


## Course Outcome (Economics)

This course will enhance the professional skills of all the students in banking, business management and administration domain. After completion of this course a student will be able to understand :-

- Basic concepts of micro and macro economics such as laws of demand and supply consumer behaviour national income accounting trade cycle etc.
- The behavioural patterns of different economic agents regarding profit price, cost etc.
- The advance theoretical issues and their practical applications of distribution theories.
- The basic concept of monetary analysis and financial marketing in Indian financial markets.
- The issues relating to sustainable development, environment protection and pollution control measures.
- Basic concepts of statistics such as measures of central tendency, dispersion etc.
- Objectives, role and limitation of fiscal policies in developing and developed countries and fiscal reforms in india.

  
PR:  
Govt. Danveer Tuition Centre  
Utai, Distt.- Durg (C.G.)

**Department of English**

Govt. Danveer Tularam Post Graduate College, Utai, Durg (C.G.)

**2.6.1. Programme Outcome, Programme Specific Outcome,**

**Course Outcome .**

**English language B.A., B.Com., B.Sc. Part-I**

**Book : English Language and Indian Culture**

**Programme Outcome:** - Students become well versed with the cultural and historical heritage of India and will become conscious of the environmental surroundings; students will gain awareness about the best literary traditions of the world.

**Programme Specific Outcome:** - To equip students with knowledge of English as a world language. To empower them to speculate and write accurately in a variety of contexts and genres. To develop an understanding of the relations between culture and history of Nation. This will help students to know India's age old literary and cultural tradition.

**Course Outcome:** - Students will get acquainted with the vast cultural heritage of India, history of India and the environmental issues. The vigour of the content it is hoped will instill a sense of

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)

pride and patriotism in the students, and also enable English language proficiency in them and gaining of critical insight and exposure to various social and cultural traditions of our country.

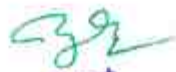
### **English Language: - B.A., B.Com.,B.Sc. Part-II**

#### **Book : Foundation Course**

**Programme Outcome:** - To disseminate scientific information in an interesting way to the students and to acquaint them with the great history of Indian scientific temper. It also provides the opportunity to analyse literature in a syntactic manner.

**Programme Specific Outcome:** - The program aims to be able to create a discrete mind which can weigh methodically and scientifically the boons and curses of science and technology. It also aims to equip students with knowledge of English as a world language. To empower them to speak and write accurately in a variety of contexts and genres.

**Course Outcome:** - To create inquisitive thinking, a questioning mind that is able to make healthy use of science. To equip

  
प्राचार्य  
शासकीय दानवीर तुलाचम स्नातकोत्तर महाविद्यालय  
उनाई जिला - दुर्ग (छ.ग.)

students in displaying scientific attitude in their day -to- day life. It further helps to prepare for various competitive exams. It also expands the range of experience in the literary field.

### English language B.A., B.Com., B.Sc. Part-III

Book : **English Language and Aspects of Development**

**Programme Outcome**: - To make students conversant with social, economic and political surrounding of modern India.

**Programme Specific Outcome**:- To equip students with knowledge of English as a world language. To empower them to speak and write accurately in a variety of contexts and genres.

**Course Outcome**: - The holistic approach of syllabus enables the students to get acquainted with Indian and overseas societal conditions and multi-layered developmental aspects of India. Grammar and vocabulary exercises equip them to participate in competitive exams.

### B.A. I English Literature

  
प्राचार्य

रासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दुर्ग (छ.प्र.)



The Programme consists of two papers and each paper has six units.

**Programme Outcome of Paper I: -**

Programme comprises **Literature in English 1550 to 1750.**

**Programme Specific Outcome:** - To acquaint students with representative writers and their works that have great pedagogical potential.

**Course Outcome:** - The students get acquainted with The Age of Renaissance, Metaphysical, Classical and Neo-classical, the four Genres of literature poetry, prose, drama and fiction, the literary and historical events of the periods prescribed.

**B.A. I English Literature Paper-II**

Programme comprises **Literature in English 1750 to 1900.**

**Programme Specific Outcome:** - To acquaint students with representative writers and their works that have great pedagogical potential.

  
प्राचार्य

भासकीय कान्हीर तुलायम स्नातकोत्तर महाविद्यालय  
उत्तरी जिला - दुर्ग (छ.ग.)

**Course Outcome:** - The students get acquainted with the Pre Romantic, Romantic and the Victorian age; the Nature and Supernatural poetry of Romantic age; the major difference in literary tendency of the Romantic and Victorian age; the society of England and the emergence took place in England and its reflection on English Literature.

### **B.A. II. English Literature Paper I**

The programme is divided into two papers.

**Programme Outcome of Paper I:** - Programme comprises Modern English Literature.

**Programme Specific Outcome:** - To acquaint students with World War and Post World War society through the representative writers and their works.

**Course Outcome:** - The student gets acquainted with the different genres of literature i.e. poetry, prose, drama, fiction and short stories, the figures of speech and techniques of drama writings; Post World War I insecurities and trauma of modern life.

### **B.A. II English Literature Paper II**

38  
प्राचार्य  
भास्कीय बानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उदई जिला - दुर्ग (छ.ग.)

**Programme Outcome of Paper II:** - Programme comprises Modern English literature.

**Programme Specific Outcome:** - To acquaint students with World War and Post World War society through the representative writers and their works.

**Course Outcome:**- The student gets acquainted with the different Genres of literature i.e. Prose, Poetry, Drama, Fiction and Short Stories, the figures of speech and techniques of drama writings; Post World War I insecurities and trauma of modern life.

### **B.A. III English Literature, Paper I**

The programme is divided into two papers. Paper I is compulsory. Paper II consists of two optional papers: Optional A & Optional B.

**Programme Outcome of Paper I:** - The Programme comprises Indian Writing in English and has six units.

**Programme Specific Outcome:** - To familiarise students with Indian writers writings in English and their representative works.

**Course Outcome:** - The students get acquainted with the great literary writers of the Pre and Post Independent India; the different



प्राचार्य

राजस्थानीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - बुर्ग (छ.ग.)

forms of poetry writing; the romantic writers of 20<sup>th</sup> Century Indian Writings in English; the expatriate view of Indian writers.

### **B.A. III English Literature, Paper II**

**Programme Outcome:** - The Programme comprises of American Literature (Optional A) and 20<sup>th</sup> Century Literature in English (Optional B). Both the papers are divided into six units.

**Programme Specific Outcome (Optional A):** - To familiarise students with American Writers and their representative works.

**Programme Specific Outcome (Optional B):** - To familiarise students with literary trends of 20<sup>th</sup> Century literature in English.

**Course Outcome (Optional A):** - The student gets acquainted with the great literary writers of America; the different literary theories and the four Genres of literary writing.

**Course Outcome (Option B):** - The student gets acquainted with the life, history and major works of 20<sup>th</sup> Century English writers; the major political events in the 20<sup>th</sup> Century and their impact on society and converses on literary Writings; the new literary theories that emerge as consequences of the change in the society.

  
प्राचार्य

राजकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तम जिला - दुर्ग (छ.ग.)



The Dept. of English of Govt. D.T. Post Graduate College UTAI, Durg seeks to develop the intellectual scientific temper of language and literature. The main purpose of the above courses is to well equip the students with the nuances of the English language which includes proficiency in Grammar and its effective usage in speaking and writing. It further helps them to prepare for various exams and increasing demand for English in Indian society at the global level. It also develops their overall confidence and personality.

38

प्राचार्य

राजकीय दानवीर तुलारम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दूर्ग (छ.ग.)

# Microbiology

## Programme outcomes, Programme specific outcomes and course outcomes of all the Programme offered by the Institution

Regular modification of curriculum is carried out to accommodate the changes with relevance to the local/ national / regional/global developmental needs

Under B.Sc Microbiology program, having 3 Parts , each with 2 Mandatory Core papers and 1 mandatory Practical Courses

### Programme outcomes,

In Part I has reflection about History of Microbiology, Microscopy, Sterilization, Bacterial cell structure and characterization of microorganisms were discussed along with Practical.

In part II molecular biology, genetic engineering bio instrumentation and biostatistics were discussed with a paper of similar practical.  
and

Part III has environmental and medical microbiology as well as molecular biology with modern applicable Practical.

The course is reasoning and application based, making the students eligible for higher studies, jobs in various sectors and Entrepreneurship abilities.

With the individual Research projects, Research orientation will be improved which is reflected in the form of papers and conference presentations.

Applied papers are advanced, making the students updated in the field. More number of practicals are there in the course making the students well worse with the subject.

## COURSE OUTCOMES

### B.Sc Microbiology Part -I

After successful completion of this course students are expected to be able to:

\_ Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures

\_ Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and also Understand the structural similarities and differences among various physiological groups of bacteria/archaea

#### Paper I

Unit I : understand the land mark work and history of different Microbiologist of India and abroad, also familiar with useful and harmful roles of Microbes.

Unit II : In this unit students are getting knowledge of microbial techniques, culture media and microbial groups

Unit III : students are familiar with diversity of Microbes Bacteria and viruses as well as structural organisation of Bacteria

Unit IV : In this students are familiar with diversity structure reproduction of Fungi and lichens and disease caused by fungi.

Unit V: this unit give general character and classification of algae and protozoan with their economic importance with Cyanobacteria.

#### Paper II

Unit I : In this unit we are familiar with study of classification and structure of carbohydrates and proteins used in our daily life.

Unit II : students are familiar with properties and classification of lipids and genetic material DNA and RNA.

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)

Unit III : In this unit students are getting knowledge of enzymes and coenzymes , its kinetics its types properties and nature.

Unit IV : In this students are familiar with anabolic and catabolism of biomolecules like photosynthesis, glycolysis, TCA etc.

Unit V: this unit give general character of growth cell division and transport across the membrane.

### **B.Sc Microbiology Part -II**

#### **Paper I**

Unit I : understand the mechanism of DNA replication and history scope of molecular biology.

Unit II : In this unit students are getting knowledge of protein synthesis

Unit III : students are familiar with mutation and DNA Repair mechanism

Unit IV : In this students are familiar with gene regulation and bioinformatics.

Unit V: this unit give general character and uses of genetic engineering

#### **Paper II**

Unit I : In this unit we are familiar with study of microscopy and centrifugation

Unit II : students are familiar with different types of chromatography and pH meter

Unit III : In this unit students are getting knowledge of spectrophotometer

Unit IV : In this students are familiar with electrophoresis and X-ray diffraction

Unit V: this unit give an idea of general character of biostatistics

### **B.Sc Microbiology Part -III**

#### **Paper I**

Unit I : history scope of molecular biology.

Unit II : students are familiar with mutation.

In this unit students are getting knowledge of protein synthesis

Unit III : understand the mechanism of DNA replication and gene regulation

Unit IV : In this students are familiar with DNA Repair mechanism.

Unit V: this unit give general character and uses of genetic engineering

#### **Paper II**

Unit I : In this unit we are familiar with study of microbes in air as droplet and disease caused by them.

Unit II : students are familiar with different types of interaction of microbes and nitrogen fixation.

Unit III : In this unit students are getting knowledge of aquatic microbes and its role in water pollution.

Unit IV : In this students are familiar with food spoiled by microbes and concept of xenobiotics.

Unit V: this unit give an idea of waste treatment like solid, liquid and its conversion into useful objects



**प्राचार्य**

**शासकीय दानवीर तुलाचम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)**



## Department of Botany

Programme Outcomes, Programme Specific Outcomes and Course Outcomes

Programme outcomes (POs), Program Specific outcomes (PSOs) and Course outcomes (COs) of the Programmes offered by the institute

Programme outcome (POs) :

As per Syllabus(BOS, Botany):- The M.Sc. - Botany curriculum is designed to equip students with subject domain knowledge and technical skills pertaining to plants in a holistic manner. It aims to train the students in all the areas of plant sciences with a unique combination of core and elective papers with significant interdisciplinary components as per syllabus. Students have exposure to cutting-edge technologies that are currently used in the subject. They are made aware about the social and environmental issues, significance of plants and their relevance to the national economy.

Programme Specific Outcomes (PSOs): As per Syllabus(BOS, Botany):-

### OBJECTIVES OF THE PROGRAMME:

The college follows Hem Chand Yadav University, Durg syllabus for Bachelor of Science (Botany). The objectives of the prescribed syllabus are:

- To discuss the syllabus such that it can attract, enthuse, sustain and promote the interest of learners for selecting plant science and allied disciplines as their career and make them realize that their choice is intellectually rewarding.
- To provide for mobility of students among institution and different disciplines.
- To increase the awareness of young learners about the abuse to which plants have been subjected by human greed & train them in exploration, identification & evaluation of plants, conservation of nature & natural resources and in the protection of endangered plant species & other biota dependent on them.
- To make provision for improvement in the quality of laboratory and field work for want of which the students are not able to appreciate the beauty and variety of form, structure, function and ecological significance of plants and their biological services.

### Course Outcome (CO):

Upon completion of this course students will be:

- To acquire knowledge relevant to microbes and lower plants with practical knowledge.
- To make aware the application of these studies to become entrepreneur.
- To become employee of related scientific industries such as supplier of classwork material, slides, specimen etc.
- To become taxonomist.
- To acquire knowledge relevant to structure, development and reproduction in flowering plants with practical knowledge.
- To become employee of biotechnology and genetic engineering related industries.
- To appear different competitive examination conducted at national and state level.
- To become teacher in educational institute.

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दुर्ग (म.प्र.)



- To appear different competitive examination conducted at national and state level.
- To become laboratory technician.
- **SCHEME OF EXAMINATION**

Botany:-Paper I- 50 Marks Time -3 Hours

Paper II-50 Marks Time -3 Hours

Practical- 50 marks Time -4 Hours

Name of Programme	Program Outcome(PO)	Program Specific Outcome(PSO)
	<b>B. Sc. Part-I</b>	
<b>B. Sc. Subject- Botany</b>	<ul style="list-style-type: none"> <li>• To study structural organization and economic importance of microbes including Bacteria, Viruses, Mycoplasma, Cyanobacteria.</li> <li>• To study the structural, developmental and economic importance of lower plants including Algae, Fungi, with practical knowledge.</li> </ul>	<b>B. Sc. Part-I (Paper-I-Bacteria, Viruses, Fungi, Lichens, and Algae )</b> <ul style="list-style-type: none"> <li>• Understanding the basic microbial characteristics, structure, reproduction and economic importance of Bacteria, Virus, Mycoplasma and Cyanobacteria.</li> <li>• Know the classification, characteristic features, life history and economic importance of algae with practical knowledge.</li> <li>• Know the General account, classification, characteristic features, structure, life history and economic importance of fungi with practical knowledge.</li> </ul>
	<ul style="list-style-type: none"> <li>• To study the structural, developmental and economic importance of lower plants including Bryophytes and Pteridophytes with practical knowledge.</li> <li>• To study the structural, developmental and economic aspects of Gymnosperms.</li> </ul>	<b>B. Sc. Part-I (Paper-II-Bryophytes, Pteridophytes, Gymnosperms and Plaeobotany)</b> <ul style="list-style-type: none"> <li>• Know the classification, characteristic features, structure and life cycle of Bryophytes with practical knowledge.</li> <li>• Know the classification, characteristic features, structure and life cycle of Pteridophytes with practical knowledge.</li> </ul>
	<b>B. Sc. Part-II</b>	
	<ul style="list-style-type: none"> <li>• To study the structural, developmental and economic aspects of</li> </ul>	<b>B. Sc. Part-II (Paper-I- Diversity of Seed Plants and The Systematics)</b>

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तरई जिला - दुर्ग (छ.ग.)

	<p>Gymnosperms as well as Angiosperms.</p> <ul style="list-style-type: none"> <li>• The outcome of this programme as to identify the plants according to taxonomy.</li> <li>• To study the anatomical structure and development of flowering plants.</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding the characteristics, origin, evolution and diversity of seeded plants.</li> <li>• Know the classification, characteristic features, structure and life cycle of gymnosperms with practical knowledge.</li> <li>• Understand the principles and rules of taxonomy of angiosperms.</li> <li>• Knowing the salient features of classification of angiosperms.</li> <li>• Understanding the diversity of flowering plants of different families.</li> </ul>
	<ul style="list-style-type: none"> <li>• To study basic body plan of plant.</li> <li>• To study the shoot and root system.</li> <li>• To study the structure, development and reproduction in flowering plants.</li> </ul>	<p><b>B. Sc. Part-II Paper-II- (Structure, Development and Reproduction in Flowering Plants)</b></p> <ul style="list-style-type: none"> <li>• Understanding the basic body plan, growth and diversity in plants.</li> <li>• Understanding the shoot system and root system in detail with practical knowledge.</li> <li>• Knowing the morphological and anatomical structure of leaves according to adaptation with practical knowledge.</li> <li>• Understand the structure, development of flower and reproduction in flowering plants in detail with practical knowledge.</li> <li>• Significance of seeds.</li> </ul>
	<p><b>B. Sc. Part-III</b></p>	
	<ul style="list-style-type: none"> <li>• To study the physiology of plants.</li> <li>• To study the growth and development in plants.</li> <li>• To study the principles, techniques and application of genetic engineering and biotechnology.</li> </ul>	<p><b>B. Sc. Part-III (Paper-I- Plant Physiology, Biochemistry and Biotechnology)</b></p> <ul style="list-style-type: none"> <li>• Know the complete physiology of plants including plant water relationship, transpiration, transport of organic substance, respiration, photosynthesis.</li> <li>• Understand the properties, structure and mechanism of action of enzymes.</li> <li>• Understand the metabolism of nitrogen and lipids.</li> <li>• Knowing the growth and development process in plants including knowledge of structure and function of plant hormone.</li> <li>• Understanding the principles, techniques and application of genetic engineering and biotechnology.</li> </ul>

	<ul style="list-style-type: none"> <li>• To study plant and environment.</li> <li>• To study the ecology and ecosystem with the practical Knowledge.</li> <li>• To study the utilization of plants.</li> </ul>	<p><b>B. Sc. Part-III( Paper-II Ecology and Utilization of Plants)</b></p> <ul style="list-style-type: none"> <li>• Understand the environment along with water, light, soil, temperature.</li> <li>• Understand the morphological, anatomical and physiological changes in plants responses to environment with practical knowledge.</li> <li>• Knowledge of ecology, ecosystem, ecological pyramids, flow of energy with practicals.</li> <li>• Understand the utilization of plants as food, fibres, oils, spices, medicine, beverages and rubber with practical knowledge.</li> </ul>
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### PG M.Sc-Botany

10	M.Sc. I semester paper I	PAPER – I CYTOLOGY	<p><b>CO 1</b></p> <ul style="list-style-type: none"> <li>• The dynamic cells, Structural organization of the plant cell, specialized plant cell type chemical foundation, biochemical energetics.</li> <li>• Cell wall - Structure and functions, biogenesis growth.</li> <li>• Plasma membrane; structure, models and functions, site for ATPase, ion carriers channels and pumps, receptors.</li> </ul> <p><b>CO 2</b></p> <ul style="list-style-type: none"> <li>• Chloroplast-structure, genome organization, gene expression, RNA editing.</li> <li>• Mitochondria; structure, genome organization, biogenesis.</li> <li>• Plant Vacuole - Tonoplast membrane, ATPases transporters as a storage organelle.</li> </ul> <p><b>CO 3</b></p> <ul style="list-style-type: none"> <li>• Nucleus : Structure, nuclear pore, Nucleosome organization.</li> <li>• Ribosome- Structure and functional significance.</li> <li>• Cell cycle and Apoptosis; Control mechanisms, role of cyclin dependent kinases.</li> <li>• Retinoblastoma and E2F proteins, cytokinesis and cell plate formation, mechanisms of programmed cell death.</li> </ul> <p><b>CO 4</b></p> <ul style="list-style-type: none"> <li>• Other cell organelles: Structure and functions of microbodies, microtubules, microfilaments,</li> </ul>
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39  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तई जिला - दुर्ग (छ.ग.)



			<p>Golgi apparatus, lysosome, endoplasmic reticulum.</p> <ul style="list-style-type: none"> <li>• Techniques in cell biology: Immuno techniques, in situ hybridization to locate transcripts in cell types FISH, GISH, Confocal microscopy.</li> </ul>
11	M.Sc. I semester paper II	PAPER - II GENETICS	<p><b>CO1</b></p> <ul style="list-style-type: none"> <li>• Chromatin Organization : Chromosome structure and packaging of DNA, molecular organization of centromere and telomere, nucleolus and ribosomal RNA genes, euchromatin and heterochromatin, Karyotype, banding pattern specialized types of chromosomes, polytene, lamp brush, B chromosomes and sex chromosomes.</li> <li>• Molecular basis of chromosome pairing chromosomal aberration and polyploidy.</li> </ul> <p><b>CO2</b></p> <ul style="list-style-type: none"> <li>• Mapping of Bacteriophage genome, Phage phenotype, recombination in phage, genetic transformation and transduction in bacteria.</li> </ul> <p><b>CO3</b></p> <ul style="list-style-type: none"> <li>• Genetic recombination &amp; genetic mapping; Mechanism of crossing over, molecular mechanism of recombination, role of Rec-A, Rec-B, Rec- C and Rec-D enzymes, site specific recombination, linkage, linkage group, genetic marker.</li> </ul> <p><b>CO4</b></p> <ul style="list-style-type: none"> <li>• Alien gene transfer through chromosome manipulation; Transfer of whole genome examples from wheat, arachis &amp; brassica. Transfer of individual chromosomes &amp; chromosome segment, methods for detecting alien chromatin, production.</li> </ul>
12	M.Sc. I semester paper III		<p><b>CO1</b></p> <ul style="list-style-type: none"> <li>• <b>Archaeobacteria and Eubacteria</b> : General account, ultra structure, nutrition and reproduction, biology and economic importance.</li> <li>• <b>Cyanobacteria</b> : Salient feature and biological importance.</li> </ul> <p><b>CO2</b></p> <ul style="list-style-type: none"> <li>• <b>Viruses</b> : Characteristics and ultra structure of virions, isolation and purification of viruses, chemical nature, replication, transmission of viruses, economic importance.</li> </ul>

39

प्राचार्य

राजकीय दानवीर तुलायम स्नातकोत्तर महाविद्यालय  
उतर्द जिला - दुर्ग (छ.प्र.)



			<ul style="list-style-type: none"> <li>• <b>Phytoplasma</b> : General characteristic and role in causing plant diseases.</li> </ul> <p><b>CO3</b></p> <ul style="list-style-type: none"> <li>• <b>Phycology</b> : Algae in diversified habitats (terrestrial, freshwater, marine), thallus organization, cell ultra structure, reproduction ( vegetative, asexual, sexual).</li> <li>• Criteria for classification of Chlorophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta.</li> <li>• Economic importance of algae.</li> </ul> <p><b>CO4</b></p> <ul style="list-style-type: none"> <li>• <b>Mycology</b> : General characters of fungi, substrate relationship in fungi, cell structure unicellular and multicellular organization, cell wall composition, nutrition (saprobic biotrophic, symbiotic) reproduction, (vegetative, asexual, sexual) heterothallism, heterokaryosis, Para sexuality, recent account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina, Mycorrhiza, fungi as biocontrol agent.</li> </ul>
13	M.Sc. I semester paper IV	PAPER - IV BRYOPHYTA, PTERIDOPHYTA AND GYMNOSPERM	<p><b>CO1</b></p> <ul style="list-style-type: none"> <li>• <b>Bryophyta</b> : morphology, structure, reproduction, life history, distribution, classification.</li> <li>• General account of Marchantiales, Jungermanniales, Anthocerotales, Sphagnumales, Funariales and Polytrichales. Economic and ecological importance.</li> </ul> <p><b>CO2</b></p> <ul style="list-style-type: none"> <li>• <b>Pteridophyta</b> : morphology, anatomy and reproduction, classification, evolution of stele.</li> <li>• Heterospory and origin of seed habit, general account of fossil pteridophyta .</li> <li>• Introduction to Psilopsida, Lycopsida, Sphenopsida and Pteropsida.</li> </ul> <p><b>CO3</b></p> <ul style="list-style-type: none"> <li>• <b>Gymnosperm</b> : General characters of gymnosperm mentioning diversity.</li> <li>• Classification of gymnosperm.</li> <li>• Resemblances and difference amongst gymnosperm, pteridophyta and angiosperm.</li> <li>• Gymnosperm distribution in India.</li> <li>• Gymnosperm Biotechnology.</li> <li>• Economic importance of gymnosperm.</li> <li>• Origin and evolution of gymnosperm stele.</li> </ul>

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दुर्ग (छ.ग.)

		<ul style="list-style-type: none"> <li>• Structure and theories regarding origin of Paleozoic ovule.</li> </ul> <p><b>CO4</b></p> <ul style="list-style-type: none"> <li>• Extinct gymnosperm : general account of pteridospermales, Glossopteridales, Caytoniales, Pentoxylales.</li> <li>• Extant gymnosperm : Cycadales, Ginkgoales, Coniferales, Ephedrales Gnetales, and Welwitschiales.</li> </ul>
14	M.Sc. I semester lab course I	<p>Identification of different stages of mitosis from suitable plant material. (onion root tips, garlic root tips).</p> <ul style="list-style-type: none"> <li>• Identification of meiosis from suitable plant material. (Onion floral buds).</li> <li>• Isolation of cell organelles : Mitochondria, Chloroplast, Nucleus, Lysosomes and there assay by succinate dehydrogenase activity (Mitochondria), acid phosphatase activity (Lysosome), acetocarmine staining (Nucleus) and microscopic observation (Chloroplast).</li> <li>• Study of mitotic index from suitable plant material.</li> <li>• Study of cyclosis in cells of suitable plant material.</li> </ul> <p><b>ALGAE:-</b></p> <p>a. Cyanophyta: - Range of thallus organization and reproductive structures, types showing unicellular, gonical, conical, filamentous, branched (pseudo and true branched).</p> <p>b. Chlorophyta: - Chlamydomonas, Gonium, Pandorina, Eudorina, Volvox, Chlorella, Pediatrum, Hydrodictyon, Scenedesmus, Ulothrix, Cladophora, Draparnaldia, Draparnaldiopsis, Fristschiella, Chara, Nitella, Coleochaete, Ulva,, Caulerpa, Oedogonium, Zygnema, Spirogyra, .</p> <p>c. Phaeophyta: -Ectocarpus, , Dictyota, Padina, Sargassum.</p> <p>d. Rhodophyta: -Porphyra, Batrachospermum, Gelidium, Gracillaria, Champia, Polysiphonia.</p> <p><b>FUNGI: -</b></p> <p>Thallus organization, Spore producing organs, Tissue differentiation and accessory structures of following –</p> <p>a. Mastigomycotina: - Synchytrium ,Saprolegnia, Achlya, Peronospora, Plasmopora, Albugo, Sclerospora.</p> <p>b. Zygomycotina: -Mucor, Rhizopus, Pilobolus.</p> <p>c. Ascomycotina: - Taphrina, Protomyces, Erotium, , Trichoglossum, Erysiphe, Phyllactinia, Uncinula.</p> <p>d. Basidiomycotina: -Uromyces, Ravenelia, Monosporidium, Melampsora, Ustilago, Agaricus, Pleurotus, Ganoderma, Polyporus, Cyathus, Lycoperdon, Phallus, Geaster.</p>

  
प्राचार्य

			e. Deuteromycotina: - Aspergillus, Penicillium, Fusarium, Cercospora, Colletotrichum, Alternaria.
15	M.Sc. I semester Lab course II		<p>Staining of salivary gland chromosomes of Chironomas larva or Drosophila.</p> <ul style="list-style-type: none"> <li>• Isolation of DNA and its quantification by UV-spectrophotometric method.</li> <li>• Isolation of RNA and its quantification by UV-spectrophotometric method.</li> <li>• Isolation of DNA by Agarose gel electrophoresis.</li> <li>• Transformation in Bacteria</li> <li>• Transduction in Bacteria.</li> </ul> <p>Bryophyta: -</p> <p>a. Hepaticopsida: - Riccia, Marchantia, Targionia, Astrella, Porella, Cyathodium, Plagiochasma,</p> <p>b. Anthocerotopsida: -Anthoceros, Notothyllus.</p> <p>c. Bryopsida: -Sphagnum, Funaria, Polytrichum,</p> <p>Pteridophyta :-</p> <p>a. Study of the following members to observe arrangement of Sori on a receptacle : - Isoetes, Osmunda, Angiopteris, Ceratopteris, Achrostichum, Gleichenia</p> <p>b. Morphology, Anatomy and reproductive structures of : - Psilotum, Selaginella, Lycopodium, Equisetum, Ophioglossum, Lygodium, Pteris, Pteridium, Salvinia, Adiantum, Azolla.</p> <p>Gymnosperms: -</p> <p>Morphology, Anatomy and reproductive structures of -Cycas, Zamia, Ginkgo, Pinus, Cryptomeria, Juniperous, Araucaria, Taxus, Cedrus Thuja, Podocarpus, Gnetum, Ephedra.</p>
16	M.Sc. II semester paper I	PAPER - I TAXONOMY AND DIVERSITY OF PLANTS	<p>CO1</p> <ul style="list-style-type: none"> <li>• Plant nomenclature : Binomial Nomenclature, International code of Botanical nomenclature.</li> <li>• Plant identification : Herbaria, Botanical gardens, Taxonomic literature, Taxonomic-keys.</li> <li>• Taxonomic hierarchy - Major categories, minor categories ,species concept.</li> <li>• Taxonomic evidences - Morphology, Anatomy, Palynology, Embryology, Cytology, Photochemistry, Genome analysis and Nucleic acid hybridization.</li> <li>• Geographical information system (GIS).</li> </ul> <p>CO2</p>

38  
प्राचार्य



			<ul style="list-style-type: none"> <li>• Pre Darwinian Classification Based on form relationship (Bentham and Hooker )</li> <li>• Post Darwinian classification Engler and Prantl, Bessey's, Hutchinson, Takhtajan and Cronquist.</li> <li>• Recent modifications : Dahlgren's system of classification.</li> <li>• Fossil angiosperm.</li> </ul> <p>CO3</p> <ul style="list-style-type: none"> <li>• Study of following families with particular reference to systematic position, phylogeny, evolutionary trends and economic importance. Dicot families; Ranunculaceae, Magnoliaceae, Nymphaeaceae, Sterculiaceae, Meliaceae, Fabaceae, Cucurbitaceae, Umbelliferae, Asteraceae, Sapotaceae, Bignoniaceae, Labiatae, Verbenaceae, Euphorbiaceae, Moraceae.</li> </ul> <p>CO4</p> <ul style="list-style-type: none"> <li>• Study of following families with particular reference to systematic position, phylogeny, Evolutionary trends and economic importance, Monocot families- Orchidaceae, Zingiberaceae, Commelinaceae, Cyperaceae, Poaceae study of local available families.</li> </ul>
17	M.Sc. II semester paper II	PAPER – II MOLECULAR BIOLOGY	<p>CO1</p> <ul style="list-style-type: none"> <li>• RNA and DNA Structure. A, B and Z Forms, replication , damage and repair ,transcription, translation.</li> </ul> <p>CO2</p> <ul style="list-style-type: none"> <li>• Molecular Cytogenetics : Nuclear DNA content, C-value paradox, Cot curve and its Significance, restriction mapping - concept and techniques, multigene families and their evolution, <i>in situ</i> hybridization and techniques, chromosomes micro dissection and micro cloning, flow cytometry and confocal microscopy and karyotype analysis.</li> </ul> <p>CO3</p> <ul style="list-style-type: none"> <li>• Gene structure and expression : fine structure of gene, Cis-trans test, fine structure analysis of eukaryotes, introns and their significance. RNA splicing, regulation of gene expression in prokaryotes and eukaryotes.</li> <li>• Protein sorting: Targeting proteins to organelles.</li> </ul> <p>CO4</p> <ul style="list-style-type: none"> <li>• Mutation: Spontaneous and induced mutation, physical and chemical mutagens molecular basis of</li> </ul>

38  
प्राचार्य



			gene, transposable elements in prokaryotes and eukaryotes, mutation induced by transposones, site directed mutagenesis, inherited human diseases and defects in DNA repair, translocation, intersect Robertsonian translocation, B-A translocation.
	M.Sc. II semester paper III	PAPER - III PLANT PHYSIOLOGY membrane transport, signal transduction stress physiology, sensory photobiology	<p><b>CO1</b></p> <ul style="list-style-type: none"> <li>• <b>Membrane transport and translocation of water and solutes:</b> Plant-water relation, mechanism of water transport through Xylem, root microbe interaction in facilitating nutrient uptake. Comparison of xylem and phloem transport, phloem loading and unloading, passive and active solute transport, membrane transport system.</li> </ul> <p><b>CO2</b></p> <ul style="list-style-type: none"> <li>• <b>Signal Transduction :</b> Overview, receptors and G proteins, Phospholipids signaling, role of cyclic nucleotides, calcium-calmodulin cascade, diversity in protein kinases and phosphatases, specific signaling mechanism- two component sensor regulatory system in bacteria.</li> </ul> <p><b>CO3</b></p> <ul style="list-style-type: none"> <li>• <b>Stress physiology :</b> Plant responses to biotic and abiotic stress, mechanism of biotic and abiotic stress tolerance, HR Fundamental and SAR, water deficit and drought resistance salinity stress, metal toxicity, freezing and heat stress, oxidative stress.</li> </ul> <p><b>CO4</b></p> <ul style="list-style-type: none"> <li>• <b>Fundamentals of enzymology :</b> General aspects of allosteric mechanism, regulatory &amp; active sites, isozymes, kinetics of enzymatic catalysis, Michaelis-Menton equation and its significance.</li> <li>• Sensory photobiology, History of discovery of phytochromes and cryptochroms and their photo chemical and biochemical properties, photophysiology of light under responses ,cellular localization, and molecular mechanism of action of enzyme.</li> </ul>
19	M.Sc. II semester paper IV	PAPER - IV PLANT METABOLISM- Photosynthesis, respiration, nitrogen sulphur metabolism, enzymology, growth regulators, movement	<p><b>CO1</b></p> <ul style="list-style-type: none"> <li>• <b>Photosynthesis :</b> General concepts and historical background, evolution of photosynthetic apparatus, photosynthetic pigments and light harvesting complexes, photo oxidation of water, mechanism of electron and proton transport, Carbon assimilation ,the Calvin cycle, photorespiration and its significance, the C<sub>3</sub> cycle, the CAM pathway, biosynthesis of starch and sucrose, physiological</li> </ul>

  
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			<p>and ecological considerations.</p> <p><b>CO2</b></p> <ul style="list-style-type: none"> <li>• <b>Respiration and lipid metabolism</b> : Overview of plant respiration, glycolysis, Krebs cycle (TCA cycle), electron transport and ATP synthesis, Pentose phosphate pathway, alternative oxidase system, structure and function of lipids, fatty acid biosynthesis, synthesis of membrane lipids ,structural lipids and storage lipids and their catabolism Glyoxylate cycle.</li> </ul> <p><b>CO3</b></p> <ul style="list-style-type: none"> <li>• <b>Nitrogen and Sulphur metabolism</b> : Overview, biological nitrogen fixation, nodule formation and nod factors; mechanism of nitrate uptake and reduction ,ammonium assimilation, sulphur uptake, transport and assimilation.</li> </ul> <p><b>CO4</b></p> <ul style="list-style-type: none"> <li>• <b>Plant growth regulators and elicitors</b> : Physiological effects and mechanism of action of auxins, gibberellins, cytokinins, ethylenes, abscisic acid, brassinosteroid, polymines jasmonic acid and salicylic acid, hormone receptors.</li> <li>• The flowering process:- Photoperiodism and its significance, endogeneous clock and its regulation, floral induction and development, Genetic molecular analysis, role of vernalization.</li> </ul>
20	M.Sc. II semester lab course I		<p><b>Angiosperms: -</b></p> <ol style="list-style-type: none"> <li>1. Methods of non-destructive field collection and documentation.</li> <li>2. Techniques of herbaria preparation.</li> <li>3. Morphological characterization of selected families of dicots and monocots and identification upto families.</li> <li>4. Preparation of artificial key based on appropriate character combination.</li> <li>5. Identification of genus and species from Monocots and Dicots</li> <li>6. Identification of given plant up to species with the help of modern flora keys.</li> </ol>
21	M.Sc. II semester Lab course II		<ol style="list-style-type: none"> <li>24. Determination of the effect of CO<sub>2</sub> concentration on the rate of photosynthesis by wilnot's bubbler.</li> <li>25. Determination of the effect of intensity of light on the rate of photosynthesis by wilnot's bubbler.</li> <li>26. Determination of the effect of intensity of light</li> </ol>

  
प्राचार्य

on the rate of photosynthesis by inverted funnel method.

27. Determination of the effect of quality of light on the rate of photosynthesis by inverted funnel method.

28. Determination of the effect of quality of light on the rate of photosynthesis by wilnot's bubbler.

#### **MINOR EXPERIMENTS**

1. Preparation of molar and molal solutions .
2. Preparation of percentage solution.
3. Preparation of normal solution of solute.
4. Preparation of normal solution of acid and base.
5. Demonstration of Brownian movement in the latex of Calotropis.
6. Demonstration of tyndall effect.
7. Demonstration of plasmolysis and deplasmolysis in plant cell.
8. Demonstration of exosmosis and endosmosis in grapes and resins.
9. Demonstration of the rate of respiration of flower buds by pipette mano-meter.
10. Demonstration of evolution of  $O_2$  during photosynthesis by inverted funnel method.
11. Demonstration of the rate of photosynthesis by inverted funnel method.
12. Demonstration of the rate of photosynthesis by wilnot's bubbler.
13. Determination of the effect of temperature on the rate of photosynthesis by inverted funnel method.
14. Demonstration of the rise of temperature during seed germination.
15. Demonstration of evolution of  $CO_2$  during respiration.
16. Demonstration of fermentation by Kuhns tube.
17. Demonstration of Determination of R.Q. of organic acids by Ganong's Respirometer.
18. Effect of phytohormones on the growth of seedling.

#### **BIOCHEMISTRY PRACTICALS**

1. Qualitative estimation of amylase enzyme activity in the germinating seeds of wheat.
2. Qualitative estimation of amylase enzyme activity in potato tuber.
3. Qualitative estimation of catalase enzyme activity in the germinating seeds of wheat.
4. Qualitative estimation of catalase enzyme activity in potato tuber.
5. Effect of enzyme concentration on the rate of catalase enzyme activity in potato tuber.
6. Effect of enzyme concentration on the rate of

प्राचार्य

राजकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दुर्ग (छ.ग.)



			<p>catalase enzyme activity in the germinating seeds of wheat.</p> <p>7. Effect of enzyme concentration on the rate of amylase enzyme activity in of potato tuber.</p> <p>8. Effect of enzyme concentration on the rate of amylase enzyme activity in the germinating seeds of wheat.</p> <p>9. Effect of substrate concentration on the rate of catalase enzyme activity in the germinating seeds of wheat.</p> <p>10. Effect of substrate concentration on the rate of catalase enzyme activity in potato tuber.</p> <p>11. Effect of substrate concentration on the rate of amylase enzyme activity in the germinating seeds of wheat.</p>
22	M.Sc. III semester paper I	PAPER - I PLANT DEVELOPMENT AND PLANT RESOURCES	<p>CO1 : Unique features of plant development. Metabolism of nucleic acids, proteins and mobilization of food reserves, tropisms; control of cell division,</p> <p>CO2: Programmed cell death in the life cycle of plants,</p> <p>CO3: Seed germination, Hormonal control of Seedling growth.</p> <p>CO 4: Seed dormancy, Overcoming of seed dormancy, Bud dormancy.</p> <p>CO5: Root development: Organization of root apical meristem,(RAM), Cell fates and lineages, Vascular tissue differentiation of root, Lateral roots, Root hairs, Root microbe interaction.</p> <p>CO6: Shoot development : Organization of shoot apical meristem (SAM), Cytological and molecular analysis of SAM. Control of tissue differentiation; especially Xylem and Phloem, Vascular cambium. Secretary ducts and laticifers, Wood development in relation to environmental factors.</p> <p>CO 7: Leaf development : Development, Phyllotaxy, Control of leaf form, Differentiation of epidermis (with special reference to Stomata and Trichome) and Mesophyll cell. Senescence, Influences of hormones and environmental factors on senescence.</p> <p>CO8: Flower development : Floral characteristics, Flower development, Genetics of floral organ differentiation: Homeotic mutant in Arabidopsis and Antirrhinum, Sex determination.</p> <p>CO9: Plant resources : Origin, Evolution, Cultivation and Uses of (i) Food, Forage and Fodder crops, (ii) Fiber crops, (iii) Medicinal and Aromatic plants, (iv) Vegetable Oil-yielding crops (v) fruits. Important fire-wood, Timber-yielding plants and Non-wood forest products (NFPs) such as bamboos, gums, tannins, dyes and resins.</p>
23	M.Sc. III semester	PLANT ECOLOGY- I (ECOSYSTEM AND	CO1: ECOSYSTEM ORGANISATION:- Structure and functions, primary production (Methods of measurement, global

38  
प्राचार्य



	paper II	VEGETATION ECOLOGY)	<p>pattern, controlling factors), Energy dynamics (trophic organization, energy flow pathways, ecological efficiencies), Litter fall and decomposition, (mechanism, substrate quality, and climatic factors), global biogeochemical cycles of C, N, P, and S, mineral cycles (pathways, processes and budgets) in terrestrial and aquatic ecosystems.</p> <p>CO2: ECOSYSTEM STABILITY AND MANAGEMENT Concept (resistance and resilience), Ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystems, ecology of plant invasion, environment impact assessment, ecosystem restorations. Concept of Sustainable development, sustainability indicators.</p> <p>CO3: VEGETATION ORGANISATION:- Concepts of community and continuum, analysis of communities (analytical and synthetic characters), Community coefficients, inter specific associations, ordination, and concept of ecological niche.</p> <p>CO4: VEGETATION DEVELOPMENT :- Temporal changes (cyclic and non cyclic), mechanism of ecological succession (relay floristic and initial floristic composition, facilitation, tolerance and inhibition models), change in ecosystem properties during succession.</p>
24	M.Sc. III semester paper III	BIOTECHNOLOGY AND GENETIC ENGINEERING OF PLANTS AND MICROBES	<p>CO1: BIOTECHNOLOGY - Basic concepts, principles and scope.</p> <p>CO2: RECOMBINANT D.N.A. TECHNOLOGY : Gene cloning principles, Tools - Restriction Endonucleases, DNA modifying enzymes, Choice of Vectors, Plasmid, Cosmid, Bacteriophage vectors, phagmids, Artificial chromosomes. Shuttle vectors, Yeast vectors, Expression vectors and techniques, construction of genomic / cDNA libraries.</p> <p>CO3: MICROBIAL GENETIC MANIPULATION: Bacterial transformation, selection of recombinants and transformants, genetic improvement of industrial microbes and nitrogen fixers, fermentation technology.</p> <p>CO4: GENETIC ENGINEERING OF PLANTS : Aims, strategies for development of transgenies (with suitable examples), Gene transfer methods - Vector mediated gene transfer- Agrobacterium the natural genetic engineer. t-DNA mediated DNA transformation. Virus mediated gene transfer, Vectorless or direct DNA transfer.</p> <p>CO5: DNA SYNTHESIS AND SEQUENCING : Chemical synthesis of gene, Polymerase chain reaction, its variation, application, advantages and limitations, DNA sequencing - Sanger and Coulson method, Maxam Gillbert method, High throughput DNA sequencing, DNA finger printing.</p> <p>Co6: GENOMICS AND PROTEOMICS : Genetic and physical mapping of genes, molecular markers for integration of useful traits, Transposon mediated gene tagging, genome projects, bioinformatics, functional genomics, microarrays, protein profiling and its significance.</p>

  
प्राचार्य

25	M.Sc. III semester paper IV (E1)	MOLECULAR PLANT PATHOLOGY-I	<p>CO1: 1. Introduction and history of plant pathology. 2. General Principles of plant pathology and classification of plant diseases.</p> <p>CO2: 3. Diseases inciting organisms - Animate Pathogens- fungi, Bacteria, Mycoplasma, Viruses, Nematodes, their general characteristics, heterotrophic behaviour with emphasis on parasitism ability and virulence.</p> <p>CO3: Disease Syndrome and General Symptoms of plant diseases : Pathogenic and nonpathogenic; Symptoms caused by fungi, Bacteria, Viruses, Mycoplasma and Nematodes.</p> <p>CO4: Sources of Infection : Seeds, soil, water and airborne diseases of plants; Significance of phyllosphere and rhizosphere studies.</p> <p>CO5: . Pathogenesis - Dissemination of plant pathogens; Mode of infection; Inoculum potential.</p> <p>CO6: . Effect of environment on disease development- Predisposing factors; Survival of fungi; Germination of spores; Disease initiation and Epidemics.</p> <p>CO7: Host Parasites relationship - Mechanism and physiology of infection, Path of infection, Role of enzymes, growth regulators and toxins in pathogenesis.</p> <p>CO8: Physiological specialization : General account; Physiological specialization with special reference to smuts and rusts.</p> <p>CO9: . Recurrence of disease with special reference of recurrence of rust disease in India.</p> <p>CO10: . Methods of Studying Plant Diseases: General account, Macroscopic study, Microscopic study, Koch postulates, Culture technique, Preparation of culture tubes, media preparation, Inoculation, Isolation, Pure culture, Parasitism of obligate parasites, Methods in bacteriology, Techniques required in introductory bacteriology</p>
26	M.Sc. III semester lab course I		<ul style="list-style-type: none"> <li>□ Effect of gravity, unilateral light and plant growth regulators on the growth of young seedling.</li> <li>• Role of dark and red light / far-red light on the expansion of cotyledons and epicotylar hook opening in pea.</li> <li>• Study of living shoot apices by dissections using aquatic plants such as <i>Ceratophyllum</i> and <i>Hydrilka</i>.</li> <li>• Study of monocot and dicot stem.</li> <li>• Study of cytohistological zonation in the shoot apical meristem (SAM) in sectioned and double-stained permanent slides of a suitable plant such <i>Coleus</i>, <i>Kalanchoe</i>, and <i>Tobacco</i>. Examinations of shoot apices in monocotyledons in both T.S. and L.S. to show the origin and arrangement of leaf primordial.</li> <li>• Study of alternate and distichous, alternate and</li> </ul>



प्राचार्य



			<p>superposed, opposite and superposed, opposite and decussate leaf arrangement. Examination of rosette plants (<i>Launaea, Mollugo, Raphanus, Hyoscyamus</i> etc.) and induction of bolting under natural conditions as well as by GA treatment.</p> <ul style="list-style-type: none"> <li>• Microscopic examination of vertical section of leaves such as <i>Cannabis, Tobacco, Nerium, Maize</i> and <i>wheat</i> to understand the internal structure of leaf tissues and trichomes, glands etc.</li> <li>• Study the C3 and C4 leaf anatomy of plants.</li> <li>• Study of epidermal peels of leaves such as <i>Coccinia, Gailardia, tradescantia, Notonea</i>, etc. To study the development and final structure of stomata and stomatal index. Demonstration of the effect of ABA on stomatal closure.</li> <li>• Study of whole roots in monocots and dicots.</li> <li>• Examination of L.S. of root from a permanent preparation to understand the organization of root apical meristem and its derivatives. (Use <i>Maize, Aerial roots of Banyan, Pistia, Jussieua</i> etc.).</li> <li>• Origin of lateral roots.</li> <li>• Study of leguminous roots with different types of nodules.</li> <li>• Food crops: Wheat, Rice, Maize, Chickpea, Potato, Tapioca, Sweet Potato, Sugar cane, Morphology, Anatomy, Micro chemical tests for stored food material.</li> <li>• Forage/Fodder crops: Study of any five important crops of the locality (For example fodder sorghum, Bajra, Bersem, Clove, Guar bean, Gram, Ficus sp.)</li> <li>• Plant fibers: (i) Textile fibers: Cotton, Jute, Linen, Sunn hemp, Cannabis. (ii) Cordage fibers; Coir (iii) Fibers for stuffing: Silk and Cotton.</li> </ul> <ol style="list-style-type: none"> <li>1. To determine minimum size and number of quadrat required for reliable estimate of biomass in grassland.</li> <li>2. To compare protected and unprotected grassland stands using community coefficients (similarity indices).</li> <li>3. To analyze plant communities Bra Curtis ordination method.</li> <li>4. To estimate IVI of the species in a woodland using point centered quarter method.</li> <li>5. To calculate mean, variance, standard deviation, standard error, coefficient of variations and to use t test for comparing two means related to ecological data.</li> <li>6. To find out the relationship between two ecological variables using correlation and regression analysis.</li> <li>7. To find out important grassland species using chi</li> </ol>
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			<p>square test.</p> <p>8. Scientific visits to a protected area, a wet land, a mangrove, NBPGR, BSI, CSIR, ICAR labs and a recognized botanical gardens or a museum.</p>
27	M.Sc. III semester Lab course II (E1)		<p>1. Growth characteristics of E. coli using plating and turbidimetric methods.</p> <p>2. Isolation of plasmid from E. coli by alkaline lysis method and its quantitation spectrophotometrically.</p> <p>3. Restriction digestion of the plasmid and estimation of the size of various DNA fragment.</p> <p>4. Cloning of DNA fragment in a plasmid vector, transformation of the given bacteria population and selection of recombinants.</p> <p>Demonstration of DNA sequencing by Sanger's dideoxy method.</p> <p>Pathological experiment</p>
28	M.Sc. III semester paper IV (E2)	<b>LIMNOLOGY-I</b>	
29	M.Sc. III semester Lab course II (E2)		<p>1. Growth characteristics of E. coli using plating and turbidimetric methods.</p> <p>2. Isolation of plasmid from E. coli by alkaline lysis method and its quantitation spectrophotometrically.</p> <p>3. Restriction digestion of the plasmid and estimation of the size of various DNA fragment.</p> <p>4. Cloning of DNA fragment in a plasmid vector, transformation of the given bacteria population and selection of recombinants.</p> <p>Demonstration of DNA sequencing by Sanger's dideoxy method.</p> <p>1. Construction of morphometric maps of aquatic systems.</p> <p>2. Measurement of transparency and temperature.</p> <p>3. Analysis of different dissolved gases: Dissolved oxygen and Carbon dioxide.</p> <p>4. Analysis of lake water for bicarbonates, carbonates, total alkalinity, chlorides etc.</p>

  
प्राचार्य

39	M.Sc. III semester paper IV (E3)	<b>Elective Course – Ethnobotany I</b>	
40	M.Sc. III semester Lab course II (E3)		<ol style="list-style-type: none"> <li>1. Growth characteristics of E. coli using plating and turbidimetric methods.</li> <li>2. Isolation of plasmid from E. coli by alkaline lysis method and its quantitation spectrophotometrically.</li> <li>3. Restriction digestion of the plasmid and estimation of the size of various DNA fragment.</li> <li>4. Cloning of DNA fragment in a plasmid vector, transformation of the given bacteria population and selection of recombinants.</li> </ol> <p>Demonstration of DNA sequencing by Sanger's dideoxy method.</p> <p>V</p>
41	M.Sc. IV semester paper I	<b>PLANT REPRODUCTION AND UTILIZATION OF RESOURCES</b>	<p><b>CO1</b> <b>CLIMATE, SOIL AND VEGETATION PATTERNS OF THE WORLD :</b> Life zones, major biomes, major vegetation types and soil types of the world, barren land.</p> <p><b>CO2</b> <b>POLLUTION, CLIMATE CHANGE AND ECOSYSTEMS :</b> Air, water and soil pollution:- kinds, sources, quality parameters, effects on plants and ecosystem. Green house gases (Carbon dioxide, methane, nitrous oxide, Chloro fluorocarbons: sources, trends and role), ozone layer, ozone hole, consequences of climate change) Carbon dioxide fertilization, global warming, sea level rise, UV radiation).</p> <p><b>CO3</b> <b>BIOLOGICAL DIVERSITY :-</b> Concepts and levels, status in India, Utilization and concerns, role of biodiversity in ecosystem functions and stability, speciation and extinction, IUCN categories of threat, distribution and global patterns, terrestrial biodiversity hot spots, inventory. World centers of primary diversity of domesticated plants; The Indo Burmese center, plant introductions and secondary centers.</p> <p><b>CO4</b> <b>CONSERVATION STRATEGIES</b> Principles of conservation, extinctions, environmental status of plants based on International union for conservation of Nature. In situ conservation, International efforts and Indian initiatives, protected areas in India- sanctuaries, national parks, biosphere reserves, Wetlands, Mangroves and coral reefs for conservation of wild biodiversity. Ex situ conservation : Principles and practices, botanical</p>

38  
प्राचार्य

			gardens, field gene bank, seed banks, in vitro repositories, cryo banks, general account of the activities of Botanical survey of India (BSI), National Bureau of plant genetic resources (NBPGR), Indian council of Agriculture research (ICAR), Council of scientific and Industrial research (CSIR), and the department of Biotechnology (DBT) for conservation and non formal conservation efforts.
42	M.Sc. IV semester paper II	<b>POLLUTION AND BIODIVERSITY CONSERVATION</b>	<p><b>CO1</b> <b>CLIMATE, SOIL AND VEGETATION PATTERNS OF THE WORLD :</b> Life zones, major biomes, major vegetation types and soil types of the world, barren land.</p> <p><b>CO2</b> <b>POLLUTION, CLIMATE CHANGE AND ECOSYSTEMS :</b> Air, water and soil pollution:- kinds, sources, quality parameters, effects on plants and ecosystem. Green house gases (Carbon dioxide, methane, nitrous oxide, Chloro fluorocarbons: sources, trends and role), ozone layer, ozone hole, consequences of climate change) Carbon dioxide: fertilization, global warming, sea level rise, UV radiation).</p> <p><b>CO3</b> <b>BIOLOGICAL DIVERSITY :-</b> Concepts and levels, status in India, Utilization and concerns, role of biodiversity in ecosystem functions and stability, speciation and extinction, IUCN categories of threat, distribution and global patterns, terrestrial biodiversity hot spots, inventory. World centers of primary diversity of domesticated plants; The Indo Burmese center, plant introductions and secondary centers.</p> <p><b>CO4</b> <b>CONSERVATION STRATEGIES</b> Principles of conservation, extinctions, environmental status of plants based on International union for conservation of Nature. In situ conservation, International efforts and Indian initiatives, protected areas in India- sanctuaries, national parks, biosphere reserves, Wetlands, Mangroves and coral reefs for conservation of wild biodiversity. Ex situ conservation : Principles and practices, botanical gardens, field gene bank, seed banks, in vitro repositories, cryo banks, general account of the activities of Botanical survey of India (BSI), National Bureau of plant genetic resources (NBPGR), Indian council of Agriculture research (ICAR), Council of scientific and Industrial research (CSIR), and the department of Biotechnology (DBT) for conservation and non formal conservation efforts.</p>
43	M.Sc. IV semester paper III	<b>BIOTECHNOLOGY- II</b>	<p><b>CO I</b> <b>PLANTS CELLS AND TISSUE CULTURE:</b> General introduction, history, scope, concept of cellular differentiation, cellular totipotency. <b>TISSUE CULTURE MEDIA:</b> Introduction, Media</p>


  
प्राचार्य



			<p>constituents, Media selection, Media preparation.</p> <p><b>CELL CULTURE:</b> Introduction isolation of single cells. Suspension cultures, Culture of Single cell, Plant cell reactors, Applications of cell culture.</p> <p><b>CLONAL PROPAGATION</b> - Auxiliary bud proliferation, Meristem and shoot tip culture, bud culture.</p> <p><b>ORGANOGENESIS AND ADVENTIVE EMBRYOGENESIS :</b> Fundamental aspects of morphogenesis; organogenesis via callus formation, direct adventitive organ formation.</p> <p><b>CO2</b></p> <p><b>SOMATIC EMBRYOGENESIS AND ANDROGENESIS :</b> Mechanisms, techniques and utility.</p> <p><b>SOMATIC HYBRIDIZATION :</b> Methods of Protoplast isolation, Spontaneous and induced methods of protoplasm fusion, identification and selection of hybrid cells. Regeneration of hybrid plants. Verification and Characterization of somatic hybrids, Cybrids, possibilities, achievements and limitations of protoplast research.</p> <p><b>CO3</b></p> <p><b>CRYOPRESERVATION AND GERMPLASM STORAGE:</b> Raising sterile tissue cultures, Addition of cryoprotectants and pretreatment, freezing, storage, thawing, determination of survival viability. Plant growth and generation, verification, encapsulation and dehydration. Slow growth method, Applications.</p> <p><b>INTELLECTUAL PROPERTY RIGHTS :</b> Possible ecological risks and ethical concerns.</p> <p><b>CO 4</b></p> <p><b>APPLICATION OF PLANT TISSUE CULTURE :</b> Artificial seeds, Production of hybrids and soma clones.</p> <p><b>PRODUCTION OF SECONDARY METABOLITES / NATURAL PRODUCTS :</b> Morphological and chemical differentiations, Medium composition for secondary product formation. Growth production patterns, Environmental factors. Selection of cell lines producing high amounts of a useful metabolite, Problems associated with secondary metabolite production. Immobilized cell system.</p> <p><b>TRANSGENICS IN CROP IMPROVEMENT:</b> Transgenic for Resistance to biotic and abiotic stresses, Transgenes for quality modification, Terminator seed technology. Chloroplast transformation and its utility.</p>
44	M.Sc. IV semester paper IV (E1)	Molecular plant pathology II	<p><b>UNIT-I</b></p> <p>1. <b>Epidemiology and disease forecasting:</b> form of epidemics, factors responsible for the establishment of an epidemic, disease forecasting.</p> <p>2. <b>General principles of plant disease control :</b>General account; Prophylactic. Chemical (including fungicides, systemic fungicides, fumigants, antibiotics, growth regulators etc.) and biological control; Breeding for disease resistance varieties of host plants, Plant quarantine.</p>

39  
प्राध्याप

			<p><b>UNIT-II</b></p> <p>1. <b>Defense Mechanism-</b> Defense of host against pathogen, Structural defense; Physiological defense, Biochemical defense-role of phenolic compounds; Phytoalexins Defense through hyper-sensitiverere actions.</p> <p>2. <b>Resistance and susceptibility:</b> General account, types of resistance, vertical and horizontal resistance; breeding for disease resistance.</p> <p><b>UNIT-III</b></p> <p>1. <b>Wilt diseases:</b> General account, systems of diseases, Mechanism of wilting.</p> <p>2. <b>Diseases due to fungi:</b> Rusts, smuts, Downy mildews powdery mildew diseases, Wilts, Leaf blight, Ergots, Tikka, necrosis, Rots-red rot of sugarcane, Damping off and warts diseases of economically important plants.</p> <p>3. <b>Diseases due to Bacteria:</b> Bacterial blight of Rice, Tundu disease, citrus canker, Crown galls of stone fruits, Angular leaf spots.</p> <p><b>UNIT-IV</b></p> <p>1. <b>Diseases due to Viruses:</b> Mosaic of tobacco, Potato and tomato, Leaf curl of tomato &amp; papaya, Yellow vein mosaic of Bhindi, Bunchy top of banana, Grassy shoot disease of sugarcane.</p> <p>2. <b>Diseases due to Mycoplasma:</b> Sandal spike, Little leaf of Brinjal, Grassy shoot disease, Sesamum, phyllody, Citrus greening.</p> <p>3. <b>Diseases due to Nematodes:</b> General characteristics of plants nematodes, Root knot, Malaya disease of Barley, wheat, Citrus nematodes, Ear cockle of wheat.</p>
45	M.Sc. IV semester lab course I		<p>Study of microsporogenesis and gametogenesis in sections of anthers.</p> <ul style="list-style-type: none"> <li>• Examination of modes of anther dehiscence and collection of pollen grains for microscopic examination (<i>Maize, Grasses, Cannabis Sativa, Crotolaria, Tradiscantia, Brassica, Petunia, Solunum melongena etc.</i>)</li> <li>• Tests for [p;;em voabo;otu isomg staoms and <i>in vitro</i> germination. Pollen germination using hanging drop and sitting drop cultures, suspension culture and surface culture.</li> <li>• Estimating percentage and average pollen tube length <i>in vitro</i>.</li> <li>• Role of transcription translation inhibitors on pollen germination and pollen tube growth.</li> <li>• Pollen storage, Pollen-pistil interaction, self-incompatibility <i>in vitro</i> pollination.</li> <li>• Study of ovule in cleared preparations, study of</li> </ul>

  
 प्राचार्य  
 शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
 - उत्तर जिला - दुर्ग (छ.ग.)

			<p>monosporic, bisporic and tetrasporic types of embryo sac development through examination of permanent, stained serial sections.</p> <ul style="list-style-type: none"> <li>• Field study of several types of flower with different pollination mechanisms (wind pollination thrips pollination bee/butterfly pollination, bird pollination.</li> <li>• Emasculation, bagging and hand pollination to study of pollen germination, seed set and fruit development using self compatible and obligate out crossing system. Study of ceistogamous flowers and. Their adaptations.</li> <li>• Study of nuclear and cellular endosperm through dissections and staining.</li> <li>• Isolation of zygotic, globular, heart shaped, torpedo stage and nature embryo from suitable seeds and polyembryony in citrus, jamun (<i>Syzygium cumini</i>) etc. by dissections.</li> <li>• Study of endospermic and non-endospermic seed.</li> <li>• Study of seed dormancy and methods to break dormancy.</li> </ul> <p>Medicinal and Aromatic plants; Depending on the geographical location College/University select five medicinal and aromatic plants each from a garden, crop field or from the wild only if they are abundantly available. <i>Papaver somniferum</i>, <i>Atropa belladonna</i>, <i>Catharanthus roseus</i>, <i>Adhatoda ceylanica</i>, <i>Allium sativum</i>, <i>Rauvolfia serpentina</i>, <i>Withania somnifera</i>, <i>Phyllanthus amarus</i>, <i>Andrographis paniculata</i>, <i>Aloe barbadense</i>, <i>Mentha arvensis</i>, <i>Rosa sp.</i> <i>Pogostemon cablin</i>, <i>Origanum vulgare</i>, <i>Vetivera zizanioides</i>, <i>Jasminum grandiflorum</i>, <i>Cymbopogon sp.</i>, <i>Pandanus odoratissimus</i>.</p> <ul style="list-style-type: none"> <li>• Study of live or herbarium specimens or other visual materials to become familiar with these resources.</li> <li>• Vegetable oils; Mustard, Groundnut, Soya bean, Coconut, Sunflower and Castor.</li> <li>• Gums, Resins, Tannins and Dyes; Perform simple tests for gums and resins. Prepare a water extract of vegetable tannins (<i>Acacia</i>, <i>Terminalia</i>, <i>Mangroves</i>, <i>Tea</i>, <i>Cassia sp.</i> <i>Myrobalans</i>) and dyes (<i>Turmeric</i>, <i>Bixa orellana</i>, <i>Indigo</i>, <i>Butea monosperma</i>, <i>Lawsonia intermis</i>) and perform tests to understand their chemical nature.</li> </ul>
46	M.Sc. IV semester Lab	Pathology	Experiment related to plant diseases and Pathology

  
प्राचार्य



	course II (E1)		
47	M.Sc. IV semester paper IV (E2)	Limnology II	<p><b>UNIT-I</b></p> <p>1. Study of Biota</p> <p>(a) Phytoplankton flora-classification of phytoplankton, special distribution of phytoplankton, seasonal distribution and species composition of phytoplankton. Algal blooms effects of salinity and climatic stresses on the distribution of phytoplankton, Phytobenthos- classification.</p> <p>(b) Phytoplankton and their inter-relationship with Zooplanktons.</p> <p>(c) Aquatic insects, birds and their environmental significance.</p> <p><b>UNIT-II</b></p> <p>1. Lake Flora-Higher Plants. Categories of aquatic higher plants, zonation of rooted higher plants, some peculiarities of aquatic higher plants.</p> <p>2. Lake Bacteria-occurrence, characteristics and importance.</p> <p>3. Ecological classification of aquatic higher aquatic plants and their significance.</p> <p>4. Biotic relationship and interaction among organisms. Symbiosis, competition among algae, Parasitism of algae, predation of algae, impact of human being on algae.</p> <p><b>UNIT-III</b></p> <p>1. Concept of Productivity: Seasonal variation, Primary productivity in freshwater lakes, Estimation of Primary Productivity.</p> <p>2. Bio indicators-Aquatic flora and fauna in relation to water quality in an aquatic environment.</p> <p>3. Use and misuse of in land waters.</p> <p>4. Methods of water quality testing BOD and COD.</p> <p><b>UNIT-IV</b></p> <p>2. Sewage-Definition, composition and its treatment.</p> <p>3. Pollution by Domestic and Agriculture sewage, Industrial effluent.</p> <p>4. Causes of pollution of Aquatic Resources, their management and conservation. 4.Resource Conservation- Aquatic pollution, control, legislation, regulation on discharge of industrial effluents and domestic wastes in rivers and reservoirs.</p>
48	M.Sc. IV semester Lab course II (E2)		<p>1. Primary production: Experiment-in-situ by light and dark bottle method.</p> <p>2. Short-term productivity experiments for the understanding of diel variation in aquatic systems.</p> <p>3. Analysis of sediments for benthic fauna and flora.</p>

  
प्राचार्य

49	M.Sc. IV semester paper IV (E3)	Ethanobotany II	<p><b>UNIT - I</b></p> <ul style="list-style-type: none"> <li>□ Plant Conservation by Tribes &amp; role of Joint Forest Management Programme in Plant Conservation specially People's Protected Area</li> <li>□ Ethno botany and its role in domestication and conservation of native plant and genetic resources.</li> <li>□ The protection of plant varieties and Intellectual Properties Rights.</li> <li>□ General account of conservation of medicinal plants.</li> <li>□ General role of Aromatic plants.</li> </ul> <p><b>UNIT-II</b></p> <ul style="list-style-type: none"> <li>□ General ideas of various system of medicine using plants.</li> <li>□ Basic knowledge of Ayurvedic, Homeopathic, Allopathic system of medicine.</li> <li>□ General idea of active principles of Plants.</li> <li>□ Herbal Cosmetics.</li> <li>□ General account of toxic plants and Harmful effect of plants on human society with special reference to allergic plants of Chhattisgarh.</li> </ul> <p><b>UNIT -III</b></p> <ul style="list-style-type: none"> <li>□ Endemic plants of Chhattisgarh.</li> <li>□ Endangered plants of Chhattisgarh.</li> <li>□ Techniques of cultivation and marketing of Aromatic plants - Podina, Lemon grass Kasturibhindi, Palmarosa.</li> <li>□ Techniques of cultivation ,marketing and importance of mushroom</li> <li>□ Techniques of cultivation, extraction of juice and importance of wheatgrass.</li> </ul> <p><b>UNIT-IV</b></p> <ul style="list-style-type: none"> <li>□ Ethnobotanical study of the following plants with special reference to their medicinal importance- 1. Allium sativum (Lahsun) 2. Aegle marmelos (Bel) 3. Terminallia arjuna (Arjun) 4 T. bellerica (Bahera) 5. Tchebula (Harra) 6. Calendula officianallis (Calendula) 7. Thuja occidentalis (Vidhya) 8 Dhatura alba (Dhatura) 9. Argemone maxicana (Pili kateli) 10. Ephedrasps. (Ephedra).</li> </ul>
50	M.Sc. IV semester Lab course II (E3)		<ol style="list-style-type: none"> <li>1. Ethnobotany</li> <li>2. Description and identification of medicinal plants and its medical properties.</li> <li>3. Extraction of phyto chemicals from various medicinal plants.</li> <li>4. Preparation medicinal plants herbarium and photographs.</li> <li>5. Herbal preparation-       <ol style="list-style-type: none"> <li>a. Preparation of digestive powder.</li> <li>b. Mouth freshener of Ajwain.</li> <li>c. Beverage of Tulsi,Bel,Tikhur, Mango.</li> <li>d. Ayurvedic teapreparation.</li> </ol> </li> </ol>

  
प्राचार्य

			<p>e. Tablet of amlavati. f. Murabba of Awla/Bel. g. Herbaldye h. Shitopladi powder. 6. Identification and study of Ethnobotanical importance of some plants of Raipur. To cultivate at least two medicinal plant in earthenpot.</p>
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38

प्राचार्य

राजकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)



## Course Outcome (Mathematics)

Our College offers three year undergraduate programs in science. In two programs with the combination (Physics, Chemistry, Mathematics) and in the combination (Physics, Computer science, Mathematics) students study mathematics. After the completion of this course in mathematics the student will:-

1. understand the foundation of mathematics
2. be able to communicate mathematical ideas with others
3. be able to use mathematical ideas to model real world problems
4. develop and maintain problem solving skills
5. be able to perform basic computation in higher mathematics
6. be able to appear for various competitive examinations like PSC, UPSC, SSC, in teaching, research institutes, railways etc.
7. be able to choose the career as teachers or researchers



प्राचार्य

राजकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उज्जैन जिला - दुर्ग (छ.ग.)

## Course Outcome (Physics)

Our institute offers three year undergraduate programs with different combination of subjects .A student may choose a course in Physics in BSc in the combination of subjects (Physics, Chemistry, Mathematics) or in the combination(Physics, Computer Science, Mathematics). On completion of under-graduate (B.Sc.) course in Physics by opting the above mentioned two combinations of subjects -

1. Students learn the basic mathematical tools, needed to understand different branches of Physics. They are trained to apply these techniques through numerical exercises.
2. They are familiarized with hands-on training in the furnished and equipped laboratory for practical verification of the physical theories that they learn during class lectures.
3. They are trained with the C language.
4. The course in Physics makes the students eligible for the further post-graduate studies in physics. They can apply for different integrated PhD courses.
5. They may appear for various competitive examinations like PSC, UPSC, SSC, in teaching, research institutes, railways etc.
6. Three years undergraduate course with Physics prepares the students for career as teachers or researchers in different branches in pure and applied physics.

39  
प्राचार्य  
राजकीय दानवीर तुलायम स्नातकोत्तर महाविद्यालय  
उदई जिला - बुर्ग (छ.प्र.)

## Course Outcome (Commerce)

Our college offers three years under graduate program in commerce in first two years all students study compulsory subjects but in 3rd year there is the facility of elective course in which students can choose one option out of the following four- (A –Finance area, B-Marketing Area, C-Commercial Area & D-Money, banking and Insurance Area :-

- The Degree course in commerce makes the students eligible for the further admission in post graduation in commerce and different professional course like C.A., ICWA, M.B.A. etc.
- They may appear for various competitive examination like State PSC, UPSC, SSC, CG Vyapam, Banking Institutions, railway etc. and also eligible for service in account and taxation related firms, self employment and establish own business.

  
PRINCIPAL  
Govt. Danveer Tularam P.G. College  
Utai, Distt.- Durg (C.G.)



Biotechnology is quite advance subject and has been so intelligently designed that graduate with this subject can be absorbed in pharma companies, agriculture sector, laboratories, hospitals, education sector, research field etc.

**HEMCHAND YADAV VISHWAVIDYALAYA,  
DURG (C.G.)**

**B.Sc.-I BIOTECHNOLOGY**

**PAPER – I**

**BIOCHEMISTRY, BIOSTASTICS AND COMPUTERS**

**UNIT-I**

1. Introduction to Biochemistry: History, Scope and Development.
2. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides.
3. Lipids: Structure, Classification and Function.

**Course outcome (CO)-The knowledge of such biochemical ingredients can give jobs of dietician, pharmacist.**

**UNIT –II**

1. Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.
2. Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application.

**Course outcome (CO)-The knowledge of such biochemical ingredients can give jobs in industries like pharmaceutical companies, beverages industries, food industry.**

**UNIT –III**

  
प्राचार्य

राजकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला – दुर्ग (छ.ग.)

1. Hormones: Plant Hormone-Auxin and Gibberellins and Animal Hormone-Pancreas and Thyroid.

2. Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain and  $\beta$ oxidation of Fatty acids.

**Course outcome (CO)-The knowledge of such biochemical metabolic activities can give jobs in medical, pharmaceutical sectors, vast scope in research fields.**

#### UNIT-IV

1. Scope of Biostatistics, Samples and Population concept, Collection of data-sampling techniques, Processing and Presentation of data.

2. Measures of Central Tendency: Mean, Median and Mode and Standard Deviation.

3. Probability Calculation: Definition of probability, Theorem on total and compound probability.

**Course outcome (CO)-The knowledge of statistics is essential in every field of commercial as well as in educational sectors, hence it may fetch job in any field.**

#### UNIT-V

1. Computers - General introduction, Organization of computer, Digital and Analogue Computers and Computer Algorithm.

2. Concept of Hardware and Software, Input and Output Devices.

3. Application of computer in co-ordination of solute concentration, pH and Temperature etc., of a Fermenter in operation and Internet application.

**Course outcome (CO)-The knowledge of computer operation is essential in every field of life, therefore it has immense importance in job sectors.**



## 2.6.2 Program outcomes/Course outcomes

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)

B.Sc-I BIOTECHNOLOGY

PAPER – IBIOCHEMISTRY, BIOSTATISTICS AND COMPUTERS

### UNIT-I

1. Introduction to Biochemistry: History, Scope and Development.
  2. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides.
  3. Lipids: Structure, Classification and Function.
- **This is based on Biochemical Ingredients required for Cellular structure, Components of food etc.**

### UNIT –II

1. Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.
  2. Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application.
- **This is based on proteins, It gives the elementary idea of proteins, enzymes, required for any Research Lab.**

### UNIT –III

1. Hormones: Plant Hormone-Auxin and Gibberellins and Animal Hormone-Pancreas and Thyroid.
  2. Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain and  $\beta$ oxidation of Fatty acids.
- **This unit gives the Idea of Plant and Animal Hormones and Metabolic activities in living beings. This helps in further studies and Research works.**

### UNIT-IV

1. Scope of Biostatistics, Samples and Population concept, Collection of data-sampling techniques, Processing and Presentation of data.
2. Measures of Central Tendency: Mean, Median and Mode and Standard Deviation.
3. Probability Calculation: Definition of probability, Theorem on total and compound probability.



- **The most important subject which is essential to Correlate the findings of Research work.**

#### UNIT-V

1. Computers - General introduction, Organization of computer, Digital and Analogue Computers and Computer Algorithm.
2. Concept of Hardware and Software, Input and Output Devices.
3. Application of computer in co-ordination of solute concentration, pH and Temperature etc., of a Fermenter in operation and Internet application.

- **The Preliminary Idea of computer gives to learn about Computer Hardware and Software which is very essential for every Job.**

## B.Sc.-I

### BIOTECHNOLOGY PAPER-II

#### CELL BIOLOGY, GENETICS AND MICROBIOLOGY

##### UNIT-I

1. Concept of life, Cell as a basic unit of living system and Cell theory.
2. Diversity of Cell shape and size.
3. Prokaryotic cell structure: Function and ultra structure of cell (Gram positive and Gram negative Bacteria), Plasma membrane, Flagella, Pilli, Endospore and Capsule.
4. Eukaryotic cell: Plant cell wall and Plasma membrane.

**Course outcome (CO)-The knowledge of cells has scope in the field of molecular biology hence research can be persued.**

##### UNIT-II

1. Cytoplasm: Structure and Functions of Endoplasmic reticulum, Ribosome, Golgi complex, Lysosomes, Nucleus, Mitochondria and Chloroplast.
2. Cytoskeleton: Microtubules, Microfilaments and Intermediate filaments.
3. Cell division: Mitosis and Meiosis.
4. Programmed Cell Death. .

**Course outcome (CO)-The knowledge of cells has scope in the field of molecular biology hence research can be persued.**

##### UNIT-III

1. Mendel's Laws of Inheritance.
2. Linkage and Crossing over.

  
प्राचार्य  
शासकीय दामवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)

3. Chromosome variation in number and structure: Deletion, Duplication, Translocation, Inversion and Aneuploidy, Euploidy (Monoploidy and Polyploidy and its importance).

**Course outcome (CO)-The knowledge of genetics can give opportunity in modern technology of genome sequencing, in study of congenital diseases etc.**

#### **UNIT-IV**

1. History, Scope and Development of Microbiology.
2. Basic techniques of Microbial Culture
3. Microbial Growth & Nutrition of Bacteria: Isolation, media sterilization- physical and chemical agents, pure culture-pour plate method, streak plate method and spread plate method.
4. General features and Economic importance of Fungi, Algae and Protozoa etc.

**Course outcome (CO)-The knowledge of microbiology is very essential to understand the role of microbes in present scenario of epidemic and pandemics. It gives idea of antibiotics, jobs in labs can be fetched.**

#### **UNIT-V**

1. Bacterial Reproduction: Conjugation, Transduction and Transformation.
2. Mycoplasma – History, Classification, Structure reproduction & Diseases.
3. Viruses – Basic features, Structure, Classification, Multiplication, Bacteriophages (Morphology, life cycle, infection and medicinal importance)

**PO/CO in Biotechnology is quite overwhelming as it opens new horizon in the modern technology .Therefore students**

**Persuing the course have scope to go in research field,industry like,cosmetics mining, beverage companies. Even one can set up its own startup like in field of agriculture, cosmetic production ,health sectoretc.**





**HEMCHAND YADAV**  
**VISHWAVIDYALAYA, DURG (C.G.)**

B.Sc. II BIOTECHNOLOGY

PAPER – I

MOLECULAR BIOLOGY & BIOPHYSICS

M.M. 50

**All the unit of paper-I are very essential to persueresearch work**

**UNIT-I**

1. Nucleic Acid: Bases, Nucleosides and Nucleotides, DNA and RNA structure.
  2. Plasmids.
  3. Transposons: Repetitive elements, LINEs & SINEs, Structure of Gene.
- **It gives the detail of Nuclear and genetic structure useful in understanding of basis of cellular working.**

**UNIT-II**

1. DNA Replication: Enzymes involved and mechanism of DNA Replication in Prokaryotes.
  2. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutation.
  3. DNA Repair: NER, BER and Mismatch Repair.
- **This unit is based on handling of Genetic Material, mutational studies etc.**

**UNIT-III**

  
प्राचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय,  
दुर्ग (C.G.)

1. Genetic Code: Features, Condon Assignment and Wobble hypothesis.

2. Transcription: Initiation, Elongation and Termination in Prokaryotes.

3. Translation: Initiation, Elongation and Termination Translation machinery in Prokaryotes. Operon-Concept of Operator, Regulator, Promoter gene, Inducer and Co-repressor.

- **It gives the idea of Genetic code ,hence understanding of basis of mutation becomes evident.**

#### UNIT –IV

1. Biophysics : Introduction, Scope and Application

2. Principle, Structure, Functions of the following: a. Microscopy b. Colorimeter and Spectroscopy c. Electrophoresis d. Centrifugation e. Chromatography.

- **It gives the idea of Biophysics. The basic studies in Instrumentation in Cell and Molecular Biology can be done by learning the various instruments etc.It is very effective in biomedical**

#### UNIT –V

1. Radioisotopes techniques: Measurement of radioactivity, Ionization Chambers, Geiger Muller and Scintillation Counter.

2. Autoradiography and DNA Fingerprinting.

3. Biosensor.

- **This unit is essential in modern world of technology,interdisciplinary research field..**

  
प्राचार्य

शासकीय दार्ष्टिक मुन्नाशम रत्नातकोत्तर महाविद्यालय  
लेतड जिला - दुर्ग (छ.ग.)

B.Sc. II  
BIOTECHNOLOGY  
PAPER II

RECOMBINANT DNA TECHNOLOGY AND GENOMICS    M.M50

UNIT-I

1. Recombinant DNA technology: General concept. Steps in gene cloning and application.
  2. Host controlled Restriction Modification System, Ligases and Polymerases, Klenow fragment, Taq, Pfu polymerase and Nuclease (Endo, Exo and restriction endonuclease).
  3. Modification Enzyme (Kinase, Phosphates and terminal deoxynucleotidyl transferase). Reverse Transcriptase.
- **This unit being with Research work in present scenario, gives the detail idea of Prokaryotes, their role in gene cloning**

UNIT -II

1. Vectors: Plasmid, Bacteriophages, Cosmid, SV40 and Expression vectors.
  2. Gene Library: Genomic and cDNA library.
  3. Selection and Screening of Recombinants: Genetic and Hybridization methods.
- **Gene library, DNA library etc. are studied, this are all essential in Research work.**

UNIT -III

  
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1. PCR: Types of PCR, Steps (Denaturation, Annealing and Extension); Applications, Advantages and Limitation of PCR.

2. Molecular Marker-RFLP, RAPD and Micro array.

3. Human Genome Project.

- **These techniques are useful in Gene Cloning. This unit gives the idea of Human Genome Project and student can go for Research Work.**

#### UNIT-IV

1. Basic concept of Gene Transfer Methods: Microinjection, Electroporation, Lipofection and Microprojectile.

2. Gene Therapy: In vivo and Ex vivo, Germ line and Somatic gene therapy.

3. Basic idea of Stem cell technology: Types of stems cell cultures and their Significance.

- **This unit gives future scope for Gene therapy, use of Stem cell etc.**

#### UNIT-V1.

1. Introduction to Bioinformatics: History, Objective and Application.

2. Major Bioinformatics Resource – NCBI , Types of Databases (Primary and Secondary Databases) , BLAST and FASTA

3. Basic concept of Genomics and Proteomics.

- **Bioinformatics is the demand of the Modern world.**

  
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## List of Practicals

### **MOLECULAR BIOLOGY, BIOPHYSICS, RECOMBINANT DNA TECHNOLOGY AND GENOMICS**

1. Isolation of DNA from Plant cell.
  2. Estimation of DNA by DPA method.
  3. Isolation RNA from yeast cells Experiment based on
  4. Centrifugation
  5. Spectrophotometer/Colorimeter
  6. Electrophoresis
  7. Paper chromatography/TLC Experiment based on Bioinformatics –
  8. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI).
  9. Use of tools studied.
- **Lab course is design in such a way that genetic material can be handled using various Instruments and Biotechniques.**
  - **It may give the jobs in various pharmaceutical companies,agriculture sector etc.**

  
प्राध्याप्य  
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उतई जिला - दुर्ग (उ.ग.)

**B.Sc.III BIOTECHNOLOGY**  
**PAPER - I**  
**GENERAL BIOTECHNOLOGY**

**Plant, Environment and Industrial Biotechnology**

**Time : 3 Hrs MM-50**

**UNIT-I**

Plant cell and tissue culture : General introduction history, scope.

Application of tissue culture

Concept of cellular differentiation.

Agro bacterium. Ti and Ri plasmid.

Bt gene. Molecular marker (RFLP, RAPD), edible vaccines.

- **This paper gives the idea of Plant tissue Culture, Bioreactor. By studying this paper-1 student can go to Research field to various Industries like- food industry, chemical industry etc.**

**UNIT-II**

Organogenesis, Embryogenesis. Protoplast isolation and fusion. Germplasm storage and Cryopreservation.

Anther and Ovary culture.

**The course outcome of this unit is equally beneficial to the student of zoology and botany. Students can persuade the higher studies in both the branches. it is beneficial to agriculture and entemology.**

**UNIT-III**

General introduction and scope of environmental biotechnology. Environmental pollution and its type.

Control of pollution through biotechnology, Wastewater treatment:- Physical, Chemical, and Biological.

  
प्रचार्य

शासकीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उत्तर जिला - दुर्ग (छ.ग.)



**The course outcome of this unit is useful in the field of pollution control. In present scenario pollution is the greatest threat in every field. Therefore knowledge in this field is essential.**

#### **UNIT-IV**

Biofertilizer, Biopesticides, IPR.

Global environmental problem- General introduction, Ozone depletion. Acid rain.

Green house effect.

**The course outcome of this unit is useful in the field of industries related with production of biofertilizers ,biopesticides.which may reduce the health hazards.**

#### **UNIT-V**

**The course outcome of this unit is useful in the field of food industries ,enzyme production.**

Bioreactors and its type.

Fermentation (Lactic acid, alcohol).

Maintenance of Industrial microorganisms.

Food technology- introduction, canning, packing and food preservation.

#### **PAPER – II**

##### **IMMUNOLOGY**

**This paper has tremendous scope in Medical Science in preparing Vaccines for various diseases, gives the idea of various auto immune diseases etc.**

#### **UNIT-I**

Immunology - General Concept, history and Development.

Immune system and immunity, Organization of Immune system.

Antigen - Antibody and its type.

**The course outcome of this unit is useful in the study of immune system which opens the road to make vaccines, antibiotics.**

## UNIT-II

Cell involved in immune system. Type and cells. Basic structure and function.

Cytokines.

Cell mediated immunity Interferons. Hypersensitivity.

**The course outcome of this unit is useful in the study of immune system which opens the road to make vaccines, antibiotics. It gives an idea to fight with microbes.**

## UNIT-III

Antigen - antibody interaction. Principles and types.

Immunohaematology - General concept. Blood group system. Rh factor. medical application of blood groups.

**The course outcome of this unit is useful in the study of hematology, it has scope in field of pathology.**

## UNIT-IV

Origin and diversity in immune system.

Effectors mechanisms. Immunity of infection diseases monoclonal Antibodies.

medical application of blood groups.

**The course outcome of this unit is useful in the study of antibodies, useful in vaccine synthesis/production.**

## UNIT-V

Autoimmune diseases. Hemolytic anemia. Rheumatoid arthritis. Insulin dependent diabetes. Myasthenia gravis.

Organ transplantation. Immunodeficient diseases. Cancers. AIDS.

**The course outcome of this unit is useful in the study of various diseases related with autoimmunity, viral, inherited disorders.**

## PRACTICAL



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## **EXPERIMENTS**

### **Plant :**

1. Sterilization of plant materials.
2. Preparation of Tissue culture media.
3. Plant tissue culture by plant parts.

### **Environment :**

1. Determination of total dissolved solids of water.
2. Determination of DO, BOD, COD of water.
3. MPN Test.


### **Industrial :**

1. Food preservation techniques.
2. Application of biopesticides on microorganisms
3. Production of Citric acid by microorganisms.

### **Immunology :**

1. Blood grouping in relation to Antigen Antibody interaction.
2. Rh factor determination.
3. Widal Test
4. VDRL Test.
5. Double diffusion experiment
6. ELISA Test BIOTECHNOLOGY

Lab course is designed as per the recent technology where modern technologies are included to give expertise in identification of various haematological ,immunological,physiological disorders.

  
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शासकीय दारुगरी तुलाराम भनातकोतर महाविद्यालय  
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## 2.6.2 Program outcomes/course outcomes

The entire syllabi is designed in such a manner that the students graduated with these courses can be absorbed in industries, Hospitality sector, Health sector, Education field, Civil services, Forces etc.

Program outcome (PO)&Course Outcome (CO)

Govt.DTPG UG College is running several Programmes and their courses/subjects.

Institute has UG& PG Programme where following courses are running:

B.A.-It has number of programmes like

1.Hindi language,English language, Economics,Hindi Lit, History.

2.Hindi language, English language, Sociology, Political Science,Hindi Lit.

3.Hindi language, English language, Sociology, Political Science,History.

4.Hindi language, English language, Sociology, Hindi lit.,History.

5.Hindi language, English language, Sociology, Political Science, Economics.

B.Sc.It has 5 programmes like

प्राचार्य

**B.Com. has 18 papers in a graduate courses which includes F.C. (Hindi, English & Environmental studies only in 1<sup>st</sup> year)**

It has immense opportunity for a commerce graduate to be absorbed in any commercial and industrial sector.

- They have opportunity to appear in various competitive exam- at district/ state/national level. Vyapam, SSC, PSC, UPSC etc.
- They can go to ICWA, CA & MBA.



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1. Physics, Chemistry, Mathematics.
2. Physics, Computer science, Mathematics.
3. Chemistry, Botany, Zoology.
4. Chemistry, Biotechnology, Zoology.
5. Chemistry, Botany, Zoology.

PG Courses-There are 6 PG courses viz

1. M.Sc. in Botany
2. M.A. In Political Science
3. M.A. In Economics
4. M.A. In History
5. M.A. In Sociology
6. M.A. In Hindi

II PO/Course outcome of zoology

Zoology has 2 papers in first, second and third year with a practical in each year. In 6 papers and 3 lab courses student has vast opportunity to learn about animal kingdom.

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B.Sc.1st year has following units in paper I  
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Zoology

B.Sc. Part I (2019-20)

Paper I

(Cell Biology and Non-chordata)

Unit:I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear

Plasma membrane, Mitochondria,  
Endoplasmic reticulum, Golgi body, Ribosome  
and

Lysosome).

3. Nucleus, Chromosomes, DNA and RNA

**Students learn about non chordates and  
basic unit of life by studying cell biology**

Unit:II

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1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

**This unit gives an idea of disease like cancer and immunity. These are basics of medical science.**

Unit:III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.

2. Protozoa: Type study - Paramecium,
2. Porifera: Type study - Sycon.
3. Coelenterata: Type study – Obelia

**This unit is about invertebrates and their examples showing organization. It teaches**

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them how the evolution occurred from single cell to multicellular organism.

Unit: IV

- General characters and classification of Phylum Platyhelminthes, Nematelminthes, Annelida and Arthropoda up to order.

2. Platyhelminthes and Nematelminthes:  
Type Study – Fasciola, Ascaris

3. Annelida: Type Study - Pheretima.

4. Arthropoda: Type Study - Palaemone.

**This unit covers invertebrates causing pathogenicity as well as higher invertebrates with their economic importance like friends of gardener earthworm used as vermicompost and prawn as food.**

Unit:V

- General characters and classification of Phylum Mollusca and Echinodermata up to

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भारतीय दान. सुला. पी. जी. महाविद्यालय  
उन्नाव जिला - बुढ़ (उ.प्र.)



order.

2. Mollusca: Type Study - Pila.

3. Echinodermata- Type Study- Asterias (Starfish)

Fifth unit tells about the marine world of animals teaching about their specific nature. In future it helps in oceanology, flora and fauna of marine water etc.

Paper II contains

Zoology

B.Sc. Part I (2019-20)

Paper II

(Chordata and Embryology)

This paper is about the vertebrate animals i.e. animals having vertebral column and development of animals.

Unit:I

1. Classification of Hemichordata

2. Hemichordata- Type study-Balanoglossus

3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

**This unit gives the idea of primitive chordates living in water.**


#### Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

**This unit covers the vertebrates with great economic importance like fishes. Idea of herpetology can fetch the job in forest.**

#### Unit-:III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are

  
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glorified reptiles.

2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.

3. Aquatic Mammals and their adaptations.

**This unit tells about the uniqueness of flying animals i.e. birds and vast biodiversity among mammals.**

Unit:IV

1. Fertilization

2. Gametogenesis, Structure of gamete and Types of eggs

3. Cleavage

4. Development of Frog up to formation of three germ layers.

5. Parthenogenesis

**This unit make the student learn about how development had occurred. This field helps in medical science in future.**



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उतई जिला - दुर्ग (छ.ग.)



## Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals


**Unit IV & V make the student learn about how development had occurred. This field helps in medical science in future.**

## Zoology

B.Sc. Part I (2019-20)

### Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-

  
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उतई जिला - दुर्ग (छ.ग.)

- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)

- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam Time: 3hrs

1. Major Dissection 10 Marks
2. Minor Dissection 05 Marks
3. Comments on Excercise based on Adaptation 04 Marks
4. Cytological Preparation 05 Marks
5. Spots-8 (Slides-4, Specimens-4) 16 Marks



प्राचार्य

शासकीय दान. तुला. पी. जी. महाविद्यालय  
उत्तर्ई जिला - दुर्ग (छ.ग.)

6. Sessional 10 Mark

**Lab course is so designed that a student can learn anatomy ,cellular activity, variety of adaptations in animal kingdom as well as performance in laboratory.**

B.Sc. II nd Year – It has 2 papers comprising of following units-

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Zoology

B.Sc. Part – II (2019-20)

Paper – I

(Anatomy and Physiology)

**This paper teaches about anatomical study of animals of various classes along with working of various organ system.**

Comparative Anatomy of various organ systems of vertebrates:

Unit: I



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- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

**This unit covers comparative organ system of vertebrates. This comparison gives an idea of animals if one wants to deal with them.**

Unit: II

- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton

Limbs and girdles

- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

**This unit gives an idea on osteology, cardiovascular system and urology. One can**

**persue the future in pathology lab after learning these systems.**

**Unit: III**

- **Nervous System: General plan of brain and spinal cord**
- **Ear and Eye: structure and function**
- **Gonads and genital ducts**

**This unit tells about neurology, vision ,auditory and reproductive systems in various animals giving a scope to learn a scientific approach of body working.**

**Unit: IV**

- **Digestion and absorption of dietary components**
- **Physiology of heart, cardiac cycle and ECG**
- **Blood Coagulation**
- **Respiration: mechanism and control of breathing**



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**शासकीय दान. तुला. पी. जी. महाविद्यालय  
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**This unit gives an idea of food ,nutrition, digestion, ECG, pulmonary field helping the student to choose any field to work with.**

**Unit: V**

- **Excretion: Physiology of excretion, osmoregulation**
- **Physiology of muscle contraction**
- **Physiology of nerve impulse, Synaptic transmission**

**This unit opens the vast scope in the field of neurosciences, muscular physiology, Imp.role of electrolytes in body etc.**

**Zoology**

**B.Sc. Part – II (2019-20)**

**Paper-II**

**VERTEBRATE  
REPRODUCTIVE BIOLOGY**

**ENDOCRINOLOGY,**

  
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## BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

**This paper has covered the vast opportunity in learning about body physiology as well as Reproductive physiology.**

**Unit: I**

- Structure and function of Endocrine glands
- Hormone receptor
- Biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones
- Endocrine disorder of pituitary, thyroid, adrenal and pancreas

**This unit covers the endocrine glands and their role in various diseases, hormonal activities etc. It helps the scientific temperament of students about the bodily activities.**

**Unit:II**

- Reproductive cycle in vertebrates

- Menstruation, lactation and pregnancy
- Mechanism of parturition
- Hormonal regulation of gametogenesis

**This unit is immensely important to make a beginner to understand about physiological activities taking place in opposite gender.**


**Unit: III**

- Evidences of organic evolution.
- Theories of organic evolution.
- Variation, Mutation, Isolation and Natural selection.
- Evolution of Horse

**This unit is very interesting showing the evolutionary history of animal kingdom and geological activities occurred in past.**

**Unit:IV**

- Introduction to Ethology: Branches and concept of ethology.


  
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उत्तर जिला - दुर्ग (छ.ग.)

- Patterns of Behaviour, Taxes, Reflexes, Drives and Stereotyped behaviour.
- Reproductive behavioural patterns.
- Drugs and behavior, Hormones and behaviour

**This is very interesting unit telling about behavioural aspect of diverse animal kingdom including reproductive patterns in animal kingdom as well as inborn and learning activities.**

**Unit:V**

- Prawn Culture
- Sericulture
- Apiculture
- Pisciculture
- Poultry keeping
- Elements of Pest Control: Chemical & Biological Control.

  
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**This is the applied aspect of the subject Zoology giving immense scope to establish own start ups.**

## **Zoology**

**B.Sc. Part II (2019-20)**

### **Practical**

**The practical work in general shall be based on the syllabus prescribed and the students will be**

**required to show the knowledge of the following:**

- Study of the representative examples of the different chordates (Classified characters).**
- Dissection of various systems of scoliodon- Afferent and Efferent branchial cranial nerves, internal ear.**

**Alternative methods: By Clay/Thermacol/ Drawing/ Model etc.)**



**प्राचार्य**

**रासकीय दान, तुला. पी. जी. महाविद्यालय  
उतई जिला - दुर्ग (उ.प्र.)**

- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behaviour.

**Scheme of Practical Exam Time: 3:30hrs**

- Major dissection (Cranial nerves/efferent branchial vessel) 10
- Exercise based on evolution 05
- Exercise based on applied zoology 05
- Exercise based on animal behavior 04
- Spotting-8 (slides-4, bones-2, specimen-2)

16

- Viva 05
- Sessional marks. 10

Lab course of B.Sc.II nd year teaches anatomy of fishes, osteology of all classes of vertebrates, evolutionary models of animals, behavioural aspect of animal kingdom and most importantly applied aspect of the subject where economically important organisms like honey bees and silk worms are studied to learn the production of honey, wax, silk , pisciculture /aquaculture can procure fishes prawn etc.

ZOOLOGY B.Sc.Final year has 2 papers with 5 units each. Every unit has essential components to make the student well versed about his/her surroundings i.e. Nature ,microbial world, toxicology, pathogenicity

  
प्राचार्य  
शासकीय दान. तुला. पी. जी. महाविद्यालय  
उतई जिला - दुर्ग (छ.प्र.)



## Paper-I (Paper Code-0917)

Ecology, Environmental-biology ; Toxicology ;  
Microbiology and Medical Zoology.

2. Attempting one question from each unit will be compulsory. 100% choice be given.

### UNIT-I (ECOLOGY)

1. Aims and scopes of Ecology.
2. Major ecosystems of the world-Brief introduction
3. Population- Characteristics and regulation of densities.
4. Communities and Ecosystems.
5. Biogeochemical cycles
6. Air and water pollution
7. Ecological succession

**This unit has covered the ecological aspect of universe comprising of physical features, demography and burning problems of pollution. By obtaining knowledge of such**



प्राचार्य  
शासकीय दान. तुला. पी. जी. महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)

topics one can work with pollution control agency, there is scope in geology department.

## UNIT-II (ENVIRONMENTAL BIOLOGY)

1. Laws of limiting factors
2. Food chain in a freshwater ecosystem.
3. Energy flow in ecosystem-Trophic levels
4. Conservation of Natural resources
5. Environmental impact Assessment

This unit teaches the Nature, its importance, **FOOD CHAIN OF LIVING BEINGS**, concept of energy in environment, most importantly they will know value of natural resources.

## UNIT-III (TOXICOLOGY)

1. Definition of Toxicity
2. Classification of toxicants

3. Principle of systematic toxicology

4. Toxic agents and their action- Metallic and inorganic agents

5. Animal poisons - Snake-venom, Scorpion and bee poisoning

6. Food poisoning

**Toxicology is important in the field of forensic science, one can be aware of animal venomes and protection, awareness about food hygiene etc.**

#### **UNIT-IV (MICROBIOLOGY)**

1. General and Applied microbiology.

2. Microbiology of Domestic water and sewage.

3. Microbiology of milk and milk products.

4. Industrial microbiology.

**The field of microbiology teaches the role of microbes not only in diseases but industry**





too. Students can get job in PHE ,any food bakery,beverage industry.

### UNIT-V (MEDICAL MICROBIOLOGY)

1. Brief introduction to pathogenic micro-organisurs, Rickettsia,

Spirochaetes and Bacteria.

2. Brief account of life-history and pathogenicity of the following

pathogens with reference to man ; Prophylaxis and treatment -

(a) Pathogenic Protozoans - Entamoeba, Trypanosoma, and Giardia

(b) Pathogenic helminths - Schistosoma

(c) Nematode Pathogenic parasites of man

3. Vector insects

Medical microbiology gives opportunity to know about the pathogenicity of several microbes. One can get jobs in field of

प्रचार्य

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pathology ,awareness increases about water ,food and personal hygiene.

PAPER-II

(Paper Code-0918)

(GENETIC'S, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES)

Note : Attempting one question from each unit will be compulsory, 100% choice be given.

UNIT-I (GENETIC'S)

1. Linkage and Linkage maps
2. Varieties of gene expression - Multiple alleles ; lithogenesis ; Pleiotropic genes; gene interaction ; epistasis.
3. Sexchromosome systems, and sex-linkage.

  
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उजई मिला - दुर्ग (छ.प्र.)

4. Mutation and chromosomal alterations ; meiotic consequences.

5. Human genetics - chromosomal and single gene disorders (somatic cell genetics)

**This unit covers genetics gives the basic idea of congenital disorders and make the student aware about gene related transmission of diseases thereby reducing the chances of spread of hereditary disorders like sickle cell anaemia etc.**

#### UNIT-II(CELL PHYSIOLOGY)

1. General idea about pH and Buffer.

2. Transport across membrane - cell membrane; Mitochondria and Endoplasmic reticulum.

3. Active transport and its mechanism; Active transport in Mitochondria and Endoplasmic reticulum.



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4. Hydrolytic enzymes - Their chemical nature, Activation and specificity.

**This unit teaches the cellular activities thereby scope of research increases.**

### UNIT-III (BIOCHEMISTRY)

1. Amino acids and Peptides - Basic structure and biological function.

2. Carbohydrate and its metabolism - Glycogenesis; Gluconeogenesis; glycolysis, Glycogenolysis; Cosis-cycle.

3. Lipid metabolism - Oxidation of glycerol; oxidation of fatty acid.

4. Protein metabolism - Deamination, Transamination, Transmethylation; Biosynthesis of Protein;

This unit gives the idea of role of food and nutrition, balanced diet.



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**This Unit gives the idea of physiology so that it gives the knowledge of medical science. The preliminary idea opens the path for medical science like courses in pathology etc.**

#### **UNIT-IV (BIOTECHNOLOGY)**

- 1. Biotechnology - Scope and importance.**
- 2. Recombinant DNA and Gene cloning.**
- 3. Cloned genes and other tools of biotechnology.**
- 4. Applications of biotechnology in (i) Pharmaceutical industry, and (ii) Food processing industry.**

**This unit gives the ample scope of research in medicines, agriculture and various industries.**

#### **UNIT-V(BIOTECHNIQUE)**

**Principles and techniques about the following**

  
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1. pH meter
2. Colorimeter
3. Microscopy-Light microscopes, Phase contrast and Electron microscopes.
4. Centrifugation
5. Separation of biomolecules by chromatography, and Electrophoresis
6. Histochemical methods for determination of Protein, Lipids, and carbohydrate

**This unit is based on instruments, their working and uses etc. It can be useful fetching jobs in any research lab, pharmaceutical industry etc.**



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## PRACTICAL WORK

The Practical work in general shall be based on syllabus prescribed in theory.

The candidates will be required to show knowledge of the following :

1. Estimation of population density, Percentage frequency, Relative density.
2. Analysis of Producers and consumers in grassland.
3. Detection of gram-negative and gram-positive bacteria.
4. Blood group detection (A,B, AB & O).
6. R.B.C., W.B.C. count.
6. Blood coagulation time.
7. Preparation of Hematin crystals from blood of rat.
8. Observation of Drosophila, wild and mutant.
9. Chromatography-Paper or gel.

  
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10. Colorimetric estimation of hemoglobin.
11. Mitosis in onion root tip.
12. Biochemical detection of Carbohydrate, Protein and Lipid.
13. Study of Permanent slides of Parasites, based on theory paper.
14. Working Principles of pH meter, Colorimeter, centrifuge and microscopes.

#### SCHEDULE FOR PRACTICAL EXAMINATION

Duration : 4 Hrs. Max Marks : 50

1. Haematological Experiment : 08 marks

(R.B.Cs./W.B.Cs. Counting/Blood group detection)

2. Ecological Experiment : 06 marks

(Estimation of Population Density/Frequency/relative Density)

3. Staining of Gram +ve and Gram -ve Bacteria/cytological 05 marks

experiment : Mitosis in onion root tip



4. Biochemical Experiment : 06 marks

(biochemical detection of carbohydrate/protein lipid)

5. Chromatography 05 marks

6. Spotting : 10 marks

Study of permanent slides of Parasites : 3

Comments on working Principles of pH meter /

Calorimeter / centrifuge and Microscope :

7. Viva Voce 05 marks

8. Sessional : 05 mark

**Practical Courses are designed in such a way that students have scope to get the opportunity to work in**

**-environmental, pathological, instrumental chemical industries or labs.**

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## **Course Outcome (Computer Science)**

Our institute offers three year undergraduate programs in science. In one of these programs students study computer science with the subject combination (Physics, Computer Science, Mathematics). On completion of this course in computer science students become able to

1. analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. communicate effectively in a variety of professional contexts.
4. recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. apply computer science theory and software development fundamentals to produce computing-based solutions.
7. to apply for the further studies in subject.
8. to appear for various competitive exams for their career.

## Course Outcome (Sociology)

This course will enhance the professional skills of all the students in social welfare, labour welfare women and child development and administration domain after completion of this course a student will be able to understand :-

- Helpful in understanding the basic connects of sociology from a scientific point of view.
- Information about the practical and professional importance of sociology.
- Generalization of the principles of ancient and modern social thought
- Knowledge of structural and institutional aspects of Indian society.
- Helpful in understanding the major problems of Indian society.
- Crime, punishment and correctional process in society.
- The basic concept of tribal society and its problems.
- Social changes and problems in importance of research methodology.
- Basic concepts of statics such as measures of central tendency, dispersion etc.
- Helpful in the formulation of social policies.
- Availability of new knowledge for social welfare.
- Rural structure the necessary knowledge has helped in rural reconstruction and planning.
- Impact of industrialization.
- Information about gender inequalities.
- Impact of social movements on various sectors.

  
प्राचार्य

राष्ट्रीय दानवीर तुलाराम स्नातकोत्तर महाविद्यालय  
उतई जिला - दुर्ग (छ.ग.)

## Course Outcome(Political Science)

This course will enhance the professional skills of all the students in constitution, public administration, foreign policy, judiciary after completion of this course a student will be able to understand :-

- Aware of the ideas of ancient medieval, modern Indian and western political thinkers.
- Familiar with different ideologies related to politics.
- Background of the making of the Indian constitution, features of the constitution fundamental rights, fundamental duties and information on the main articles and section of the constitution.
- Knowledge of problems of Indian political system.
- Knowledge of traditional and modern method of study of politics and understanding of political theories and concepts.
- Understand the manufacturing system and industries of international and regional organization.
- Information about foreign policy of Indian, Pakistan, shri Lanka, china, Russia, America.
- Approaches to the study of public administration.
- Financial administration in Indian.
- Information about the method of research methodology.
- Effects of national movement in Chhattisgarh, role of Chhattisgarh state information about contribution of great men of Chhattisgarh in political social sector of Chhattisgarh.

  
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## Course Outcome (Chemistry)

Our institute offers three year undergraduate programs with different combination of subjects .A student may choose a course in Chemistry in BSc in the combination of subjects (Physics, Chemistry, Mathematics, Botany, Zoology. Microbiology, Biotechnology) On completion of undergraduate (B.Sc.) course in Chemistry by opting the above mentioned combinations of subjects -

1. Students learn the basic Fundamental Concept, needed to understand different branches of Chemistry. They are trained to apply these techniques through numerical exercises.
2. They are familiarized with hands-on training in the furnished and equipped laboratory for practical verification of the Chemistry theories that they learn during class lectures.
3. They are trained with the Chemistry Practical and Handle analytical instruments.
4. The course in Chemistry makes the students eligible for the further post-graduate studies in Chemistry. They can apply for different integrated PhD courses.
5. They may appear for various competitive examinations like PSC, UPSC, SSC, teaching, research institutes, services, railways etc.
6. Three years undergraduate course with Chemistry prepares the students for career as teachers or researchers in different branches in pure and applied Chemistry.



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