CO-PO-PSO Mapping for B.Sc. Botany Syllabus

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Semester I															
Phycology and Microbiology (UGBOTCC01)	CO1	Develop knowledge on the diversity, phylogeny, classification of algae.	3	3	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Understand the structure, role and infectious cycle of bacteria and viruses.	0	3	0	0	0	0		0	3	0	0	0	
	CO3	Understand life cycles of different algal species.	0	3	0	0	0	0		0	3	0	0	0	
	CO4	Explore the economically important algae.	0	0	0	0	0	3		0	0	3	0	0	
	CO5	Gain knowledge on the beneficial & harmful bacteria and viruses.	0	0	0	0	3	3		0	0	0	3	0	
Biomolecules and Cell Biology (UGBOTCC02)	CO1	Understand cell structures and function, along with molecules present in cells.	3	3	0	0	0	0	3.00	3	3	0	0	0	2.87
	CO2	Understand the mechanism of cell cycle.	3	3	0	0	0	0		3	0	0	2	0	
	CO3	Focus on cellular components, nuclear & organellar genome, along with their regulatory role.	0	3	3	0	0	0		0	0	3	0	0	
	CO4	Upgraded their analytical skills and instrumentation.	0	0	0	3	3	0		0	0	0	3	3	
	CO5	Acquire knowledge in designing experiment, statistical analysis, and interpretation of results.	0	0	0	0	3	0		0	0	0	0	3	
Cryptogamic Botany (UGBOTGE01)	CO1	Understand the diversity of lower plant groups.	3	0	2	0	0	0	2.50	0	2	0	0	0	2.42
	CO2	Know the systematic, morphology and structure, of Bacteria, Viruses and Algae.	0	3	2	0	0	0		3	2	0	0	0	
	CO3	Understand the life cycle patterns of Cryptogams.	0	0	0	1	0	0		0	0	1	0	0	
	CO4	Understand the useful and harmful features of Bacteria, Viruses and Algae.	0	0	0	0	3	0		0	0	0	0	3	
	CO5	Understand the economic importance of Bryophytes and Pteridophytes.	0	0	0	0	3	3		0	0	0	3	3	
English Communication (UGAECC01)	CO1	Engage in self-directed English language learning.	2	3	3	0	0	0	2.93	3	0	0	0	0	3.00
	CO2	Be responsible and ethical English users.	3	3	3	0	0	0		3	3	0	0	0	
	CO3	Enhance their English language proficiency in the aspects of reading, writing, listening and speaking.	0	3	3	3	0	0		3	3	0	0	0	
	CO4	Develop academic literacy required for undergraduate learning, further studies and research.	0	0	3	3	0	0		0	3	0	3	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
	CO5	Apply the requisite communicative skills and strategies to future careers.	0	0	3	0	3	0		0	0	3	0	3	
	CO6	Gain an insight into cultural literacy and cross-cultural awareness.	3	0	0	0	3	0		0	0	3	0	0	
Semester II															
Mycology and Phytopathology (UGBOTCC03)	CO1	Understand the classification, structure, role and infectious cycle of fungi.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Evaluate the impact of fungi in industrial processes.	0	3	3	0	0	0		0	0	3	0	0	
	CO3	Know the procedures for mushroom cultivation.	0	3	0	0	0	0		0	0	3	0	0	
	CO4	Identify plant diseases, their causes & importance in agriculture industry.	0	0	0	3	3	0		0	0	3	3	0	
	CO5	Apply acquired knowledge to control plant diseases.	0	0	0	0	3	3		0	0	0	3	3	
Archegoniate (UGBOTCC04)	CO1	To know about morphological, anatomical and developmental patterns in bryophytes to gymnosperms.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	To know about the reproductive parts, mechanism of reproduction and life cycle patterns.	3	3	0	0	0	0		3	3	0	0	0	
	CO3	To understand stelar evolution and seed formation in pteridophytes.	3	3	0	0	0	0		3	3	0	0	0	
	CO4	Economic values of the lower plants.	0	0	3	0	0	0		0	0	3	0	0	
	CO5	Observe and identify bryophytes, pteridophytes and gymnosperms& their internal structures.	0	0	0	3	3	0		0	0	0	3	0	
Biology of Vascular Plants (UGBOTGE02)	CO1	Outline ecological and evolutionary importance of the angiosperm and gymnosperm.	0	3	0	0	0	0	3.00	0	3	0	0	0	3.00
	CO2	Explain the economic importance of the angiosperm and gymnosperm.	0	0	3	0	0	0		0	0	3	0	0	
	CO3	Analyze and evaluate a comparative account of angiospermic families.	0	0	0	3	0	0		0	0	0	3	0	
	CO4	Discuss the systematic position and classification of angiosperm and gymnosperm.	0	0	0	3	0	0		0	0	0	3	0	
	CO5	Analyze and examine various angiosperm families and their economically important members.	0	0	0	0	0	3		0	0	0	0	3	
Environmental Science (ENVS)	CO1	Define and demonstrate the concept, components and function of natural resources and ecosystems.	0	0	3	0	0	0	0	0	0	1	0	0	3
	CO2	Define, illustrate and analyze cause, effects and control measures of various environmental pollutants.	0	0	3	0	0	0		0	0	3	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

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			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Science (EVS) (UGAECC02)	CO3	Demonstrate the basic idea about the disasters and its management.	0	0	0	3	0	0	3.0	0	0	1	0	0	2.3
	CO4	Illustrate and apply the knowledge about the social, environmental issues and environmental legislation.	0	0	0	0	0	3		0	0	3	0	0	
	CO5	Define, demonstrate and evaluate the impact of human population on the Environment	0	0	0	0	0	3		0	0	3	0	3	
Semester III															
Anatomy of Angiosperms (UGBOTCC05)	CO1	Understand structural & functional components of plants.	3	3	0	0	0	0	3.00	0	0	0	2	0	2.80
	CO2	Compare, contrast and describe the various tissue systems in plants.	0	3	3	0	0	0		0	3	0	0	0	
	CO3	Outline the process of secondary growth in plants.	0	0	0	3	0	0		0	3	0	0	0	
	CO4	Outline the practical use of plant anatomy.	0	0	0	0	3	0		0	0	0	0	3	
	CO5	Design, carry out laboratory techniques in plant anatomy.	0	0	0	0	3	3		0	0	0	3	0	
Economic Botany (UGBOTCC06)	CO1	Understand economically important plants, their origin and morphology etc.	3	3	0	0	0	0	2.75	0	3	0	0	0	3.00
	CO2	Gain knowledge about plant products and their biochemical nature and industrial applications.	0	3	0	0	0	0		0	3	0	0	0	
	CO3	Get an idea about the industrial processing of economically important plant products.	0	0	1	0	0	0		0	3	0	0	0	
	CO4	Understand scope and importance of indigenous medicinal science, medicinal plants & their therapeutic use.	0	0	0	0	3	3		0	0	3	0	0	
	CO5	Enlighten the students about the opportunities for income and employment generation.	0	0	0	0	3	3		0	0	0	3	3	
Genetics (UGBOTCC07)	CO1	Understand the basics of genetic analysis at the gene, genome and population levels.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Understand the pattern of inheritance in plants.	0	0	3	0	0	0		0	3	0	0	0	
	CO3	Gain knowledge on molecular markers, linkage pattern and mapping techniques.	0	0	0	3	3	0		0	3	0	3	0	
	CO4	Gain knowledge on types of mutation, mutagenic agents and its application in plant breeding.	0	0	0	3	3	0		0	0	3	3		
	CO5	Develop a strong foundation for further molecular studies.	0	0	0	0	0	3		0	0	0	0	3	
Plant Ecology	CO1	Illustrate the basic concept of ecology and its biotic and abiotic components.	3	3	0	0	0	0		3	3	0	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Plant Ecology, Anatomy and Embryology (UGBOTGE03)	CO2	Explain and interpret the relationship between organisms and its ecosystem.	0	0	1	0	0	0	2.75	0	0	3	0	0	3.00
	CO3	Distinguish the normal and anomalous secondary growth in plants.	0	0	0	3	0	0		0	3	0	0	0	
	CO4	Analyze biodiversity at various levels and prioritize its conservation.	0	0	0	3	0	0		0	0	0	3	0	
	CO5	Discuss plant reproduction and post reproductive events.	0	0	0	0	3	3		0	0	0	0	3	
Value Education and Indian Culture (UGBOTSEC01)	CO1	Define, demonstrate and apply the daily routine, self-evaluation & Integral Personality Development	3	0	0	0	0	0	3.00	0	3	0	0	0	3.00
	CO2	Demonstrate, and apply the Power of thoughts & the Science of Peace	0	0	3	0	0	0		0	3	3	0	0	
	CO3	Demonstrate the relation between Values and enlightened citizenship	0	3	0	0	0	0		0	3	0	0	0	
	CO4	Discuss awareness about Indian Practice and Culture	0	0	0	3	0	0		0	0	3	0	0	
	CO5	Demonstrate and practice the Four Yogas	0	0	0	0	0	3		0	0	3	0	0	
	CO6	Explain and analyse the idea about Modern India: her hopes, challenges and Swami Vivekananda	0	0	0	0	0	3		0	3	3	0	0	
Semester IV															
Molecular Biology (UGBOTCC08)	CO1	Relate the concepts of prokaryotic, and eukaryotic gene function.	3	3	0	0	0	0	2.90	3	3	0	0	0	3.00
	CO2	Explain central dogma of molecular biology (replication, transcription, and translation).	3	0	0	2	0	0		0	3	0	0	0	
	CO3	Distinguish between prokaryotic & eukaryotic gene regulation.	0	0	0	3	3	0		0	3	0	0	0	
	CO4	Isolate E. coli & plant DNA and its quantification.	0	0	0	0	3	3		0	0	0	3	0	
	CO5	Conversant with Laboratory Techniques viz. centrifugation, gel electrophoresis, spectrophotometry etc.	3	3	0	0	3	3		0	0	0	3	3	
Plant Ecology and Phytogeography (UGBOTCC09)	CO1	Explain various ecosystems & relationships between organisms and environment.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Outline various ecosystems and plant distribution.	0	0	3	0	0	0		0	3	0	0	0	
	CO3	Discuss phytogeography, including major plant communities of the world alongwith climatic conditions of the area.	0	0	3	0	0	0		3	3	0	0	0	
	CO4	Identify phytogeographical regions of India, plant biodiversity and its importance.	0	0	3	3	0	0		0	0	3	0	0	
	CO5	Analyze plant population and their community.	0	0	0	0	3	0		0	0	0	0	3	
Plant	CO1	Know about the diversity and morphology of various angiosperm families.	3	3	0	0	0	0		3	0	0	2	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Plant Systematics (UGBOTCC10)	CO2	Develop knowledge on plant nomenclature system.	3	3	0	0	0	0	3.00	0	3	0	0	0	2.85
	CO3	Learn and compare various systems of classification.	0	0	0	3	0	0		0	0	0	3	0	
	CO4	Acquire knowledge on angiosperm phylogeny and evolution.	0	0	0	3	0	0		0	0	0	3	0	
	CO5	Upgraded their analytical skills in plant herbarium techniques.	0	0	0	0	3	3		0	0	0	3	3	
Semester V															
Reproductive Biology of Angiosperms (UGBOTCC11)	CO1	Understand the molecular and morphological aspects in plant reproductive development.	3	0	0	0	0	0	2.83	0	3	0	0	0	2.57
	CO2	Understand the structure and organization of the male and female reproductive organs.	0	3	0	0	0	0		0	0	0	0	1	
	CO3	Understand the process of fertilization and pollen-stigma interaction.	0	0	0	2	0	0		0	3	0	2	0	
	CO4	Compare embryo and endosperm development in monocots & dicots.	0	0	0	3	3	0		0	0	0	3	0	
	CO5	Address the compatibility & incompatibility issues in angiosperms.	0	0	0	0	0	3		0	0	0	3	3	
Plant Physiology (UGBOTCC12)	CO1	Relate physiological events in plants and their mechanism.	0	3	0	0	0	0	3.00	0	0	0	0	1	2.66
	CO2	Interpret the effect of physiological parameters in plant growth and development.	0	3	0	0	0	0		0	0	3	0	0	
	CO3	Analyze the physiological adaptations of plants in stress conditions.	0	3	3	0	0	0		0	0	3	0	0	
	CO4	Examine physiological mechanism of flowering & requirement of mineral nutrition.	0	0	3	3	0	0		0	0	0	3	0	
	CO5	Estimate the effect of various parameters in physiological responses.	0	0	0	0	3	3		0	0	0	3	3	
Industrial and Environmental Microbiology (UGBOTDSE01)	CO1	Outline the basic aspects of microbial science in industrial application.	3	0	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Explain various aspects of fermentation technology.	3	3	0	0	0	0		3	3	0	0	0	
	CO3	Develop knowledge on the current updates in agriculture & environmental microbiology.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Develop ideas on the routine and specialized microbiological laboratory skills.	0	0	3	3	0	0		0	0	0	3	0	
	CO5	Design and formulate research activities in applied microbiology.	0	0	0	0	3	3		0	0	0	0	3	
Plant Breeding (UGBOTDSE02)	CO1	Gather knowledge to design, execute, analyze results of genetic experiments in plant breeding systems.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Demonstrate practical emasculation and pollination methods in crop plants.	0	0	0	3	0	0		0	0	0	3	0	
	CO3	Understand the patterns of inheritance in plants.	0	0	3	3	0	0		0	0	0	3	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
	CO4	Examine the methods of crop improvement.	0	0	0	0	3	0		0	0	0	3	0	
	CO5	Formulate and justify the application of plant breeding methods to achieve a specific objective.	0	0	0	0	3	3		0	0	0	0	3	
Semester VI															
Plant Metabolism (UGBOTCC13)	CO1	Relate the photosynthetic process of light and dark Reactions.	3	3		0	0	0	2.85	3	3	0	0	0	2.66
	CO2	Outline the mechanism of biological N2 fixation.	0	0	3	0	0	0		0	0	2	0	0	
	CO3	Compare the pigment composition in plants.	0	0	0	3	0	0		0	3	0	0	0	
	CO4	Understand the mechanism of carbohydrate & lipid metabolism.	0	0	0	2	0	0		0	0	0	2	0	
	CO5	Explain the biochemical responses of stress in plants.	0	0	0	0	3	3		0	0	0	0	3	
Plant Biotechnology (UGBOTCC14)	CO1	Recall the basic concepts of biotechnology and explain its fundamental applications.	3	3	0	0	0	0	3.00	3	3	0	0	0	3.00
	CO2	Become familiar with the tools and techniques of genetic engineering.	0	3	0	0	0	0		3	3	0	0	0	
	CO3	Acquire knowledge on the application of gene cloning in agriculture.	0	0	3	3	0	0		0	0	3	0	0	
	CO4	Translate the concepts in future studies and debate on issues related to GMOs.	0	0	3	0	3	0		0	0	3	3	0	
	CO5	Design plant tissue culture and RDT experiments to address a research problem.	0	0	0	0	3	3		0	0	0	0	3	
Biostatistics (UGBOTDSE03)	CO1	Organize biological data and calculate descriptive statistics from these data.	3	3	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Compute and interpret biological variability.	0	3	3	0	0	0		0	3	0	0	0	
	CO3	Compare different biological population using statistical algorithms.	0	0	0	3	0	0		0	0	3	3	0	
	CO4	Evaluate tests to perform hypothesis testing and experimental design for biological experiments.	0	0	0	0	3	3		0	0	0	3	0	
	CO5	Discuss the use of statistical software and packages in biostatistics.	0	0	0	0	0	3		0	0	0	0	3	
Applied Phycology (UGBOTDSE04)	CO1	Outline the various aspects of applied phycology.	0	3	0	0	0	0	3.00	0	3	0	0	0	2.66
	CO2	Develop knowledge on harmful algae and their remedy.	0	0	3	0	0	0		0	0	0	1	0	
	CO3	Identify algal sources of food, phycocolloids, fuel.	0	0	0	3	3	0		0	0	3	3	0	
	CO4	Plan and formulate culture of economically important species.	0	0	0	0	3	3		0	0	0	3	0	
	CO5	Formulate the application of algal species to solve a human demand.	0	0	0	0	0	3		0	0	0	0	3	

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Research Methodology (UGBOTDSE05)	CO1	Discuss and demonstrate methodologies and techniques used in biological research.	3	3	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Explain and execute basic computer skills necessary for the conduct of research.	3	3	0	0	0	0		3	3	0	0	0	
	CO3	Assess the basic function and working of analytical instruments used in research.	0	0	0	3	0	0		0	3	0	0	0	
	CO4	Identify the overall process of designing a research study from its inception to its report.	0	0	0	3	3	0		0	0	0	3	0	
	CO5	Explain the rationale for research ethics and demonstrate its contribution in research career.	0	0	0	0	3	3		0	0	0	3	3	
			Grand Average						2.92						2.87

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

CO-PO-PSO Mapping for M.Sc. Botany Syllabus

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Semester I															
Phycology and Microbiology (Theory) (PGBOTCC1.1)	CO1	Outline diversity of bacteria & algae.	3	0	0	0	0	0	3	0	1	0	0	0	2.67
	CO2	Summarize microbial physiology of & their growth, metabolism, development and phylogeny.	0	3	0	0	0	0		3	3	0	0	0	
	CO3	Design and execute experiments using microbes.	0	3	3	0	0	0		0	0	3	0	0	
	CO4	Assess eutrophication, water quality & understand bacterial genetics and its application.	0	0	0	3	0	0		0	0	0	3	0	
	CO5	Develop concepts on antibiotics & chemotherapy, environmental and industrial microbiology.	0	0	0	3	0	0		0	0	0	0	3	
Mycology and Plant Pathology (Theory) (PGBOTCC1.2)	CO1	Explain the life cycle patterns of pathogenic fungi and their host specificity.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Analyze how host immune systems respond to pathogenic infections.	0	3	0	0	0	0		3	0	0	0	0	
	CO3	Explain the importance of plant defence systems in combating infections.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Determine the importance of mycology and plant pathology as a discipline of plant science.	0	0	0	3	0	0		0	0	3	0	0	
	CO5	Exploit the scope of database and bio-informatics in plant disease management.	0	0	0	3	0	0		0	0	0	3	3	
Biostatistics & Bio-Maths; Biophysics (Theory) (PGBOTCC1.3)	CO1	Explain the various application of biostatistics.	3	1	0	0	0	0	2.71	0	1	0	0	0	2.60
	CO2	Distinguish different types of data and sampling methods.	3	3	0	0	0	0		0	3	0	0	0	
	CO3	Analyze and interpret quantitative data.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Identify appropriate tests to perform hypothesis testing and experimental design and its interpretation.	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Explain the use of statistical software packages in biostatistics.	0	0	0	3	0	0		0	0	0	0	3	
Ecology; Evolution (Theory) (PGBOTCC1.4)	CO1	Analyze the biodiversity of a habitat by application of key concepts.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Interpret and outline how biotic interactions affect biotic communities in natural ecosystems.	0	3	3	0	0	0		0	0	3	0	0	
	CO3	Relate the biogeography and biodiversity of plants in Indian perspective.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Perceive knowledge on biomes and ecosystems and their evolution.	0	0	3	0	0	0		0	0	3	0	0	
	CO5	Apply key concepts in conservation and estimate biodiversity of diverse habitats.	0	0	0	3	0	0		0	0	0	0	3	
Phycology & Microbiology	CO1	Develop media and culture different algae/ bacteria in laboratory condition.	0	3	3	0	0	0	00	3	3	0	0	0	00
	CO2	Identify bacteria/ algae based on their staining properties/ morphology.	0	0	3	0	0	0		3	0	3	0	0	
	CO3	Examine metabolic, growth and developmental properties of bacteria.	0	0	3	0	0	0		0	0	3	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

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			1	2	3	4	5	6	Average	1	2	3	4	5	Average
(Practical) (PGBOTCC1.5)	CO4	Isolate and culture microbes from different natural sources.	0	0	3	3	0	0	3.	0	0	0	3	0	3.
	CO5	Identify antibiotic resistance in bacteria from different environmental and clinical samples.	0	0	0	3	0	0		0	0	0	0	3	
Mycology & Plant Pathology (Practical) (PGBOTCC1.6)	CO1	Demonstrate culture media preparation and culture of fungi in laboratory.	3	0	0	0	0	0	3.00	3	0	0	0	0	2.67
	CO2	Develop idea on laboratory instruments, sterilization and safety in plant pathology laboratory.	3	0	0	0	0	0		0	1	0	0	0	
	CO3	Analyze & estimate biomolecules and essential compounds from fungal sources.	0	3	0	0	0	0		0	3	0	0	0	
	CO4	Survey local crop diseases and propose probable remedies.	0	3	3	0	0	0		0	3	3	0	0	
	CO5	Design and formulate commercial mushroom cultivation.	0	0	0	3	0	0		0	0	0	0	3	
Semester II															
Plant Anatomy; Developmental Biology (Theory) (PGBOTCC2.1)	CO1	Extend state of the art knowledge on how plant tissues differentiate.	3	1	0	0	0	0	2.43	3	0	0	0	0	2.75
	CO2	Relate their existing know-how on genes involved in plant developmental processes.	0	1	1	0	0	0		0	1	0	0	0	
	CO3	Develop their concepts on aerial, xeromorphic, hydromorphic and stressed root systems and their anatomical features.	0	0	3	0	0	0		0	3	3	0	0	
	CO4	Evaluate the role of PGRs in developmental biology.	0	0	3	3	0	0		0	0	3	3	0	
	CO5	Interpret the molecular details of plant developmental process.	0	0	0	3	0	0		0	0	0	3	3	
Taxonomy and Biosystematics; Embryology of seed plants (Theory) (PGBOTCC2.2)	CO1	Outline the range of variations in angiosperms.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Relate the trends in angiosperm classification.	3	0	0	0	0	0		0	3	0	0	0	
	CO3	Compare the various rules, principles and recommendations of plant nomenclature.	0	3	3	0	0	0		0	3	3	0	0	
	CO4	Discuss the methods of pollination fertilization and embryogeny.	0	0	3	0	0	0		0	0	3	3	0	
	CO5	Explain the use of molecular biology & computers in angiosperm taxonomy.	0	0	0	3	0	0		0	0	0	3	3	
Biochemistry and Metabolism; Plant Physiology (Theory) (PGBOTCC2.3)	CO1	Outline the various biochemical pathways.	3	0	0	0	0	0	2.60	3	0	0	0	0	2.50
	CO2	Develop knowledge on the concepts of anabolism and catabolism.	3	0	0	0	0	0		3	0	1	0	0	
	CO3	Summarize enzymatic catalysis & apply the concepts of enzymology and bioenergetics.	0	1	0	0	0	0		0	0	1	0	0	
	CO4	Inspect the substrate specificity of enzymes.	0	0	3	0	0	0		0	0	3	3	0	
	CO5	Develop concepts of plant growth regulators (PGRs) and stress physiology.	0	0	0	3	0	0		0	0	0	3	3	
Environmental Science; System	CO1	Summarize how pollutants affect our immediate environment.	3	0	0	0	0	0	86	3	0	0	0	0	00
	CO2	Examine the toxicity levels of various heavy metals.	3	0	0	0	0	0		0	3	0	0	0	
	CO3	Inspect how greenhouse gases are affecting the environment and depleting ozone layer.	0	3	2	0	0	0		0	0	3	3	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Biology (Theory) (PGBOTCC2.4)	CO4	Assess the rules and regulations of Environmental Impact Assessment (EIA).	0	0	3	0	0	0	2.	0	0	0	3	0	3.
	CO5	Formulate the use experimental, computational and mathematical methods in systems biology.	0	0	3	3	0	0		0	0	0	0	3	
Taxonomy & Plant Anatomy (Practical) (PGBOTCC2.5)	CO1	Illustrate the internal tissue system and secondary growths in plant.	3	1	0	0	0	0	2.71	3	0	0	0	0	3.00
	CO2	Summarize normal & anomalous secondary growth in plants.	3	3	0	0	0	0		3	3	0	0	0	
	CO3	Demonstrate maceration of vascular tissue.	0	3	0	0	0	0		0	3	3	0	0	
	CO4	Identify plants based on morphological data and preparation of artificial key.	0	0	3	0	0	0		0	0	3	0	0	
	CO5	Analyze local flora and flora of different phytogeographical zone	0	0	0	3	0	0		0	0	0	3	0	
Plant Physiology & Biochemistry (Practical) (PGBOTCC2.6)	CO1	Demonstrate isolation of enzymes from plant organs and their quantitative estimation.	3	1	0	0	0	0	2.75	0	1	1	0	0	2.56
	CO2	Examination of photosynthetic parameters in plants.	0	3	0	0	0	0		0	3	3	0	0	
	CO3	Demonstrate isolation of biomolecules, hormones and design bioassay for the same.	0	3	3	0	0	0		0	0	3	3	0	
	CO4	Inspect redox state of plants and analyze scavenging enzymes.	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Design and formulate chromatographic techniques.	0	0	3	3	0	0		0	0	0	3	3	
Semester III															
Cell & Molecular Biology (Theory) (PGBOTCC3.1)	CO1	Summarize the various aspects of cellular & molecular biology.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Develop concepts on cellular processes like DNA replication, transcription and translation.	3	3	0	0	0	0		0	0	3	0	0	
	CO3	Develop and analyze an overall idea about cellular interaction, cell signalling and protein sorting.	3	3	0	0	0	0		0	0	3	0	0	
	CO4	Explain the events of post transcriptional modification and regulation of gene expression	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Improve their understanding on the molecular mechanism of cell division and its regulation.	0	0	3	3	0	0		0	0	0	3	3	
Genetics & Genomics (Theory) (PGBOTCC3.2)	CO1	Outline concepts of mendelian inheritance, and its deviation.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Illustrate different types of mutations and their impact	3	3	0	0	0	0		0	3	3	0	0	
	CO3	Illustrate characteristics of genetics linkage and crossing over.	0	3	0	0	0	0		0	3	3	0	0	
	CO4	Explain the structure and function of prokaryotic and eukaryotic genomes.	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Develop software skills related to structural and functional aspects of genes and proteins.	0	0	0	3	0	0		0	0	0	0	3	
Plant Biotechnology	CO1	Recall the basic concepts of plant tissue culture and explain fundamental cellular events during the process.	3	0	0	0	0	0		3	0	0	0	0	
	CO2	Explain the basic principles, tools and techniques of Genetic engineering	3	1	0	0	0	0		0	3	3	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

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			1	2	3	4	5	6	Average	1	2	3	4	5	Average
and Recombinant DNA Technology (Theory) (PGBOTCC3.3)	CO3	Evaluate the impact of biotechnology in medical science, forensics, and conservation of biodiversity.	0	0	3	0	0	0	2.71	0	0	3	0	0	3.00
	CO4	Translate the concepts in future studies and debate on the GMO related issue and evaluate its significances.	0	0	3	3	0	0		0	0	3	3	0	
	CO5	Design and formulate experiments to address a research problem.	0	0	0	3	0	0		0	0	0	0	3	
Plant Biotechnology (Practical) (PGBOTCC3.5)	CO1	Outline the basic organization of a plant tissue culture lab and functioning of its instruments.	3	0	0	0	0	0	2.63	3	0	0	0	0	3.00
	CO2	Demonstrate different type of sterilization technique.	3	0	0	0	0	0		0	3	3	0	0	
	CO3	Evaluate the effect of various PGRs (diff conc.) in plant tissue culture.	0	3	3	0	0	0		0	3	3	0	0	
	CO4	Formulate tissue culture from different plant explants.	0	3	3	0	0	0		0	0	3	3	0	
	CO5	Design and formulate Agrobacterium mediated transformation technique.	0	3	3	0	0	0		0	0	0	3	3	
Cytology and Molecular Biology (Practical) (PGBOTCC3.6)	CO1	Outline basic foundation of stain preparation and techniques of cytology.	3	0	0	0	0	0	2.71	3	0	0	0	0	3.00
	CO2	Plant mitotic & meiotic chromosomal analyses.	0	3	1	0	0	0		0	3	3	0	0	
	CO3	Compare & contrast karyotype in different plant species.	0	3	3	0	0	0		0	3	0	3	0	
	CO4	Formulate isolation, qualitative and quantitative estimation of DNA.	0	0	0	3	0	0		0	0	3	0	3	
	CO5	Design and formulate amplification of DNA.	0	0	0	3	0	0		0	0	0	0	3	
Semester IV															
Research Methodology and Bioinstrumentation (Theory) (PGBOTCC4.1)	CO1	Develop the ability to apply the methods while working on a research project work	3	0	1	0	0	0	2.44	3	0	0	0	0	3.00
	CO2	Explain different sampling methods, research designs and codes of research.	0	3	3	0	0	0		0	3	3	0	0	
	CO3	Assess the quality of research paper and scientific misconduct.	0	3	3	0	0	0		0	0	3	0	0	
	CO4	Develop necessary skills to perform research in their own field.	0	0	3	0	0	0		0	0	3	3	0	
	CO5	Develop basic knowledge on function and working of analytical instruments used in biological research.	0	0	0	3	0	0		0	0	0	3	3	
Phytochemistry and Herbal Technology (Theory) (PGBOTCC4.2)	CO1	Outline the history and scope of herbal medicine.	3	0	0	0	0	0	3.00	3	0	0	0	0	2.71
	CO2	Summarize the cultivation, collection, processing, storage and conservation of medicinal plants.	3	3	0	0	0	0		0	1	3	0	0	
	CO3	Evaluate different types of secondary metabolites, their properties, classification, test for identification and isolation techniques.	0	3	3	0	0	0		0	3	3	0	0	
	CO4	Discuss the therapeutic applications of herbs, poisonous plants; and edible vaccines.	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Develop knowledge on quality assessment of plant-based drugs.	0	0	3	3	0	0		0	0	0	0	3	
Genetics and Plant	CO1	Outline basic ideas on chromosome biology and apply molecular markers for crop improvement.	3	0	0	0	0	0		3	0	0	0	0	
	CO2	Explain the mechanism of eukaryotic gene regulation and epigenetics.	3	3	0	0	0	0		3	3	0	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

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			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Biotechnology 1 (Theory) (PGBOTME4.1A)	CO3	Analyze and interpret quantitative genetic experiments	0	0	3	0	0	0	3.00	0	0	3	0	0	3.00
	CO4	Discuss knowhow and exhibition of contemporary knowledge in Biotechnology for economic utilization.	0	0	3	0	0	0		0	0	0	3	0	
	CO5	Develop concepts on plant tissue culture techniques on research problems pertinent to crop improvement and biotechnology industry.	0	0	0	3	0	0		0	0	0	3	3	
Genetics and Plant Biotechnology II (Theory) (PGBOTME4.2A)	CO1	Summarize the fundamental principles of structural & functional genomics.	3	0	0	0	0	0	3.00	3	0	0	0	0	2.75
	CO2	Develop a thorough idea on genome editing and its tools.	3	3	0	0	0	0		0	3	3	0	0	
	CO3	Develop an in-depth understanding of the computational tools implicated in biological research.	0	0	3	0	0	0		0	0	3	1	0	
	CO4	Examine and interpret the structural and functional aspects of gene through in silico research.	0	3	3	0	0	0		0	0	0	3	3	
	CO5	Discuss techniques commonly used in genomics, proteomics and plant metabolic engineering.	0	0	3	3	0	0		0	0	0	0	3	
Genetics and Plant Biotechnology (Practical) (PGBOTME4.3A)	CO1	Analyze gene, protein sequence, develop protein interaction map and decode biological significance therein.	0	3	3	0	0	0	3.00	0	3	3	0	0	3.00
	CO2	Develop knowledge on DNA, RNA, protein isolation techniques from different plant samples.	0	3	3	0	0	0		0	3	3	0	0	
	CO3	Design and formulate electrophoretic techniques and PCR primers for their own experiments.	0	0	3	3	0	0		0	0	3	3	0	
	CO4	Design and execute mutagenesis experiments.	0	0	0	3	0	0		0	0	0	3	3	
	CO5	Design and execute plant tissue culture experiments.	0	0	0	3	0	0		0	0	0	3	3	
Diversity and Ecology of algae (Theory) (PGBOTME4.2A)	CO1	Outline knowledge on the biology, ecology and interrelationships between algal groups.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	List the habitats and biodiversity of algae.	3	0	0	0	0	0		3	0	0	0	0	
	CO3	Categorize algal members on the basis of their harmful/beneficial role.	3	0	3	0	0	0		0	3	3	0	0	
	CO4	Develop understanding on the evolutionary interrelationships between different algal groups.	0	0	3	0	0	0		0	0	3	3	0	
	CO5	Discuss the role of algal members in carbon sequestration, global warming and biological ocean acidification	0	0	3	3	0	0		0	0	3	0	3	
Advanced phycology and algal biotechnology (Theory) (PGBOTME4.2B)	CO1	Outline algal distribution, habitats in freshwater & marine environments.	3	0	0	0	0	0	3.00	1	0	0	0	0	2.71
	CO2	Develop an idea how the algal bio resources will be utilised and explored.	0	3	0	0	0	0		3	3	0	0	0	
	CO3	Dissect the various aspects of algal economic importance with special reference to biotechnological & other industrial applications.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Explain how the micro & macro algal natural products will processed in industry for different purposes.	0	0	3	3	0	0		0	0	3	3	0	
	CO5	Evaluate the impact of abiotic stress in algal species.	0	0	3	0	0	0		0	0	0	3	0	
	CO1	Develop knowledge on various algal habitats.	3	0	0	0	0	0	00	3	0	0	0	0	00

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

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			1	2	3	4	5	6	3. Average	1	2	3	4	5	3. Average
Phycology (Practical) (PGBOTME4.3B)	CO2	Analyze enzyme, pigment, secondary metabolite composition from various algal sources.	0	3	0	0	0	0	3.00	0	3	3	0	0	2.60
	CO3	Identification of algal microflora from different habitats.	0	3	3	0	0	0		0	0	3	0	0	
	CO4	Design and execute water quality assessment.	0	0	3	3	0	0		0	0	0	3	0	
	CO5	Execute handling and culture of economically important algae.	0	0	0	3	0	0		0	0	0	3	3	
Taxonomy of Angiosperms (Theory) (PGBOTME4.1C)	CO1	Outline the wide activities in angiosperm and trends in classification system.	3	0	0	0	0	0		1	0	0	0	0	
	CO2	Develop the concepts of taxonomy and systematics	3	0	3	0	0	0		0	0	3	0	0	
	CO3	Explain concept of species and speciation.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Discuss the importance of rules, principles and recommendations in taxonomy.	0	0	3	0	0	0		0	0	3	0	0	
	CO5	Discuss the general range of variations in the group of angiosperms.	0	0	3	0	0	0		0	0	0	3	0	
Taxonomy of Angiosperms (Theory) (PGBOTME4.2C)	CO1	Develop knowledge on evolution of floral organs.	3	0	0	0	0	0	3.00	3	0	0	0	0	3.00
	CO2	Survey the contribution of various data sources in plant taxonomy.	3	3	0	0	0	0		0	3	0	0	0	
	CO3	Discuss the principles of biosystematics numerical taxonomy.	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Estimate the role biodiversity and conservation in plant taxonomy.	0	0	3	3	0	0		0	0	0	3	3	
Taxonomy of Angiosperms (Practical) (PGBOTME4.3C)	CO1	Preparation of botanical keys by locating key characters.	3	0	1	0	0	0	2.67	3	1	0	0	0	2.60
	CO2	Collection of plants and preparation of herbarium specimens	0	3	0	0	0	0		0	3	0	0	0	
	CO3	Use of computer based softwares and statistical methods as an aid in plant taxonomy	0	0	3	0	0	0		0	0	3	0	0	
	CO4	Provide lab-based training in writing species descriptions and illustration.	0	0	3	3	0	0		0	0	0	0	3	
Intellectual Property Rights (IPR) (Theory) (PGBOTSOC4A)	CO1	Distinguish and explain various forms of IPRs.	0	0	3	0	0	0	3.00	0	0	3	0	0	3.00
	CO2	Apply statutory provisions to protect particular form of IPRs.	0	0	3	0	0	0		0	0	0	3	0	
	CO3	Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, Industrial Design.	0	0	0	3	0	0		0	0	0	3	0	
	CO4	Identify procedure to protect different forms of IPRs national and international level.	0	0	0	3	0	0		0	0	0	0	3	
Biosafety Management (Theory) (PGBOTSOC4B)	CO1	Outline the benefit of a framework for essential public health functions.	3	0	0	0	0	0	3.00	1	0	0	0	0	2.50
	CO2	Plan a detailed Biological Risk Assessment, based on agent and procedure-specific properties.	0	0	3	0	0	0		0	0	3	0	0	
	CO3	Evaluate the different Biosafety Levels, and describe the type of agents appropriate for each level.	0	0	0	3	0	0		0	0	3	0	0	
	CO4	Adapt and formulate the principles of biological containment.	0	0	3	3	0	0		0	0	0	3	0	
Post-harvest management of Crops (Theory) (PGBOTSOC4C)	CO1	Outline the principles of post-harvest technology.	1	0	0	0	0	0	2.50	3	1	0	0	0	2.60
	CO2	Illustrate the physiological & biochemical changes occurring during fruits and vegetables development.	0	3	0	0	0	0		0	0	3	0	0	
	CO3	Discuss the role and the significance of proper post-harvest handling to maintain the quality of fruits and vegetables.	0	0	3	0	0	0		0	0	3	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
	CO4	Analyse various aspects of quality control and evaluation.	0	0	0	3	0	0		0	0	0	0	3	
			Grand Average						2.77						2.76

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

CO-PO-PSO Mapping for Ph.D. Course work Syllabus

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Research Methodology (PHDBOT01)	CO1	Understand the objectives, motivation and types of research	1	0	0	0	0	0	2.60	3	0	0	0	0	3.00
	CO2	Define and formulate a research problem	0	0	0	3	0	0		0	3	0	0	0	
	CO3	Collect data (primary or secondary) based on the formulated problem and analyse the data.	0	3	0	0	0	0		0	0	3	0	0	
	CO4	Analyse the data with hypothesis testing, generalization and interpretation.	0	0	3	0	0	0		0	0	3	0	0	
	CO5	Discuss the application of results and write the thesis.	0	0	3	0	0	0		0	0	0	3	0	
Computer Applications (PHDBOT02)	CO1	Explain and use TeX and LaTeX.	0	3	0	0	0	0	3.00	0	3	0	0	0	3.00
	CO2	Understand the advantages of LaTeX over other more traditional software's.	3	0	0	0	0	0		3	0	0	0	0	
	CO3	Prepare handouts and presentations using LaTeX.	0	0	0	3	0	0		0	0	3	0	0	
	CO4	Understand the core BioPython scripting elements such as variables and flow control structures.	3	0	0	0	0	0		3	0	0	0	0	
	CO5	Use BioPython to analyze biological data files.	0	0	3	0	0	0		0	0	3	0	0	
Literature Review (PHDBOT03)	CO1	Identify and retrieve relevant publications within a field of research and write a literature review by searching the literature systematically.	0	3	0	0	0	0	3.00	0	0	0	3	0	3.00
	CO2	Select representative scientific sources from several perspectives relevant to the assignment.	0	3	0	0	0	0		0	0	3	0	0	
	CO3	Write a research proposal for obtaining Financial assistance from national funding agencies.	0	0	0	3	0	0		0	0	0	3	0	
	CO4	Draw conclusions related to the research problem and give recommendations towards new research opportunities.	0	0	0	3	0	0		0	0	0	3	0	
	CO5	Represent and systematically structure a discussion on the theories and experimental results and define, design and write a literature review independently	0	0	3	0	0	0		0	3	0	0	0	
	CO1	Understand the objectives, motivation and types of molecular biology research.	3	0	0	0	0	0		3	0	0	0	0	

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118

Course Name	COs	CO Description	PO							PSO					
			1	2	3	4	5	6	Average	1	2	3	4	5	Average
Advance Level Elective Course (PHDBOT04)	CO2	Explain and use advanced molecular biology and biochemical techniques.	0	1	0	0	0	0	2.60	0	2	0	0	0	2.80
	CO3	Prepare handouts and presentations using LaTeX.	0	0	0	3	0	0		0	0	3	0	0	
	CO4	Analyse the research data with advanced statistical softwares.	3	0	0	0	0	0		3	0	0	0	0	
	CO5	Discuss the application of advanced biological techniques and applied botany.	0	0	3	0	0	0		0	0	3	0	0	
			Grand Average						2.80						2.95

Principal
Ramakrishna Mission
Vivekananda Centenary College
Rahara, Kolkata-700 118