DEPARTMENT OF BOTANY

COURSE CURRICULUM & MARKING SCHEME

B.Sc. V, VI, VII, VIII Semester

BOTANY

(Based on Choice Based Credit System)

SESSION : 2025-26

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 (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

SYLLABUS SCHMEME FOR UG – 2025 - 26

SEMESTER – V - VIII

Course	DSC		DSE	
Semester	**Code**	**Title**	**Code**	**Title**
V	**BOSC – 05**	Cell and Molecular Biology	**BOSE – 03**	Genetic Engineering
VI	**BOSC – 06**	Genetics	**BOSE – 04 I**	Plant Pathology and Integrated Plant Disease Management
			BOSE – 04 II	Ethnobotany and Medicinal Plants
VII	**BOSC – 07**	Ecology and Phytogeography	**BOSE – 05**	**Microbiology, Phycology, Mycology**
			BOSE – 06	Cell Biology
			BOSE – 07	Biology and Diversity of Bryophyta, Pteridophyta, and Gymnosperm
			BOSE – 08	Plant Physiology
VIII	**BOSC – 08**	Molecular Plant Pathology	**BOSE – 09**	**Taxonomy of Angiosperms**
			BOSE – 10	Genetics and Genomics
			BOSE – 11	Molecular Biology and Cytogenetics
			BOSE – 12	Plant Metabolism
	SEC			
V-VI	**SEC - 5-6**	Mushroom Cultivation/ Organic Farming/ Medicinal Botany/ Nursery and Gardening	**For CGPA – 7.5 (Dissertation and Research Methodology)** DS Research Methodology/ Research Work & Dissertation	

- *Forth year for bachelor degree Honour's (For such students who have **not** achieved a 7.5 CGPA in 3 years Bachelor Degree Programme) (1DSC + 4 DSE)*
- *Forth year for bachelor degree Honour's with Research (For such students who have achieved a 7.5 CGPA in 3 years Bachelor Degree Programme) (1 DSC + 1 DSE + DS (12C) in VIII Sem.)*

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - V**		**Session: 2025-26**
1	**Course Code**	**BOSC – 05 T**		
2	**Course Title**	**Cell and Molecular Biology**		
3	**Course Type**	**Discipline Specific Course (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.	10

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.

OnlineResources: (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
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - V**		**Session: 2025-2026**
1	**Course Code**	**BOSC – 05 P**		
2	**Course Title**	**Lab Course (Cell and Molecular Biology)**		
3	**Course Type**	**Laboratory Course**		
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.

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
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VI**		**Session: 2025-26**
1	**Course Code**	**BOSC – 06 T**		
2	**Course Title**	**Genetics**		
3	**Course Type**	**Discipline Specific Course (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**

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.

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VI**	**Session: 2025-26**
1	**Course Code**	**BOSC – 06 P**		
2	**Course Title**	**Lab Course (Genetics)**		
3	**Course Type**	**Laboratory Course**		
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.

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)

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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

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		Mr. Motiram Sahu	
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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.)	
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6.	Ex Meritorious Student PG	Devika Janghel	
7.	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 2025-26

DSE

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION			
Program:		**Class: B.Sc.** **Semester -V**	**Session: 2025-26**
1	**Course Code**	**BOSE – 03 T**	
2	**Course Title**	**Genetic Engineering**	
3	**Course Type**	**Discipline Specific Elective (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	**Course Contents**	**No. of Periods**
I	Genetic engineering Overview, Molecular Tools & Enzymes, Primers, linkers and adaptors. Vectors; Properties, Types, Transformation Techniques; Introduction of DNA into host cells.	10
II	Screening and Selection of Recombinant Clone, Selection of transformed bacterial cells. cDNA Library and Genomic Library, colony and plaque hybridization, Polymerase Chain Reaction: Requirements, General process, Types and applications.	10
III	DNA Sequencing types and application, Site Directed Mutagenesis and its application. Genome Mapping; Genetic marker, Types of DNA Marker; RFLP, RAPD, AFLP. DNA fingerprinting.	10
IV	Gene Silencing: mechanisms of Gene Silencing, Applications of Gene Silencing, RNA Interference (RNAi), siRNA and miRNA, DNA Microarray: Types and Applications of DNA Microarrays.	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 and applications of CRISPR/Cas System.	10

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):** **15Marks** **Semester End Exam (SEE):** **60 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation(CCE)	Internal Test of 15 Marks andAssignment 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 (01each) Question - C: Short answer type question Question -D: Long answer type question **Total = 60 Marks**	02 x 5 = 10 Marks 03 x 5 = 15 Marks 07 x 5 = 35 Marks

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester -V**	**Session: 2025-26**
1	**Course Code**	**BOSE – 03 P**		
2	**Course Title**	**Lab Course (Genetic Engineering)**		
3	**Course Type**	**Laboratory Course**		
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**	**1Credit**	**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
Keywords	Gene, DNA, Plasmid, AFLP, RAPD, Primer

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)**

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION			
	Program:	**Class: B.Sc. Semester - VI**	**Session: 2025-2026**
1.	**Course Code**	**BOSE – 4 I T**	
2.	**Course Title**	**Plant Pathology and Integrated Plant Disease Management**	
3.	**Course Type**	**Discipline Specific Elective (DSE) –I**	
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	**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**

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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		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		Dr. Rajeshwari Prabha Lahare	
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		2. Dr. N.B. Singh (Govt. N.PG. Science College Raipur C.G.)	
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester -VI**	**Session: 2025-2026**
1	**Course Code**	**BOSE – 4 I P**		
2	**Course Title**	**Lab Course (Plant Pathology and Integrated Plant Disease Management**		
3	**Course Type**	**Laboratory Course –T**		
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.

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
TEXT BOOKS Recommended: Singh RS. 1982. Plant Pathogens ñ The Fungi. Oxford & IBH, New Delhi. Noordam D. 1973. Identification of Plant Viruses, Methods and Experiments. Oxford & IBH, New Delhi. Bos L. 1964. Symptoms of Virus Diseases in Plants. Oxford & IBH., New Delhi. Verma JP, Varma A & Kumar D. (Eds). 1995. Detection of Plant Pathogens and their Management. Angkor Publ., New Delhi. Singh DP & Singh A. 2007. Disease and Insect Resistance in Plants. Oxford & IBH, New Delhi. **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

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		Mr. Motiram Sahu	
		Dr. Rajeshwari Prabha Lahare	
3.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	

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5.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
6.	Ex Meritorious Student PG	Devika Janghel	
7.	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 VI

SESSION 2025-26

DSE II

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION			
Program:		**Class: B.Sc.** **Semester -VI**	**Session: 2025-2026**
1	**Course Code**	**BOSE – 04 II T**	
2	**Course Title**	**Ethnobotany and Medicinal Plants**	
3	**Course Type**	**Discipline Specific Elective (DSE)-II**	
4	**Course Learning Outcome (CLO)**	At the end of this course, the students will be able to: • Develop a comprehensive understanding of the identification, cultivation, and processing of medicinal plants, and their chemical constituents responsible for therapeutic properties, enabling the evaluation of their potential for drug development and healthcare applications. • Explore the integration of traditional medicine practices, ethnobotany, and pharmacological principles in the study of medicinal plants, enabling the critical evaluation of their efficacy, safety, and cultural significance in different healthcare systems.	
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 to Ethnobotany** • Concept, scope, and objectives of ethnobotany • Ethnobotany as an interdisciplinary science • Relevance of ethnobotany in the present context • Major and minor ethnic/tribal groups of India and their lifestyles • Sacred plants and their cultural significance	10
II	**Ethnobotany and Traditional Uses** • Plants used by tribal communities: a) Food plants b) Intoxicants and beverages c) Resins, oils, and miscellaneous uses • Role of ethnobotany in sustainable development • Role of ethnic communities in the conservation of plant genetic resources	10

	• Ethnobotany in primary health care programmes • Retrospect and prospects of ethnobotany in India	
III	**Ethnobotany in Modern Medicine** • Medico-ethnobotanical sources in India • Importance of locally available plants in ethnobotanical practices (with habitat and morphology) • Role of plant-based drugs in the pharmaceutical industry • Quality, safety, and efficacy of herbal medicines • Endangered plant taxa and participatory forest management (with reference to Chhattisgarh)	10
IV	**Medicinal Plants and Indigenous Systems** • History, scope, and importance of medicinal plants • Indigenous medicinal sciences: Definitions and scope • Traditional medicine systems in India: a) Ayurveda b) Siddha c) Unani d) Homeopathy • Concept of herbalism and its significance • Phytomedicines and herbal raw materials • Local health traditions and practices in traditional medicine	10
V	**Conservation and Propagation of Medicinal Plants** • Conservation issues and approaches for medicinal plants • IUCN Red List criteria • **In situ conservation**: a) Biosphere reserves b) Sacred groves c) National parks • **Ex situ conservation**: a) Botanical gardens b) Ethnomedicinal plant gardens • Propagation of medicinal plants: o Nursery objectives, classification, and components o Techniques: sowing, pricking, greenhouse use o Propagation methods: cutting, layering, grafting, budding	10
Keywords	Ethnobotany, conservation, Medicinal Plants, Tribals	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi - 1981 Lone et al,. Palaeo ethnobotany
3. S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
4. S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.

Reference Books Recommended:

1. Colton C.M. 1997. Ethnobotany - Principles and applications. John Wiley and sons - Chichester
2. Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah
3. Rajiv K. Sinha - Ethnobotany The Renaissance of Traditional Herbal Medicine - INA-SHREE Publishers, Jaipur-1996
4. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
5. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India. Approach, 2nd edn. Agrobios, India.
6. Medicinal Plants of India" by C.P. Khare
7. "Handbook of Medicinal Plants" by L.D. Kapoor Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

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

- e-Resources / e-books and e-learning portals
- https://www.fs.usda.gov/wildflowers/ethnobotany/index.shtml
- https://www.researchgate.net/publication/333017295 Role of ethnobotany in modern medicines with special reference to Rauvolfia serpentina Trichopus zeylanicus Artemisia sp and Withania somnifera
- https://www.sciencedirect.com/science/article/abs/pii/S0738081X18300415
- https://www.mdpi.com/journal/diversity/special issues/ethnobotany biodiversity

Online Resources-

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.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
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	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
	Program:	**Class: B.Sc.**	**Semester -VI**	**Session: 2025-2026**
1	**Course Code**	**BOSE – 04 II P**		
2	**Course Title**	**Lab Course (Ethnobotany and Medicinal Plants) –II**		
3	**Course Type**	**Laboratory Course (DSE)**		
4	**Course Learning Outcome (CLO)**	At the end of this course, the students will be able to get • Acquire practical skills about the connection between plants and human society. • Acquire knowledge of ethnobotanical research methods. • Apply critical thinking and problem-solving skills of traditional plant uses. • Idea about protection and conservation of medicinal and ethnobotanical plants. • Documentation of cultural knowledge about healing.		
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.	Identify and collect medicinal plant specimens from various habitats. Documentation for relevant information such as plant parts used, traditional uses, and ecological characteristics.
2.	Preparation of herbarium of the collected plants
3.	To study the distribution of tribals / ethnic peoples of a selected area.
4.	Collection of locally used plants of ethnobotanically important plants
5.	To study morphological description and identification of various medicinal plants.
6.	Engage with local communities and traditional healers to document their knowledge of medicinal plants. Record their uses, preparation methods, and cultural significance, emphasizing the importance of preserving traditional knowledge.
7.	To study common name, botanical name, important varieties and commercially important parts of medicinal and aromatic plants.
8.	To study different methods of plant extraction to obtain bioactive compounds
9.	Phytochemical and secondary metabolites analysis to determine the chemical potential therapeutic properties of collected specimens of local area.
10.	Tribal knowledge towards disease diagnosis, treatment for different medicinal plants and its cultivation and conservation.
11.	To find out antimicrobial potential of medicinal plant extracts.
Keywords	Therapeutic, antimicrobial, medicinal plants, herbarium

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended -

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun

Reference Books Recommended -

1. "Handbook of Medicinal Plants" by L.D. Kapoor.
2. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare.

Online Resources -

- e-Resources / e-books and e-learning portals
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9526633/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9922502/
- https://bnrc.springeropen.com/articles/10.1186/s42269-022-00770-8
- https://cmjournal.biomedcentral.com/articles/10.1186/s13020-016-0108-7

Online Resources-

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.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)**

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GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG (CHHATTISGARH)

DEPARTMENT OF BOTANY

SESSION - 2025-2026

B.Sc. SEMESTER V-VI

SKILL ENHANCEMENT COURSE (SEC)

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG (CHHATTISGARH)

DEPARTMENT OF BOTANY

Session - 2025-2026

B.Sc. Semester V-VI

SKILL ENHANCEMENT COURSE (SEC)

MEDICINAL BOTANY

(Credits 2)

Lectures: 18

Medicinal Plants: History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda, Siddha and Unani: History, origin. **(6 Lectures)**

Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding. **(6 Lectures)**

Ethnobotany: Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany

Folk medicines: Folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. **(6 Lectures)**

Suggested Readings

1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn.- Agrobios, India.

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GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG (CHHATTISGARH)

DEPARTMENT OF BOTANY

Session - 2025-2026

B.Sc. Semester V-VI

SKILL ENHANCEMENT COURSE (SEC)

MUSHROOM CULTURE TECHNOLOGY

(Credits 2)

Lectures: 18

Mushroom: Introduction, History, Nutritional and medicinal value of edible mushrooms; Poisonousmushrooms.Types of edible mushrooms available in India – *Volvariella volvacea, Pleurotus citrinopileatus*, *Agaricus bisporus*. **(6 Lectures)**

CultivationTechnology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low-cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. **(6 Lectures)**

Pure Culture Techniques: Medium, Sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low-cost technology, Composting technology in mushroom production. **(6 Lectures)**

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991).
2. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
4. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
5. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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 (CHHATTISGARH)

DEPARTMENT OF BOTANY

Session - 2025-2026

B.Sc. Semester V-VI

SKILL ENHANCEMENT COURSE (SEC)

NURSERY AND GARDENING

(Credits 2)

Lectures: 20

Module 1: **(4 Lectures)**

Nursery: Definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities- planting, direct seedling and transplants.

Module 2: **(4 Lectures)**

Seed: Structure and types- Seed dormancy; Causes and methods of breaking dormancy- Seed storage: Seed banks, factors affecting seed viability, genetic erosion- Seed production technology- seed testing and certification.

Module 3 **(4 Lectures)**

Vegetative Propagation: air- layering, cutting, selection of cutting, collection, season, treatment of cutting, rooting medium and planning of cuttings- hardening of plants- green house- mist chamber, shed root, shade house and glass house.

Module 4 **(4 Lectures)**

Gardening: Definition, objectives and scope- different type of gardening – land scape and home gardening- parks and its components- plant materials and designing- computer application in landscaping- Gardening operation: soil, laying, manuring, watering management of pests and diseases and harvesting.

Module 5 **(4 Lectures)**

Sowing/raising of seed and seedlings- Transplanting of seedlings- study of cultivation of different vegetables: cabbage, brinjal, ladiesfinger, onion, garlic, Storage and marketing procedure.

Suggested Readings:

7. Bose T.K. and Mukherjee, D. 1972 Gardening in India, Oxford & IBH Publishing Co. New Delhi.
8. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
9. Kumar, N., 1997, Introduction to Horticulture, Rajlaxmi Publications, Nagercoil.
10. Edmond Musser & Andres, Fundamentals of Horticultures, McGraw Hill Book Co., New Delhi.
11. Agrawal, P.K. 1993 Hand book of seed technology. Deptt. of Agriculture and Co-operation, National Seed Corporation Ltd., New Delhi.
12. Janick Jules. 1979 Horticultural Science (3rd Ed.), W.H. Freeman and Co. San Francisco.

Practical:

5. Practice of grafting, budding, cutting and layering, anatomical studies of rooting of cuttings and grafting union, planning and layout for commercial nursery,
6. Sample seed testing, use of bioregulators in propagation, sterilization of equipment's and laboratory,
7. Media preparation, selection and preparation of explants, meristem culture and micro grafting, planning and layout of experiments on various aspects of propagation.
8. Visit to tissue culture labs and nurseries.

Course Outcome:

On successful completion of this course, the students will be able to perform soil and plant nutrients management activities, make compost, perform nursery planning and management activities, perform plant protection activities, be familiar with various garden, perform garden development activities, maintain garden and garden plants, propagate plant, arrange and decorate house plants, prepare and maintain lawn, market plants, perform communication and professionalism development activities, and perform entrepreneurship development activities

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		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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.)	
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GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG
(CHHATTISGARH)
DEPARTMENT OF BOTANY
Session - 2025-2026
B.Sc. Semester V-VI
SKILL ENHANCEMENT COURSE (SEC)
ORGANIC FARMING
(Credits 2)
Lectures: 20

Unit-I **(4 Lectures)**

Introduction to organic farming and its significance.

Concepts and principles of organic farming

Key indicators for organic farming, sustainable agriculture and climate change

Unit- II **(4 Lectures)**

Input management, Compost production, Vermicomposting, Compost quality

Compost utilization and marketing

Unit-III **(4 Lectures)**

Organic Crop management: field crops, horticulture and plantation crops.

Plant protection measures, biopesticides, natural predators, cultural practice.

Unit-IV **(4 Lectures)**

Rotation design for organic system

Transition to organic agriculture

Farming system

Unit-V **(4 Lectures)**

Quality analysis of organic foods, antioxidants and their natural source, organic food and human health.

Standards of organic food and marketing.

Suggested Reading:

1) Reddy S R(2019) Fundamentals of Agronomy Kalyani Publications, Uttar Pradesh
2) Tolanur S (2018) Fundamentals of Soil Science IIndEdition , CBS Publishers , New Delhi
3) Reddy S R (2017) Principles of Organic Farming Kalyani Publishers , New Delhi

4) Dongarjal R.P. and Zade S.B(2019) Insect Ecology and Integrated Pest Management Akinik
Publications , New Delhi

Practical:

1) Crop planning & management in organic agriculture

2) Identification of different fungal and bacterial biocontrol agents

3) Application of manures and composts

4) Preparation of plant protection inputs Periods

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VII**	**Session: 2025-26**
1	**Course Code**	**BOSC - 07 T**		
2	**Course Title**	**Ecology and Phytogeography**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Course Learning Outcome (CLO)**	At the end of this course, students will be able to understand: • The interrelationship between organisms and environment. • Methods to study vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography. • Evolving strategies for sustainable natural resource management and biodiversity conservation. • Climatic changes and its restoration • Familiar with sustainable development		
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	**Ecological Factors and Management** • Climatic Factors: - Light, Temperature, Air, and Water • Topographic and Edaphic Factors: - Soil Formation and Types - Soil Texture, Profile, and Classification • Soil Physico-Chemical Properties: - Soil Organic Matter, Soil Types, and Soil Properties • Biotic Factors: - Interrelationships in Ecosystems - Major Soil Types of the World • Ecological Management Concepts: - Sustainable Development and Sustainability Indicators	10
II	**Ecosystem Organization** • Structure and Function of Ecosystems: - Primary Production: Methods of Measurement and Global Patterns - Controlling Factors of Primary Production • Energy Dynamics in Ecosystems: - Trophic Organization and Energy Flow Pathways - Ecological Efficiencies • Decomposition and Litter Fall: - Mechanisms, Substrate Quality, and Climate Factors • Global Biogeochemical Cycles: - Carbon (C), Nitrogen (N), Phosphorus (P), Sulfur (S) • Mineral Cycles: Pathways, Processes, and Budgets in Terrestrial and Aquatic Ecosystems	10
III	**Community Dynamics and Eco-Stability** • Concept of Community: - Community and Continuum - Analytical and Synthetic Characters of Communities • Inter-Specific Associations: - Ordination and Ecological Niche • Vegetation Development: - Temporal Changes (Cyclic vs Non-Cyclic) - Mechanisms of Ecological Successions: Relay Floristic vs Initial Floristic Composition - Facilitation, Tolerance, and Inhibition Models • Ecological Stability: - Resistance and Resilience Concepts - Ecological Perturbations: Natural vs Anthropogenic Impacts - Ecology of Plant Invasion - - Environmental Impact Assessment and Ecosystem Restoration	10

IV	**Phytogeography and Pollution** • Phytogeography: - Phytogeographical Regions of India with Reference to Chhattisgarh • Pollution and Its Impact: - Air, Water, Soil, and Sound Pollution: Types, Sources, and Quality Parameters - Effects of Pollution on Plants and Ecosystems • Climate Change and Its Consequences: - Greenhouse Gases (CO2, CH4, N2O, CFCs) and Their Sources - Trends and Role of Greenhouse Gases • Ozone Layer and Ozone Hole: Causes and Consequences • Consequences of Climate Change: CO2 Fertilization, Global Warming, Sea Level Rise, UV Radiation	10
V	**Ecological Management and Sustainability** • Ecological Management: - Concepts of Ecological Management for Sustainability • Sustainable Development: - Principles and Practices of Sustainable Development • Sustainability Indicators: - Measuring Sustainability: Methods, Indicators, and Applications in Ecosystem Management • - Role of Ecological Management in Sustainable Practices	10
Keywords	Ecological Factors community and continuum ecosystem, Phytogeographical climate changes	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended -

1. Brady, N. C. (1990) The Nature and Properties of Soil Macmillan, Sydney, Australia.
2. Begon, M; Harper, J. L. And Townsend, C. R. (1996) Ecology. Blackwell Science, Cambridge, USA
3. Chapman, J. L. and Raiss, M. J. (1988) Ecology: Principles and Applications. Cambridge Univ. Press, Cambridge, U.K.
4. Kumar, H. D. (1986) Modern Concept of Ecology, Vikas Publishing House Private Ltd., New Delhi.

Reference books:

1. Hill, M. K. (1997) Understanding Environmental Pollution. Cambridge Univ. Press, Cambridge, U. K.
2. Odum, E. P. (1971) Fundamentals of Ecology. Saunders, Phildelphhia.
3. Odum, E. P. (1983) Basic Ecology. Saunders, Philasephia

Online Resources-
e-Resources / e-learning portals

- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources-
e-Resources / e-books and e-learning portals

- https://courses.lumenlearning.com/wm-biology2/chapter/community-structure-and-dynamics/
- https://education.nationalgeographic.org/resource/ecosystem/
- https://www.embibe.com/exams/ecological-factors/
- https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-pollution#:~:text=Environmental%20pollution%20is%20unwarranted%20disposal, both%20quantitatively%20and%20qualitatively%20(Hussain%2C
- https://onlinecourses.nptel.ac.in/noc24_ce03/preview
- https://onlinecourses.swayam2.ac.in/nou24_ge10/preview

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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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VII**		**Session: 2025-2026**
1	**Course Code**	**BOSC – 07 P**		
2	**Course Title**	**Lab Course 07 (Ecology and Phytogeography)**		
3	**Course Type**	**Laboratory Course**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Students will be able to determine frequency, abundance and density of any area. • Learn community relationships of plants. • Understand IVI and biomass. • Can determine diversity indices. • Biodiversity of different ecosystems • Interaction among different community • Pollution and its effect		
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	To determine minimum size and number of quadrates required for reliable estimate o biomass in grass land ecosystem.
2	To study the frequency, abundance and density of plants in the local ecosystem by quadrat method.
3	To determine gross and net productivity by light and dark bottle method.
4	To determine soil moisture content, porosity and bulk density of soil collected from different locations.
5	To determine the water holding capacity of various soils.
6	To determine the basal cover, or vegetational cover of one herbaceous community by quadrat method.
7	To determine IVI of the grass land.

8	To measure the above-ground plant biomass in a grassland.
9	To determine diversity indices (richness, Simpson, Shannon-Wiener) in grazed an protected grassland.
10	Experiment on Physico-Chemical Analysis of Water (pH, Temperature, etc.
11	To determine transparency or turbidity of different water bodies.
12	To measure the amount of dissolved oxygen in pond water.
13	To determine the total dissolved solids (TDS) in water
14	To measure the amount of BOD in different types of water.
15	Ombrothermic diagram of your locality.
Keywords	Quadrate, Productivity, Turbidity, TDS,

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended

1. Bendre and Kumar, 2018. A text book of botany practical, Vol-2
2. Raj Mandeep, 2022. Principles of ecology.
3. Rao K S, 1993 Practical Ecology
4. Ashok K. Rathoure Bioremediation: Current Research and Applications.

Text Books Recommended -

1. Penny A. Cook, James R. Bell, C. Philip Wheater, 2011. Practical Field Ecology: A Project Guide
2. D. D. Gilbertson, M. Kent, F. B. Pyatt, 1985. Practical Ecology for Geography and Biology
3. Masood, A.A. A text book of botany practical, Edn.-5
4. Gaurav Saxena Vineet Kumar and Maulin P. Shah. Bioremediation for Environmental Sustainability: Toxicity, Mechanisms of Contaminants Degradation, Detoxification and Challenges.

Online Resources-
e-Resources / e-books and e-learning portals

- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources-
e-Resources / e-books and e-learning portals

- https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-022-00401-0
- https://www.internationalscholarsjournals.com/articles/applied-ecology-and-its-economical-applications-88784.html
- https://link.springer.com/book/10.1007/978-981-15-3372-3
- https://www.jstor.org/stable/2405009
- https://en.wikipedia.org/wiki/Bioremediation
- https://www.sciencedirect.com/topics/earth-and-planetary-sciences/bioremediation
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5026719/
- https://www.ysi.com/parameters/turbidity
- https://www.davidzeleny.net/wiki/doku.php/vegsurvey:materials:how to calculate_ivi

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)**

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VII**	**Session: 2025-26**
1	**Course Code**	**BOSE - 05 T**		
2	**Course Title**	**Microbiology, Phycology and Mycology**		
3	**Course Type**	**Discipline Specific Elective (DSE) I**		
4	**Course Learning Outcome (CLO)**	**At the end of this course -** • Student will able to understand the structure and replication of different microbes and know the disease caused by them, disease symptoms and their control. • They will know all about algae including their habitat, range of thallus organization, reproduction and classification. • Student will know all about fungi including morphology, mode of nutrition, reproduction, heterothallism and para sexuality, classification, disease symptoms and their control. • Student will get knowledge of the life cycle of all groups of algae and fungi and their economic importance.		
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	**A. Microbes** • Characteristics, structure and replication of viruses • Structure, nutrition and genetic recombination of Bacteria • General account of Mycoplasma. **B. Phycology -I** • General characters of Algae including diversified habitat, range of vegetative structure and reproduction. • Classification of algae giving emphasis on pigment composition, flagellation, cell wall composition and reserve food material.	10
II	**Phycology -II** General account of - a. Cyanophyceae b. Chlorophyceae (Pandorina, Cladophora, Drapernaldiopsis) c. Charophyceae (Chara) d. Xanthophyceae (Botridium) e. Bacillariophyceae (Pinnularia) f. Phaeophyceae (Fucus) g. Rhodophyceae (Batrachospermum) h. Economic importance with special reference to biofertilizers.	10
III	**Mycology - I** • General characteristics of fungi including its morphology, cellular structure and nutrition. • Reproduction in fungi • Heterothallism and Parasexuality • Ainsworth system of fungal classification. • General symptoms of plant disease.	10
IV	**Mycology -II** Brief life cycle of - a. Myxomycotina (*Dictostelium*) b. Mastigomycotina (*Achlya*) c. Zygomycotina (*Cunnighamella*) d. Ascomycotina (*Penicillium*, *Phyllactinia*) e. Basidiomycotina (Rust- *Uromyces*, Smut - *Ustilago*) f. Deuteromycotina (*Alternaria, Fusarium*) g. Economic importance, Mushroom cultivation.	10
Keywords	Microbes, Algae, Fungi, Heterothallism and Parasexuality	

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6.	Ex Meritorious Student PG	Devika Janghel	
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

1. A Textbook of Microbiology by S. S. Purohit.
2. A Textbook of Microbiology by R. C. Dubey and D. K. Maheshwari.
3. Microbiology, Vol. I and II by C. B. Powar and Daginawala.
4. Algae by B. R. Vashishta.
5. Algae by H. O. Kumar.
6. Algae by Chapman.
7. Structure and Reproduction of AlgaeVol.I and II by F. E. Fritsch.
8. Cryptogamic Botany, Vol I by G. M. Smith.
9. Introduction to Mycology by C. J. Alexopoulos.
10. Mycology by Malothra and Aneja.
11. An Introduction to Fungi by H. C. Dube.

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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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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VII**	**Session: 2025-2026**
1	**Course Code**	**BOSE – 05 P**		
2	**Course Title**	**Lab Course (Microbiology, Phycology and Mycology)**		
3	**Course Type**	**Laboratory Course**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Demonstrate staining techniques and analyze bacterial cell structures, growth patterns, and environmental isolation methods. • Prepare and identify algal specimens through temporary mounts, pigment analysis, and diversity studies. • Identify and analyze structural and reproductive features of fungi using microscopic techniques and slide presentations. • Examine the morphology and vegetative structure of *Chara* and recognize the role of algal biofertilizers like *Anabaena* and *Nostoc*. • Identify plant disease symptoms through field observation and apply knowledge of fungal life cycles and mushroom cultivation practices.		
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**		

	• Bacterial cell structure staining (Gram staining, Endospore staining) • Bacterial growth curve using spectrophotometer or colony count • Isolation and identification of bacteria from soil/water samples • Preparation of temporary mount and identification of algal material. • Preparation of temporary mount and identification of fungal material. • Microscopic observation of algal diversity from pond samples • Demonstration of different types of algal pigments (Paper chromatography) • Study of Chara morphology and nodal-internodal structure • Demonstration of algal biofertilizers: Blue-Green Algae cultures (Anabaena, Nostoc) • Microscopic observation of fungal structures: hyphae, spores (temporary and permanent slides) • Slide presentation of parasexual cycle in fungi (e.g., Aspergillus) • Field collection and identification of symptoms of common plant diseases • Microscopic study of *Penicillium* and *Phyllactinia* (Ascomycotina) • Demonstration of mushroom cultivation methods (spawn, substrate preparation, fruiting) • Monographic study of following genera: (Bryophyta) *Plagiochasma, Fimbrieria, Porella, Fossombronia, Anthoceros, Sphagnum, Funaria, Polytrichum* • Monographic study of following genera (Pteridophyta) *Psilotum, Isoetes, Equisetum, Ophioglossum, Osmunda, Marsilea* • Monographic study of the following members of (Gymnosperms) - *Cycas, Pinus, Araucaria, Thuja, Ginkgo biloba, Ephedra, Gnetum* • Fossil specimen and slides.
Keywords	*Cycas, Pinus, Araucariam, Plagiochasma, Fimbrieria, Porella,* Fossil, *Cycus, Pinus*

Name & Signature of Members of Board of Studies

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1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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

1. A Textbook of Microbiology by S. S. Purohit.
2. A Textbook of Microbiology by R. C. Dubey and D. K. Maheshwari.
3. Microbiology, Vol. I and II by C. B. Powar and Daginawala.
4. Algae by B. R. Vashishta.
5. Algae by H. O. Kumar.
6. Algae by Chapman.
7. Structure and Reproduction of AlgaeVol.I and II by F. E. Fritsch.
8. Cryptogamic Botany, Vol I by G. M. Smith.
9. Introduction to Mycology by C. J. Alexopoulos.
10. Mycology by Malothra and Aneja.
11. An Introduction to Fungi by H. C. Dube.

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)**

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

<table>
<tr><td colspan="5">PART A: INTRODUCTION</td></tr>
<tr><td colspan="2">Program:</td><td colspan="2">Class: B.Sc. Semester - VII</td><td>Session: 2025-26</td></tr>
<tr><td>1</td><td>Course Code</td><td colspan="3">BOSE - 06 T</td></tr>
<tr><td>2</td><td>Course Title</td><td colspan="3">Cell Biology</td></tr>
<tr><td>3</td><td>Course Type</td><td colspan="3">Discipline Specific Elective (DSE) II</td></tr>
<tr><td>4</td><td>Course Learning Outcome (CLO)</td><td colspan="3">At the end of this course, students will be able to
• Understand the structural and functional organization of plant cells, including specialized cell types, the chemical foundation of life, and the principles of biochemical energetics.
• Demonstrate comprehensive knowledge of the structure, function, and biogenesis of major cellular organelles such as the cell wall, plasma membrane, chloroplasts, mitochondria, ribosomes, vacuoles, and the nucleus.
• Analyze the regulation of the cell cycle and programmed cell death, with a focus on key molecular players such as cyclins, CDKs, Retinoblastoma protein, and E2F transcription factors.
• Apply knowledge of the cytoskeleton and cellular motility mechanisms, and utilize modern cell biology techniques such as in situ hybridization, FISH, GISH, and flow cytometry for exploring cellular structure and function.</td></tr>
<tr><td>5</td><td>Credit Value</td><td>4 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>
</table>

I	• The dynamic cells, Structural organization of the plant cell, specialized plant cell type chemical foundation, biochemical energetics. • **Cell wall**: Structure, functions, biogenesis, growth. • **Plasma membrane**: structure, models, functions, Ion carriers, channels and pumps, receptors.	10
II	• **Chloroplast**: Structure, functions, genome organization. • **Mitochondria**: Structure, genome organization, biogenesis. • **Ribosome**: Structure and functions. • **Plant Vacuole**: Structure, Functions.	10
III	• **Nucleus**: Structure, nuclear envelope, nuclear pore complex, nucleolus. • **Cell cycle**: Control mechanisms, role of cyclin and cyclin dependent kinases. • Retinoblastoma and E2F proteins • **Apoptosis**: Programmed cell death, Mechanism.	10
IV	• **Cell shape and motility:** The cytoskeleton; organization, role of microtubules, microfilaments; motor protein; implications in cilia, flagella and chromosome movement. • **Other cellular organelles**: Structure and functions of Lysosome, Peroxysome, Golgi apparatus, Endoplasmic reticulum. • **Techniques in cell biology:** *In Situ* hybridization to locate transcripts in cell types FISH, GISH, Flow cytometry.	10
Keywords	Cell, Cell Wall, Mitochondria, Chloroplast, Ribosome, FISH	

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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

1. Alberts, B. et al. (2002). Molecular Biology of the Cell (4th Edition). Garland Science (Taylor and Francis), New York.
2. Buchanan, B.B., Gruissem, W., & Jones, R.L. (2000). Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
3. Cooper, G.M. & Hausman, R.E. (2007). The Cell: A Molecular Approach (4th Edition). Sinauer Associates, Inc., Sunderland, USA.
4. De Robertis, E.D.P. & De Robertis, E.M.F. (2005). Cell and Molecular Biology (8th Edition, Indian Edition). Lippincott Williams & Wilkins, Philadelphia. [B.I. Publications Pvt. Ltd., New Delhi].
5. Karp, G. (1999). Cell and Molecular Biology: Concepts and Experiments. John Wiley & Sons, Inc., USA.
6. Gupta, P.K. Cell and Molecular Biology. Rastogi Publications.
7. Krishnamurthy, K.V. (2000). Methods in Cell Wall Cytochemistry. CRC Press, Boca Raton, Florida, USA.
8. Lewin, B. (2000). Genes VII. Oxford University Press, New York, USA.
9. Lodish, H. et al. (2004). Molecular Cell Biology (5th Edition). W.H. Freeman and Company, New York.
10. Powar, C.B. (2005). Cell Biology (3rd Edition). Himalaya Publishing House, Mumbai.

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 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	04 x 4 = 16 Marks
	Question - C: Short answer type question	06 x 4 = 24 Marks
	Question - D: Long answer type question	10 x 4 = 40 Marks
	Total	**= 80 Marks**

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VII**	**Session: 2025-26**
1	**Course Code**	**BOSE - 07 T**		
2	**Course Title**	**Biology and Diversity of Bryophyta, Pteridophyta, and Gymnosperm**		
3	**Course Type**	**Discipline Specific Elective (DSE) III**		
4	**Course Learning Outcome (CLO)**	**At the end of this course -** • Student will able to understand the evolutionary trends of Bryophyta, Pteridophyta and Gymnosperms. • They will get knowledge about habitats, structure and life cycle of the different members of the plant groups of Bryophyta, Pteridophyta and Gymnosperms. • They will get knowledge about economic importance of Bryophyta, Pteridophyta and Gymnosperms & also they will know about Azolla as a biofertilizer. • They will able to understand about geological time scale and fossil plants.		
5	**Credit Value**	**4 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	**Topics (Course Contents)**	**No. of Periods**

I	• General characters, classification, distribution and, Ecological significance of Bryophytes. Fossil bryophytes. • General account including morphology, anatomy, reproduction and interrelationship of the following groups. - Marchantiales – *Plagiochasma* - Jungermanniales –*Porella* - Anthocerotales{eg. *Anthoceros}* - Sphagnals {eg. *Sphagnum}* - Polytricales {eg. *Polytrichum}*	10
II	• General characteristics, classification, and distribution of Pteridophyta • Evolution of stele, heterospory and seed habit. • General account of following fossil Pteridophytes. - *Asteroxylon, Lepidodendron, Calamophyton.* • Morphology, anatomy, and reproduction of the following groups: - Psilopsida {living Member} - *Psilotum.* - Lycopsida – *Isoetes.* - Pteropsida- *Ophioglossum, Osmunda*	10
III	• General Characteristics, Diversity, Classification, Evolution & Economic importance of Gymnosperms. • General account of Cycadeoidales (Cycadeoidea, Williamsonia), Cordiatales (Cordiates). • Brief account of following - Pteridospermales – Lyginopteridaceae (*Lyginopteris*). - Medullosaceae – *(Medullosa)*. - Caytonaceae – *(Caytonia)*. - Pentoxylales - *(Pentoxylon)*.	10
IV	• Structure and Reproduction of the following– - *Cycadales (Zamia,).* - *Coniferales (Araucaria, Cedrus).* - *Ephedrales (Ephedra)* - *Welwischiales (Welwischia)* - *Gnetales (Gnetum, Ginkgo bioloba).*	10
Keywords	Bryophyta, Pteridophyta, and Gymnosperm	

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6.	Ex Meritorious Student PG	Devika Janghel	
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

1. Sporne, K.R. An introduction to Gymnosperms
2. Coutler and chamberian
3. Bhatnagar, S.P. Gymnosperms
4. Vashishta, P.C. Gymnosperms
5. Stewart, W.N. and Rathwell, G.W.1993, Paleobotany and Evolution on plants. Cambridge university press.
6. Cavers, Interrelationship of Bryophyta.
7. Udar, R. Bryophyta.
8. Prempuri, Bryophyta
9. Parihar , N.S An introduction of Embryophyta, Vol.I Bryophyta.
10. Parihar , N.S An introduction of Embryophyta, Vol.II Bryophyta.
11. Rashid A. An Introduction of pteridophyta.
12. Vashishta, P.C. Pteridophyta.
13. Smith, G.M. Cryptogamic Botany.
14. Eames. J. Morphology of Vascular plants- Lower Groups.

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 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	04 x 4 = 16 Marks
	Question - C: Short answer type question	06 x 4 = 24 Marks
	Question - D: Long answer type question	10 x 4 = 40 Marks
	Total	**= 80 Marks**

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VII**	**Session: 2025-26**
1	**Course Code**	**BOSE - 08 T**		
2	**Course Title**	**Plant Physiology**		
3	**Course Type**	**Discipline Specific Elective (DSE) IV**		
4	**Course Learning Outcome (CLO)**	**At the end of this course, students will be able to** • Understand thermodynamic principles, redox reactions, and the biochemical basis of energy flow in plants, including ATP structure and function. • Analyze protein structure and enzymology, including enzyme kinetics, mechanisms, regulation, and biotechnological applications. • Explain mechanisms of water and solute transport, membrane dynamics, plant water relations, and root-microbe interactions. • Evaluate plant signaling pathways, hormone actions, and stress responses at molecular and physiological levels.		
5	**Credit Value**	**4 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	**Topics (Course Contents)**	**No. of Periods**

I	• **Energy flow:** Principles and Application of thermodynamics, free energy & chemical potential, Redox reactions, structure & function of ATP, • Hierarchical structure of proteins: folding, degradation, purification, detection and functional characterization; sequence alignments. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds). • **Fundamentals of Enzymology:** General aspects, Nature of enzymes, mode of enzyme action, classification, enzyme kinetics, Michaelis Menten Equation & ribozymes, abzymes, artificial enzymes, enzyme technology its Significance, Enzyme inhibition, allosteric mechanism, regulatory & active sites, isozymes, factors affecting enzyme activity.	10
II	• **Membrane Transport & Translocation of water & solutes:** • Plant water relations – properties of water, diffusion, osmosis, permeability, plasmolysis, imbibitions, DPD. • Mechanism of water transport through xylem – absorption of water, ascent of sap, transpiration and mineral nutrition. • Root microbe interaction (mycorrhiza) in facilitating nutrient uptake, • Comparison of Xylem & Phloem transport. Phloem loading & unloading (translocation) - active & passive solute transport.	10
III	• **Signal Transduction:** Overview, second messengers, receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, calcium-calmodulin cascade, diversity in protein kinases and phosphatases, specific signaling mechanisms and their regulation, e.g. simple and hybrid type of two-component sensor-regulator system in bacteria and plants (examples of chemotaxis, osmosensing, ethylene and cytokinin signaling),quorum sensing.	10
IV	• **Plant Growth Regulators & Elicitors:** • Physiological effects & mechanism of action of auxin, gibberllins, cytokinins, ethylene, abscisic acid, brassinosteroids, polyamines, jasmonic acid & salicylic acid, hormone receptors. • **Stress Physiology:** plant responses to biotic & abiotic stress, mechanism of biotic & abiotic tolerance, HR & SAR, water deficit & drought resistance, salinity stress, metal toxicity, cold & heat stress, oxidative stress.	10
Keywords	Energy, Enzyme, Membrane, Transport, Signal, Growth, Stress	

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PART C - LEARNING RESOURCES	
Text Books, Reference Books, Other Resources	
1. Plant Physiology and Development – *Lincoln Taiz, Eduardo Zeiger, Ian Max Møller, Angus Murphy* 2. Biochemistry and Molecular Biology of Plants – *Bob Buchanan, Wilhelm Gruissem, Russell Jones* 3. Plant Biochemistry – *Hans-Walter Heldt, Birgit Piechulla* 4. Introduction to Plant Physiology – *William G. Hopkins, Norman P.A. Hüner* 5. Plant Stress Physiology – *Sergey Shabala* 6. Lehninger Principles of Biochemistry – *David L. Nelson, Michael M. Cox* 7. Molecular Biology of the Cell – *Bruce Alberts et al.* 8. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry – *Trevor Palmer* 9. Cell Physiology – *Giese* 10. Plant Physiology – *Bidwell* 11. Plant Physiology – *Subhash Chandra Dutta* 12. Plant Physiology – *Noggle and Fritz* 13. Plant Physiology – *Devlin*	
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 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 04 x 4 = 16 Marks Question - C: Short answer type question 06 x 4 = 24 Marks Question - D: Long answer type question 10 x 4 = 40 Marks **Total = 80 Marks**

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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-26**
1	**Course Code**	**BOSC - 08 T**		
2	**Course Title**	**Molecular Plant Pathology**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand the Historical Development and Basic Principles of Plant Pathology • Identify and Diagnose Plant Diseases Based on Symptoms and Sources. • Apply Laboratory and Analytical Techniques for Plant Disease Study. • Analyze Plant Defense Mechanisms at the Molecular Level. • Design Integrated Plant Disease Management Strategies		
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	**History and Principles of Plant Pathology:** Milestones in phytopathology with particular reference to India. Classification of plant diseases. Koch's postulates. General Symptoms of plant diseases: Pathogenic and non-pathogenic; Symptoms caused by fungi, Bacteria, Viruses, Mycoplasma and Nematodes. Sources of Infection: Seeds, soil, water and airborne diseases of plants;	10
II	**Laboratory and Analytical Techniques:** Preparation and sterilization of common media. Methods of isolation of pathogens and their identification. Preservation of microorganisms in pure culture. Methods of inoculation. Molecular detection of pathogens in seeds and other planting materials: Southern, Northern and Western hybridization, immunosorbent electron microscopy (ISEM), ELISA, and PCR. Laboratory equipment and their use: autoclave, hot air oven, laminar flow, incubator, ELISA Reader.	10

III	**Plant Defense Mechanisms at Molecular Level:** Altered metabolism of plants under biotic and abiotic stresses. Molecular mechanisms of pathogenesis: recognition phenomenon, penetration, invasion, primary disease determinant. Enzymes and toxins in relation to plant disease. Mechanisms of resistance. Phytoalexins. PR proteins. Antiviral proteins. SAR. HR.	10
IV	**Management of Plant diseases:** General principles of plant quarantine. Exotic pathogens and pathogens introduced into India. Management of pathogens through satellite. Production of disease-free seeds and planting materials. Seed certification. Important cultural practices and their role in disease management, solarization, integrated disease management.	10
Keywords	Pathology, Sterilization, ELISA, PCR	

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended:

1. A text book of Modern Plant Pathology – K.S. Bilgrami and H. S.Dubey
2. An introduction to Principles of Plant pathology - R.S.Singh
3. Plant Pathology- R.S. Malhotra

Reference Books:

1. Agrios, G.N. (2005). Plant Pathology. Academic Press.
2. Dickinson, M. (2003). Molecular Plant Pathology. BIOS Scientific Publishers.
3. Strange, R.N. (2003). Introduction to Plant Pathology. Wiley-Blackwell.
4. Walbot, V. (2009). Molecular Biology of Plants. Cold Spring Harbor Laboratory Press.
5. Collinge, D.B. (2001). Plant Pathogen Interactions. Blackwell Publishing.

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	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
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Shriram Kunjam	
		Dr. Satish Kumar Sen	
		Dr. Vijay Laxmi Naidu	
		Motiram Sahu	
		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	Devika Janghel	
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 (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.**	**Semester - VIII**	**Session: 2025-26**
1	**Course Code**	**BOSC - 08 P**		
2	**Course Title**	**Lab Course - 08 (Molecular Plant Pathology)**		
3	**Course Type**	**Laboratory Course**		
4	**Course Learning Outcome (CLO)**	After the completion of the course the students will be able to: • Prepareand sterilize of common culture media: Potato Dextrose Agar (PDA), Nutrient Agar. • Preserve of pure cultures: Slant culture, glycerol stock method, oil overlay method. • Work and demonstrate of laboratory instruments, Autoclave, hot air oven, laminar flow cabinet, Incubator, ELISA Reader, Light and Electron Microscopy. • Collect and herbarium prepare of diseased specimens		
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 and sterilization of common culture media: Potato Dextrose Agar (PDA), Nutrient Agar
2	Sterilization techniques: Operation and use of autoclave and hot air oven.
3	Isolation and Identification of fungal and bacterial pathogens from infected plant parts.
4	Preservation of pure cultures: Slant culture, glycerol stock method, and oil overlay method.
5	Measurement of disease incidence and severity: Using quadrat method and disease rating scales.
6	Study and documentation of disease symptoms: Fungal (e.g., rusts, smuts, mildews), Bacterial (e.g., wilts, soft rot, leaf spot), Viral (e.g., mosaic, leaf curl, chlorosis), Mycoplasma-like organisms (e.g., phyllody, little leaf), Nematode-caused symptoms (e.g., root knots, galls)
7	DNA extraction from infected plant tissues or pathogens.
8	Working and demonstration of laboratory instruments, Autoclave, hot air oven, laminar flow cabinet, Incubator, ELISA Reader, Light and Electron Microscopy.

9	Collection and herbarium preparation of diseased specimens
Keywords	Nutrient, Agar, PDA, Preservation, Chlorosis, Phyllody

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended:

4. A text book of Modern Plant Pathology – K.S. Bilgrami and H. S.Dubey
5. An introduction to Principles of Plant pathology - R.S.Singh
6. Plant Pathology- R.S. Malhotra

Reference Books:

6. Agrios, G.N. (2005). Plant Pathology. Academic Press.
7. Dickinson, M. (2003). Molecular Plant Pathology. BIOS Scientific Publishers.
8. Strange, R.N. (2003). Introduction to Plant Pathology. Wiley-Blackwell.
9. Walbot, V. (2009). Molecular Biology of Plants. Cold Spring Harbor Laboratory Press.
10. Collinge, D.B. (2001). Plant Pathogen Interactions. Blackwell Publishing.

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

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1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Shriram Kunjam	
		Dr. Satish Kumar Sen	
		Dr. Vijay Laxmi Naidu	
		Motiram Sahu	
		Dr. Rajeshwari Prabha Lahare	
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5.	Corporate/ Industrial area Representative	Shri Manish Jain (Apollo College, Durg C.G.)	
6.	Ex Meritorious Student PG	Devika Janghel	
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.)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-26**
1	**Course Code**	**BOSE - 09 T**		
2	**Course Title**	**Taxonomy of Angiosperms**		
3	**Course Type**	**Discipline Specific Elective (DSE) - I**		
4	**Course Learning Outcome (CLO)**	**At the end of this course -** 1. Apply taxonomic tools, such as herbarium and floras, to identify and classify plant species. 2. Understand and explain species concepts, taxonomic hierarchy, and the principles used in assessing plant relationships. 3. Demonstrate knowledge of the international code of botanical nomenclature and apply it in plant classification and nomenclature. 4. Analyze the diversity of flowering plants across various families and understand the significance of different classification systems in angiosperms.		
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	• **Taxonomy Tools**- Herbarium, Floras. • **The species Concepts**- Taxonomic, hierarchy, species, Genus, family and other categories. Principles used in assessing relationship. • Delimitation of taxa and attribution of rank. Salient features of international code of Botanical nomenclature.	10

II	• **System of Angiosperm classification**: - Phenetic versus Phylogenetic Systems, cladistics in Taxonomy. • Salient Features of the systems Proposed by Bantham and Hooker, Hutchinson, Takhtajan and Cronquist. • **Taxonomic evidence** - Morphology, Anatomy, Palynology, Embryology-Cytology and Phytochemistry.	10
III	• **Diversity of flowering plants**: General account of following families - - Dicotyledons – Polypetalae. ▪ Ranales – Ranunculaceae, Magnoliaceae, Annonaceae, Nymphaeaceae. ▪ Geraniales – Rutaceae, Meliaceae. ▪ Myrtales – Myrtaceae, Lythraceae.	10
IV	• **Diversity of flowering plants**: General account of following families - - Dicotyledons – Gamopetalae – ▪ Asterales – Compositae, ▪ Lamiales –Lamiaceae, Verbenaceae. - Monochlamydeae – Polygonaceae, Euphorbiaceae. - Monocotyledons – Musaceae, Liliaceae, Palmaceae, Cyperaceae.	10
Keywords	Chromatin, Chromosome, Gene, Recombination, Transposones	

Name & Signature of Members of Board of Studies

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1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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	Devika Janghel	
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

1. Mathur, R.C. Systematic Botany of Angiosperms.
2. Rajkumar. Systematic Botany.
3. Tyagi, Y.D. and Kchetrapal. An Introduction to the Taxonomy of Angiosperms.
4. Sumbhamusthi, V.S.S. Taxonomy of Angiosperms.
5. Singh, Pandey, and Jain. A Textbook of Botany - Angiosperms.
6. Chopra, G.L. Angiosperms.

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

Lab Course

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-2026**
1	**Course Code**	**BOSE – 09 P**		
2	**Course Title**	**Lab Course (Taxonomy of Angiosperms)**		
3	**Course Type**	**Laboratory Course**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Identify and classify angiosperms into Polypetalae, Gamopetalae, Monochlamydae, and Monocots based on floral characteristics. • Dissect and analyze floral structures to construct floral formulae and diagrams for representative plant families. • Differentiate between fused and free petal conditions and their significance in plant classification. • Compare structural features of dicot and monocot flowers through practical examination. • Apply taxonomic knowledge to identify plants using morphological and reproductive characters.		
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**		

	• Dissection and Floral Diagram Preparation of representative species (e.g., *Delphinium*, *Azadirachta indica*, *Nymphaea*) • Floral Formula Construction • Study of Inflorescence, Flower, Fruit, and Seed Morphology • Identification using floral characters and comparison among families • Dissection and floral structure study of *Oscimum*, *Vitex*, *Duranta*, etc. • Floral Formula and Diagram of Asteraceae and Lamiaceae members • Observation of unique characters like bilabiate corolla, syngenesious stamens, etc. • Study of flower structure in *Polygonum*, *Croton*, etc. • Note presence or absence of calyx/corolla and analyze perianth type • Preparation of floral diagrams and floral formulae • Study of floral and vegetative features of *Musa*, *Allium*, and *Cyperus* • Dissection and analysis of trimerous flowers (typical of monocots) • Identification of family-specific characteristics (e.g., inferior ovary in *Musa*, umbellate inflorescence in *Allium*) • Comparative analysis between monocot and dicot floral structure
Keywords	*Cycas, Pinus, Araucariam, Plagiochasma, Fimbrieria, Porella,* Fossil

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
1. Mathur, R.C. Systematic Botany of Angiosperms. 2. Rajkumar. Systematic Botany. 3. Tyagi, Y.D. and Kchetrapal. An Introduction to the Taxonomy of Angiosperms. 4. Sumbhamusthi, V.S.S. Taxonomy of Angiosperms. 5. Singh, Pandey, and Jain. A Textbook of Botany - Angiosperms. 6. Chopra, G.L. Angiosperms.
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)**

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-26**
1	**Course Code**	**BOSE - 10 T**		
2	**Course Title**	**Genetics and Genomics**		
3	**Course Type**	**Discipline Specific Elective (DSE) – II**		
4	**Course Learning Outcome (CLO)**	**At the end of this course -** • Analyzing the structure of chromosomes and how the packaging of DNA occurs. Students can differentiate Euchromatin and Heterochromatin region of chromosome on the basis of staining properties. • Students can draw a good karyotype and Idiograms of Karyotype, and also how the evolution of Karyotype takes place. • Categorizing the role and process of mutation and different mutagenic agent which brings about mutation in the organism. • Students will also understand the role of mutation in crops improvement and permutation. • Understanding of the history of gene from 'something', 'factor'; and gene and one gene one enzyme one character hypothesis. • Students will also know the interaction of gene, genetic recombination producing the characters differently.		
5	**Credit Value**	**4 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	**Topics (Course Contents)**	**No. of Periods**

I	• **Chromatin Organization:** Chromosome structure and packaging of DNA, molecular organization of centromere and telomere, chromatin and heterochromatin, banding pattern, Karyotype. Ribosomal RNA genes. • **Special types of chromosomes**: Polytene, lamp brush, B chromosomes and sex chromosomes & Sex determination in plants. • **Cytoplasmic inheritance:** Mitochondrial DNA & Cytoplasmic male sterility in plants.	10
II	• **Structural alterations in chromosomes**: origin, meiosis and breeding behaviour of duplication, deficiency, inversion and translocation heterozygotes; • **Numerical alterations in chromosomes**: Aneuploids - monosomic, nullisomic, trisomic and tetrasomic; Euploids - haploids and polyploids; origin & production of autopolyploids, allopolyploids. • **Genetics of prokaryotes and eukaryotic organelles:** Phage phenotype, genetic recombination in virus & bacteria (transformation, conjugation and transduction in bacteria).	10
III	• **Genetic recombination-** Mechanism of crossing over, molecular mechanism of genetic recombination. • Role of Rec-A, Rec-B, Rec- C and Rec-D enzymes. • Homologus & Site specific recombination, • Linkage - theories, types mechanism & linkage group. • **Genomic:** Definition and scope, importance of genomic, Genome size and complexity	10
IV	• **Chromosome inheritance**: Chromosome theories, mendelian laws, gene interaction. • **Transposones:** transposable elements in prokaryotes and eukaryotes. • **DNA damages & Repair**: mechanisms, inherited human diseases and defects in DNA repair.	10
Keywords	Chromatin, Chromosome, Gene, Recombination, Transposones	

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3.	Subject specialist	1. Prof. P.C. Panda Retd. Professor Borsi Durg C.G.)	
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6.	Ex Meritorious Student PG	Devika Janghel	
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

1. Ahluwalia K.B 2005 (First Edition). Genetics. New Age International Private Ltd. Publishers, New Delhi.
2. Gardner and Simmons Snustad 2005 (Eighth Edition). Principles of Genetics, John Wiley and Sons, Singapore.
3. Gupta P.K Genetics, Rastogi Publications.
4. Karp, G. 1999. Cell and Molecular Biology: Concept and Experiments. John Wiley and Sons, Inc., USA.
5. Lewin, B. 2000. Gene VII. Oxford University Press, New York, USA.
6. Lewis, R. 1997. Human Genetics: Concepts and Application (Second Edition). WCB McGraw Hill, USA.
7. Pawar C.B 2003 (First Edition). Genetics Vol. I and II. Himalaya Publishing House, Mumbai.
8. Russel, P.J. 1998. Genetics (Fifth Edition). The Benjamin/Cummings Publishing Company IND., USA.
9. Sariu C 2004 (Sixth Edition) Genetics. TATA McGraw-Hill Publishing Company Ltd., New Delhi.
10. Snustad, D.P and Simmons, M.J 2000. Principles of Genetics (Second Edition). John Wiley and Sons Inc., USA.
11. Strickberger 2005. (Third Edition). Genetics. Prentice Hall of India Pvt. Ltd., New Delhi.
12. Verma and Agarwal, Genetics, S. Chand Co, New Delhi.. 20. Singh B.D 2004. Genetics. Kalyani Publication, Ludhiana.
13. Introduction to genomics by Arthur M. Lesk

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 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	04 x 4 = 16 Marks
	Question - C: Short answer type question	06 x 4 = 24 Marks
	Question - D: Long answer type question	10x 4 = 40 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

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1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-26**
1	**Course Code**	**BOSE - 11 T**		
2	**Course Title**	**Molecular Biology and Cytogenetics**		
3	**Course Type**	**Discipline Specific Elective (DSE) - III**		
4	**Course Learning Outcome (CLO)**	At the end of this course, students will be able to • Understand the structure and function of DNA, RNA (including tRNA), and the mechanisms of replication, transcription, RNA splicing, and translation in prokaryotes and eukaryotes. • Explain protein targeting and sorting mechanisms, types and causes of mutations, and chromosome-level changes including Robertsonian and B-A translocations. • Analyze gene structure and expression, perform genetic fine structure analysis, and understand regulatory mechanisms of gene expression in both prokaryotes and eukaryotes. • Apply knowledge of molecular genetics mapping techniques such as RFLP, RAPD, AFLP, and VNTRs for identifying genetic markers. • Interpret molecular cytogenetic concepts like the C-value paradox, Cot curves, and restriction mapping; understand alien gene transfer, chromosome manipulation, and the concepts of inbreeding and heterosis.		
5	**Credit Value**	**4 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		**Topics (Course Contents)**		**No. of Periods**

I	• **DNA**: structure - A, B and Z forms, replication, RNA editing, RNA Splicing • **tRNA**: Structure and function. • **Protein Synthesis:** mechanism of protein synthesis, transcription in prokaryotes & eukaryotes, translation.	10
II	• **Proteins Sorting**: targeting of proteins to organelles. • **Mutations**: • spontaneous and induced mutations, physical and chemical mutagens, • Molecular basis of gene mutations. • Site directed mutagenesis. • Robertsonian translocation, B-A translocation.	10
III	• **Gene structure and expression**: fine structure of gene, Cis-trans test, fine structure analysis of eukaryotes, introns and their significance. • Regulation of gene expression in prokaryotes (operon circuit) and eukaryotes (Britten-Davidson model). • **Molecular Genetic mapping**: Genetic markers: RFLP, RAPD, AFLP, VNTRs.	10
IV	• **Molecular Cytogenetics**: - Nuclear DNA content; - C - value paradox, cot curve and its significations, - Restrictions mapping, concept and techniques • **Alien genes transfer through chromosomes manipulations**: transfer of whole genomes from Wheat, Brassica, Arachis; transfer of individual chromosomes and chromosomes segments; Inbreeding and heterosis.	10
Keywords	Gene, DNA, RNA, Chromosome, Protein, Mutation,	

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		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	Devika Janghel	
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

1. Albert Etal 2002 (Fourth Edition). Molecular Biology of the cell, Garland Science (Iaylar and Francis) New York Group (wt)
2. Buchanan B.B, Gruissm W. and Jones R.L 2000. Biochemistry and Molecular Biology of Plant. American Society of Plant Physiologist, Maryland, USA.
3. Cooper G.M and Hausman R.E 2007 (Fourth Edition). The Cell molecular approach Sinauer associate, Inc, Suderland (USA).
4. De Robertis and De Robertis 2005 (Eight edition) (Indian) Cell and Molecular Biology, Lippincott Williams, Philadelphia. [B.I Publications Pvt. Ltd. New Delhi].
5. Gerald Karp 1999 Cell and Molecular Biology- Concept and Expts. John Wiley and ScneIne., USA.
6. Gupta P.K Cell and Molecular biology Rastogi Publications.
7. Gupta P.K, Cytogenetics Rastogi Publications.
8. Krishnamurthy, K.V 2000. Methods in Cell Wall Cytochemistry. CRC Press, Boca Raton, Florida.
9. Lewin, B. 2000. Gene VII. Oxford University Press, New York, USA.
10. LodishEtal 2004 (Fifth Edition). Molecular Cell Biology, W H Freeman and company, New York.
11. Powar C.B 2005 (Third Edition). Cell Biology, Himalaya Publishing, Mumbai.

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 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	04 x 4 = 16 Marks
	Question - C: Short answer type question	06 x 4 = 24 Marks
	Question - D: Long answer type question	10x 4 = 40 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	**Chairperson**	**Dr. G. S. Thakur**	
2.	Members	Dr. Vijay Laxmi Naidu	
		Dr. Satish Kumar Sen	
		Dr. Shriram Kunjam	
		Mr. Motiram Sahu	
		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 (CG)

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF BOTANY

COURSE CURRICULUM 2025-26

PART A: INTRODUCTION				
Program:		**Class: B.Sc.** **Semester - VIII**		**Session: 2025-26**
1	**Course Code**	**BOSE - 12 T**		
2	**Course Title**	**Plant Metabolism**		
3	**Course Type**	**Discipline Specific Elective (DSE) - IV**		
4	**Course Learning Outcome (CLO)**	At the end of this course, students will be able to • Understand the principles of photochemistry and the mechanisms of photosynthesis including pigment systems, electron transport, and carbon assimilation pathways. • Explain plant respiration and lipid metabolism including key pathways like glycolysis, TCA cycle, and fatty acid biosynthesis. • Describe nitrogen and sulphur metabolism, including biological nitrogen fixation, nitrate reduction, and secondary metabolite biosynthesis. • Analyze the structure and function of plant photoreceptors and their roles in light-induced physiological responses. • Interpret the genetic, hormonal, and environmental regulation of flowering and circadian rhythms in plants.		
5	**Credit Value**	**4 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	**Topics (Course Contents)**	**No. of Periods**

I	• **Photochemistry & photosynthesis:** o General concepts & historical background. o Evolution of photosynthetic apparatus, photosynthetic pigments & light harvesting complexes. o Photooxidation of water, mechanism of electron & proton transport (Hill reaction). o Carbon assimilation- the Calvin cycle, C4 cycle, CAM pathway. o Photorespiration & its significance. o Biosynthesis of Starch & Sucrose.	10
II	• **Respiration & Lipid Metabolism:** o Overview of Plant respiration, Glycolysis, TCA cycle, electron transport & ATP synthesis, Pentose Phosphate pathway, o Glyoxalate pathway, o Alternative Oxidase system, o Structure & function of lipids fatty acid biosynthesis, synthesis of membrane lipids, structure lipids & storage lipids & their catabolism.	10
III	• **Nitrogen & Sulphur Metabolisms:-** o Biological Nitrogen fixation. Nodule formation & Nod factors. o Mechanism of Nitrate uptake & reduction, ammonium assimilation. Nitrate and ammonium assimilation; amino acid biosynthesis. Sulphur uptake, transport & assimilation. o Secondary metabolites - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.	10
IV	• **Sensory Photo-Biology :-** o Sensory photobiology - Structure, function and mechanisms of action of Phytochromes, Cryptochromes and Phototropins. Photophysiology of light induced responses. o The flowering process: Photoperiodism & its significance, vernalization - floral induction & development genetic & molecular analysis. Flowering as a multi-organ function, floral induction, evocation and development. Regulation of flowering by light and temperature. Role of circadian rhythm. Involvement of hormones. Genetic, molecular and biotechnological aspects, manipulation of flowering and floriculture. o Endogenous clock & its regulation.	10
Keywords	Photochemistry, Photosynthesis, Respiration, Metabolism, Photoperiodism,	

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PART C - LEARNING RESOURCES	
Text Books, Reference Books, Other Resources	
1. Cell Physiology by Giese. 2. Plant Physiology by Bidwell. 3. Plant Physiology by Subhash Chandra Dutta. 4. Plant Physiology by Noggle and Frutz. 5. Plant Physiology by Devlin. 6. Plant Physiology by Taiz and Zeiger. 7. Photosynthesis by Robinowitch and Govindjee.	
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 and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D)from each Unit** **Pattern -FOUR Questions (A, B, C, D)from each Unit** Question - A & B: (Compulsory) Very short answer type 04 x 4 = 16 Marks Question - C: Short answer type question 06 x 4 = 24 Marks Question - D: Long answer type question 10x 4 = 40 Marks **Total = 80 Marks**

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