

RISHI BANKIM CHANDRA COLLEGE FOR WOMEN

Program Outcomes Department of BOTANY

Sl No.	PO Master Name
1	Students will gather a vast knowledge on plant sciences and its different aspects such as Horticulture, Floriculture, Plant protection, Plant Taxonomy, Genetics, Molecular Biology, Plant Biotechnology, Ecology, Environmental Biology etc
2	A candidate can look forward to being a part of the industry by working as a technician in laboratory, working with some industry giants, development and management of forests, parks, waste lands, sea wealth etc.
3	Students have choice to complete M.Sc in Cytology Genetics Lichenology Economic botany Palynology Palaeobotany Bryology Ethnobotany, Phycology Phytochemistry Forestry Plant morphology Phytopathology Plant anatomy Plant physiology Plant genetics Ag
4	Students can opt different Government jobs after completion of B.Sc. in Primary school teacher(AT) High School teacher(AT) Clerk of School, College, University and any Govt office. Job in bank Assistant Professor IFS WBFS SDO BDO DM Collector Botany
5	Understand the diversity among Bacteria, Viruses and Algae and their importance. Know the systematic, morphology and structure, of Bacteria, Viruses and Algae, Know about structure and properties of Biomolecules (Carbohydrate, Lipid, Proteins and Nuc
6	The role plants in human welfare, Gain knowledge about various economic used plants, Understand properties of hereditary molecule, Genetics, Proteins, Codon, gene mutation, the uses of plants and microbes, the conservation of biodiversity
7	Know the scope and importance of the ecology and phytogeography and its importance in life, Understand the diversity of angiosperms and know the Pre-Darwinian and Post- Darwinian systems of Classification and forestry, Know about history and relevan
8	Students can understand Analytical technique in plant sciences for bioactive compound, Laboratory use. Will gain knowledge about plant physiology.
9	Few of the industries which one can work with are: Chemical Industry Food Companies Arboretum Forest Services Biotechnology Firms Oil Industry Land Management Agencies Seed And Nursery Companies Plant Health Inspection Services National Parks
10	Understand use of statistics rule for biological purposes in research work., management of natural resources for human and ecosystem welfare.
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Course Outcomes

Department of BOTANY

SI No.	Semester	Course Name	Course Outcome
1	1st Semester	Botacor01t phycology & microbiology	1. virus: characteristics, dna virus - t phage, lambda phage, rna virus - tobacco mosaic virus - physico chemical characteristics and multiplication. economic importance of virus like vaccine production. 2. bacteria: general characteristics, structure, nutrition, growth, metabolism, reproduction and recombination. economic importance of bacteria - agriculture and industry. 3. algae: general characteristics, special characteristics, ecology and economic importance. 4. study of structure, reproduction, ecology and economic importance of different genus under different groups (cyanophyta, xanthophyta, chlorophyta, charophyta, phaeophyta and rhodophyta)
2	1st Semester	Botacor02t biomolecules and cell biology	1. biomolecules like carbohydrates, lipids, protein and nucleic acids. 2. study of bioenergetics including thermodynamics, different reactions, atp structure and roles. 3. study of enzymes: structure, classification, mechanism an inhibition. 4. study of cell including cell organelles of prokaryotic and eukaryotic cells. 5. cell division: mitosis and meiosis of eukaryotic cells, regulation of cell cycle.
3	2nd Semester	Botacor03t mycology and phytopathology	1. fungi: general characteristics, classification, structure, reproduction, economic importance an ecology of different groups (chytridiomycota, zygomycota, ascomycota, basidiomycota, allied fungi, oomycota). 2. symbiotic associations, applied mycology (industry, agriculture and environment). 3. phytopathology: principles and concepts - symptoms, disease cycle, host pathogen relationship, environmental relation, prevention and control of differnet plat diseases like early late blight of potato, citrus canker, tobacco mosaic virus etc. 4. role of quarantine.
4	2nd Semester	Botacor04t archegoniate	1. bryophytes: general characteristics, adaptations, classificaiton, study of systematic position, morphology, anatomy and reproduction of different genus (riccia, anthoceros, sphagnum and funaria etc.), ecological and economic importance of bryophytes. 2. pteridophytes: general characteristics, classification. study of systematic position, morphology, anatomy and reproduction of different genus (psilotum, selaginella, equsetum and pteris). special featur of pteridophytes, ecological and economical importance. 3. gymnosperms: general characteristics, classificatiopn, morphology, anatomy and reproduction of cycas, pinus, gnetum. ecological and economical importance.
5	3rd Semester	Botacor05t morphology and anatomy of angiosperms	1. morphology and types with examples of inflorescences, flowers, fruits and seeds. 2. anatomy: tissues, meristems, vascular cambium and wood. applications in systematics, forensic and pharmacognosy. 3. adaptive and protective systems of plants.
6	3rd Semester	Botacor06t economic botany	1. economic importance with several varieties of cereals, legumes, sources of sugar, beverages, sources of oils and fats, natural rubber, drug yielding plants, timber plants and fibres.
7	3rd Semester	Botacor07t genetics	1. mendelian genetics and its extension, extrachromosomal inheritance. 2. linkage, crossingover, chromosome mapping. 3. variations in chromosome number and structures. 4. gene

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			mutations, transposons, dna repair. 5. fine structure of gene. 6. population and evolutionary genetics.
8	3rd Semester	Bothgec03t / botgcor03t plant anatomy and embryology	1. tissues, organs, secondary growth, adaptive and protective systems. 2. structural organization of flowers, pollination and fertilization, embryo and endosperm, apomixis and polyembryony.
9	1st Semester	Bothgec01t / botgcor01t biodiversity	1. microbes: study about virus and bacteria, economic importance. 2. algae: general characteristics, classification, special features, morphology and life cycles of different genus like nostoc, oedogonium, fucus etc. ecological and economic importance of algae. 3. fungi: general characteristics, ecology, special features, classifications, life cycles of different genus like rhizopus, penicillium, agaricus etc. symbiotic association - lichen and mycorrhiza, economic importance of fungi. 4. archegoniate: general fetures, bryophytes (general characteristics, adaptations, classification, morphology, anatomy and reproduction of riccia, anthoceros and funaria, ecological and economic importance), pteridophyte (general characteristics, classification, morphology, anatomy and reproduction of diffierent genus like selaginaella, equisetum and pteris, special features, ecological and economic importance), gymnosperms (general characteristics, classification, morphology, anatomy and reproduction of cycas and pinus, ecological and economic importance)
10	4th Semester	Botacor08t molecular biology	1. nucleic acids: structures of dna and rna 2. replicaiton of dna 3. central dogma, genetic code 4. transcription, processing and modification of rna 5. translation.
11	4th Semester	Botacor09t plant ecology and phytogeography	1. study about soil, water, light, temperature, wind and fire. 2. biotic interactions 3. population ecology 4. plant communities: sucesion 5. ecosystems: functional aspects of ecosystem 6. phytogeography: principles and types, phytogeographical divisions of india bsi 1996, local vegetation.
12	4th Semester	Botacor10t plant systematics	1. significance of plant systematics, taxonomic hierarchy, botanical nomenclature, systems of classification. 2. biometrics, neumerical taxonomy and cladistics. 3. phylogeny of angiosperms.
13	4th Semester	Bothgec04t / botgcor04t plant physiology and metabolism	1. plant water relations. 2. mineral nutrition. 3. translocation in phloem. 4. photosynthesis 5. respiration 6. enzymes 7. nitrogen metabolism 8. plant growth regulators 9. plant responses to light and temperature
14	3rd Semester	Botssec01m plant diversity and human welfare	Scope of plant diversity, loss of biodiversity, management of plant diversity, conservation of biodiversity, role of plants in relation to human welfare.
15	4th Semester	Botssec02m ethnobotany	Concepts, scopes and objectives, methodologies of ethnobotanical studies, role of ethnobotany in modern modern medicine.
16	5th Semester	Botacor11t reproductive biology of angiosperms	1. reproductive development, anther and pollen biology, ovule. 2. pollination (types) and fertilization. 3. self incompatibility. 4. embryo including development, endosperm and seed. 5. polyembryony and apomixis - causes and applicaitons.
17	5th Semester	Botacor12t plant physiology	1. plant water relations. 2. minerals nutrition, nutrient uptake and translocation in the phloem. 3. plant growth regulators. 4. p[hytology of flowerings 5. phytochromes, cytochromes, phjtototropins.
18	5th Semester	Botadse01t natural resource management	Natural resources, sustainable utilization, land, water, biological resources, forests, energy, contemporary practices in resource management, national and international efforts in resource management and conservation.

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19	5th Semester	Botadse03t industrial and environmental microbiology	Scopes of microbes in industry and environment, bioreactors and fermentation process, microbial production of industrial products, microbial enzymes of industrial interests and enzyme immobilization, microbes and quality of environment, microbial flora of water, microbes in agriculture and remediation of contaminated soil.
20	6th Semester	Botacor13t plant metabolism	1. concepts of metabolism. 2. carbon assimilation. 3. carbohydrate metabolism. 4. carbon oxidation. 5. atp synthesis. 6. lipid metabolism. 7. nitrogen metabolism. 8. signal transduction mechanisms.
21	6th Semester	Botacor14t plant biotechnology	1. plant tissue culture 2. recombinant dna technology 3. gene cloning 4. methods of gene transfer 5. applications of biotechnology
22	6th Semester	Botadse04t analytical techniques in plant science	Imaging related techniques, cell fractionations, radioisotopes, spectrophotometry, chromatography, characterization of protein and nucleic acids, biostatistics.
23	6th Semester	Botadse06t biostatistics	Definitions, collections of primary and secondary data, measures of central tendency, correlation, statistical inference.
24	1st Semester	Botacor01p botacor01p phycology & microbiology	1. study of electron micrographs of t phage and tmv - structure and reproduction. 2. study of bacteria - structure and reproduction, special features by slides and photographs. demonstration of preparation of media, sterilization and subculturing. 3. study of vegetative and reproductive structures of different genus (oedogonium chara etc.) under different groups through hand drawing, prism drawing and magnification.
25	1st Semester	Botacor02p biomolecules and cell biology	1. study of qualitative tests of different biomolecules. 2. study of plant cell: structure, measurement, counting, organelles membrane permeability. 3. study of dna staining, cell division - different stages of mitosis and meiosis.
26	1st Semester	Bothgec01p / botgcor01p biodiversity	1. gram staining of bacteria 2. study of vegetative and reproductive structures of different algal genus. 3. asexual and sexual structures of different fungal genus from temporary and permanent slides. 4. herbarium specimens of black stem rust of wheat. 5. lichens - different forms from jar specimen. 6. mycorrhiza - from photographs. 7. morphology, special features and reproductive structures of different genus of bryophyte, pteridophyte and gymnosperms.
27	2nd Semester	Botacor03p mycology and phytopathology	1. fungi: different groups (chytridiomycota, zygomycota, ascomycota, basidiomycota, allied fungi, oomycota)- structure, reproductional stages, measurements through permanent slides and temporary mounts. 2. lichens: study of different groups (crustose, foliose and fruticose). 3. mycorrhizae - ecto and endo through photographs. 4. phytopathology: study of different diseases (viral, bacterial, fungal) through herbarium specimens.
28	2nd Semester	Botacor04p archegoniate	1. bryophyte: morphology of thallus, whole mount of special structures, sporophyte of different genus (riccia, marchantia, anthoceros, funaria etc.) by temporary and permanent slides. 2. pteridophyte: morphology, whole mount, t.s. and l.s. of strobilus and special structures of different genus (selaginella, equisetum, pteris etc.) by temporary and permanent slides. 3. gymnosperm: morphology, anatomy, reproductive structures by temporary and permanent slides. 4. botanical excursion.
29	2nd Semester	Bothgec02p / botgcor02p plant ecology and taxonomy	1. instruments required for ecological studies, adaptations of hydrophytes and xerophytes, biotic interactions, quadrat studies, quantitative analysis of herbs at different sites. 2. study of

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			vegetative and floral characters of different families like brassicaceae, liliaceae etc. 3. mounting wild plants in herbarium sheets.
30	3rd Semester	Botacor05p morphology and anatomy of angiosperms	1. study of anatomical details of plants through permanent, temporary slides and museum specimens (meristem, cambium, xylem, phloem, epidermal system, periderm). 2. preparation of permanent slides by double staining method of root, stem and leaf anatomy.
31	3rd Semester	Botacor06p economic botany	1. study of several economic important crops (cereals, legumes, sugar yieldings, spices, beverages, oils and fats, drug yieldings, tobacco, rubber, wood, fibre and timber) - types, microchemical tests, sections, biochemical tests.
32	3rd Semester	Botacor07p genetics	1. mitosis of allium cepa, lens esculentus and aloe vera through temporary squash preparations. 2. meiosis of allium cepa and rhoeo discolor through temporary smear preparations. 3. mendel's law through seed ratio, probability and chi-square. 4. chromosome mapping. 5. gene interaction through seed ratio. 6. study of structural and numerical aberrations of chromosomes. 7. study of human genetics traits like colour blindness etc. through photos.
33	3rd Semester	Bothgec03p / botcor03p plant anatomy and embryology	1. study of tissues through permanent slides and photographs. 2. anatomy of dicot: root, stem, leaf. monocot: root, stem, leaf. 3. adaptive anatomy: xerophyte and hydrophyte. 4. study of anther, ovules, pollination types and seed dispersal mechanisms, dissection of embryo and endosperm, calculation of percentage of germinated pollen.
34	4th Semester	Botacor08p molecular biology	1. preparation of lb medium 2. dna isolation and dna estimation. 3. dna replication through photographs. 4. structure of prokaryotic and eukaryotic rna polymerase through photographs. 5. nucleic acid as genetic material through photographs. 6. spliceosome, splicing mechanism and ribozyme through photographs
35	4th Semester	Botacor09p plant ecology and phytogeography	1. study of ecology, instruments, measurements, analysis of water and soil. 2. determination of dissolved oxygen and carbon dioxide of water. 3. study of anatomical adaptations of hydrophytes and xerophytes, biotic interactions, quantitative analysis of herbaceous vegetations. 4. field visit at different ecological sites.
36	4th Semester	Botacor10p plant systematics	1. study of vegetative and floral characters of different angiospermic families - asteraceae, solanaceae, brassicaceae, lamiaceae, euphorbiaceae, malvaceae, polygonaceae, acanthaceae, scrophulariaceae, rubiaceae. 2. botanical excursions (at least three)
37	4th Semester	Bothgec04p / botcor04p plant physiology and metabolism	Study of osmotic potential, transpiration, stomatal index and frequency, enzyme activity, photosynthesis and respiration. demonstration of effects of auxins, transpiration and respiration.
38	5th Semester	Botacor11p reproductive biology of angiosperms	1. study of anthers, pollen grains through photograph and fresh materials, pollen viability tests. 2. ovule types, special structures like entothelium etc. female gametophyte - types, egg apparatus through photographs. 3. endosperm: dissection of developing seeds for endosperm. 4. embryogenesis: study of dicot embryo developing stages, suspensors through photographs.
39	5th Semester	Botacor12p plant physiology	1. determination of osmotic potential and water potential. 2. transpiration, stomatal index and stomatal frequency (mesophyte - basella and xerophyte - ficus), proportion of area covered by stomatal pores. 3. study of epigeal and hypogeal seed germination - gram and corn seeds. 4. effect of iaa at different conc. on avena. 5. study of amylase activity on germinating barley or wheat. 6.

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			demonstration of succation due to transpiration, fruit ripening, rooting from cutting, bolting, avena coleoptile bioassay.
40	5th Semester	Botadse01p natural resouce management	Estimation of solid waste, collection of data on vegetation, measurement of woody species, calculatiuon and analysis of ecological footprints.
41	5th Semester	Botadse03p industrial and environmental microbiology	Study of instruments of microbiology, sterilization techniques and preparation of culture media.
42	6th Semester	Botacor13p plant metabolism	1. chemical separation and demonstration of absorpction spectrum of photosynthetic pigments. 2. effect of light intensity and carbon dioxide on the rate of photosynthesis. 3. compare rate of respiration of different parts of a plant. 4. activity of nitrate reductase in germinating leaves. 5. activity of lipases in germinating oil seeds.
43	6th Semester	Botacor14p plant biotechnology	1. preparation of ms medium, sterilization, inoculation methods by using different explants. 2. study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis and artificial seeds through photographs. 3. construction of restriction map of dna. 4. methods of gene transfer through photographs (agrobacterium mediated). 5. steps of genetic engineering through photographs. 7. isolation of genomic dna and gel electrophoresis.
44	6th Semester	Botadse04p analytical techniques in plant science	Blotting techniques, paper and layer chromatography
45	6th Semester	Botadse06p biostatistics	Calculation of central tendency, correlation coefficient, probability and f value.
46	2nd Semester	Botghco02t / botdsc02t plant ecology and taxonomy	1. ecology: introduction, ecological factors, plant communities, ecosystem, phytogeography. 2. plant taxonomy: introduction, identification, taxonomic evidences from palynology, cytology, phytochemistry and molecular data, taxonomic hierarchay, botanical nomenclature, classification, numerical taxonomy and cladistics.
47	6th Semester	Botgdse04t analytical techniques in plant science	Imaging related techniques, cell fractionations, radioisotopes, spectrophotometry, chromatography, characterization of protein and nucleic acids, biostatistics.
48	6th Semester	Botgdse04p analytical techniques in plant science	Blotting techniques, paper and layer chromatography
49	5th Semester	Botgdse01t cell and molecular biology	Techniques in biology, cell, cell organelles, cell cycle, genetic materials, dna: structure and replication, transcription, types of rna, translation, genetic code, regulation of gene expression
50	5th Semester	Botgdse01p cell and molecular biology	Study of cells and cell organelles through photograph and temporary mounts, study of mitosis and meiosis, plasmolysis, measurement of cell size, photographic study of npc, dna packaging, special chromosomes, preparation of karyotype and ideogram.