSTEMATICS	
Course Code		P15BO3MCT10	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Distinguish the types of classification	PSO 2, PSO 5	An
CO-2	Describe the taxonomic literature and BSI	PSO 3, PSO 5	R
CO-3	Explain the herbarium technique, botanical nomenclature and key preparation	PSO 2, PSO 5	R, An
CO-4	Describe the recent techniques in taxonomy	PSO 2, PSO 5	R,U
CO-5	Illustrate and compare the floral characters of Polypetalae	PSO 3, PSO 4	R, U
CO-6	Explain the taxonomical characters of gamopetalae families	PSO 2, PSO 5	R,U
CO-7	Identify and Differentiate the characters of monochlamydeae	PSO 3, PSO 4	R, U, An
CO-8	Explain the characters of monocot families	PSO 2, PSO 4	R, An
CO-9	Enumerate the economic importance of Angiosperms	PSO 1, PSO 3	U
CO-10	Develop the Employability skills by learning the importance and types of classification of angiosperms and their characters and economic importance, herbarium technique, botanical nomenclature, modern trends in taxonomy	PSO-1	C

Course Title		MAJOR CORE 11- RESEARCH METHODOLOGY	
Course Code		P15BO3MCT11	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the construction and application of different types of microscope	PSO 2, PSO 5	An
CO-2	Explain the techniques of histochemistry	PSO 2, PSO 5	An
CO-3	Explain the preparation of material for light and electron microscopy	PSO 2, PSO 5	An
CO-4	Explain the principle and construction of the instruments used for the qualitative and quantitative of biopolymers	PSO 4, PSO 5	U
CO-5	Identify the applications of the various instruments used for the qualitative and quantitative of biopolymers	PSO 4, PSO 5	R, U
CO-6	Compare and contrast the different types of chromatographic and electrophoretic techniques mentioned in the syllabus	PSO 2, PSO 5	R,U
CO-7	Develops the techniques used to trace and quantify the Radioisotopes	PSO 2	An,U
CO-8	Discuss the methodologies adopted to consolidate the research findings into thesis and manuscript	PSO 2, PSO 4	C
CO-9	Develop the Employability skills by learning the application of various instruments and their function with the principle applied in research field.	PSO-1	C

Course Title		MAJOR CORE-12 PRACTICAL 3 ANGIOSPERM SYSTEMATICS AND RESEARCH METHODOLOGY	
Course Code		P15BO3MCP12	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Analyse the characters of plants and prepare dichotomous key	PSO2,	R, U,An
CO-2	Analyse the rules of nomenclature	PSO2,	R,U,An
CO-3	Understand, analyze, Identify and describe the locally available specimens of Gamopetalae and Polypetalae	PSO2,	R,U,An
CO-4	Understand, analyze, Identify and describe local specimens of Monocotyledons and Monochlamydeae mentioned in the syllabus	PSO2,	R,U,An
CO-5	Understand and apply the method of hand and microtome sectioning and staining	PSO5	R,U, An
CO-6	Understand and apply the procedure for histochemical test,buffer preparation and standard graph	PSO5	R, U, An
CO-7	Develop the practical skills by identify the Angiospermic plants, prepare dichotomous key, prepare permanent slides, prepare standard graph and preparation of buffers	PSO-1	C

Course Title		ME 1- RECOMBINANT DNA TECHNOLOGY	
Course Code		P15BO3MET01	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the role of molecular tools and cloning vectors in genetic engineering.	PSO1, PSO3	R, U
CO-2	Describe the techniques of genetic engineering.	PSO4, PSO3	U
CO-3	Discuss the different types of blotting techniques	PSO1, PSO3	U
CO-4	Explain the tools and techniques adopted in amplification of DNA	PSO1, PSO5	U
CO-5	Relate the different kinds of screening strategies	PSO1, PSO5	R,U
CO-6	Describe the pharmaceutical products of DNA	PSO1, PSO5	R, U
CO-6	Explain gene therapy methods and its application	PSO1, PSO3	R, U
CO-6	Analyze the disease by DNA assay	PSO1, PSO5	R, U, An
CO-7	Develop the Employability skills by learning the basic principles and recent techniques of genetic engineering, DNA amplification, Pharmaceutical products of DNA and DNA in disease diagnosis and medical forensics	PSO-1	C

Course Title		ME 1- 1 NANOTECHNOLOGY	
Course Code		P15BO3MET04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the the interaction between Biomolecules and Nanoparticle Surfaces	PSO1, PSO3	R, U
CO-2	Describe the the functional materials in food nanotechnology	PSO4, PSO3	U
CO-3	Discuss the the Diagnostic and Therapeutic Applications	PSO1, PSO3	U
CO-4	Explain the the concept of molecular nanomachines	PSO1, PSO5	U
CO-5	Relate the the types of core shell nanoparticles	PSO1, PSO5	R,U

Course Title		NME 2 – MAN AND MICROBES	
Course Code		P15BO3NMT02	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the basic inventory of microbes and their role in food processing	PSO1, PSO3	R, U
CO-2	Analyse the role of microbes in agriculture	PSO1, PSO3	R,U
CO-3	Explain the role of microbes in environment and the techniques adopted in treating waste solid and liquid	PSO1, PSO3	R,U
CO-4	Analyse the role of microbes in industry	PSO1, PSO3	R,U
CO-5	Explain the major disease of human caused by microbes	PSO1, PSO3	R,U
CO-6	Summarize the role of beneficial microbes in human health	PSO1, PSO3	R, U, An
CO-7	Develop the Employability skills by understanding the basics of microbiology and uses of microbes (beneficial and detrimental)	PSO-1	C

Course Title		MC 13 PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS	
Course Code		P15BO4MCT13	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Compare the different cycles and pathways of Photosynthesis and Respiration	PSO2, PSO5	R, U
CO-2	Explain the Molecular mechanisms of biological nitrogen fixation	PSO2, PSO5	R,U
CO-3	Discuss the importance of Phytochrome and stress physiology of plants	PSO2, PSO5	R,U
CO-4	Describe and classify the biomolecules of plants.	PSO2, PSO6	R,U, An
CO-5	Explain the structure of amino acids, enzymes and enzyme kinetics	PSO2, PSO6	R, U
CO-6	Explain the energy transfer processes and energy rich molecules in Biological system	PSO2, PSO6	R, U, An
CO-7	Develop the Employability skills by understanding the water relations and types of photosynthesis and nitrogen metabolism of plants and photobiology of plants	PSO-1	C

Course Title		MAJOR CORE 14 PRACTICAL 4 PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS	
Course Code		P15BO4MCP14	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand and determine water potential, osmotic potential In room temperature	PSO5	R, U, An
CO-2	Understand and analyze the types of pigments using chromatography, rate of photosynthesis, and amylase and Nitrate reductase activity enzyme activity	PSO5	R,U, An
CO-3	Understand and determine the estimation of Reducing sugars, Proteins, Ascorbic acid, total phenols and enzymes	PSO5	R,U, An
CO-4	Understand and apply the procedure for saponification value, chromatography and estimation of proline	PSO5	R,U, An
CO-5	Explain the structure of amino acids, enzymes and enzyme kinetics	PSO5	R, U, An
CO-6	Develop the practical skills by determining and analyzing the water potential, osmotic potential, pigments, rate of photosynthesis, enzyme activity, Reducing sugars, Proteins, Ascorbic acid, total phenol and enzymes, proline, ATP molecule, absorption spectrum and apply the procedure for saponification value and chromatography	PSO-1	C

Course Title		MAJOR ELECTIVE 2- BIOMETRICS AND BIOINFORMATICS		
Course Code		P15BO4MET02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the methods of data collection and presentation of data	PSO 2, PSO 5	An	
CO-2	Calculate the measure of central location and variability and coefficient of correlation and regression	PSO 2, PSO 5	An, Ap	
CO-3	Compare and apply the different theories of Probability	PSO 2, PSO 5	An	
CO-4	Explain the procedure for test of significance	PSO 4, PSO 5	An	
CO-5	Apply the different types of test of significance	PSO 4, PSO 5	Ap	
CO-6	Recall and relate the application of information technology in the field of biology	PSO 2, PSO 5	R,U	
CO-7	Make use of various bioinformatics tools to analyse molecular data	PSO 2	An,U	
CO-8	Demonstrate pairwise and multiple sequence alignment using bioinformatics tools	PSO 2, PSO 4	C	
CO-9	Develop the Employability skills by understanding the collection and presentation of data, measures of central location, variability, probability, correlation, regression and test of significance in biometrics	PSO-1	C	

Course Title		MAJOR ELECTIVE 2- GENOMICS AND PROTEOMICS		
Course Code		P15 BO4MET05		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level	
CO-1	Explain the structural organization of Prokaryotic and eukaryotic genomes	PSO 2, PSO 5	An	
CO-2	Describe the methods of conventional Sequencing techniques	PSO 2, PSO 5	An, Ap	
CO-3	Compare the dominant and codominant markers	PSO 2, PSO 5	An	
CO-4	List the applications of DNA markers	PSO 4, PSO 5	An	
CO-5	Explain the microarray technology	PSO 4, PSO 5	Ap	
CO-6	Describe the concept of protein engineering	PSO 2, PSO 5	R,U	

Course Title		MAJOR ELECTIVE 3 – CLINICAL MICROBIOLOGY & BASICS OF IMMUNOLOGY	
Course Code		P15BO4MET03	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the exact role of microbes	PSO 2, PSO 5	An
CO-2	Explain the safety measures adopted in pathological laboratory	PSO 2, PSO 5	An, Ap
CO-3	Elaborate the safety disposal of hazardous waste generated from the hospital	PSO 2, PSO 5	An
CO-4	Listout the techniques for common serological test	PSO 4, PSO 5	An
CO-5	recall and analyse the causes, symptoms and control measures of various diseases	PSO 4, PSO 5	Ap
CO-6	Explain the pathogenicity and disease cycle of Amoebiasis	PSO 2, PSO 5	R,U
CO-7	Distinguish the basics of immunology and the antigen-antibody interaction	PSO 2	An,U
CO-8	Identify the types of antibodies	PSO 2, PSO 4	C
CO-9	Distinguish cell mediated immunity and humoral immunity	PSO 2	An,U
CO-10	Develop the Employability skills by learning and remembering the role of microbes (beneficial and harmful) with human, environmental safety, various techniques of diagnosis, human diseases and basics of immunology	PSO-1	C

Course Title		MAJOR ELECTIVE 3 – PLANT DIASEASE AND PEST MANAGEMENT	
Course Code		P15BO4MET07	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the classification of plant diseases	PSO 2, PSO 5	An
CO-2	Discuss the host-parasite interactions	PSO 2, PSO 5	An, Ap
CO-3	Elaborate the plant disease management	PSO 2, PSO 5	An
CO-4	Discuss the food grain situation & principles of grain storage	PSO 4, PSO 5	An
CO-5	Explain the principles of insect control- physical, mechanical, biological, biochemical and chemical methods	PSO 4, PSO 5	Ap

Course Title	SELF STUDY PAPER- NURSERY MAINTENANCE & HOME GARDENING		
Course Code	P18B04SST01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the steps involved in establishment of nursery and it's maintenance	PSO3 , PSO 5	Ap
CO-2	Differentiate the various culturing methods of plants for nursery	PSO 3, PSO 5	U, Ap
CO-3	Explain different vegetative propagation of plants	PSO 3, PSO 5	U, Ap
CO-4	Outline the kitchen garden designing	PSO 3, PSO 5	U, Ap
CO-5	Describe various culture methods of fruits and vegetables	PSO 3, PSO 5	U, Ap
CO-6	Explain the method of establishing ornamental garden.	PSO 3, PSO 5	R,U
CO-7	Discuss the roles of horticultural organizations.	PSO 3	U, Ap

Programme: M.Phil. Botany with specialization in Plant Biotechnology

PO No.	Programme Outcomes <i>Upon completion of the M.Phil. Degree Programme, the post graduate will be able to</i>
PO-1	Obtain quality education in the advanced areas of Botany
PO-2	Write and formulate research projects/translate the research data into research p Projects and further to publicize it
PO-3	Competant enough to face the competitive exams at national /state level (UGC-NET, CSIR/ SET etc.)and acquire academic excellence with an aptitude for higher studies and research
PO-4	Develop Scientific tools to formulate phyto drugs to fulfill the needs of the society and to respect and conserve nature and the environment

PSO No.	Programme Specific Outcomes <i>Upon completion of these courses the student would</i>
PSO-1	Apply the acquired scientific knowledge to give solutions to lead a healthy life, protect the environment, energy need, safety, nutritious food, good environment, clean water, air and phytomedicines
PSO-2	Develop entrepreneurship skills in various fields like microbial techniques,cultivation of medicinal plants, identification of plants, cultivation of biofertilizers, mushrooms, handling of instruments and research skills through the projects
PSO-3	Carryout the field work, research projects individually and prepare herbal medicines for common ailments and traditional nutritive food
PSO-4	Apply and correlate the relationship between plant physiology, Biochemistry, Biotechnology, Biophysics and Biometrics
PSO-5	Become aware of environmental issues, environmental laws and applications of remote sensing in environmental studies

Course Title	RESEARCH METHODOLOGY		
Course Code	MPH18BO1C01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level

CO-1	Explain the method of designing a research and sources of information.	PSO3 , PSO 5	Ap
CO-2	Compare and contrast the different types of chromatographic and electrophoretic techniques mentioned in the syllabus	PSO 3, PSO 5	U, Ap
CO-3	Explain the various steps in different types of electrophoresis and blotting.	PSO 3, PSO 5	U, Ap
CO-4	Describe the construction of different types of microscopes and principles of microtechnique.	PSO 3, PSO 5	U, Ap
CO-5	Calculate the statistical constants and apply the different types of test of	PSO 3, PSO 5	U, Ap
CO-6	Significance and make use of various bioinformatics tools to analyse molecular Data	PSO 3, PSO 5	R,U

Course Title		PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY	
Course Code		MPH16BO1C02	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the different mechanisms of absorption of water and photosynthesis	PSO3 , PSO 5	Ap
CO-2	Compare the different types of respiration and nitrogen metabolism	PSO 3, PSO 5	U, Ap
CO-3	Compare the roles of different growth hormones and stresses in plants	PSO 3, PSO 5	U, Ap
CO-4	Explains the structure and biological significance of carbohydrates, lipids and secondary metabolites	PSO 3, PSO 5	U, Ap
CO-5	Describe the structure and properties of amino acids, proteins and enzymes	PSO 3, PSO 5	U, Ap

Course Title		TEACHING AND LEARNING SKILLS	
Course Code		MPH18TS1C03	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	1. apply computer skills in the respective areas	PSO3 , PSO 5	Ap
CO-2	2. communicate their language with different skills	PSO 3, PSO 5	U, Ap
CO-3	3. apply the various methods of teaching.	PSO 3, PSO 5	U, Ap
CO-4	4. Outline learning process and integration of teaching and Academic resources	PSO 3, PSO 5	U, Ap
CO-5	5. Explain various teaching skills and assessment technology	PSO 3, PSO 5	U, Ap

Course Title		(Elective) (a) APPLIED BIOTECHNOLOGY	
Course Code		MPH16BO1E04	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	1. Explain the basic techniques in plant tissue culture	PSO3 , PSO 5	Ap
CO-2	2. Compare the different types of tissue culture methods	PSO 3, PSO 5	U, Ap
CO-3	3. Explain the techniques like haploid production, invitro fertilization and syntheric seed production.	PSO 3, PSO 5	U, Ap
CO-4	4. Explain the applications of plant genetic transformation.	PSO 3, PSO 5	U, Ap
CO-5	5. Describe GM foods, bioremediation, biomining and biodiesel	PSO 3, PSO 5	U, Ap

Course Title		(Elective) (b) PHARMACOGNOSY	
Course Code		MPH16BO1E05	
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	1. Explain the classification, agrotechniques and harvesting technology of drugs	PSO3 , PSO 5	Ap
CO-2	2. Compare the various methods of drugh evaluation and allergens.	PSO 3, PSO 5	U, Ap
CO-3	3.Explain the therapeutic significance of phytoconstituents.	PSO 3, PSO 5	U, Ap
CO-4	4. Explain the traditional crude drugs	PSO 3, PSO 5	U, Ap
CO-5	5.Describe quality control of crude drugs.	PSO 3, PSO 5	U, Ap

Course Title	(Elective) (c) BIOPROSPECTING OF MEDICINAL PLANTS		
Course Code	MPH16BO1E06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	1. Describe the structure, types and biological significance of carbohydrates, proteins & vitamins.	PSO3 , PSO 5	Ap
CO-2	2. Describe the types, properties and importance of secondary metabolites.	PSO 3, PSO 5	U, Ap
CO-3	3. Explain the principle, procedures and applications of separation techniques.	PSO 3, PSO 5	U, Ap
CO-4	4. Explain the principle and construction of the instruments used for compound identification.	PSO 3, PSO 5	U, Ap
CO-5	5. Explain the collection and conservation of plant resources.	PSO 3, PSO 5	U, Ap

Course Title	(Elective) (d)APPLIED MOLECULAR BIOLOGY		
Course Code	MPH16BO1E07		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	1. Explain the molecular life of living organisms	PSO3 , PSO 5	Ap
CO-2	2. Explain the concepts of Genomics.	PSO 3, PSO 5	U, Ap
CO-3	3. Describe the types of human genetic diseases.	PSO 3, PSO 5	U, Ap
CO-4	4. Explain the production of transgenic plants and animals.	PSO 3, PSO 5	U, Ap