Program Outcome (PO) and Course Outcome (CO) under LOCF/NCCF

Program Offered: B.Sc. in Botany

Program Outcomes (PO)	
PO1:	**To transform curriculum into outcome-orientedscenario**
PO2:	**To develop the curriculum for fosteringdiscovery-learning**
PO3:	**Systematic and coherent understanding of the fundamental concepts in classical to new modern applied plant science**
PO4:	**Students will be able to use the evidence based analytical approach to explain the gene to phenotype concept**
PO5:	**The students will be able to understand the various plant groups, biochemistry, anatomy, taxonomy, microbiology, genomics, molecular biology**
PO6:	**Students will be able to understand the basic principle of equipments, instruments**
PO7:	**Students will be able to demonstrate the experimental techniques and methods of their area ofspecialization**

Programme Specific Outcome

PROGRAMME NAME	B.Sc HONOURS in BOTANY
PSO	Being a practical based subject, a student completing this programme become adept in hands-on activities. Students get conversant with different recent trends of scientific works happening in and around on plant sciences. It is extremely important that both, the teacher and students are clear about the contents, scope and limitations, and the competencies expected to be developed as a result of undergoing a particular programme/course of study. This clarity helps the teacher to plan for and execute content-delivery in an efficient manner, while the learner is made aware of the standards that he/she is expected to attain.

SEMESTER:I Major (Honours/ Undergraduate), Minor

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Plant Groups and Microbial World**	**BSCBOTMJ101**	**CO1:**Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the fascinating world of microbes and plants **CO2:**Hands on training will help students to learn use of microscope, various instruments handling, mounting, section-cutting and staining techniques for the study of bacteria and plant materials **CO3:** Making drawings in practical records will enhance understanding morphological and structural details and related functional aspects in diverse plant and microbial groups **CO4:**After the completion of the course the students will be able to develop understanding about the classification and diversity of different plants, microbes and their economic importance **CO5:** The students will develop conceptual skill about identifying plants and microbes **CO6:** The students will gain knowledge about developing commercial enterprise of the microbial products
2	**Plant Groups and Microbial World**	**BSCBOTMN101**	**CO1:**Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the fascinating world of microbes and plants **CO2:**Hands on training will help students to learn use of microscope, various instruments handling, mounting, section-cutting and staining techniques for the study of bacteria and plant materials **CO3:** Making drawings in practical

			records will enhance understanding morphological and structural details and related functional aspects in diverse plant and microbial groups **CO4:**After the completion of the course the students will be able to develop understanding about the classification and diversity of different plants, microbes and their economic importance **CO5:** The students will develop conceptual skill about identifying plants and microbes **CO6:** The students will gain knowledge about developing commercial enterprise of the microbial products
3	**Mushroom technology**	**BSCBOTSE101**	**CO1:**Recall various types and categories of mushrooms **CO2:** Demonstrate various types of mushroom cultivating technologies **CO3:** Examine various types of food technologies associated with mushroom industry **CO4:** Value the economic factors associated with mushroom cultivation **CO5:** Device new methods and strategies to contribute to mushroom production
4	**Introduction to Local Flora**	**MDC118**	**CO1:** understanding about various life form **CO2:** Ecological role of various plant group **CO3:** Knowledge about local plant **CO4:** study of economic plant

SEMESTER: II Major (Honours/ Undergraduate), Minor

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Cryptogamic Botany & Palaeobotany**	**BSCBOTMJ201**	**CO1:**Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the

			fascinating world of cryptogams and plant fossils **CO2:** After the completion of the course the students will be able to develop critical understanding on morphology, anatomy and reproduction of Algae, Bryophytes, Pteridophytes& Gymnosperms and also an understanding of the plant evolution and their transition to land habit **CO3:** The students will learn the major patterns of diversity among cryptogams along with their characters **CO4:** The students will develop an understanding by observation and table study of representative members of phylogenetically important groups to learn the process of evolution in a broad sense **CO5:** The students will understand morphology, reproduction and developmental changes therein through typological study and create a knowledge base in understanding the basis of lower group of extant plants and fossil members'. They will also get acquainted to the diversity and economic values of such plants
2	**Cryptogamic Botany &Palaeobotany**	**BSCBOTMN201**	**CO1:**Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the fascinating world of cryptogams and plant fossils **CO2:** After the completion of the course the students will be able to develop critical understanding on morphology, anatomy and reproduction of Algae, Bryophytes, Pteridophytes& Gymnosperms

			and also an understanding of the plant evolution and their transition to land habit **CO3:** The students will learn the major patterns of diversity among cryptogams along with their characters **CO4:** The students will develop an understanding by observation and table study of representative members of phylogenetically important groups to learn the process of evolution in a broad sense **CO5:** The students will understand morphology, reproduction and developmental changes therein through typological study and create a knowledge base in understanding the basis of lower group of extant plants and fossil members'. They will also get acquainted to the diversity and economic values of such plants
3	**Biofertilizer**	**BSCBOTSE201**	**CO1:**Develop their understanding on the concept of bio-fertilizer **CO2:** Identify the different forms of biofertilizers and their uses **CO3:** Compose the Green manuring and organic fertilizers **CO4:** Develop the integrated management for better crop production by using both nitrogenous and phosphate bio fertilizers and vesicular arbuscularmycorrhizal (VAM) **CO5:** Interpret and explain the components, patterns, and processes of bacteria for growth in crop production
4	**Herbal Home Remedies**	**MDC217**	**CO1:** Develop conceptual skill about traditional Indian medicinal system, herbal medicines, their processing, storage and

			marketing **CO2:** Gain knowledge about developing commercial enterprise of herbal medicines **CO3:** Learn the basic tools and techniques for phytochemical analysis and propagation of the medicinal plants

SEMESTER: III Major (Honours/ Undergraduate), Minor

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Gymnosperms, Mycology and Plant Pathology-I**	**BSCBOTMJ301**	**CO1:**The concept of progymnosperms and its significance in plant evolutionary history will be determined **CO2:** General characteristics of gymnospermous plant group with special reference to their classification, morphology, reproduction, distribution and ecology will be described **CO3:** True fungi will be identified and the principles and application of plant pathology in the control of plant disease will be demonstrated **CO4:** The common plant diseases according to geographical locations will be identified and devices to control measures will be known
2	**Gymnosperms, Mycology and Plant Pathology-II**	**BSCBOTMJ302**	**CO1:**The role and economic importance of gymnosperms in human welfare will be known **CO2:** The evolutionary significance of gymnosperms will be understood along with their prehistoric life forms and evolution through geological ages **CO3:** The skills in laboratory, field and glasshouse work related to mycology and plant pathology will be gained **CO4:** An idea will be generated to develop an understanding of

			microbes and fungi and also to know their adaptive strategies
3	**Gymnosperms, Mycology and Plant Pathology**	**BSCBOTMN301**	**CO1:**General characteristics of gymnospermous plant group with special reference to their classification, morphology, reproduction, distribution and ecology will be described **CO2:** True fungi will be identified and the principles and application of plant pathology in the control of plant disease will be demonstrated **CO3:** The common plant diseases according to geographical locations will be identified and devices to control measures will be known

SEMESTER: IV Major (Honours/ Undergraduate), Minor

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Structural Botany, Economic Botany and Pharmacognosy-I**	**BSCBOTMJ401**	**CO1:**To know about different plants organ like root, stem and leaves and their importance **CO2:** Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems **CO3:** Increase the awareness and appreciation of plants & plant products encountered in everyday life **CO4:** Appreciate the diversity of plants and the plant products in human use
2	**Structural Botany, Economic Botany and Pharmacognosy-II**	**BSCBOTMJ402**	**CO1:**Develop an understanding of concepts and fundamentals of plant anatomy **CO2:** Examine the internal anatomy of plant systems and organs **CO3:** Develop critical understanding on the evolution of concept of organization of shoot and root apex **CO4:** Analyze the composition of different parts of plants and their relationships **CO5:** Evaluate the adaptive and protective systems of plants **CO6:** To know about medicinal properties and

			uses of plants by folklore and ayurveda system.
3	**Plant Morphology, Plant Anatomy & Plant Taxonomy**	**BSCBOTMN401**	**CO1:**To know about different plants organ like root, stem and leaves and their importance **CO2:** Develop an understanding of concepts and fundamentals of plant anatomy **CO3:** Examine the internal anatomy of plant systems and organs **CO4:** Interpret the rules of ICN in botanical nomenclature **CO5:** Generalize the characters of the families according to Bentham & Hooker's system of classification **CO6:**Evaluate the Important herbaria and botanical gardens
4	**Horticulture, Nursery and Gardening**	**BSCBOTSE401**	**CO1:** Understand the concept of different types of horticultural practices for value addition **CO2:** Understand the process of sowing seeds in nursery **CO3:** List the various resources required for the development of nursery **CO4:** Distinguish among the different forms of sowing and growing plants **CO5:** Analyse the process of Vegetative propagation **CO6:** Appreciate the diversity of plants and selection of gardening **CO7:** Examine the cultivation of different vegetables in nursery and gardening

SEMESTER: V (Honours, Program)

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Plant Physiology and Metabolism**	**BSCHBOTC501**	**CO1:**Understand Water relation of plants with respect to various physiological processes **CO2:** Explain chemical properties and deficiency symptoms in plants **CO3:** Classify aerobic and anaerobic respiration **CO4:** Explain the significance of Photosynthesis and respiration

			CO5: Assess dormancy and germination in plants **CO6:** Students acquire the adequate knowledge of metabolism in plants **CO7:** Explain the ATP-Synthesis **CO8:** To acquire adequate knowledge about translocation in plants, carbon dioxide concentrating mechanisms, growth regulators and flowering of plants
2	**Cytology and Genetics**	**BSCHBOTC501**	**CO1:**Have conceptual understanding of laws of inheritance, genetic basis of loci and alleles and their linkage **CO2:** Comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders **CO3:** Develop critical understanding of chemical basis of genes and their interactions at population and evolutionary levels **CO4:** Analyze the effect of mutations on gene functions and dosage **CO5:** Examine the structure, function and replication of DNA
3	**Analytical Techniques in Plant Sciences**	**BSCHBOTDSE501**	**CO1:**Develop conceptual understanding of cell wall degradation enzymes and cell fractionation **CO2:** Classify different types of chromatography techniques **CO3:** Explain the principles of Light microscopy, compound microscopy, Fluorescence microscopy and confocal microscopy **CO4:** Apply suitable strategies in data collections and disseminating research findings
4	**Bioinformatics**	**BSCHBOTDSE502**	**CO1:** Understand the concept of databases and use of

			different public domain for DNA and proteins sequence retrieval **CO2:** Understand the concept of pairwise alignment of DNA sequences using algorithms **CO3:** Explain the structure of proteins homology modeling approach using SWISS MODEL and SWISS-PDB **CO4:** Reflect upon the role of various models in molecular evolution **CO5:** Analyze the role of (QSAR) techniques in Drug Design
5	**Stress Biology**	**BSCHBOTDSE503**	**CO1:** Develop the understanding of concept of stress, stress factors and resistance mechanisms **CO2:** Explain different types of stress with examples **CO3:** Develop the ability for critical appraisal of various physiological mechanisms that protect the plant from environmental stress i.e. adaptation, avoidance and tolerance **CO4:** Analyze the role of production and scavenging mechanisms
6	**Plant Breeding**	**BSCHBOTDSE504**	**CO1:** Develop conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool **CO2:** Familiarize with genetic basis of heterosis **CO3:** Classify Sexual and Asexual modes of reproduction **CO4:** Explain monogenic and polygenic inheritance **CO5:** Reflect upon the role of various non- conventional methods used in crop improvemen
7	**Anatomy of Angiosperms**	**BSCPBOTC501**	**CO1:** Develop an understanding of concepts and

			fundamentals of plant anatomy **CO2:** Examine the internal anatomy of plant systems and organs **CO3:** Develop critical understanding on the evolution of concept of organization of shoot and root apex **CO4:** Analyze the composition of different parts of plants and their relationships **CO5:** Evaluate the adaptive and protective systems of plants
8	**Plant Physiology**	**BSCPBOTC502**	**CO1:** Understand Water relation of plants with respect to various physiological processes **CO2:** Explain chemical properties and deficiency symptoms in plants **CO3:** Classify aerobic and anaerobic respiration **CO4:** Explain the significance of Photosynthesis and respiration **CO5:** Assess dormancy and germination in plants **CO6:** To acquire adequate knowledge about translocation in plants, carbon dioxide concentrating mechanisms, growth regulators and flowering of plants
9	**Plant Diversity and Human welfare**	**BSCHBOTSEC501**	**CO1:** Develop understanding of the concept and scope of plant biodiversity **CO2:** Identify the causes and implications of loss of biodiversity **CO3:** Apply skills to manage plant biodiversity **CO4:** Utilize various strategies for the conservation of biodiversity **CO5:** Conceptualize the role of plants in human welfare with special reference to India
10	**Mushroom culture technology**	**BSCHBOTSEC502**	**CO1:** Recall various types and categories of mushrooms

			CO2: Demonstrate various types of mushroom cultivating technologies **CO3:** Examine various types of food technologies associated with mushroom industry **CO4:** Value the economic factors associated with mushroom cultivation **CO5:** Device new methods and strategies to contribute to mushroom production

SEMESTER: VI (Honours, Program)

COURSE OUTCOMES (CO)			
Sl No.	**Course Name**	**Course Code**	**Course Outcomes(CO)**
1	**Molecular Biology**	**BSCHBOTC601**	**CO1:**Analyse the structures and chemical properties of DNA and RNA through various historic experiments **CO2:** Differentiate the main types of prokaryotes through their grouping abilities and their Characteristic **CO3:** Evaluate the experiments establishing central dogma and genetic code **CO4:** Gain an understanding of various steps in transcription, protein synthesis and protein modification
2	**Plant Biotechnology and Genetic Engineering Course Code**	**BSCHBOTC602**	**CO1:**Understand the core concepts and fundamentals of plant biotechnology and genetic Engineering **CO2:** Develop their competency on different types of plant tissue culture **CO3:** Analyze the enzymes and vectors for genetic manipulations **CO4:** Examine gene cloning and evaluate different methods of gene transfer **CO5:** Critically analyze the major concerns and applications of transgenic technology

			CO6: To learn about gene cloning, recombinant DNA technology and bioinformatics includes recent biotechnological advancement related to genomics and proteomics **CO7:** Acquire the knowledge about gene transfer and applications of biotechnology **CO8:** Acquire the knowledge about tissue culture techniques, restriction digestion, isolation and electrophoresis of plasmid DNA
3	**Research Methodology**	**BSCHBOTDSE601**	**CO1:**Understand the concept of research and different types of research in the context of Biology **CO2:** Develop laboratory experiment related skills **CO3:** Develop competence on data collection and process of scientific documentation **CO4:** Analyze the ethical aspects of research **CO5:** Evaluate the different methods of scientific writing and reporting
4	**Biostatistics**	**BSCHBOTDSE602**	**CO1:** Comprehend the fundamental concepts related to descriptive and inferential Biostatistics **CO2:** Develop skills in data tabulation, its treatment, analysis, interpretation and graphical representation of data **CO3:** Analyze the implications of inferential statistics in biology **CO4:** Develop their competence in hypothesis testing and interpretation
5	**Natural Resource Management**	**BSCHBOTDSE603**	**CO1:** Understand the concept of different natural resources and their utilization **CO2:** Critically analyze the sustainable utilization land, water, forest and energy resources **CO3:** Evaluate the management strategies of different natural resources **CO4:** Reflect upon the different national and international efforts in

			resource management and their conservation
6	**Horticultural Post-harvest**	**BSCHBOTDSE604**	**CO1:** Understand the concept of different types of horticultural practices for value addition **CO2:** Visualize the post-harvest problems likely to be confronted **CO3:** Know the tricks of the trade and how to increase the longevity of the produce
7	**Cytogenetics**	**BSCPBOTC601**	**CO1:** Have conceptual understanding of laws of inheritance, genetic basis of loci and alleles and their linkage **CO2:** Comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders **CO3:** Develop critical understanding of chemical basis of genes and their interactions at population and evolutionary levels **CO4:** Analyze the effect of mutations on gene functions and dosage
8	**Plant Ecology and Phytogeagraphy**	**BSCPBOTC602**	**CO1:** Understand core concepts of biotic and abiotic **CO2:** Classify the soils on the basis of physical, chemical and biological components **CO3:** Analysis the phytogeography or phytogeographical division of India **CO4:** Evaluate energy sources of ecological system **CO5:** Assess the adaptation of plants in relation to light, temperature, water, wind and fire **CO6:** Conduct experiments using skills appropriate to subdivisions
9	**Floriculture**	**BSCPBOTSEC601**	**CO1:** Develop conceptual understanding of gardening from historical perspective **CO2:** Analyze various nursery management practices with routine garden operations **CO3:** Distinguish among the various Ornamental Plants and their cultivation

			Evaluate garden designs of different countries **CO4:** Appraise the landscaping of public and commercial places for floriculture **CO5:** Diagnoses the various diseases and uses of pests for ornamental plants
10	**Fermentation Technology**	**BSCPBOTSEC602**	**CO1:** Employ the process for maintenance and preservation of microorganisms **CO2** Analyze the various aspects of the fermentation technology and apply for Fermentative production **CO3:** Demonstrate proficiency in the experimental techniques for microbial production of enzymes: amylase and protease, bio product recover

Durgapur Government College

Mapping/Co-relation Program Outcome(PO) & Course Outcome(CO)

Department : Botany Academic Session : 2024-25

CO details	PO details							
Sl. No.	Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7
1.	**BSCBOTMJ101**	✓	✓	✓	✓	✓	✓	✓
2.	**BSCBOTMN101**	✓	✓	✓	✓		✓	✓
3.	**BSCBOTSE101**	✓	✓	✓	✓	✓		✓
4.	**MDC118**	✓	✓	✓	✓	✓	✓	✓
5.	**BSCBOTMJ201**	✓	✓	✓	✓	✓	✓	✓
6.	**BSCBOTMN201**	✓	✓	✓	✓	✓	✓	✓
7.	**BSCBOTSE201**	✓	✓	✓	✓	✓	✓	✓
8.	**MDC217**	✓	✓	✓	✓	✓	✓	✓

9.	**BSCBOTMJ301**	✓		✓	✓	✓	✓	✓
10.	**BSCBOTMJ302**	✓	✓	✓	✓	✓	✓	✓
11.	**BSCBOTMN301**	✓	✓	✓	✓		✓	✓
12.	**BSCBOTMJ401**	✓	✓	✓	✓	✓		✓
13.	**BSCBOTMJ402**	✓	✓	✓	✓	✓	✓	✓
14.	**BSCBOTMN401**	✓	✓	✓	✓	✓	✓	✓
15.	**BSCBOTSE401**	✓		✓	✓			✓
16.	**BSCHBOTC501**	✓	✓	✓	✓	✓	✓	✓
17.	**BSCHBOTC501**	✓	✓	✓		✓	✓	✓
18.	**BSCHBOTDSE501**	✓	✓	✓	✓	✓	✓	✓
19.	**BSCHBOTDSE502**	✓	✓	✓	✓	✓	✓	✓
20.	**BSCHBOTDSE503**	✓	✓	✓	✓		✓	✓
21.	**BSCHBOTDSE504**	✓	✓	✓	✓	✓		✓
22.	**BSCPBOTC501**	✓	✓	✓	✓	✓	✓	✓
23.	**BSCPBOTC502**	✓	✓	✓	✓	✓	✓	✓
24.	**BSCHBOTSEC501**	✓		✓	✓	✓	✓	✓
25.	**BSCHBOTSEC502**	✓	✓	✓	✓	✓		✓
26.	**BSCHBOTC601**	✓	✓	✓	✓	✓	✓	✓
27.	**BSCHBOTC602**	✓	✓	✓	✓		✓	✓
28.	**BSCHBOTDSE601**	✓	✓	✓	✓	✓		✓
29.	**BSCHBOTDSE602**	✓	✓	✓	✓	✓	✓	✓
30.	**BSCHBOTDSE603**	✓		✓	✓			✓
31.	**BSCHBOTDSE604**	✓	✓	✓	✓	✓	✓	✓

32.	**BSCPBOTC601**	✓	✓	✓	✓	✓	✓	✓
33.	**BSCPBOTC602**	✓	✓	✓	✓		✓	✓
34.	**BSCPBOTSEC601**	✓	✓	✓	✓	✓		✓
35.	**BSCPBOTSEC602**	✓	✓	✓	✓	✓	✓	✓