

DEPARTMENT OF BOTANY

COURSE CURRICULUM & MARKING SCHEME

B.Sc. PART – II & III BOTANY

SESSION : 2022-23



ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com


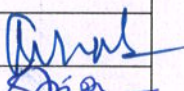
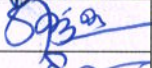
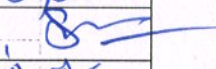
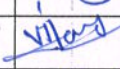
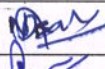
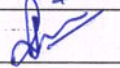

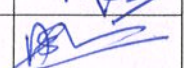
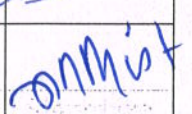
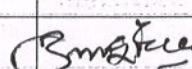
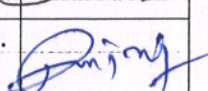
GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
Syllabus and Marking Scheme for B.Sc. Part II

SESSION:2022-2023

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I (Course Code- BBO03)	Plant Taxonomy, Economic Botany, Plant Anatomy and Embryology	50	17
II (Course Code- BBO04)	Ecology and Plant Physiology	50	17
III	Lab course/ Practical	50	17
	Total	150	

02 Theory papers	-	100
01 Practical	-	50
Total Marks	-	150

Name and Signatures of Members Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	Chairperson	Dr. Ranjana Shrivastava	
2.	Members	1. Prof. Smt. Gayatri Pandey	
		2. Dr. G. S. Thakur	
		3. Dr. Shriram Kunjam	
		4. Dr. Satish Kumar Sen	
		5. Dr. Vijay Laxmi Naidu	
		6. Mr. Motiram Sahu	
		7. Dr. Rajeshwari Prabha Lahare	
3.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	
		2. Dr. N.B. Singh (Govt. N.PG. Science College Raipur C.G.)	
4.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
5.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
6.	Ex Meritorious Student PG	Umashankar Gayakwad	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T.PG. Autonomous College Durg C.G.)	

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG (C.G.)
B.Sc. Part-II
BOTANY
SESSION-2022-2023
PAPER – I(Course Code- BBO03)
PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND
EMBRYOLOGY

M.M. 50

Min. 17

UNIT-I

Bentham and Hooker system of classification. Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of Plant material and Herbarium techniques. Important botanical gardens and herbaria of India, Kew Botanical Garden, England.

UNIT-II

Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaceae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

UNIT-III

Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants; Cotton, jute, sun, hemp, coir. Timber yielding plants: Sal, Teak, Shisham and Pine. Medicinal plants: Kalmegh, Ashwagandha, Ghritkumari, Giloy, Brahmi, Sarpagandha of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato. Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages: Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia. Ethnobotany in context of Chhattisgarh.

UNIT-IV

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anomalous secondary growth in Dracaena, Bignonia, Laptadenia.

UNIT-V

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self-incompatibility, fertilization, endosperm, embryo, polyembryony, apomixes and parthenocarpy.

Books Recommended:

1. Singh, Pandey, Jain. Diversity and Systematics of Seed Plants, Rastogi Publications Meerut.
2. Sharma OP, Plant Taxonomy, Tata Mc Graw Hill, New Delhi
3. Pandey BP, Taxonomy of Angiosperms, S. Chand Publishing, New Delhi
4. Pandey, BP, Plant Anatomy, S.Chand Publishing, New Delhi
5. Pandey, BP, Economic Botany, S.Chand Publishing, New Delhi
6. Bhojwani, SS and Bhatanagar SP, Embryology of Angiosperm, Vikas Publication House, New Delhi
7. Singh, Pandey, Jain, Embryology of Angiosperms, Rastogi Publication, Meerut
8. Sharma, V, Alum, A. Ethnobotany, Rastogi Publications, Meerut Tayal, MS Plant Anatomy, Rastogi Publication, Meerut

Course Outcomes

- Understanding of morphology, and processing and economic value of plant sources of cereals, legumes, spices, oil, rubber, timber and medicines.
- The students will learn about the use of fibre plants, beverages, fruits and vegetables that are integral to day-to-day life of plants.
- Understand the diversity of angiosperms.
- Understand the distinguishing features of angiosperm families.
- Know the role of Phytochemistry and Numerical taxonomy in classification of plants.
- Students understand how different plant tissue evolve and modify their structure and functions with respect to their environment.

7. Singh, Pandey, Jain, Embryology of Angiosperms, Rastogi Publication, Meerut
8. Sharma, V, Alum, A. Ethnobotany, Rastogi Publications, Meerut Tayal, MS Plant Anatomy, Rastogi Publication, Meerut

Course Outcomes

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- Understand the distinguishing features of angiosperm families.
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- Students understand how different plant tissue evolve and modify their structure and functions with respect to their environment.

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows:

Question Type	MM 50 (Marks x No. of Questions)
A (Very short Answer)	1x10 = 10
B (Short Answer)	3x5 = 15
C (Long Answer)	5x5 = 25

The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

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		4. Dr. Satish Kumar Sen	
		5. Dr. Vijay Laxmi Naidu	
		6. Mr. Motiram Sahu	
		7. Dr. Rajeshwari Prabha Lahare	
3.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	
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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
B.Sc. Part –II
BOTANY
SESSION-2022-2023
PAPER – II(Course Code- BBO04)
ECOLOGY AND PLANT PHYSIOLOGY

M.M. 50

Min. 17

UNIT-I

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptations in hydrophytes, xerophytes and epiphytes.

UNIT-II

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids Biogeochemical cycles: carbon cycle, nitrogen cycle and phosphorus cycle

UNIT-III

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

UNIT-IV

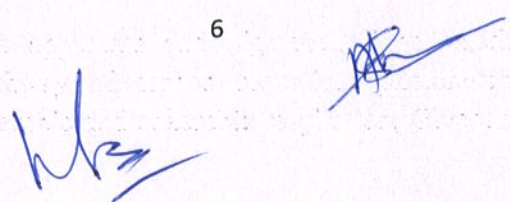
Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C₃, C₄ CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis. Respiration: Aerobic and anaerobic respiration, Glycolysis, Krebs's cycle, factors affecting respiration, R.Q.

UNIT-V

Plant growth hormones: Auxin, Cytokinin, Gibberellin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, Plant movement.

Books Recommended:

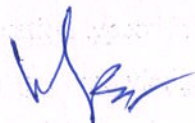
1. Koromondy, EJ. Concepts of Ecology, Prentice Hall, USA
2. Singh, JS Singh SP and Gupta SR. Ecology and Environmental Science and Conservation, S. Chand Publishing, New Delhi
3. Sharma, PD. Ecology and Environment, Rastogi Publications, Merrut
4. Hopkins, WG and Huner, PA. Introduction to Plant Physiology, John Wiley and Sons.



5. Pandey SN and Sinha BK, Plant Physiology, Vikas Publishing, New Delhi
6. Taiz, L and Zeiger. E. Plant Physiology, 5th edition, Sinauer Associates Inc. M.A, USA
7. Srivastava, HS Plant Physiology and Biotechnology, Rastogi Publications, Meerut.

Course Outcome –

- Understand about plants and environment
- Become familiar with community ecology and ecosystem
- Become acquainted with population ecology bio-geographical regions & vegetation type of India
- Will get knowledge about medicinal plants, fiber , vegetables , oil, spices , rubber yielding plants.
- Know importance and scope of ecology and plant physiology
- Understand the plant and plant cells in relation to water
- Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reaction C3 and 4 pathways.
- Will get the knowledge of respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
- Learn about the movement of sap and absorption of water in plant body.
- Understand the plant movement
- Learn and understand about mineral nutrition in plants.



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		2. Dr. N.B. Singh (Govt. N.PG. Science College Raipur C.G.)	
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5.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg, C.G.)	
6.	Ex Meritorious Student PG	Umashankar Gayakwad	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

B. Sc. –Part II

BOTANY (PRACTICAL)

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories.
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O₂ in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Study of anther and ovule
12. Anatomy of Monocot/Dicot stem/leaf/root.
13. Primary anomalous structure of stem (Nyctanthes, Boerhaavia) and Anomalous secondary growth in Dracaena, Bignonia.

PRACTICAL SCHEME

	TIME: 4 Hrs.	M.M.: 50
1. Anatomy	1. Anatomy	07
2. Taxonomy	2. Taxonomy	07
3. Physiology	3. Physiology	06
4. Ecology	5. Ecology	05
5. Spotting	6. Spotting	10
6. Viva-Voce	7. Viva-Voce	05
7. Project Work/Field Study/Economic Botany	8. Project Work/Field Study/Economic Botany	05
8. Sessional	9. Sessional	05

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
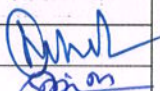
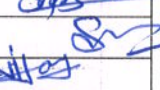
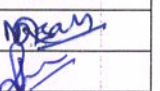
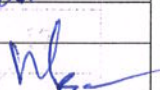
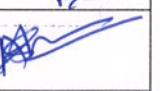

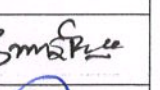





GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG
Syllabus and Marking Scheme for B.Sc. Part III

Session: 2022-2023

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
Paper- I (Course Code- BBO05)	Analytical Technology Plant Pathology, Experimental Embryology, Elementary Biostatistics, Environmental Pollution, and Conservation	50	17
Paper- II (Course Code- BBO06)	Genetics, Molecular Biology, Biotechnology and Biochemistry	50	17
III	Lab Course/ Practical	50	17
	Total	150	

02 Theory papers	-	100
01 Practical	-	50
Total Marks	-	150

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG

B.Sc. – Part III

BOTANY

SESSION-2022-2023

PAPER-I (Course Code- BBO05)

**ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL
EMBRYOLOGY, ELEMENTARY BIOSTATISTICS AND ENVIRONMENTAL
POLLUTION AND CONSERVATION**

M.M. 50

Min. 17

UNIT-I

Structure, Principle and applications of analytical Instrumentation.

Chromatography techniques, Oven, Incubator, Centrifuge, Spectrophotometer

UNIT-II

Plant tissue culture techniques, growth media, totipotency, protoplast culture, somatic hybrids and cybrids, micropropagation, somaclonal variations, haploid culture.

Analytical techniques: Microscopy-Light microscope, Electron microscopes.

UNIT-III

General principles of plant pathology, general symptoms of fungal, bacterial, and viral diseases, mode of infection, disease resistance, and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases

Rust disease of wheat, Tikka disease of ground nut, Red rot of sugarcane, Bacterial blight of rice, Yellow vein mosaic of bhindi, Little leaf of brinjal.

UNIT-IV

Introduction to pollution, greenhouse gases, Ozone depletion, Dissolve oxygen, B.O.D., C.O.D.

Biomagnifications, Eutrophication, Acid precipitation, Phytoremediation. Plant indicators, Biogeographical Zones of India, Concept of Biodiversity, CBD, MAB, National parks and Biodiversity Hot Spots, Conservation strategies, Red Data Book, IUCN threat categories, invasive species, endemic species, concept of sustainable development.

UNIT-V

Introduction and application of Biostatistics, measure of central tendency-Mean, Median, Mode, measures of dispersal-Standard deviation, standard error.

Books Recommended:

Singh, RS, Plant Diseases, Oxford & IBH, New Delhi.

Pandey, BP, Plant Pathology, S. Chand Publishing, New Delhi.

Sharma, PD, Microbiology and Plant Pathology, Rastogi Publications, Meerut.

Sharma, PD, Mycology and Phytopathology, Rastogi Publications, Meerut.

Singh JS, Singh SP and Gupta, SR, Ecology Environmental Science and Conservation, S. Chand Publishing, New Delhi.

Sharma, PD Ecology and Environment, Rastogi Publications, Meerut.

Bhojwani, SS and Razdan, MK, Plant Tissue Culture: Theory and Practices. Elsevier.

Sharma AK, Text book of Biostatistics, Discovery Publishing House Pvt. Ltd.

COURSE OUTCOME

- Understand the principle, application, and techniques of instruments.
- Know the culture methods and techniques.
- Learn about Analytical techniques.
- Understand about the various plant diseases, managements, and controls.
- Learn the symptoms of plant diseases.
- Understand about causes and effect of environmental pollution.
- Know about reason of Global warming, and Ozone hole.
- Learn about the Conservation strategies.
- Understand sustainable development.
- Understand the Biodiversity.
- Know about the Biostatistics.

Question Paper Format and Distribution of Marks for Under Graduate Examination

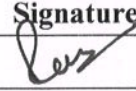
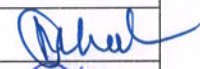


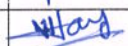
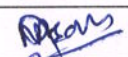
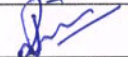

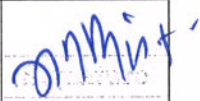

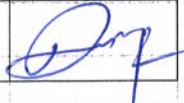
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EVALUATION PATTERN

- Theory 50 marks
- Practical 50 marks

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG

B.Sc. Part-III

BOTANY

SESSION: 2022-2023

PAPER-II (Course Code- BBO06)

GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY

M.M. 50

Min. 17

UNIT-I

Cell and cell organelles, organization and morphology of chromosomes, giant chromosomes, cell division, Mendel's laws, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytoplasmic inheritance, gene concept: cistron, muton, recon.

UNIT-II

Nucleic acids, structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, Operon model.

UNIT-III

Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors (Plasmid, Bacteriophages, Cosmids, Phagemids), gene cloning, PCR, Application of Biotechnology; G.M. plants, Monoclonal antibodies, DNA finger printing.

UNIT-IV

Protein: Chemical composition, primary, secondary and tertiary structure of Proteins.

Carbohydrate: general account of monosaccharide's, disaccharides, and polysaccharides.

Fat: Structure and properties of fats and fatty acids, synthesis and breakdown.

UNIT-V

Enzymes: Nomenclature and classification, components of enzyme, theories of enzyme action, enzyme kinetics (Michaelis-Menten constant), allosteric enzymes, isozymes, Abzymes, Ribozymes, factors affecting enzyme activity.

Books Recommended:

Nelson, DL, Cox, MM, Lehninger Principles of Biochemistry, W.H. Freeman and Company, New York, USA.

Cooper, GM, The Cell: A Molecular Approach, ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.

Singh, BD, Fundamental of Genetics, Kalyani Publications.

Singh, BD, Genetics, Kalyani Publications.

Gupta, PK, Cell and Molecular Biology, Rastogi Publications, Meerut.

Singh, BD, Biotechnology: Expanding Horizons, Kalyani Publications.

Gupta, PK, Elements of Plant Biotechnology, Rastogi Publications, Meerut.

Gupta, SN, Concepts of Biochemistry, Rastogi Publications, Meerut.

Jain, JL, Jain, S and Jain, N, Fundamentals of Biochemistry, S Chand Publishing, New Delhi

Suggested Laboratory Exercises

1. To study of host parasite relationship of plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of Curd.
6. Study of plant diseases as listed in the theory paper.
7. Biochemical test of carbohydrate and protein.
8. Instrumentation techniques.

COURSE OUTCOME

- Know the structure and components of cell.
- Understands about genetics and Mendel's laws.
- Know the gene concept.
- Understand about molecules, genetic material.
- Know the regulation and expression of gene.
- Understand about recombinant technology.
- Study the various vectors used in recombinant technology.
- Know the application of Biotechnology.
- Understand about biomolecules (Proteins, Fats, carbohydrates).
- Study the enzyme and enzymes concept.
- Know the various enzymes.

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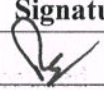
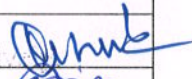
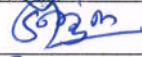


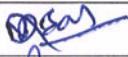
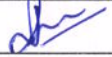

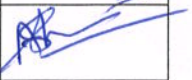


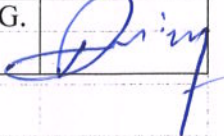
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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG

B.Sc. Part-III

BOTANY

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
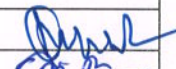
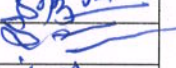

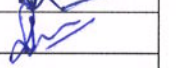
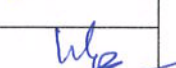

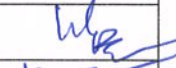

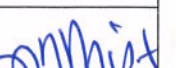
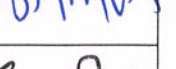
PRACTICAL SCHEME

Time: 4 Hrs.

Marks: 50

01.	Plant Disease/Symptoms	10
02	Instrumentation techniques	05
03	Staining of Microbes	05
04	Tissue Culture Techniques	05
05	Spotting (1-5 spots)	10
06.	Project Work/ Field Study	05
07	Viva Voce	05
08.	Sessional	05

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