DEPARTMENT OF BOTANY

COURSE CURRICULUM & MARKING SCHEME

B.Sc. III, IV, V, VI Semester

BOTANY

(Based on Choice Based Credit System)

SESSION : 2024-25

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

FOUR YEAR UNDERGRADUATE PROGRAM

Semester III & IV

Session 2024-25

SUBJECT - BOTANY

DSC

Paper No.	Title of the Paper	Marks Allotted		
		Theory	Internal	Min
Third Semester (Course Code- BBO103)	Plant Anatomy and Embryology **(03 Credit)**	**80**	**20**	**40**
BBOL03	Lab Course/ Practical **(01 Credit)**	**50**		**20**
	Total	**150**		
Four Semester (Course Code- BBO104)	Plant Physiology **(03 Credit)**	**80**	**20**	**40**
BBOL04	Lab course/ Practical **(01 Credit)**	**50**		**20**
	Total	**150**		

03.7.2024

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - III**	**Session: 2024-2025**
1	**Course Code**	**BBO103**		
2	**Course Title**	**Plant Anatomy and Embryology**		
3	**Course Type**	**DSC**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Know importance and scope of Plant anatomy and Embryology • Understand the plant Shoot and Root Apex organization. • Understand the process secondary growth in Plants. • Will get the knowledge of different types of tissue system and wood structure in plants. • Learn about the reproduction in Plants. • Understand the Anatomical anomalies in Plants. • Learn and understand about Pollination mechanism in plants		
5	**Credit Value**	**3Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :100**		**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	Shoot Apex and Types, Classification of Meristematic Tissue, Theory related to shoot Apex organization, Root Apex and Types, Theory related to Root Apex organization. Permanent Tissue and types, Tissue system, epidermal tissue system, Ground tissue system and Vascular tissue system	10
II	Internal Structure of Dicot and Monocot Root, Internal Structure of Dicot and Monocot Stem, Internal Structure of Dicot and Monocot Leaf,Secondary Growth in Dicot and Monocot Stem and its Significance, Wood and Wood Structure, Periderm, Differentiation of Secondary Tissues in Stem	10
III	Anatomical anomalies in the primary structure of Dicot and Monocot Stems (*Nyctanthes, Boerhaavia, Casuarina*), Anomalous Secondary Growth in *Dracaena, Bignonia, Laptadenia.*	10
IV	Flower as a reproductive organ, Anther and Development of Male Gametophyte, Ovule and its type, Development of Female Gametophyte.	10
V	Mechanisms and types of Pollination, Self-incompatibility, Fertilization and Events of Fertilization, Endosperm and its type, Embryo and its Development, Polyembryony, Apomixes and Parthenocarpy.	10

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	**Chairperson**	**Dr. Ranjana Shrivastava**	
2.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. 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	Tanu Verma	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES		
Text Books, Reference Books, Other Resources		
TEXT BOOKS Recommended : • Plant Anatomy - Mauseth, J.D. - 1988 - The Benjamin/Cummings Publisher, USA • Plant Anatomy - Pandey, B.P. - - S. Chand Publishing, New Delhi • Embryology of Angiosperms - Bhojwani, S.S. &Bhatanagar, S.P. - - Vikas Publication House, New Delhi • Embryology of Angiosperms - Singh, Pandey, & Jain - - Rastogi Publication, Meerut **Reference Books** • Integrative Plant Anatomy - Dickison, W.C. - 2000 - Harcourt Academic Press, USA • Plant Anatomy - Fahn, A. - 1974 - Pergamon Press, USA • Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function, and Development - Evert, R.F. - 2006 - John Wiley and Sons, Inc. **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** https://epgp.inflibnet.ac.in/		
PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D)from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**	

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		Class: B.Sc. Semester - III		Session: 2024-2025
1	Course Code	BBO103		
2	Course Title	Plant Anatomy and Embryology		
3	Course Type	DSC		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Differentiate Plant Adaptations: Describe anatomical characteristics of hydrophytes and xerophytes. • Identify Plant Anatomy: Recognize anatomical structures of monocot and dicot stems, leaves, and roots. • Analyze Anomalous Structures: Explain primary anomalous structures in stems (Nyctanthes, Boerhaavia) and secondary growth in Dracaena and Bignonia. • Examine Pollen: Describe pollen grain structures of Brassica, Hibiscus, Datura, and Solanum. • Understand Placentation: Identify different types of placentation in plants (Pea, Hibiscus, Brassica, Sunflower, Dianthus). • Investigate Stem Anatomy: Analyze stem structures of Zea mays (monocot) and Helianthus (dicot) using permanent slides. • Explore Root Anatomy: Differentiate root structures of Zea mays (monocot) and Helianthus (dicot) using permanent slides. • Analyze Leaf Anatomy: Compare anatomical structures of dicot and monocot leaves using permanent slides. • Examine Adaptive Features: Describe adaptive anatomy in xerophytes (Nerium leaf) and hydrophytes (Hydrilla stem). • Study Anther and Tapetum: Differentiate young and mature anther structures and types of tapetum. • Identify Ovule Types: Explain different types of ovules. • Calculate Pollen Germination: Calculate the percentage of germinated pollen in a given medium.		
5	Credit Value	1Credit	1 credit =30 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

PART B: CONTENT OF THE COURSE	
S.No.	List of Experiments
1	Anatomical characteristics of hydrophytes and xerophytes.
2	Anatomy of Monocot/Dicot stem/leaf/root.
3	Primary anomalous structure of stem (*Nyctanthes, Boerhaavia*) and Anomalous secondary growth in *Dracaena, Bignonia.*
4	Study the structure of Pollen Grain {eg.*Brassica, Hibiscus, Datura, Solanum*}.

5	Study the different types of Placentation (Axile, Basal, Marginal Parietal, Free central) {eg. Pea, Hibiscus, Brassica, Sunflower, Dianthus}.
6	Stem: Monocot: Zea mays; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
7	Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: *Helianthus* (only Permanent slides).
8	Leaf: Dicot and Monocot leaf (only Permanent slides).
9	Adaptive anatomy: Xerophyte (Nerium leaf); Hydrophyte (Hydrilla stem).
10	Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
11	Types of ovules: Anatropous, Orthotropous, Circinotropous, Amphitropous/ Campylotropous.
12	Calculation of percentage of germinated pollen in a given medium.

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PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

<table>
<tr><td colspan="5">PART A: INTRODUCTION</td></tr>
<tr><td colspan="2">Program:</td><td colspan="2">Class: B.Sc. Semester - IV</td><td>Session:2024-2025</td></tr>
<tr><td>1</td><td>Course Code</td><td colspan="3">BBO104</td></tr>
<tr><td>2</td><td>Course Title</td><td colspan="3">Plant Physiology</td></tr>
<tr><td>3</td><td>Course Type</td><td colspan="3">DSC</td></tr>
<tr><td>4</td><td>Course Learning Outcome (CLO)</td><td colspan="3">This Course will enable the students to:
• Explain Plant Water Relations: Understand diffusion, osmosis, imbibition, plasmolysis, water potential, soil water types, water absorption, and theories of ascent of sap.
• Describe Transpiration and Mineral Nutrition: Analyze transpiration, stomatal movement, factors affecting transpiration, mineral nutrition, deficiency symptoms, nitrogen fixation, and nitrate/ammonium uptake and assimilation.
• Understand Photosynthesis: Explain the photosynthetic apparatus, light reactions, ATP synthesis, electron and proton transport, carbon reduction pathways (C3, C4, CAM), photorespiration, and factors affecting photosynthesis.
• Differentiate Respiration Processes: Compare aerobic and anaerobic respiration, describe glycolysis, the Kreb's cycle, respiration factors, R.Q., glyoxylate pathway, alternative oxidase system, and pentose phosphate pathway.
• Identify Plant Hormones and Growth: Recognize the roles of auxin, cytokinin, gibberellin, ethylene, and abscisic acid. Understand flowering physiology, florigen concept, photoreceptors, photoperiodism, vernalization, seed dormancy, germination, and plant movement.</td></tr>
<tr><td>5</td><td>Credit Value</td><td>3 Credits</td><td colspan="2">1 credit =15 Hours – Learning and Observation</td></tr>
<tr><td>6</td><td>Total Marks</td><td colspan="2">Maximum Marks :100</td><td>Minimum Passing Marks:40</td></tr>
<tr><td colspan="5">PART B: CONTENT OF THE COURSE</td></tr>
<tr><td colspan="5">Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)</td></tr>
<tr><td>Unit</td><td colspan="3">Topics (COURSE CONTENTS)</td><td>No. of Periods</td></tr>
<tr><td>I</td><td colspan="3">Plant water relations: Diffusion, permeability, osmosis, imbibition, Plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap.</td><td>10</td></tr>
<tr><td>II</td><td colspan="3">Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation. Mineral nutrition and absorption, Deficiency symptoms, Biological Nitrogen fixation. Mechanism of Nitrate uptake & reduction, ammonium assimilation.</td><td>10</td></tr>
</table>

III	Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. Photooxidation of water, mechanism of electron & proton transport (Hill reaction). C3, C4, CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis.	10
IV	Respiration: Aerobic and anaerobic respiration, Glycolysis, Kreb's cycle, factors affecting respiration, R.Q. Glyoxylate pathway, Alternative Oxidase system, Pentose Phosphate pathway.	10
V	Plant growth hormones: Auxin, Cytokinin,Gibberellin, Ethylene and Abscisic acid. Physiology of flowering, Florigen concept, Phytochromes &Cryptochromes, Photoperiodism and Vernalization. Seed dormancy and germination, Plant movement.	10

Name & Signature of Members of Board of Studies

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PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Introduction to Plant Physiology - Hopkins, W.G. & Huner, P.A. - John Wiley and Sons
- Plant Physiology - Pandey, S.N. & Sinha, B.K. - Vikas Publishing, New Delhi
- Plant Physiology (5th edition) - Taiz, L. & Zeiger, E. - Sinauer Associates Inc., M.A, USA
- Plant Physiology and Biotechnology - Srivastava, H.S. - Rastogi Publications, Meerut
- Experiments in Plant Physiology: A Laboratory Manual - Bajracharya, D. - 1999 - Narosa Publishing House, New Delhi

Reference Books

- Fundamentals of Plant Physiology - Jain, V.K. - S. Chand Publishing, New Delhi
- Plant Physiology - Salisbury, F.B. & Ross, C.W. - Wadsworth Publishing, USA
- Plant Biochemistry - Dey, P.M. & Harborne, J.B. - Academic Press, USA

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D)from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.Semester - IV**		**Session:2024-2025**
1	**Course Code**	**BBO104**		
2	**Course Title**	**Plant Physiology**		
3	**Course Type**	**DSC**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand Transpiration: Demonstrate and measure transpiration using various methods. • Analyze Photosynthesis: Demonstrate oxygen evolution and study factors affecting photosynthesis. • Compare Respiratory Substrates: Compare respiratory quotients of different substrates and respiration rates in plant parts. • Determine Osmotic Potential: Measure the osmotic potential of plant cell sap. • Evaluate Environmental Effects: Assess the impact of light and wind on transpiration. • Calculate Stomatal Index: Determine the stomatal index of mesophytic leaves. • Demonstrate Enzyme Activity: Demonstrate catalase activity and effects of pH and enzyme concentration. • Perform Chromatography: Separate amino acids using paper chromatography.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks: 50**		**Minimum Passing Marks: 20**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
1	Demonstration of transpiration.
2	Determine the rate of transpiration using Ganong's photometer.
3	Demonstration of oxygen evolution in photosynthesis and factors affecting photosynthesis.
4	Comparison of respiratory quotient (R.Q.) of different respiratory substrates.
5	Determine the rate of transpiration using the four-leaf method.
6	Calculate the stomatal index of different mesophytic leaves.
7	Determine the osmotic potential of plant cell sap using the plasmolytic method.
8	Study the effect of two environmental factors (light and wind) on transpiration in an excised twig.
9	Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
10	Study the effect of light intensity and bicarbonate concentration on oxygen evolution in photosynthesis.

11	Compare the rate of respiration in any two parts of a plant.
12	Separate amino acids using paper chromatography.

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- Practical Manual of Plant Physiology and Biochemistry - Dharmalingam, S. & Basu, R. - Scientific Publishers, India

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PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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FOUR YEAR UNDERGRADUATE PROGRAM

SEMESTER III & IV

SESSION 2024-25

DSE

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION			
	Program:	**Class: B.Sc.** **Semester -III** **Session:2024-2025**	
1	**Course Code**		
2	**Course Title**	**Plant Resource Utilization and Conservation**	
3	**Course Type**	**DSE**	
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Students will learn about different dimensions of plant identification as a resource for self- sustenance, their domestication, commercialization based on the need and induction of modification using modern techniques. • They will learn about the different conservation processes like in-situ and ex-situ conservation of plants that are going to be extinct very soon due to biotic, abiotic and anthropogenic causes. • Study of plant resource utilization will enhance their specific knowledge and technological skills in converting the rich bio-resource into economic wealth.	
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**
6	**Total Marks**	**Maximum Marks :100** **Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Plant Resource Utilization and Conservation Topics (COURSE CONTENTS)	No. of Periods
I	**Plant Resources**: Plant resources: Origin, Evolution, Cultivation and economic importance of Food and Fodder crops, Pulses (Wheat, Rice, Sugarcane, Black gram). Fiber crops (Jute & Cotton), Medicinal and Aromatic plants (Mint, Lemongrass, Eucalyptus, Saffron & Clove), Vegetable Oil-yielding crops (Groundnut, Soyabean, Sunflower, Mustard), and Spices.	10
II	**Forest Product:** Timber-yielding plants (Sal, Teak, Shisham, Dandara), fire-wood plants and non-wood forest products (NFPs) such as bamboos, gums, tannins, dyes (Heena, Sinduri), and resins.	10
III	**Ethnobotany:** Concept, history, evolution and scope; introduction to indigenous systems of medicine Ayurveda, Unani and Siddha. Indian Traditional knowledge on herbal Medicinal plants.	10
IV	**Biodiversity:** Biodiversity scenario at global, national and regional level. The future of biodiversity, Biodiversity act of India and related international conventions, Biodiversity Hotspots in India and world, threats to biodiversity (IUCN categories).	10

V	**Plant Conservation:** Principles of conservation, Strategies for in-situ conservation: sanctuaries, national parks and biosphere reserves. Strategies for ex-situ conservation: botanical gardens, field gene banks, seed banks, cryobanks.	10

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	Chairperson	**Dr. Ranjana Shrivastava**	
		1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
2.	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.)	
3.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
4.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
5.	Ex Meritorious Student PG	Tanu Verma	
6.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES		
Text Books, Reference Books, Other Resources		
TEXT BOOKS Recommended: 1. Sharma, O. P. Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi. 2. Swaminathan, M. S. and Kocchar, S. L. Plants and Society. Macmillan Publication Ltd., London. Thakur, R. S., Puri, H. S. and Husain, A Major Medicinal Plants of India. Central Institute of Medicinal and Aromatic Plants, CSIR, Lucknow. 3. S.K. Jain: Glimpses of Indian Ethnobotany 4. S.K. Jain, B.K. Sinha and R.C. Gupta: Notable plants in Ethnomedicine of India **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** https://epgp.inflibnet.ac.in/		
PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) Question - C: Short answer type question Question -D: Long answer type question **Total**	04 x 5 = 20 Marks 05 x 5 = 25 Marks 07 x 5 = 35 Marks **= 80 Marks**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
7.	Chairperson	**Dr. Ranjana Shrivastava**	
		1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
8.	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.)	
9.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	

10.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
11.	Ex Meritorious Student PG	Tanu Verma	
12.	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
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF BOTANY
COURSE CURRICULUM 2024-25
Lab Course

PART A: INTRODUCTION				
Program:		Class: B.Sc.	Semester -III	Session:2024-2025
1	Course Code			
2	Course Title	Plant Resource Utilization and Conservation		
3	Course Type	DSE		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Ability to identify and classify various plant species, including economically important and endangered plants. • Proficiency in herbarium techniques, including the collection, preservation, and documentation of plant specimens. • Development of practical skills in laboratory and field techniques relevant to plant resource utilization and conservation. • Ability to conduct research, analyze data, and present findings related to plant resource utilization and conservation.		
5	Credit Value	1 Credit	1 Credit =30 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50	Minimum Passing Marks: 20	

PART B: CONTENT OF THE COURSE	
S. No.	List of Experiments
1.	Extraction of essential oil from aromatic plants.
2.	Identification and uses of medicinal plants/Oil yielding plants/Spices/Food/Fodder.
3.	Preparation of herbal based product- a. Triphala b. Giloy Vati c. Amla Churna d. Aloe vera gel.
4.	Conservation of endangered/medicinal plant species in bioresource garden.
5.	Field visit: Collection and preparation of herbarium and voucher specimen
6.	Project work: Collection of ethnobotanical data of plants used by local people

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

Hill Albert F. (1937) Economic Botany. Mcgraw-Hill Publications.

Kochhar S. (2016) Economic Botany: A Comprehensive Study. Cambridge University Press. doi:10.1017/9781316286098.003

Farroqui, A.A. and Sreeramu, B.S. (2005). Cultivation of Medicinal and Aromatic crops, University Press Ind. Ltd., Hyderabad.

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
13.	Chairperson	**Dr. Ranjana Shrivastava**	
		1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
14.	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.)	
15.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
16.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
17.	Ex Meritorious Student PG	Tanu Verma	
18.	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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION			
	Program:	**Class: B.Sc.** **Semester -IV** **Session: 2024-2025**	
1	**Course Code**		
2	**Course Title**	**INSTRUMENTATION AND LABORATORY TECHNIQUES**	
3	**Course Type**	**DSE**	
4	**Course Learning Outcome (CLO)**	• **This Course will enable the students to:** • To get the knowledge of different instrument used in the laboratory. • It will provide the knowledge of sterilization, fixative and staining technique and different concept of solution • Students can learn about the process of herbarium technique and future preservation of the species as many of the species are becoming rare day by day due to deforestation, over-collection of the lay people, building activities etc. • They can make different types of herbarium sheets particularly for medicinal plants locally available on their area, keeping them in safe.	
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**
6	**Total Marks**	**Maximum Marks :100**	**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**INSTRUMENTATION AND LABORATORY TECHNIQUES Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Microscopy:** working principles of Simple and compound light microscope, Phase Contrast, hot air oven, incubators, autoclave, and laminar air flow chamber, centrifuge, pH meter.	10
II	**Chromatography:** Introduction, principle, methods and application of paper chromatography, thin layer Chromatography, GLC, HPLC, Ion-exchange chromatography, and column chromatography.	10
III	**Fixatives and stains:** principles, types, procedures and application; methods of sterilization and culture media; mounting media, Concept of solutions, indicators, pH and buffers (Preparation of normal, molal, molar, ppm and percent solutions; reagents (Acid & Base), different indicators, pH and buffer.	10
IV	Field and herbarium techniques, preservation of museum and herbarium specimen, Collection and preservation techniques for special types of plant (submersed aquatic plant, succulent and xerophytes, palm, canes and bamboos)	10
V	**Biostatistics and Data Analysis:** Introduction to biostatistics and statistical concepts: Statistics, data, population, samples, parameters; Representation	10

	of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test.	

Name & Signature of Members of Board of Studies

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1.	Chairperson	**Dr. Ranjana Shrivastava**	
		1. Dr. G. S. Thakur	
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		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
2.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	
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3.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
4.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
5.	Ex Meritorious Student PG	Tanu Verma	
6.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Biological Instrumentation & methodology (Tools and Techniques of Biology) (2012). P.K. Bajpai. S Chand & Company Pvt Ltd, Ram Nagar, New Delhi-110055
2. Narayanan P (2008) Essential of biophysics, New Age International Publishers, New Delhi.
3. Herman EB (2008) Media and Techniques for Growth, Regeneration and Storage 2005 2008. Agritech Publications, New York, USA.
4. Baruah BN (2006). B. Sc. Botany, Part I, Part II, Kalyani Publisher, Ludhiana.
5. Baruah BN (2011). B. Sc., Botany First and Second Semester, GU, Kalyani Publisher, Ludhiana.
6. Baruah BN (2016). Economic Botany, Sem III, Odisha University, Kalyani Publisher, Ludhiana.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:	
Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF BOTANY
COURSE CURRICULUM 2024-25
Lab Course

PART A: INTRODUCTION				
Program:		Class: B.Sc.	Semester -IV	Session:2024-2025
1	Course Code			
2	Course Title	INSTRUMENTATION AND LABORATORY TECHNIQUES		
3	Course Type	DSE		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Understanding of the principles, components, and functions of basic laboratory instruments. • Ability to operate a variety of laboratory instruments such as spectrophotometers, chromatographs, microscopes, centrifuges, and pH meters. • Knowledge and application of analytical techniques including spectroscopy, chromatography, electrophoresis, and titration. • Skills in data collection, statistical analysis, and interpretation of experimental results. • Understanding and application of laboratory safety protocols and compliance with regulatory standards and guidelines.		
5	Credit Value	1 Credit	1 Credit =30 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50	Minimum Passing Marks: 20	

PART B: CONTENT OF THE COURSE	
S. No.	List of Experiments
1.	Preparation of solutions (normal, molal, molar, ppm and percent solutions) of known concentrations using pure samples and stock solutions.
2.	Measurement of pH using pH meter.
3.	Preparation of buffers (phosphate/ acetate buffer)
4.	Determination of Plant pigments by Spectrophotometric method (absorption spectra).
5.	Collection and Preservation of different plant sample (Aquatic plant/Alage/Succulent plant/Tuber etc)
6.	Visit to some Laboratories outside the state.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

- Willard HH, Merritt LL, Dean JA, Settle FA (1986) Instrumental Methods of Analysis. 6th Edition. CBS Publishers and Distributors, New Delhi.
- Sharma BK (2002) Instrumental Methods of Chemical Analysis. 21st Edition, Goel Publishing House, Meerut.

TEXT BOOKS Recommended:

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

e-PG Pathshala - https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
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		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
2.	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.)	
3.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
4.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
5.	Ex Meritorious Student PG	Tanu Verma	
6.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG Autonomous College Durg C.G.)	

FOUR YEAR UNDERGRADUATE PROGRAM

Semester V& VI

Session 2024-25

SUBJECT - BOTANY

DSC

Paper No.	Title of the Paper	Marks Allotted		
		Theory	Internal	Min
Fifth Semester (Course Code- BBO105)	Cell and Molecular Biology (03 Credit)	60	15	30
BBOL105	Lab Course/ Practical (01 Credit)	25		10
	Total	150		
Sixth Semester (Course Code- BBO106)	Genetics (03 Credit)	60	15	30
BBOL106	Lab course/ Practical (01 Credit)	25		10
	Total	150		

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program:		Class: B.Sc.	Semester - V	Session:2024-2025
1	Course Code	BBO105		
2	Course Title	Cell and Molecular Biology		
3	Course Type	DSC		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Understand cell theory and differentiate prokaryotic and eukaryotic cell structures. • Demonstrate knowledge of cell cycle phases, mitosis, and meiosis. • Identify and describe cellular organelles and their functions. • Understand nucleus organization, chromosome structure, cytoskeleton roles, and programmed cell death mechanisms. • Describe nucleic acid structure and function, including DNA and RNA types. • Understand genetic elements like plasmids, transposable elements, and gene structure concepts. • Explain mitochondrial and chloroplast genome organization. • Explain DNA replication mechanisms, mutation types and understand DNA damage, repair, and genetic code properties. • Describe transcription, translation processes, and RNA processing in prokaryotes. • Explain gene regulation mechanisms and recombination processes.		
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :75		Minimum Passing Marks:30

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Cell:** Cell theory. Prokaryotic cell structure: Function and ultra structure of cell, Cytoskeleton, Eukaryotic cell: Plant cell wall. Plasma membrane: Structural and Physiological Concepts. Cell Cycle: Cell division, Mitosis and Meiosis.	10
II	**Cytoplasm:** Structure and Functions of Endoplasmic reticulum, Ribosome, Golgi Complex, Lysosomes, Vacuoles, Mitochondria and Chloroplast. Nucleus organization and Chromosome, Nucleosome Model. Programmed Cell Death.	10
III	**Nucleic Acid:** Bases, Nucleoside and Nucleotide, Structure, Types and function of DNA and RNA. Plasmids, C value Paradox, Structure of gene, old and new concept. Mitochondrial and Chloroplast DNA.	10
IV	**DNA** Replication**:** Enzyme involved and Mechanisms of DNA Replication. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutations. DNA damage and repair. Genetic code: Properties, Codon assignment, Wobble Hypothesis	10
V	**Gene Expression:** Transcription: Initiation, Elongation and Termination in Prokaryotes. RNA Processing Translation: Initiation, Elongation and Termination in Prokaryotes. Gene Regulation: Operon Concept, Promoter, Operator, Regulator, Inducer and Co-repressor. Recombination: Homologous, Non-Homologous and Site-Specific Recombination. RNA Interference: Mi RNA and SiRNA.	10

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	**Chairperson**	**Dr. Ranjana Shrivastava**	
2.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. 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	Tanu Verma	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

- Cell Biology, C. B. Powar, 2005, Himalaya Publishing House.
- Cell and Molecular Biology: Concepts and Experiments (7th ed.), G. Karp and J. G. Patton, 2013, Wiley.
- The Cell: A Molecular Approach, G. M. Cooper, 2000, ASM Press & Sinauer Associates.
- Genes and Genomes, P. Berg, 1983, University Science Books.
- Genomes 4, T. A. Brown, 2018, Garland Science.
- Principles and Techniques of Biochemistry and Molecular Biology (7th ed.), K. Wilson and J. Walker, 2010, Cambridge University Press.
- Principles of Cell and Molecular Biology (2nd ed.), L. J. Klein, Smith, and V. M. Kish, 1999, WCB/McGraw-Hill.
- Modern Genetic Analysis: Integrating Genes and Genomes, A. J. F. Griffiths, W. M. Gelbart, J. H. Miller, and R. C. Lewontin, 2002, W. H. Freeman.
- Molecular Biology of the Gene (7th ed.), J. D. Watson, T. A. Baker, S. P. Bell, A. Gann, M. Levine, and R. Losick, 2013, Pearson.
- Lehninger Principles of Biochemistry (7th ed.), D. L. Nelson and M. M. Cox, 2017, W. H. Freeman.
- Cell and Molecular Biology (2nd ed.), P. K. Gupta, 2003, Rastogi Publications.

Reference Books:

- Advanced Molecular Biology: A Concise Reference, R. M. Twyman, 2004, Garland Science.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:	**75 Marks**
Continuous Comprehensive Evaluation (CCE):	**15 Marks**
Semester End Exam (SEE):	**60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question - D: Long answer type question 07 x 5 = 35 Marks **Total = 60 Marks**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
8.	**Chairperson**	**Dr. Ranjana Shrivastava**	
9.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - V**	**Session: 2024-2025**
1	**Course Code**	**BBOL105**		
2	**Course Title**	**Cell and Molecular Biology**		
3	**Course Type**	**DSC**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand the principles and techniques of preparing pre-treating agents, fixing solutions, and stains for cytological studies. • Demonstrate proficiency in studying mitosis using root tips and meiosis using flower buds, including the identification of mitotic and meiotic stages. Also, perform cell counting, viability assessments, and blood smear preparation, interpreting results for biological significance. • Master techniques for preparing microscope slides of dicot leaf sections and Balsam leaf epidermal cells, identifying and describing anatomical structures. • Acquire skills in isolating chloroplasts, measuring stomatal cells, and estimating DNA from plant cells using spectrophotometry or fluorometry. • Understand the principles and applications of RNA and DNA isolation, plasmid DNA isolation, and their roles in molecular biology. • Demonstrate practical skills in using spectrophotometry and electrophoresis, designing and analyzing experiments in molecular biology applications.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**
PART B: CONTENT OF THE COURSE				

S. No.	List of Experiments
1	Preparation of pre-treating / fixing agents/ stains for cytological studies.
2	Study of Mitosis using root tips.
3	Study of Meiosis using flower buds.
4	Cell Counting and viability
5	Blood Smear Preparation
6	Preparation of microscope slide for Dicot leaf section
7	Isolation of chloroplasts.
8	Measurement of stomatal cells
9	Slide preparation of Balsam (*Impatiens balsamina*) Leaf Epidermal Cells
10	Isolation of DNA.
11	Isolation of RNA.
12	Plasmid DNA isolation
13	Estimation of DNA from plant cells.
14	Spectrophotometer, Electrophoresis,
15	Experiments (at least two) on the basis of electrophoresis.

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
15.	**Chairperson**	**Dr. Ranjana Shrivastava**	
16.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
17.	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.)	
18.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
19.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
20.	Ex Meritorious Student PG	Tanu Verma	
21.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

- Principles of Genetics (6th ed.), D. P. Snustad and M. J. Simmons, 2008, John Wiley & Sons.
- Cell and Molecular Biology: Concepts and Experiments (7th ed.), G. Karp and J. G. Patton, 2013, Wiley.
- Principles and Techniques of Biochemistry and Molecular Biology (7th ed.), K. Wilson and J. Walker, 2010, Cambridge University Press.
- Molecular Biology of the Cell (6th ed.), B. Alberts, A. D. Johnson, J. Lewis, D. Morgan, M. Raff, and K. Roberts, 2014, Garland Science.
- Lehninger Principles of Biochemistry (7th ed.), D. L. Nelson and M. M. Cox, 2017, W. H. Freeman.
- Principles of Cell and Molecular Biology (2nd ed.), L. J. Klein, Smith, and V. M. Kish, 1999, WCB/McGraw-Hill.
- Reference Books:
- Cell Biology, C. B. Powar, 2005, Himalaya Publishing House.
- Advanced Molecular Biology: A Concise Reference, R. M. Twyman, 2004, Garland Science.
- Modern Microbial Genetics, U. N. Streips and R. E. Yasbin (Eds.), 2004, John Wiley & Sons.
- Fundamental Bacterial Genetics, N. Trun and J. Trempy, 2009, John Wiley & Sons.
- Introduction to Genetics: A Molecular Approach, T. A. Brown, 2011, Garland Science.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **25 Marks**

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
22.	**Chairperson**	**Dr. Ranjana Shrivastava**	
23.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program:		Class: B.Sc. Semester - VI		Session: 2024-2025
1	Course Code	BBO106		
2	Course Title	Genetics		
3	Course Type	DSC		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Explain Mendel's inheritance principles and apply them to genetic crosses. • Demonstrate knowledge of multiple alleles and allelic interactions with real-world examples. • Understand linkage, gene mapping, and crossing over; create and interpret linkage maps. • Understand sex determination mechanisms and explain chromosomal alterations. • Acquire knowledge of cytoplasmic inheritance and population genetics principles; apply Hardy-Weinberg Equilibrium to genetic variation studies.		
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :75		Minimum Passing Marks:30

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Mendal's Principle:** Mendelian genetic concepts; Mendel's experiments, Concepts of Phenotype and Genotype; Heredity & Variation, Mendal's Law of Inheritance; Law of Dominance, Law of Segregation; Monohybrid cross, Law of Independent Assortment, Dihybrid cross, Back cross and Test cross.	10

II	**Multiple Alleles**: Definition, ABO blood groups and Rh factor in Human. Allelic interactions; Co-dominance and Incomplete dominance; Over-dominance; Pleiotropy, lethal alleles, Penetrance and expressivity. Position effect. **Gene Interactions:** Dominant epistasis, Recessive epistasis, Duplicate recessive epistasis, Duplicate dominant interaction, Dominant and recessive interaction (with an example for each trait).	10
III	**Linkage and Gene Mapping:** Chromosomal basis of inheritance, Linkage definition, cis and trans arrangement of genes. Types of linkage, complete and incomplete linkage maps. Crossing over; definition; recombination and recombination frequency, Mechanism of crossing over: Coupling and Repulsion hypothesis. Mitotic crossing over, Factors affecting linkage and crossing over, significance of linkage and crossing over	10
IV	**Sex determination and Extra-nuclear inheritance:** Chromosome theory of Sex determination: XX- XY, XX-XO, ZZ-ZW; Intersexes and Super sexes in *Drosophila*, Y chromosome in sex determination of *Melandrium*. Genetic and Hormonal control of Sex determination: Gynandromorphs, Environment and sex determination. Numerical and Structural alterations in Chromosomes, Polyploidy & Aneuploidy.	10
V	**Characteristic features of Cytoplasmic Inheritance**; Inheritance of Mitochondrial Genome, Chloroplast Genome, Kappa particles in *Paramecium*, Sigma factor in *Drosophila*, Shell coiling in Snail. Dosage compensation; Sex-linked, sex-limited and sex-influenced characters Male Sterility in plants and their applications. Population Genetics: Gene pool, Hardy-Weinberg Equilibrium, principle & law, Factors affecting HWE.	**10**

Name & Signature of Members of Board of Studies

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5.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
6.	Ex Meritorious Student PG	Tanu Verma	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

- An Introduction to Genetic Analysis (7th ed.), A. J. F. Griffiths, J. H. Miller, D. T. Suzuki, R. C. Lewontin, and W. M. Gelbart, 2000, W. H. Freeman.
- Concepts of Genetics, W. S. Klug, M. R. Cummings, and C. A. Spencer, 2005, Benjamin-Cummings Publishing Company.
- Concepts of Genetics (10th ed.), W. S. Klug, M. R. Cummings, C. Spencer, and M. A. Palladino, 2020, Pearson.
- Genetic Analysis: An Integrated Approach (2nd ed.), M. F. Sanders and J. L. Bowman, 2014, Pearson.
- Genetics: From Genes to Genomes (4th ed.), L. Hartwell, M. L. Goldberg, A. E. Reynolds, and L. M. Silver, 2009, McGraw-Hill.
- Genetics: A Conceptual Approach (7th ed.), B. A. Pierce, 2000, Macmillan.
- Genetics: Analysis & Principles (7th ed.), R. J. Brooker, 2015, McGraw-Hill.
- Genetics: Analysis of Genes and Genomes (5th ed.), D. L. Hartl, 2014, Jones and Bartlett Publishers.
- Molecular Cell Biology (6th ed.), H. Lodish, A. Berk, C. A. Kaiser, M. Krieger, A. Bretscher, H. Ploegh, A. Amon, and M. P. Scott, 2008, Macmillan.
- Principles of Genetics (6th ed.), D. P. Snustad and M. J. Simmons, 2008, John Wiley & Sons.
- Fundamentals of Genetics, B. D. Singh, 2010, Kalyani Publications.

Reference Books:

- Modern Microbial Genetics, U. N. Streips and R. E. Yasbin (Eds.), 2004, John Wiley & Sons.
- Fundamental Bacterial Genetics, N. Trun and J. Trempy, 2009, John Wiley & Sons.
- Cytogenetics, P. K. Gupta, 2010, Rastogi Publications.
- Introduction to Genetics: A Molecular Approach, T. A. Brown, 2011, Garland Science.
- Drosophila: A Laboratory Handbook (2nd ed.), M. Ashburner, 2005, Cold Spring Harbor Laboratory Press.

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:	
Maximum Marks:	**75 Marks**
Continuous Comprehensive Evaluation (CCE):	**15 Marks**
Semester End Exam (SEE):	**60 Marks**
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question - D: Long answer type question 07 x 5 = 35 Marks **Total = 60 Marks**	

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
8.	**Chairperson**	**Dr. Ranjana Shrivastava**	
9.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
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		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
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11.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
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14.	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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VI**		**Session:2024-2025**
1	**Course Code**	**BBOL106**		
2	**Course Title**	**Genetics**		
3	**Course Type**	**DSC**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Students will prepare and apply fixing agents, stains, and study mitosis using root tips and meiosis using flower buds. • Students will prepare and analyze salivary gland chromosomes in Chironomus and Drosophila larvae. • Students will perform blood typing for ABO and Rh factors and conduct hemoglobin electrophoresis. • Students will solve monohybrid and dihybrid cross problems, address non-Mendelian inheritance, linkage, crossing over, and construct genetic maps. • Students will construct and analyze pedigrees, assess inheritance of quantitative characters, and score dysmorphic features in syndromic patients. • Students will learn and apply genetic counseling communication processes for genetic testing.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
1	Preparation of pre-treating / fixing agents/ stains for cytological studies.
2	Study of Mitosis using root tips.
3	Study of Meiosis using flower buds.
4	Preparation of salivary gland chromosomes in *Chironomous* larvae
5	Preparation of salivary gland chromosomes in *Drosophila* larvae
6	Blood typing in humans for multiple alleles and Rh factor
7	Genetic Problems on Monohybrid cross,
8	Genetic Problems on Dihybrid cross

9	Genetic Problems Non-Mendelian Interactions.
10	Problems on Linkage and crossing over.
11	Problems based on construction of genetic map.
12	Hemoglobin electrophoresis (paper electrophoresis)
13	Scoring dysmorphic features in syndromic patients
14	Construction and analysis of Pedigree
15	Assessment of inheritance of quantitative characters
16	To study the communication process of Genetic counselling for genetic testing.

Name & Signature of Members of Board of Studies

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15.	**Chairperson**	**Dr. Ranjana Shrivastava**	
16.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
17.	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.)	
18.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
19.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
20.	Ex Meritorious Student PG	Tanu Verma	
21.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
TEXT BOOKS Recommended: • Principles of Genetics, D. P. Snustad and M. J. Simmons, 2008, John Wiley & Sons. • Concepts of Genetics (10th ed.), W. S. Klug, M. R. Cummings, C. Spencer, and M. A. Palladino, 2020, Pearson. • Genetics: Analysis & Principles (7th ed.), R. J. Brooker, 2015, McGraw-Hill. • Genetic Analysis: An Integrated Approach (2nd ed.), M. F. Sanders and J. L. Bowman, 2014, Pearson. • Molecular Cell Biology (6th ed.), H. Lodish, A. Berk, C. A. Kaiser, M. Krieger, A. Bretscher, H. Ploegh, A. Amon, and M. P. Scott, 2008, Macmillan. **Reference Books:** • Cytogenetics, P. K. Gupta, 2010, Rastogi Publications. • Modern Microbial Genetics, U. N. Streips and R. E. Yasbin (Eds.), 2004, John Wiley & Sons. • Fundamental Bacterial Genetics, N. Trun and J. Trempy, 2009, John Wiley & Sons. **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 25 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
22.	**Chairperson**	**Dr. Ranjana Shrivastava**	
23.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	

		6. Dr. Rajeshwari Prabha Lahare	
24.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	
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26.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
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28.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

FOUR YEAR UNDERGRADUATE PROGRAM

SEMESTER V& VI

SESSION 2024-25

DSE

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION			
Program:		Class: B.Sc. Semester -V	Session: 2024-2025
1	Course Code		
2	Course Title	Genetic Engineering	
3	Course Type	DSE	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Students will demonstrate the use of molecular tools in genetic engineering, understanding their mechanisms and applications. • Students will have a thorough understanding of PCR processes and DNA sequencing methods, including their applications in research and diagnostics. • Students will be able to perform genome mapping and DNA profiling, understanding their significance in genetic research. • Students will be familiar with advanced assays and the CRISPR/Cas system, applying these techniques in genome editing and bioinformatics analysis.	
5	Credit Value	3 Credits 1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :75 Minimum Passing Marks:30	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	Genetic engineering Overview, Molecular Tools; DNA polymerase, Nucleases, Restriction Endonuclease, End modification enzymes, DNA ligases. Primers, linkers and adaptors. Vectors; Properties, Types (Plasmid, Cosmid, Phagemid, M13 vector, Shuttle vector, YAC, BAC, Bacteriophage vector), Cloning vs Expression vectors. Transformation Techniques; Introduction of DNA into host cells (in Plant and Bacterial cell), Natural gene Transfer method, Vector Mediated Method, Vectorless method Chemical and physical method.	10
II	Screening and Selection of Recombinant Clone: Selectable and screenable marker. Selection of transformed bacterial cells, beta galactosidase gene complementation, Blue-white screening, Recombinant screening; Insertional inactivation, Red-white selection. cDNA Library and Genomic Library: General concept and components, construction and screening of libraries; colony and plaque hybridization, Application. Polymerase Chain Reaction: Requirements, General process, Types and applications.	10
III	DNA Sequencing: Chain termination method, Automated sequencing, Sequencing enzyme, Chemical degradation method, Pyrosequencing method. Next generation sequencing technology. Site Directed Mutagenesis: Non-PCR	10

	based; Cassette mutagenesis, Primer extension mutagenesis, PCR Based; Overlap extension method, Megaprimer PCR, Inverse PCR, Application. Genome Mapping; Genetic marker, Types of DNA Marker; RFLP, RAPD, AFLP, Physical mapping; Restriction mapping.	
IV	Gene Silencing: mechanisms of Gene Silencing, Transcriptional Gene Silencing (TGS), Post-Transcriptional Gene Silencing (PTGS), RNA Interference (RNAi), siRNA and miRNA, Applications of Gene Silencing (Antisense oligonucleotides, Ribozymes). DNA Microarray: Types of DNA Microarrays, Mechanisms and Applications of DNA Microarrays. DNA fingerprinting.	10
V	Electrophoretic mobility Shift Assay, Foot printing assay, Phage Display, Yeast two-hybrid assay, Transcript analysis and their applications. CRISPR/Cas System: General Mechanism. Types of CRISPR/Cas9 System, CRSIPR/Cas9 and targeted genome editing, Regulation for CRISPR/cas-9 technology, Applications of CRISPR/Cas System.	10

Name & Signature of Members of Board of Studies

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4.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
5.	Ex Meritorious Student PG	Tanu Verma	
6.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

- Green, M. R., & Sambrook, J. (2012). Molecular cloning: A laboratory manual (4th ed.). Cold Spring Harbor Laboratory Press.
- Primrose, S. B., & Twyman, R. (2006). Principles of gene manipulation and genomics* (7th ed.). Wiley-Blackwell.
- Setlow, J. K. (Ed.). (2001). Genetic engineering: Principles and methods (Vol. 23). Springer.
- Brown, T. A. (2016). Gene cloning and DNA analysis: An introduction (7th ed.). Wiley-Blackwell.
- Watson, J. D., Caudy, A. A., Myers, R. M., & Witkowski, J. A. (2007). Recombinant DNA: Genes and genomes - A short course (3rd ed.). W.H. Freeman and Company.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals

https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:	
Maximum Marks:	**75 Marks**
Continuous Comprehensive Evaluation (CCE):	**15 Marks**
Semester End Exam (SEE):	**60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (01 each)	02 x 5 = 10 Marks
	Question - C: Short answer type question	03 x 5 = 15 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

Name & Signature of Members of Board of Studies

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester -V**		**Session: 2024-2025**
1	**Course Code**			
2	**Course Title**	**Genetic Engineering**		
3	**Course Type**	**DSE**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understanding the fundamental principles and concepts underlying genetic engineering and recombinant DNA technology. • Ability to perform essential molecular biology techniques such as DNA extraction, gel electrophoresis, PCR (Polymerase Chain Reaction), and restriction digestion. • Proficiency in isolating genomic and plasmid DNA from various organisms. • Ability to utilize bioinformatics tools for sequence analysis, primer design, and the interpretation of genetic data. • Awareness of safety protocols, ethical considerations, and regulatory guidelines associated with genetic engineering research.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
1	Isolation of Genomic DNA
2	Isolation of plasmid DNA.
3	Restriction map of plasmid DNA.
4	Restriction mapping of Bacterial genomic DNA
5	DNA finger printing.
6	PCR based experiment. (AFLP, RAPD)
7	Ligation of DNA.
8	Gene expression in *E. coil* and analysis of gene product.
9	DNA end labeling
10	Random primer labeling
11	Gene amplification and Cloning of amplified product

Name & Signature of Members of Board of Studies

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PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
TEXT BOOKS Recommended: • Green, M. R., & Sambrook, J. (2012). Molecular cloning: A laboratory manual (4th ed.). Cold Spring Harbor Laboratory Press. • Daniel L. Hartl & Elizabeth W. Jones : Genetics – analysis of Genes & Genomes . • Benjamin A. Pierce : genetics – a conceptual approach • D. Peter Snustad & Michael J. Simmons : Principles of Genetics • Tom Strachan & Andrew P. Read : Human Molecular Genetics **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 25 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	Chairperson	**Dr. Ranjana Shrivastava**	
		1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
2.	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.)	
3.	VC Nominated member	Dr. Aruna Shrivastava (Govt. D.B. Girls PG College Raipur C.G.)	
4.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
5.	Ex Meritorious Student PG	Tanu Verma	
6.	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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
	Program:	**Class: B.Sc.**	**Semester -VI**	**Session:2024-2025**
1.	**Course Code**			
2.	**Course Title**	**Plant Pathology and Integrated Plant Disease Management**		
3.	**Course Type**	**DSE**		
4.	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Acquired knowledge may help the students for isolation, inoculation, culturing, preservation, maintenance of microorganisms and handling of different instruments. • Acquired knowledge may help the students for predicting crop loss and disease management through various approaches. • Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study. • Help the learners for proper understating of pathogen behaviour, their interaction with host which in turn allow them for developed resistant cultivars.		
5.	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6.	**Total Marks**	**Maximum Marks :75**	**Minimum Passing Marks:30**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Classification of plant diseases according to causal agents (Fungi, Bacteria, Viruses, Nematodes).	**10**
II	Disease Symptoms, biotic and abiotic causes of plant diseases, survival and dispersal of important plant pathogens, Host parasite interaction, recognition of host by pathogens, concept of infection, entry of pathogen into host, mode of host penetration, appressorium, infection peg, symptomatology, inoculums; Defense strategies- Physical and biochemical (preformed and post inflectional). ISR and SAR.	**10**
III	Detection and diagnosis of plant diseases: Methods to prove Koch's postulates with biotroph and necrotroph pathogens, pure culture techniques, use of selective media to isolate pathogens. Preservation of plant pathogens and disease specimens, disease diagnostics, serological and molecular techniques for detection of plant pathogens.	**10**

IV	Principles of plant disease management by cultural, physical, biological, chemical, organic amendments and botanicals methods of plant disease control, integrated control measures of plant diseases. Disease resistance and molecular approach for disease management. Genetics for disease resistance – R genes, vertical and horizontal resistance.	**10**
V	History of fungicides, bactericides, concepts of pathogen immobilization, chemical protection and chemotherapy, nature, properties and mode of action of antifungal, antibacterial and antiviral chemicals.	**10**

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5.	Ex Meritorious Student PG	Tanu Verma	
6.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG Autonomous College Durg C.G.)	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

Reference Books:

1. Pathak, V. N. Essentials of Plant Pathology. Prakash Pub., Jaipur
2. Mehrotra RS &Aggarwal A. 2007.Plant Pathology.7th Ed. Tata McGraw Hill Publ. Co. Ltd.
3. Agrios, GN. 2010. Plant Pathology. Acad. Press.
4. Kamat, M. N. Introductory Plant Pathology. Prakash Pub, Jaipur
5. Singh RS. 2008. Plant Diseases.8th Ed. Oxford & IBH. Pub. Co.
6. Singh RS. 2013. Introduction to Principles of Plant Pathology. Oxford and IBH Pub. Co.
7. Nene YL &Thapliyal PN. 1993. Fungicides in Plant Disease Control. 3rd Ed. Oxford & IBH, New Delhi. Vyas SC. 1993. Handbook of Systemic Fungicides. Vols. I-III. Tata McGraw Hill, New Delhi.
8. Rhower GG. 1991. Regulatory Plant Pest Management. In: Handbook of Pest Management in Agriculture. 2nd Ed. Vol. II. (Ed. David Pimental). CRC Press. 17) Singh RS & Sitaramaiah K. 1994. Plant Pathogens – Nematodes. Oxford & IBH, New Delhi.
9. Thorne G. 1961. Principles of Nematology. McGraw Hill, New Delhi.
10. Gibbs A & Harrison B. 1976. Plant Virology - The Principles. Edward Arnold, London.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals

e-PG PATHSHALA - https://epgp.inflibnet.ac.in/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:	**75 Marks**
Continuous Comprehensive Evaluation (CCE):	**15 Marks**
Semester End Exam (SEE):	**60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (01 each)	02 x 5 = 10 Marks
	Question - C: Short answer type question	03 x 5 = 15 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester -VI**	**Session:2024-2025**
1	**Course Code**			
2	**Course Title**	**Plant Pathology and Integrated Plant Disease Management**		
3	**Course Type**	**DSE**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Identify and diagnose various plant diseases caused by fungi, bacteria, viruses, and nematodes through observation and laboratory techniques. • Utilize microscopy and molecular tools for the accurate identification of plant pathogens. • Apply principles of integrated disease management, including cultural, biological, and chemical control methods. • Integrate knowledge of environmental interactions into disease forecasting and management strategies.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
1	Study of symptoms of various plant diseases.
2	Preparation of media, isolation and Koch's postulates.
3	Staining and identification of plant pathogenic bacteria.
4	Mode of transmission of plant viruses
5	Study of morphological features and identification of plant parasitic nematodes.
6	Preservation of plant pathogens and disease specimens.
7	Extraction of nematodes from soil.
8	Acquaintance with different formulations and preparation of certain homemade fungicide and botanicals etc.
9	Field experiments, data collection and preparation of references.

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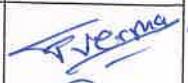
5.	Ex Meritorious Student PG	Tanu Verma	
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