

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE
RAJNANDGAON (C.G.)



SYLLABUS & MARKING SCHEME
FOR
M.Sc. BOTANY (1 Year PG Programme)
Programme Code: MS1BOT
YEAR
2026-27

DEPARTMENT OF BOTANY

2026-27

SEMESTER PATTERN

M.Sc. BOTANY (1 Year PG Programme)

Semester	Course Title	Credit	IA	ESE	Total
I Sem.	DSC1-Plant ecology	4+0+0	30	70	100
	DSC2-Plant resource utilization, and conservation	4+0+0	30	70	100
	DSC3-Plant physiology	4+0+0	30	70	100
	DSE1-Plant metabolism	4+0+0	30	70	100
	SEC1- Gardening and Floriculture	0+0+2	-	-	50
	PC-1	0+0+4	-	-	100
	Total	22			550
II Sem.	DSC4-Biotechnology & genetic engineering of plants	4+0+0	30	70	100
	DSC5-Biotechnology & genetic engineering of microbes	4+0+0	30	70	100
	DSC6-Molecular plant pathology	4+0+0	30	70	100
	DSE2-Plant disease & control mechanism	4+0+0	30	70	100
	VAC1- Ancient Indian Botany and Ethnobotany	0+0+2	-	-	50
	PC-II	0+0+4	-	-	100
	Total	22			550

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2026-27

SEMESTER PATTERN

M.Sc. BOTANY (1 Year PG Programme)

Candidates for the M.Sc. Examination will be requiring passing in written as well as in practical examinations separately. It's compulsory to attend a part of their training at least one Botanical excursion to a Hill station (within or outside C.G.) or Seashore.

M.Sc. Examination is in semester pattern, there are two semester examination within one years. In each semester there are four theory paper and two practical.

Their shall be 8 papers in theory carrying 70 marks and of three hours duration, and 8 internal assessment and 8 assignment each of 30 marks and one practical examination each carrying 100 marks and having 4 Credit in each semester. Each practical examination is carrying 100 marks and is based on four theory papers having 4 Credit in each practical examination.

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2026-27

SEMESTER PATTERN

M.Sc. BOTANY (1 Year PG Programme)

SEMESTER – I

Semester	Course Title	Credit	IA	ESE	Total
I Sem.	DSC1-Plant ecology	4+0+0	30	70	100
	DSC2-Plant resource utilization, and conservation	4+0+0	30	70	100
	DSC3-Plant physiology	4+0+0	30	70	100
	DSE1-Plant metabolism	4+0+0	30	70	100
	SEC1- Gardening and Floriculture	0+0+2	-	-	50
	PC-1	0+0+4	-	-	100
	Total	22			550

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2026-27
M.Sc. BOTANY (1 Year PG Programme)

SEMESTER – I

DSC-I

M.M. - 70

PLANT ECOLOGY

Credit 4

Course Code: PBOC1T301

Unit-1

Ecosystem organization: - Structure and function, Primary production (methods of measurement, global pattern, controlling factors), Energy dynamics (trophic organization, energy flow pathways, ecological efficiencies), Litter fall and decomposition (mechanism, substrate quality and climatic factors), Global biogeochemical cycles of C, N, P and S.

Unit-2

Vegetation organization: - Concept of community and continuum, Community coefficients, Interspecific associations, Concept of ecological niche.

Vegetation development: - Temporal changes (cyclic and non cyclic), Mechanism of ecological succession (relay floristic and initial floristic composition, changes in ecosystem properties during succession).

Unit-3

Climate, soil and vegetation patterns of the world: - Life zones, Major biomes, major vegetation and soil types of the world.

Biological diversity: - Concept and levels, Role of biodiversity in ecosystem function and stability, Speciation and extinction, IUCN categories of threat, Terrestrial biodiversity hot spots.

Air, water and soil pollution: - Kinds, Sources, Quality parameters, effect on plants and ecosystems.

Unit-4

Climatic changes: - Green house gases (CO_2 , CH_4 , N_2O , CFCs, sources, trends and role), Ozone layer and ozone hole, Consequences of climatic change (global warming, sea level rise, Acid rain).

Ecosystem stability: - Concepts (resistance and resilience), Ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystems, Ecology of plant invasion, Environmental impact assessment.

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M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – I
DSC-2 **M.M. - 70**
PLANT RESOURCE UTILIZATION AND CONSERVATION
Credit 4
Course Code: PBOC1T302

Unit-1

Plant diversity: - Concepts, Status in India, Utilization and concerns.

Sustainable development: - Basic concepts, Sustainable development and Sustainability indicators.

World centers of primary diversity of domesticated plants: - The Indo-Burmese center, Plants introduction and secondary centers.

Unit-2

Origin, evolution, botany, cultivation and uses: - (i) Food storage and fodder crops (ii) Fibre crops (iii) Medicinal and aromatic plants and (iv) Vegetable oil yielding crops.

Important fire-wood and timber-yielding plants and non wood forest products (NWFPs): - such as bamboos, raw material for paper-making, gums, tannins dyes, resins and fruits. Ethnobotanically important plant of Chhattisgarh and its conservation

Unit-3

Green revolution: - Benefits and adverse consequences.

Innovations for meeting world food demands.

Plants used as avenue trees: - For shade, pollution control and aesthetics. Principles of conservation, Extinctions, Environmental status of plants based on international union for conservation of nature.

Endangered species: - Concept and conservation

Unit-4

Strategies for *in-situ* conservation: - International efforts and initiatives, Protected areas in India – sanctuaries, national parks, biosphere reserves, wetlands, mangroves and coral reefs for conservation of wild biodiversity.

Strategies for *ex-situ* conservation: - Principles and practices, botanical gardens, gene banks, seed banks, cryobanks. General account of the activities of Botanical survey of India (BSI), National bureau of plant genetic resources (NBPGR), Indian council of agricultural research (ICAR), Council of scientific & industrial research (CSIR) and Department of biotechnology (DBT) .

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M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – I
DSC-3 **M.M. - 70**
PLANT PHYSIOLOGY
Credit 4
Course Code: PBOC1T303

Unit-1

Translocation of water and solutes and membrane transport: - Plant water relations, Mechanism of water transport through xylem, Root-microbe interactions in facilitating nutrient uptake, Comparison of xylem and phloem transport, Phloem loading and unloading, Passive and active solute transport, Membrane transport system.

Unit-2

Photochemistry and photosynthesis: - General concept and historical background, Evolution of photosynthetic apparatus, Photosynthetic pigments and light harvesting complexes, Photo-oxidation of water, Mechanism of electron and proton transport.

Carbon assimilation: - The Calvin cycle, Photorespiration and its significance, C₄ cycle, the CAM pathway, Physiological and ecological consideration.

Unit-3

Sensory photobiology: - History of discovery of phytochromes, cryptochromes and their photochemical and biochemical properties, Photo-physiology of light induced responses, Cellular localization, Molecular mechanism of action of photomorphogenetic receptors.

Unit-4

Respiration: - Overview of plant respiration, Glycolysis, TCA cycle, Electron transport and ATP synthesis, Pentose phosphate pathway, Glyoxylate cycle.

Stress physiology: - Plant responses to biotic and abiotic stress, Mechanism of biotic and abiotic stress tolerance, HR and SAR, Water deficit and drought resistance, Salinity stress, Metal toxicity, Freezing and Heat stress, Oxidative stress. High temp. stress, low temp. stress

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M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – I
DSE-1 **M.M. - 70**
PLANT METABOLISM
Credit 4
Course Code: PBOC1T304

Unit-1

Energy flow: - Principles of thermodynamics, Free energy and redox reactions, Structure and function of ATP.

Signal transduction: - Overview, receptors and G-protein, Phospholipid signaling, Role of cyclic nucleotides, Calcium-Calmodulin cascade, Diversity in protein kinases and phosphatases, Specific signaling mechanisms e.g. Two component sensor-regulator system in bacteria.

Unit-2

Biosynthesis of starch and sucrose.

Lipid metabolism: - Structure and function of lipids, Fatty acid biosynthesis, Synthesis of membrane lipids, Structural lipids, storage lipids and their catabolism.

Unit-3

Nitrogen fixation, nitrogen and sulphur metabolism: - Overview, Biological nitrogen fixation, Nodule formation and nod factors, Mechanism of nitrate uptake and reduction, Ammonium assimilation, Sulfate uptake, transport and assimilation.

Unit-4

The flowering process: - Photoperiodism and its significance, Endogenous clock and its regulation, floral induction and development, Genetic and molecular analysis, Role of vernalization.

Plant growth regulators and elicitors: - Physiological effect and mechanism of action of Auxins, Gibberellins, Cytokinins, Ethylene, Absciscic acid, Brassinosteroids, Jasmonic acid and Salicylic acid. Hormone receptors.

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SEMESTER – I
Skill based course SEC-1 MM-50
GARDENING AND FLORICULTURE
Credit-2
Course Code-PBOC1T305

Unit 1

Concept and Types of Garden: Concept of Garden & Landscape Gardening, Style of garden- Formal & Informal garden, Free Style garden, Home Garden, Hanging garden: Types of garden- English, Mughal, Babylonian garden.

Unit 2

Garden Plants: Ornamental plants- Shrubbery, Fernery, Arches (Climber and creepers), Pargolas, Edges & Hedges and Pot plants, Cacti and Succulents plants, Flower borders and beds, Ground covers and carpet beds.

Units 3

Floriculture: Present situation and Scoe in India, Various typesof flowers- Seasonal flower, Cut flower. Flower crops- Rose, Chrysanthemum, Carnation, Gerbera, Tuberose, Aster, Lilly, Dahlia and Marigold.

Unit 4

Different tools and equipments used in gardening work, Preparation of soil for garden, Soil decontamination technique, planting method, Fertigation method, Propagation techniques for selected ornamental plants, Budding, Cutting, Layering and Grafting, Weed management, Harvesting techniques, Flower bouquet.

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2026-27
M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – I

Practical Course-PC-I

(Practical based on DSC1, DSC2, DSC3 and DSE1)

Credit 4

Course Code: PBOC1L306

(i)	Exercise based on DSC1.....	20
(ii)	Exercise based on DSC2.....	20
(iii)	Exercise based on DSC3/DSE1.....	20
(iv)	Spotting.....	10
(v)	Viva.....	10
(vi)	Sessional.....	20
		Total – 100 marks

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2026-27
SEMESTER PATTERN
M.Sc. BOTANY (1 Year PG Programme)

SEMESTER-II

Semester	Course Title	Credit	IA	ESE	Total
II Sem.	DSC4-Biotechnology & genetic engineering of plants	4+0+0	30	70	100
	DSC5-Biotechnology & genetic engineering of microbes	4+0+0	30	70	100
	DSC6-Molecular plant pathology	4+0+0	30	70	100
	DSE2-Plant disease & control mechanism	4+0+0	30	70	100
	VAC1- Ancient Indian Botany and Ethnobotany	0+0+2	-	-	50
	PC-2	0+0+4	-	-	100
	Total	22			550

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2026-27
M.Sc. BOTANY (1 Year PG Programme)

SEMESTER – II

DSC-4

M.M. - 70

BIOTECHNOLOGY AND GENETIC ENGINEERING OF PLANTS

Credit 4

Course Code: PBOC1T401

Unit–1

Biotechnology: - Basic concepts, principles and scope.

PLANT CELL AND TISSUE CULTURE :- General introduction, History, scope, concept of cellular differentiation, totipotency, culture media and their constituents.

Unit–2

Applications of plant tissue culture: - Clonal propagation, artificial seed production of hybrids and somaclones, Production of secondary metabolites/natural products, Cryopreservation and germplasm storage.

Strategies for Plant Conservation :- Ex-situ and in-situ conservation.

Unit–3

Organogenesis and adventives embryogenesis: - Fundamental aspects of morphogenesis, Somatic embryogenesis and androgenesis. Mechanism, techniques and utility.

Somatic hybridization: - Protoplast isolation, fusion and culture, Hybrid selection and regeneration possibilities, Achievements and limitations of protoplast research.

Unit–4

Genetic engineering of plants: - Aims, Strategies for development of transgenic (with suitable examples), *Agrobacterium* - the natural genetic engineer. T – DNA and transposon mediated gene tagging, Intellectual property rights, Possible ecological risks and ethical concerns.

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2026-27
M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – II
DSC-5 **M.M. - 70**
BIOTECHNOLOGY & GENETIC ENGINEERING OF
MICROBES
Credit 4
Course Code: PBOC1T402

Unit–1

Recombinant DNA technology: - Gene cloning principles and techniques, cloning and expression vectors, chimeric DNA, molecular probe, Applications, Construction of genomic/cDNA libraries, Choice of vectors, DNA synthesis and sequencing, Polymerase chain reaction. DNA fingerprinting.

Unit–2

Genomics and proteomics: - Genetic and physical mapping of genes, Molecular markers, Artificial chromosomes, Genome projects, Bioinformatics, Functional genomics, Microarrays, Protein profiling and its significance.

Unit–3

Microbial genetic manipulation: - Bacterial transformation, Introduction of the recombinant DNA into a suitable host, Selection of recombinants and transformants, Multiplication Expression and Integration of the DNA insert in host genome.

Unit–4

Genetic Improvement of Industrial Microbes and nitrogen Fixers, Enzyme Technology: - Use of microbes in industry and agriculture, Intellectual Property right, Possible ecological risk and ethical concerns, Cryopreservation and germplasm storage.

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2026-27
M.Sc. BOTANY SEMESTER – IV
DSC-6 M.M. - 70
MOLECULAR PLANT PATHOLOGY
Credit 4
Course Code: PBOET403

Unit–1

Introduction: - History of plant pathology, general principles of plant pathology and classification of plant diseases.

Disease inciting organisms: - Animate pathogen, Fungi, Bacteria, Mycoplasma, Viruses, Nematodes and their general characteristics, heterotrophic behaviour with emphasis on parasitism ability and virulence.

Unit–2

General symptoms of plant diseases: - Pathogenic and non-pathogenic symptoms caused by fungi, bacteria, viruses, Mycoplasma and nematodes.

Unit–3

Pathogenesis: - Dissemination of plant pathogens, Mode of infection, Inoculum-potential, Koch's postulates.

Host-parasite relationship: - Mechanism and physiology of infection, Path of infection, Role of enzymes, Growth regulators and toxins in pathogenesis.

Effect of Infection on the physiology of the host

Enzymes and toxins in plant disease

Defence mechanism: - Defence of host against pathogen, Resistance and susceptibility, Hyper-sensitive reaction (HR), Phytoalexins, Disease syndrome, Physiological specialization with special reference to smuts and rusts.

Unit–4

Effect of environment on disease development: - Predisposing factors, Survival of fungi, Germination of spores, Disease initiation and epidemics.

Epidemiology and disease forecasting: - Form of epidemics, Factors responsible for the establishment of an epidemic, Disease forecasting.

Source of infection: - Seed, soil, water and air born diseases of plants, Significations of phyllosphere and rhizosphere studies.

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2026-27
M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – II
DSE-2 **M.M. - 70**
PLANT DISEASE & CONTROL MECHANISM
Credit 4
Course Code: PBOE1T404

Unit-1

Diseases due to fungi: - Rusts, Smuts, Downy mildews, Powdery mildews, Wilts, Leaf blight, Ergots, Tikka, Necrosis, Red Rots, Damping off, Warts, stem gall

Unit-2

Diseases due to bacteria: - Blight of rice, Tundu disease, Citrus canker, Crown gall of stone fruits, Angular leaf spots.

Diseases due to viruses: - Mosaic of tobacco, potato, tomato and banana; Leaf curl of tomato and papaya; Yellow vein mosaic of bhindi, Bunchy top of banana.

Unit-3

Diseases due to mycoplasma: - Sandal spike, Little leaf of brinjal, Grassy shoot disease, Sesamum, phyllody, Citrus greening.

Diseases due to nematodes: - General characters of plant nematodes. Root knot, Malaya disease of barley, wheat, Citrus nematodes, Ear cockles of wheat.

Non Parasitic Disease and angiospermic parasite

Unit-4

Principles of plant disease control: - Regulatory, chemical and biological control, breeding with resistant varieties of host plants, Plant quarantine, Recurrence of disease with special reference to rust disease in India.

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2026-27
M.Sc. BOTANY (1 Year PG Programme)

SEMESTER – I

VAC-1

MM-50

Ancient Indian Botany and Ethnobotany

Credit-2

Course Code-PBOC1T405

Unit 1

Ancient Indian Botany: Indigenous Medicinal Science; Definition and Scope of Ayurveda- History, origin, Panch mahabhoot, Saptadhatu, Tridosha- Concept, Rasayana, Classification of rasayana, Plants used in Ayurvedic system of medicine.

Unit 2

Siddha system of medicine- origin and history of siddha system of medicine, Branches of Siddha system of medicine, plants used in Siddha system of medicine.

Unani System of medicine- origin and history of Unani System of medicine, Principles of Unani System of medicine, plants used in Unani system of medicine.

Units 3

Ethnobotany: General introduction, Important-ethnic groups of Chhattisgarh, Scopes of ethnobotany, Sub-divisions of ethnobotany, Present status of ethnobotany in India, Methods of study of ethnobotany, Importance of ethnobotany, Ethnobotany as a tool to protect interests of ethnic groups- Biopiracy, Intellectual property rights, Traditional knowledge, importance of traditional knowledge system.

Unit 4

Ethnobotanical medicinal plants: Neem, Ghritkumari, Clove, Ginger, Tulsi, Turmeric, Giloy, Amla, Ashwagandha, Arandi, Vasak, Safed musli and Satawari. Ethnoecology- Importance, Goals and application of ethnoecology.

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2026-27
M.Sc. BOTANY (1 Year PG Programme)
SEMESTER – II

Practical Course-PC-II

(Practical based on DSC4, DSC5, DSC6 and DSE2)

Credit 4

Course Code: PBOC1L406

(i)	Exercise based on DSC4.....	20
(ii)	Exercise based on DSC5.....	20
(iii)	Exercise based on DSC6/DSE2.....	20
(iv)	Spotting.....	10
(v)	Viva.....	10
(vi)	Sessional.....	20
Total – 100 marks		

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