

**RAJEEV GANDHI GOVT. POST GRADUATE COLLEGE
AMBIKAPUR, SURGUJA (C.G.) INDIA**



**Learning Outcome based Curriculum
For
UNDERGRADUATE PROGRAMME
In
BOTANY
(2021-2024)**

B.Sc. BOTANY PROGRAMME OUTCOME

PO1. Knowledge and understanding of: Different concept of botany like: The range of plant diversity in terms of structure, function and environmental relationships, The evaluation of plant diversity, Plant classification and the flora of Chhattisgarh, The role of plants in the functioning of the global ecosystem etc.

PO2. Intellectual skills for:

1. Think logically and organize tasks into a structured form.
2. Assimilate knowledge and ideas based on wide reading and through the internet.
3. Transfer of knowledge and methods from one topic to another within the subject.
4. Understand the evolving state of knowledge in a rapidly developing field.
5. Construct and test hypothesis.

PO3. Practical skills and Application: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules.

PO4. Awareness regarding Environmental concern: Understand the and the role of plants in sustaining life on earth and the interrelationship between human beings and nature, create awareness on natural resources and their importance in sustainable development, analyse the importance of biodiversity conservation and develop conservation strategies.

PO5. Awareness on life processes: Understand plant life processes, biomolecules, basic hereditary and evolutionary principles.

PO6. Problem Solving: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.

PO7. Scope & importance of Botany: Understand scope & importance of Botany in every field

PO8. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO9. Scientific Temperament and Project management: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

SEMESTER I

BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

(UD3 BOT 101)

After completion of this course student will able to :-

Co1. Understand the structure and reproduction of plant and Animal viruses. They will also understand the types and economic importance of Cyanophages and Mycorrhiza.

Co2. Student will understand the structure, reproduction and mode of nutrition of bacteria. They will also know their positive and negative values.

Co3. Student will understand the structure and reproduction pattern of different group of fungi. They will also know the mode of nutrition and economic importance of fungi.

Co4. Student will able to understand the thallus structure, nutrition and reproduction pattern of Algae. They will also know the how algae synthesize their food and their economic value for various industries.

Co5. Students also know how nitrogen fixation in soil by blue green Algae and they gain knowledge about mushroom cultivation techniques.

Co6. Understand the techniques and lab practices for working in a laboratory like baking industry.

Co7. Develop Skill in Slide Preparation of fungal disease on the basis of symptoms.

Co8. Can start own enterprise on algal and fungal products.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
PO1	√		√					
PO2				√				
PO3					√	√	√	
PO4								
PO5	√	√	√					
PO6						√		
PO7				√				
PO8								√
PO9					√			

B.Sc. (BOTANY)		I ST SEMESTER	
COURSE CODE: UD3 BOT 101		COURSE TYPE:	
ECC			
COURSE TITLE: BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY: 90	PRACTICAL:45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

UNIT – I 18 Hours	VIRUSES: General characteristics, types of viruses based of structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle. Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages. Mycorrhiza-Types and Significance.
UNIT – II 18 Hours	BACTERIA : General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, Rhizobium, Azatobactor, Anabaena.
UNIT – III 18 Hours	FUNGI: General account of habit and habitat, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi, Heterothallism and Parasexuality. Outlines of classification of fungi, Economic importance of fungi. Life cycle of Saprolegnia, Albugo, Aspergillus ,Peziza ,Agaricus ,Ustilago , Puccinia , Alternaria and Cercospora.VAM Fungi.
UNIT – IV 18 Hours	ALGAE: Algae General characters, range of thallus organization, Gaidukov phenomenon, reproduction, Life cycle patterns and economic importance .Classification, Systematic position, Occurrence, structure and life cycle of following genera: Nostoc ,Gloeocapsa, Volvox, Oedogonium, Chara, Vaucheria, Ectocarpus , Polysiphonia.
UNIT – V 18 Hours	LICHENS: General account, types, structure, nutrition, reproduction and economic importance. Mycoplasm : Structure and importance . Blue Green Algae (BGA) in nitrogen economy of soil and reclamation of Ushar land .Mushroom Biotechnology.

SUGGESED READINGS	<p>Books recommended:</p> <p><i>Dubey R.C and Maheshwari D.K. A text books o f microbiology, S.Chand Publishing ,New Delhi</i></p> <p><i>Presscott,L. Harley ,J and Klein, D Microbiology,7th edition,Tata Mc Graw-Hill Co. New Delhi.</i></p> <p><i>Sharma P.D.. Microbiology and plants pathology , Rastogi Publications. New Delhi.</i></p> <p><i>Alexololous ,C.J.Mims, C.W and Blackwell ,MM, Introduction to mycology, John Wiley & Sons.</i></p> <p><i>Dubey H.C. An Introduction to Fungi ,Vikas Publishing ,New Delhi.</i></p>
--------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SEMESTER II

BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

(UD3 BOT 201

After completion of this course student will gain knowledge of

Co1 – The characters, distribution, classification and regeneration in bryophytes. They also know the economic and ecological importance of bryophyta.

Co2 – The classification of pteridophytic classes and morphological and anatomical characters of genus included in the different pteridophytic order. They also know the stele evolution in pteridophytes and the use of Azolla as biofertilizer.

Co3 – Students can critically differentiate the characters of Psilotum, Lycopodium, Selagenella, Equisetum and Marsilea.

Co4 – Students will understand the general characteristics, affinities economic importance and classification of gymnosperms. They can compare the characters of Cycas, Pinus and Ephedra.

Co5 – Students will gain understanding of the meaning of fossil and its use in the determination of age of plant materials. Understanding the applied knowledge and different aspect of paleobotany they can critically differentiate fossil and living fossil.

Co6-Techniques and lab practices for working in field of Lower botany and develop skills for preparation of Slides

Co7- Can initiate his laboratory of slide preparation and led to sell them in institution.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1	√		√				
PO2				√	√		
PO3						√	
PO4							√
PO5	√	√		√			
PO6							
PO7	√	√					√
PO8							√
PO9					√		

B.Sc. (BOTANY)		II ND SEMESTER	
COURSE CODE: UD3 BOT 201		COURSE TYPE: ECC	
COURSE TITLE: BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY:90	PRACTICAL:45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

UNIT – I <i>18 Hours</i>	BRYOPHYTA : General characteristics, affinities ,range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in Riccia , Marchantia , Pellia ,Anthoceros ,Funaria, Vegetative reproduction in Bryophytes ,Evolution of sporophytes .
UNIT – II <i>18 Hours</i>	PTERIDOPHYTES: General characteristics, affinities, economic importance and classification. Heterospory and seed habit, stellar system in Pteridophytes , Apospory and apogamy, Telome theory ,Azolla as Biofertilizer.
UNIT – III <i>18 Hours</i>	Systematic position, Occurrence, Morphology , Anatomy and Reproductive structure of Psilotum , Lycopodium , Selaginella, Equisetum ,Marsilea.
UNIT – IV <i>18 Hours</i>	GYMNOSPERM: General characteristics, Affinites , economic importance and classification, Morphology ,Anatomy and Reproduction in Cycus , Pinus and Ephedra.
UNIT – V <i>18 Hours</i>	PALAEOBOTANY: Geological time scale, types of fossils and fossilization , Rhynia ,Study of some fossil Gymnosperms , Lygenopteris.

SUGGESED READINGS

Books recommended:

*Parihar ,N.S. **The biology and morphology of pteridophytes**, Central Book Depart. Allahabad.*

*Parihar ,N.S. **An Introduction to Bryophyta Vol.I:Bryophytes**, Central Book Depart. Allahabad.*

*Sambamurty .AVSS, **A Text book of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany**,IK International Publishers.*

*Pandey S.N. Mishra S.P. & Trivedi P.S. **A text book of Botany (Vol.-II)** Vikas Publishing ,New Delhi*

*Bhatanagar ,SP and Moitra ,**A Gymnosperms** ,New Age International (P) Ltd., Publishers ,New Delhi..*

*Biswas C. And Johri BM, **The Gymnosperms** Springer-Verlag.Germany.*

*Sristava , H.N. **Fundamentals of Pteridophytes** ,Pradeep Publications, Jalandhar.*

*Srivastava, H.N .**Palaeobotany**, Pradeep Publications ,Jalandhar .*

*Srivastava, H.N .**Bryophyta** , Pradeep Publications ,Jalandhar*

*Singh Pandey and Jain ,**A text Book of Botany** ,Rastogi Publication ,Meerut.*

B.Sc. I&II Semester (BOTANY)
COURSE CODE: UD3 BOT 202

PRACTICAL

Study of external (Morphological) and internal (Microscopic/anatomical) features of representative genera given in the theory.

1. Algae: Gloeocapsa, Seytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachospermum.
2. Gram staining.
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora.
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria.
5. Pteridophyta: Lycopodium, Selaginella, Equisetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Ephedra.

PRACTICAL SCHEME

TIME: 3Hrs.

M.M.: 50

1. Algae/Fungi/Gram Staining	10
2. Bryophyta/Pteridophyta	10
3. Gymnosperm	10
4. Spotting	10
5. Viva-Voce	05
6. Sessional	05

SEMESTER III

PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY

(UD3 BOT 301)

After completion of this course student will able to:-

Co1 – Students will gain the knowledge about the system of classification and nomenclature of different species. They will get knowledge about preservation of plants and Herbarium Techniques.

Co2 – Students will understand the distinguishing characters of flowering plants and their economic importance. They will also get knowledge about various angiospermic families and know the technical terms of various parts of flowers.

Co3 – Students will get the knowledge about the economic importance of plants. They will get knowledge about food ,fodder , fiber yield in plants and use of plants as Medicine

Co4 – Students will understand the anatomical structure of different shoot and root .They will able to distinguish them by their anatomy .They will also get knowledge about secondary growth.

Co5 – Students will able to understand the structure and function of reproductive organs .They will also get knowledge about the pollination , fertilization, Apomixis and parthanocarp

Co6-Learn techniques and lab practices for working in field of taxonomy & Anatomy and develop skills for preparation of Slides

Co7- They can initiate his laboratory of slide preparation and led to sell them in institution.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1		√			√		
PO2	√			√			
PO3	√					√	
PO4							
PO5		√					
PO6					√		
PO7		√	√				
PO8							√
PO9							√

B.Sc. (BOTANY)		III RD SEMESTER	
COURSE CODE: UD3 BOT 301		COURSE TYPE: ECC	
COURSE TITLE: PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY:90	PRACTICAL: 45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

UNIT – I 18 Hours	Bentham and Hooker system of classification. Binomial Nomenclature, International code of Nomenclature for Algae, Fungi and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of plant material and Herbarium techniques. Important botanical gardens and herbaria of India, Kew Botanical garden, England.
UNIT – II 18 Hours	Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaceae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, Verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.
UNIT – III 18 Hours	Economic Botany: Botanical name, Family, part used and uses of the following economically important plants, fiber yielding plants: Cotton, jute, sun, hemp, coir. Timber yielding plants: Sal, Teak, Shisham and Pine. Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy, Brahmi, Sarpgandha, ----of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, Gram, Ground nut, Sugarcane and Potato. Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages: Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropa, Pongamia Ethnobotany in context of Chhattisgarh.
UNIT – IV 18 Hours	Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, Anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.

UNIT – V 18 Hours	Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of gametophyte, pollination, mechanisms, self incompatibility, fertilization, endosperm, embryo, polyembryony, apomixes and parthenocarpy.
SUGGESED READINGS	<p>Books recommended:</p> <p><i>Singh, Pandey, Jain. Diversity and Systematics of Seed Plants, Rastogi Publications Meerut</i></p> <p><i>Sharma OP, Plant Taxonomy, Tata Mc Graw Hill, New Delhi</i></p> <p><i>Pandey BP, Taxonomy of Angiosperms, S. Chand Publishing, New Delhi</i></p> <p><i>Pandey, BP, Plant Anatomy, S. Chand Publishing, New Delhi</i></p> <p><i>Pandey, BP, Economic Botany, S. Chand Publishing, New Delhi</i></p> <p><i>Singh, Pandey, Jain. Embryology of Angiosperms, Rastogi Publications Meerut</i></p> <p><i>Sharma, V, Alum, A. Ethnobotany, Rastogi Publications, Meerut</i></p> <p><i>Tayal, MS, Plant Anatomy, Rastogi Publication, Meerut.</i></p>

SEMESTER IV

ECOLOGY AND PLANT PHYSIOLOGY

(UD3 BOT 401)

After completion of this course student will able to:-

Co1 – Student will get the knowledge about the environmental and ecological factors. They will also get the knowledge about the morphology and anatomy of hydrophytes, Xerophytes and epiphytes.

Co2 – Student will get the knowledge about community characters and population interaction. They will also know how to energy flow in Ecosystem and Bio Geochemical cycle of Different Elements.

Co3 – Student will understand the Different Physiological processes of plants regarding Plants water relationship. They will get to know about the movement of stomata and process of Transpiration..

Co4 – Student will understand the mechanism of photosynthesis and get knowledge about how to plants synthesis carbohydrates .They will also get the knowledge about the mechanism of transpiration and R.Q.

Co5 – Student will understand the Action of different plants hormones on plants. They will also know the process of Photoperiodism , Vernalization and Seed dormancy.

Co6-Learn techniques and lab practices for working in field of Physiology.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1	√			√			
PO2		√		√			
PO3						√	
PO4	√						
PO5			√		√		
PO6							
PO7							
PO8							
PO9		√					

B.Sc. (BOTANY)		IV TH SEMESTER	
COURSE CODE: UD3 BOT 401		COURSE TYPE: ECC	
COURSE TITLE: ECOLOGY AND PLANT PHYSIOLOGY			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY:90	PRACTICAL: 45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

UNIT – I 18 Hours	Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Lievig’s law of minimum, Shelford’s law of tolerance, morphological and anatomical adaptations in hydrophytes, xerophytes and epiphytes.
UNIT – II 18 Hours	Population and community characteristics, Raunkiaer’s life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species. Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids. Biogeochemical cycles: carbon cycle, nitrogen cycle and phosphorus cycle.
UNIT – III 18 Hours	Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.
UNIT – IV 18 Hours	Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C3, C4 CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis. Respiration: Aerobic and anaerobic respiration, Glycolysis, Krebs’s cycle, factors affecting respiration, R.Q.
UNIT – V 18 Hours	Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

SUGGESED READINGS	<p>Books recommended:</p> <p><i>Koromondy, E. J. Concepts of Ecology, Prentice Hall, USA</i></p> <p><i>Singh, JS Singh SP and Gupta SR. Ecology and Environmental Science and Conservation, S. Chand Publishing, New Delhi</i></p> <p><i>Sharma, PD. Ecology and Environment, Rastogi Publications, Meerut</i></p> <p><i>Hopkins, WG and Huner, PA. Introduction to Plant physiology, John Wiley and Sons</i></p> <p><i>Pandey SN and Sinha BK, Plant Physiology, Vikas Publishing, New Delhi</i></p> <p><i>Srivastava, HS Plant Physiology and Biotechnology, Rastogi Publications, Meerut</i></p> <p><i>Taiz, L and Zeiger. E. Plant Physiology , 5th edition, Sinauer Associates Inc. M.A, USA</i></p>
--------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

B.Sc. III&IV Semester (BOTANY)
COURSE CODE: UD3 BOT 402

PRACTICAL

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories.
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O₂ in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.

PRACTICAL SCHEME

TIME: 3Hrs.

M.M. : 50

1. Anatomy	08
2. Economic Botany	04
3. Physiology	08
4. Ecology	10
5. Spotting	10
6. Viva- Voce	05
7. Project Work/Field Study	05

SEMESTER V

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

(UD3 BOT 501)

After completion of this course student will able to:-

Co1 – Student will be able to know about equipments required in tissue culture they will get idea about chromatography technique.

Co2 – Student will get knowledge about tissue culture technique and they also know how to prepare growth media.

Co3 – Students will gain understanding of the plant diseases, causal organism, host and their relationship and control measure for plant diseases, understanding of fungicide and use of chemical physical and biological controlling of diseases.

Co4 – Students will understand the effect of air, water and soil pollution in environment. They will get to know how ecological management takes place and conservation of biodiversity.

Co5 – Student will get knowledge about elementary biostatistics and their application.

Co6-Learn techniques and lab practices for working in field of taxonomy & Anatomy and develop skills for preparation of Slides

Co7- They can initiate his laboratory of slide preparation and led to sell them in institution.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1			√				
PO2	√				√	√	
PO3	√	√				√	
PO4				√			
PO5							
PO6			√		√		
PO7							
PO8							√
PO9		√					√

B.Sc. (BOTANY)		V TH SEMESTER	
COURSE CODE: UD3 BOT 501		COURSE TYPE: ECC	
COURSE TITLE: ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL EMBRYOLOGY, ELEMENTARY BIOSTATISTICS, ENVIRONMENTAL POLLUTION AND CONSERVATION			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY:90	PRACTICAL:45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

UNIT – I 18 Hours	Structure, Principle and applications of analytical instrumentation: Chromatography technique, Oven, Incubator, Autoclave, Centrifuge, Spectrophotometere.
UNIT – II 18 Hours	Plant Tissue culture techniques, growth media, totipotency, protoplast culture, somatic hybrids and cybrids, micropropagation, somaclonal variations, haploid culture. Analytical techniques: Microscopy-Light microscope, Electron microscope.
UNIT – III 18 Hours	General principles of plant pathology, general symptoms of fungal, bacterial and viral diseases, mode of infection, diseases resistance and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases. Rust diseases of wheat, Tikka diseases of ground nut, Red rot of sugarcane, Bacterial blight of rice, Yellow vein mosaic of bhindi, Little leaf of brinjal.
UNIT – IV 18 Hours	Introduction to pollution, green house gases, Ozone depletion, Dissolve Oxygen, B.O.D., C.O.D. Bio magnification, Eutrophication, Acid precipitation, Phytoremediation, Plant indicators,. Biogeographical Zones of India, Concept of Biodiversity, CBD,MAB, National parks and biodiversity Hot spots, Conservation strategies, Red Data Book, IUCN threat categories, invasive species, endemic species, concept of sustainable development.
UNIT – V 18 Hours	ELEMENTARY BIOSTATISTICS: Introduction and application of Biostatics, measure of central tendency-Mean, Median, Mode, measures of dispersal-Standard deviation, standard error.

SUGGESED READINGS	<p>Books recommended:</p> <p><i>Singh, RS, Plant Diseases, Oxford & IBH, New Delhi</i></p> <p><i>Pandey, BP, Plant Pathology, S.Chand Publishing, New Delhi</i></p> <p><i>Sharma, PD, Microbiology and Plant Pathology, Rastogi Publication, Meerut</i></p> <p><i>Sharma, PD, Mycology and Phytopathology, Rastogi Publication, Meerut</i></p> <p><i>Singh JS, Singh SP and Gupta, SR, Ecology Environmental Science and Conservation, S. Chand Publishing, New Delhi</i></p> <p><i>Sharma, PD, Ecology and Environment, Rastogi Publication, Meerut</i></p> <p><i>Bhojwani, SS and Razdan, MK, Plant Tissue Culture: Theory and Practices, Elsevier</i></p> <p><i>Sharma AK, Text book of Biostatistics, Discovery Publishing House Pvt. Ltd.</i></p>
--------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SEMESTER VI

GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY

(UD3 BOT 601)

After completion of this course student will able to:-

Co1 – Student will understand the importance of cell and know the Role of various call organelles. They will also know that why and how several genetic phenomenon effect the inheritance.

Co2 – Student will understand the structure of DNA and RNA and their Role in protein synthesis. They will also get knowledge about gene regulation and operon model.

Co3 – Understanding the recombinant DNA technology and how this technology apply in different genetic phenomenon like PCR, DNA finger printing and genetically modified plants.

Co4 – Student can critically differentiate the structure and properties of protein, carbohydrate and Fat and also know their synthesis and uses.

Co5 – Understanding of the structure, Nomenclature and classification of enzymes. Also know the Role and activity of enzymes in cell.

Co6-Learn techniques and lab practices for working in field of taxonomy & Anatomy and develop skills for preparation of Slides

Co7- They can initiate his laboratory of slide preparation and led to sell them in institution.

PO-CO Mapping

PO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1	√			√			
PO2					√		
PO3			√			√	
PO4							
PO5	√	√		√			
PO6			√				
PO7							√
PO8							√
PO9		√			√	√	

B.Sc. (BOTANY)		VI TH SEMESTER	
COURSE CODE: UD3 BOT 601		COURSE TYPE: ECC	
COURSE TITLE: GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY			
CREDIT:		HOURS:	
THEORY:	PRACTICAL:	THEORY:90	PRACTICAL: 45/2
MARKS			
THEORY: 50+25		PRACTICAL:50/2	

<i>UNIT – I</i> 18 Hours	Cell and cell organelles, organization and morphology of chromosomes, giant chromosome, cell division, Mendel's laws, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytoplasmic inheritance, gene concept: cistron, muton, recon.
<i>UNIT – II</i> 18 Hours	Nucleic acids, structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, Operon model.
<i>UNIT – III</i> 18 Hours	Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors (Plasmid, Bacteriophages, Cosmids, Phagemids), gene cloning, PCR, Application of Biotechnology; G.M. Plants, Monoclonal antibodies, DNA finger printing.
<i>UNIT – IV</i> 18 Hours	Protein: Chemical composition, primary, secondary and tertiary structure of Proteins. Carbohydrate: general account of monosaccharides, disaccharids and Polysacchaeides. Fat: Structure and properties of fats and fatty acids, synthesis and breakdown.
<i>UNIT – V</i> 18 Hours	Enzymes: Nomenclature and classification, components of enzyme, theories of enzyme action, enzyme kinetics (Michaelis-Menten constant), allosteric enzymes, isozymes, Abzymes. Ribozymes, factors affecting enzyme activity.

SUGGESED READINGS

Books recommended:

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

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

*Singh BD, **Fundamental of Genetics**, Kalyani Publication*

*Singh BD, **Genetics**, Kalyani Publication*

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

*Singh BD, **Biotechnology: Expanding Horizons**, Kalyani Publication*

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

*Gupta, SN, **Concepts of Biocemistry**, Rastogi Publications, Meerut*

*Jain, JL., Jain S, Jain, N, **Fundamentals of Biochemistry**, S Chand Pubolishing, New Delhi*

B.Sc. V&VI Semester (BOTANY)
COURSE CODE: UD3 BOT 602

PRACTICAL

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

PRACTICAL SCHEME

TIME: 3Hrs.

M.M.: 50

1. Plant Disease/ Symptoms	10
2. Instrumentation Techniques	05
3. Staining of Microbes	05
4. Tissue culture Techniques	05
5. Spotting	10
6. Viva- Voce	05
7. Project Work/Field Study	05
8. Sessional	05