

“ Education for Knowledge, Science and Culture.”

– Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)



**Syllabus
for
Bachelor of Science**

**B.Sc. Part - III BOTANY
(Semester- V & VI)**

Under Choice Based Credit System

CBCS Syllabus to be implemented from 2023 – 2024

(Subject to modifications in the future)



CHOICE BASED CREDIT SYSTEM

B.Sc. III (Sem. – V and VI) Botany

Course Structure

Paper No.	Course Code	Title of Paper	No. of Credits
Semester V			
V	DSE -1007E1	Cytology and Research Techniques in Life Sciences	04
	DSE -1007E2	Microbiology, Plant Pathology and Biofertilizer	
	DSE -1007E3	Biochemistry and Stress Physiology	04
	DSE -1007E4	Plants Systematics and Pale botany	
	SECs(E)	Technique of Life Science	02
Semester VI			
VI	DSE-1007F1	Genetics and Plant Breeding	04
	DSE-1007F2	Biostatistics, Economic Botany and Ethno botany	
	DSE-1007F3	Molecular Biology and Biotechnology	04
	DSE-1007F4	Horticulture, Forestry and Herbal Technology	
	SECs(F)	Techniques in Plant Diversity & Crop Improvement	02



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - V “Cytology and Research Techniques in Life Sciences & Microbiology, Plant Pathology and Biofertilizer”

(DSE – 1007 E1)

Section I: Cytology and Research Techniques in Life Sciences

Course Outcomes: On completion of the course, students will be able to:

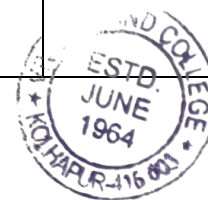
CO1: Know the details of microscopy-principles of light microscopy, Electron microscopy (TEM&SEM), fluorescence microscopy.

CO 2: Perform chromatography technique.

CO 3: Know the details of micrometry, microphotography and electrophoresis.

CO 4: Know the radioactive isotopes and its importance.

Paper V	DSE 1007 E1 : “Cytology and Research Techniques in Life Sciences & Microbiology, Plant Pathology and Biofertilizer” Section : I (DSE 1007E1): Cytology and Research Techniques in Life Sciences	No. of Hours per Unit / Credit
1.	Cell as a unit of Life 1a: The cell theory, Prokaryotic and Eukaryotic cells, Cell size and shape. 1b: Cell Membrane and cell wall 1c: Models of membrane structure. 1d: The functions of membranes. 1e. Cell cycle 1f. Apoptosis	10
2.	Cell Organelles 2 a. Eukaryotic cell components – Nucleus, Endoplasmic Reticulum, Golgi complex . 2 b: Glyoxisomes, Peroxisomes and Lysosomes–Structure, composition and functions. 2 c. Specialized cell organelle – Ribosome	08
3.	Analytical Techniques in Plant Sciences. 3a: Principles of Microscopy– Light Microscope, Fluorescence Microscopy, Electron Microscopy (TEM and SEM) 3b: Chromatography: Principles–Paper chromatography, TLC, HPLC. 3c: Micrometry, Microphotography, Electrophoresis	09



4	Radiation Biology 4a:RadioactiveIsotopes 4b: Effect of Radiations on Biological Systems. 4c: Beneficial Effect of Radiations. 4d:AutoradiographyTechnique 4e:Geiger–Muller Experiment /Liquid Scintillation Counter 4f:Precautionary measures	09
---	--	----

References:

- 1) Bajpai, P. K. Biological instrumentation and methodology. S.Chand and Co. Ltd, New Delhi.
- 2) Cotteril, R.(2002). Biophysics: An Introduction, John Wiley and sons.
- 3) Debajyoti Das. Biophysics and biophysical Chemistry. Academic Publishers, Kolkatta.
- 4) Dwivedi J.N., Singh, R.B.(1990).Essentials of plant Techniques. Scientific Publisher, Jodhpur.
- 5) Ruzin, S. E.(1999). Plant Microtechnique and Microscopy. Oxford University Press, New York, U.S.A



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - V “Cytology and Research Techniques in Life Sciences & Microbiology, Plant Pathology and Biofertilizer”

(DSE – 1007 E2)

Section II: Microbiology, Plant Pathology and Biofertilizer

Course Outcomes: On completion of the course, students will be able to:

CO1: Know the microorganisms in biological world.

CO 2: Become aware of applications of different microbes in various industries.

CO 3: Know the potential of these studies to become and entrepreneur.

CO 4: Equip themselves with skills related to laboratory as well as industries based studies.

Paper V	DSE 1007 E1 : “Cytology and Research Techniques in Life Sciences & Microbiology, Plant Pathology and Biofertilizer” Section : II (DSE 1007E1): Microbiology, Plant Pathology and Biofertilizer	No. of Hours per Unit / Credit
1	Microbiology 1a:Methods in Microbiology 1b:Micro-organisms in Biological world 1c:Scope of Microbes in Industry and Environment	08
2	Plant Pathology 2a:Classification of plant diseases based on Pathogens, Crops and Symptoms. 2b:Study of Mechanism of Infection in Disease development(Biochemical changes),prevention and control of Plant Diseases. Role of Quarantine, Significance of Plant Pathology.	09
3	Study of Plant Diseases 3a:Cereals– Rust of Jowar 3b:Cashcrop–Red Rot of Sugarcane 3c:Legume–Wilt of Gram 3d:Spices–Leaf spot of Black Peeper 3e:Vegetable– Onion smut 3f:Fruit- Apple scab	09



4	<p>Bio fertilizer</p> <p>4a: Microbes in Agriculture – Biological Nitrogen Fixation, <i>Mycorrhizae</i>.</p> <p>4b: Organic Farming–Introduction, Concept and scope of Organic farming, Green Manuring , Bio compost Making Method</p>	10
---	---	----

References:

- 1) Agrios G. N.(1997).Plant pathology. Academic Press, London.
- 2) Pelezor M. J.and Chan E.C.S.(1972)Laboratory Exercies in Microbiology Mcgraw Hill Book co.
- 3) Prescott L. M, Harley J. P.,Klein D. A.(2005).Microbiology, McGraw Hill, India.
- 4) Rangaswami G. and Mahadevan A.(1999) .Diseases of crop plants in India. Prentice Hall. 4thed. New Delhi..
- 5) Sharma P.D.(2011). Plant pathology, Rastogi publication, Merrut, India.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - V “Biochemistry and Stress Physiology & Plants Systematics and Pale botany”

(DSE – 1007 E3)

Section I: Biochemistry and Stress Physiology

Course Outcomes: On completion of the course, students will be able to:

CO 1: Understand the properties and classification of carbohydrates and proteins.

CO 2: Understand the Beta oxidation, Gluconeogenesis and its role immobilization of fatty acids during germination.

CO 3: Understand the different types of plant stresses.

CO 4: Know the mechanism of senescence and aging in plants.

Paper V	DSE 1007 E2 : “Biochemistry and Stress Physiology & Plants Systematics and Pale botany” Section : I (DSE 1007E2): Biochemistry and Stress Physiology	No. of Hours per Unit / Credit
1.	Plant Biochemistry. Carbohydrate metabolism. 1a: Introduction and classification of Carbohydrates 1b: Properties of Monosaccharides, Oligosaccharides, Polysaccharides. 1c: Significance of Carbohydrate Protein metabolism. 1d: Introduction, properties and characters of amino acids 1e: Protein-structure and classification 1f: Protein synthesis	12
2.	Lipid metabolism and Fattyacid metabolism. 2a: Introduction and classification of lipids. 2b: Properties of fatty acids (Stearic and Palmatic acid), and unsaturated fatty acids(Linoleic and Linolenic acid) 2c: Beta oxidation. 2d: Gluconeogenesis and role in mobilization of fatty acids during germination. 2e: Significance of lipids.	12



3.	Stress physiology. 3a: Defining Plant stress. 3b: Types of stress:-Water stress-Salinity stresses, light stress, Temperature stress. 3c. Stress sensing mechanisms in plants, Calcium Signaling, Phospho lipid signaling.	08
4	Senescence and Aging. 4a: Patterns of senescence. 4b: Physical changes during senescence. 4c: Control of senescence.	04

References:

- 1) Buchanan B.B, Grussem W. and Jones R. L. (2000). Biochemistry and Molecular Biology of Plants. American society of Plant Physiologists, Maryl and USA.
- 2) Dryer R. L. and Lata G.F.(1989). Experimental Biochemistry, Oxford University Press, New York.
- 3) Lea P. J. and Leegood R.C. (1999). Plant Biochemistry and Molecular Biology (2nd Edition). John Wiley and Sons. Chichester, England.
- 4) Malikand Shrivastava- Plant Physiology, S.Chand and Co. New Delhi.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - V “Biochemistry and Stress Physiology & Plants Systematics and Pale botany”

(DSE – 1007 E4)

Section II: Plants Systematics and Pale botany

Course Outcomes: On completion of the course, students will be able to:

CO 1: Know the concept of systematics.

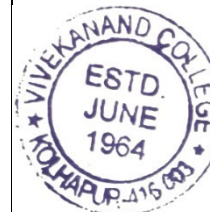
CO 2: Know the phylogeny of angiosperms, a general account of origin of Angiosperms.

CO 3: Trace the history of development of systems of classification, emphasizing angiospermic taxa.

CO 4: Know the wide verities of angiosperm and trades in classification.

CO 5: Know the characters of economically important families of angiosperms.

Paper V	DSE 1007 E2 : “Biochemistry and Stress Physiology & Plants Systematics and Paleobotany” Section : II (DSE 1007E2): Plants Systematics and Pale botany	No. of Hours per Unit / Credit
1.	Importance of Plant Systematics. 1a:Introduction to Systematics, Evidences From Palenology, Cytology, Phytochemistry and Molecular data. 1b:Field inventory, Functions of Herbarium, Important Herbaria and Botanical gardens of the World and India.	12
2.	System of Classification. 2a:Phylogeny of Angiosperms,The general account of origin of Aniosperms (withr eference to Gnetalean theory) 2b:Classificationsy stem of Takhtajan, Brief reference of Angiosperm Phylogeny Group (APG-III) classification(2009). 2c: Ranks of IUCN and methods of Conservation.	08
3.	PlantFamilies. 3a:Morphological and floral characters, distinguishing characters and economic importance of following families. 3b:Anacardiaceae, Fabaceae, Apiaceae, Rubiaceae, Acanthaceae, Euphorbiaceae, Poaceae.	08



4.	Paleobotany. 4a:General account types of fossils, Geological time scale. 4b:Study of following form genera with reference to systematic position, external morphology and affinities – <i>Lyginopteris</i> and <i>Enigmocarpon</i> 4c:Applications of Paleobotany-Role of microfossils in oil and coal exploration.	08
----	---	----

References:

- 1) Davis P.H. and Haywood V. H. - Principles of angiosperm anatomy. Oliver and Royd, London.
- 2) Heywood, V. H. and Moore, D.M - Current concepts in plant taxonomy. Academic Press, London.
- 3) Lowrence G. H. M.- Taxonomy of vascular plants. MacMillan, New York.
- 4) Naik, V.N.- Taxonomy of angiosperms. Tata Mc Graw Hill, New York.
- 5) Sporne K.R.- The morphology of Angiosperms. B. I. Publication, Bombay.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Semester V: SEC (E)

Title: "Technique of Life Science"

Course Outcomes: On completion of the course, students will be able to:

CO 1: Familiar with various instrument & techniques used in labs.

CO 2: Familiar with different plant diseases & their management.

CO 3: Get to know the plant products used in agriculture and organic farming.

CO 4: Learn plant biochemistry.

Syllabus:

- 1) Study of Micrometry technique.
- 2) Study of the photo micrographs of cell organelle.
- 3) Cytological techniques-preparation of fixatives, preparation of stains (Acetocarmine and Acetoorcein)
- 4) To study the different types of microscope and its parts.
- 5) Study of Plant diseases as per theory
 - a) Rust of Wheat
 - b) Red rot of Sugarcane
 - c) Rust of Soybean
 - d) Mosaic of Bean
- 6) Preparation of PDA (slants and plates) and Sterilization.
- 7) Study of fermentation by yeast.
- 8) Study of organic products- Jeevamruth, Dashparniark
- 9) To study various tools and instruments required in the lab-Autoclave, Laminarflow, Incubator, Waterbath, P^Hmeter, Oven.



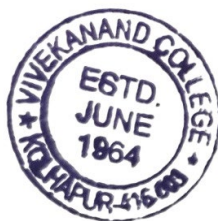
Semester V: SEC (E)

Title: "Technique of Life Science"

- 10) Qualitative test for sugar, starch and cellulose in plant material. (Any two test for each)
- 11) Qualitative test for proteins and lipids in plant material.(Any two test for each)
- 12) Separation of amino acid by circular paper chromatography.
- 13) Estimation of chlorophyll in leaf issue.
- 14) Comparative study of chlorophyll content in healthy and senescence leaf.
- 15) Study the pathway of phospholipid signaling and calcium modulation by photographs.

References:

- 1) Bajpai, P. K. Biological instrumentation and methodology S. Chand and Co. Ltd., New Delhi.
- 2) Pelezor M. J. and Chan E.C.S. Laboratory Exercises in Microbiology, Mcgraw Hill Book co.
- 3) Vayas S.C. and Vaya S.S and Modi H.A.(1998)-Biofertilizers and organic farming, Akta Prakashan Nadiad.
- 4) Sathe T.V.(2004). Vermiculture and organic farming, Daya Publications.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - VI “Genetics and Plant Breeding & Biostatistics, Economic Botany and Ethno botany”

(DSE – 1007 F1)

Section I: Genetics and Plant Breeding

Course Outcomes: On completion of the course, students will be able to:

CO 1: Know the Mendelian genetics and basic laws of inheritance.

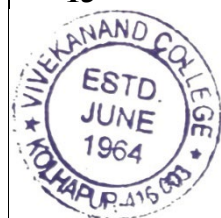
CO 2: Know the phenomenon of dominance, laws of segregation, and independent assortments of genes.

CO 3: Understand the phenomenon of linkage and crossing over.

CO 4: Know the genomic organization in plants.

CO 5: Understand the different techniques of plant breeding.

Paper VI	DSE 1007 F1 : “Genetics and Plant Breeding & Biostatistics, Economic Botany and Ethno botany” Section : I (DSE 1007F1): Genetics and Plant Breeding	No. of Hours per Unit / Credit
1	Heredity 1a:Introduction, Terminologies, Laws of Inheritance (Monohybrid and Dihybrid) 1b:Multiple Allelism.	09
2	Linkage and Crossing over 2a: Linkage- Concept and History, Types of Linkage 2b:Crossingover- Concept and Significance, Cytological proof crossing over. 2c:Linkage Maps	08
3	Extra–Chromosomal Genome 3a:Introduction and Organization of genome 3b:Plastid Inheritance 3c: Mitochondrial Inheritance	06
4	Plant Breeding 4a: Introduction and objectives, Plant genetic resources, Centers of origin and Domestication of crop plants. 4b: Methods of crop improvements. Methods of Breeding, Selection methods for self-pollinated, cross pollinated and	13



	vegetative propagated plants. Mutation breeding	
--	--	--

References:

- 1) Acquaah, G.(2007).Principles of Plant Genetics and Breeding. Black well Publishing.
- 2) Chaudhari, H.K.(1984).Elementary Principles of Plant Breeding. Oxford IBH. 2ndedition.
- 3) Gardner E.J., Simmons M.J. and Snustad D.P.(2008).Principles of Genetics.8thEd.Wiley, India.
- 4) Snustad, D. P. and Simmons, M. J.(2010).Principles of Genetics. John Wiley and Sons Inc., India5thEdition.
- 5) Singh, B.D. (2005).Plant Breeding: Principle sand Methods. KalyaniPublishers,7thEdition



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - VI “Genetics and Plant Breeding & Biostatistics, Economic Botany and Ethno botany”

(DSE – 1007 F2)

Section II : Biostatistics, Economic Botany and Ethno botany

Course Outcomes: On completion of the course, students will be able to:

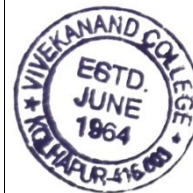
CO 1: Know the biostatistics and statistical terms.

CO 2: Know the method of sampling and representation of data.

CO 3: The role of plants in human welfare.

CO 4: Gain the knowledge about various plants of economic use and importance of plant and plant products.

Paper VI	DSE 1007 F1 : “Genetics and Plant Breeding & Biostatistics, Economic Botany and Ethnobotany” Section : II (DSE 1007F1): Biostatistics, Economic Botany and Ethno botany	No. of Hours per Unit / Credit
1	Biostatistics 1a: Introduction, Statistical Terms. 1b: Sampling-Sampling Methods. 1c: Collection and Representation of data (Diagrammatic and Graphic representation) 1d: Measures of Central Tendency -Mean, Mode and Median 1e: Variances and standard deviation, Coefficient of variation. 1f: Test of Significance(T- test),Chi-square test (X ² test)	10
2	Economic Botany-I 2a: Study of following economical important plant with reference to origin, morphology, parts used and uses. 2b:Cereals- Barley and Oats 2c:Legumes– Soybeana nd <i>Vigna</i> 2d:Vegetables– <i>Sp i n a c h</i> / 2e:Spices-Clove and blackpepper	09
3	Economic Botany- II 3a:Beverages-Tea and Coffee 3b:Fiber Yielding Plants-Cotton and <i>Hibiscus cannabinis</i> 3c:Oil yielding <i>Pongamia pinnata</i> and	08



	Sunflower 3d:Dye : <i>Lawsonia</i> and <i>Indigofera</i>	
4	Ethno botany 4a: Introduction, Concept and Scope 4b: Ethnobotanical studies with reference to data collection- Field work, Herbarium, Ancient literature, Archaeological findings, Sacred groves. 4c: Role of ethnobotany in modern medicine- <i>Adathoda vasica</i> , <i>Tinospora cordifolia</i> , <i>Curcuma longa</i> and <i>Tribulus terrestris</i>	09

References:

- 1) Chrispeels, M. J. and Sadava, D. E. Plants, Genes and Agriculture. Jones and Bartlett Publishers.
- 2) Gupta, P .K. Genetics. Rastogi Publications, Shivaji Road, Meerut.
- 3) Klug, W. S., Cummings, M. R., Spencer, C.A. Concepts of Genetics. Benjamin Cummings, USA.
- 4) Sharma ,J. R..Principles and Practice of Plant Breeding. Tata McGraw Hill Publishing Co. Ltd, New Delhi.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - VI “Molecular Biology and Biotechnology & Horticulture, Forestry and Herbal Technology”

(DSE – 1007 F3)

Section I: Molecular Biology and Biotechnology

Course Outcomes: On completion of the course, students will be able to:


CO 1: Know the scope and importance of molecular biology.

CO 2: Gain knowledge about the mechanism and essential component required for the DNA replication.

CO 3: Know the fundamentals of Recombinant DNA technology.

CO 4: Gain the knowledge of genetic engineering.

CO 5: Know the principles and basic protocols of plant tissue culture.

Paper VI	DSE 1007 F2 : “Molecular Biology and Biotechnology & Horticulture, Forestry and Herbal Technology” “Section : I (DSE 1007F2): Molecular Biology and Biotechnology	No. of Hours per Unit / Credit
1	Genetic Material 1a:NucleicAcids(DNA, RNA) 1b:Griffith’sandAvery’sstrans formation experiment, Harshey-Chase bacteriophage experiment 1c:DNAstructure and Types of DNA 1d:DNA replication 1e:Types of RNA	09 

2	Recombinant DNA Technology 2a:Introduction and Principle 2b:Enzymes involved in recombinant DNA technology 2c:Cloning Vectors (Plasmid, Bacteriophage and Cosmids) 2d:Gene Amplification: PCR technique	09
3	Genetic Engineering 3a:Introduction 3b:Methodofgenetransfer- <i>Agrobacterium</i> mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment 3c:Transgenic Plants (<i>Bt</i> Cotton and Golden Rice) 3d:Applications of Genetic transformation 3e:BlottingTechniques-Northern, Southern and DNA Fingerprinting	09
4	Plant Tissue Culture 4a:Principle and Totipotency 4b:Components of culture media, Sterilization techniques 4c:Techniques inTissue culture (Callus culture and Cell suspension) 4d:Organogenesis, Embryogenesis 4e:Anther culture 4f:Applications of Plant Tissue Culture	09

References:

- 1) Bhojwani S.S and Razdan M.K. Plant Tissue Culture.Theory and Practice. Elsevir Science Amsterdam.The Netherlands.
- 2) Glick B. R; Pasternak J.J..Molecular Biotechnology-Principles and Applications of Recombinant DNA,ASM Press,Washington.
- 3) Rusell,P. J. Genetics- A Molecular Approach. Benjamin Cummings, U.S.A.3rdedition.
- 4) Snustad D. P.and Simmons M.J.Principles of Genetics. John Wiley and Sons Inc.,U.S.A .
- 5) Watson J. D; Baker T. A; Bell S.P;Gann A; Levine M; Losick R. Molecular Biology of the gene,Pearson Benjamin Cummings, CSHL Press, New York,U.S.A.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Paper - VI “Molecular Biology and Biotechnology & Horticulture, Forestry and Herbal Technology”

(DSE – 1007 F4)

Section II: Horticulture, Forestry and Herbal Technology

Course Outcomes: On completion of the course, students will be able to:

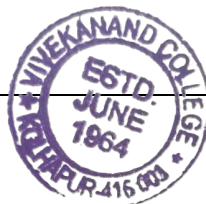
CO 1: Know the science of horticulture and methods of propagation of horticultural plants.

CO 2: Know how to manage a good nursery.

CO 3: Gain the basic knowledge of forestry and its products.

CO 4: Know different methods of herbal technology.

Paper VI	DSE 1007 F2 : “Molecular Biology and Biotechnology & Horticulture, Forestry and Herbal Technology” Section : II (DSE 1007F2): Horticulture, Forestry and Herbal Technology	No. of Hours per Unit / Credit
1	Horticulture 1a: Introduction and importance 1b: Methods of Propagation and Asexual and Sexual 1c: PlantNursery–Introduction, Types of Nursery Infrastructure and requirement Use of Fertilizers and Pesticides Commercial importance	09
2	Gardening and Ornamental Plants 2a:Gardening- Definition, Objective, Types of Gardening, Importance and Landscape garden 2b:Ornamental Plants: Herbs, Shrubs, Trees, Indoor plants, Lawn and Climber	09



3	Forestry 3a:Introduction, Forest types of India 3b:Wild life and Biosphere reserves 3c:Social and Agricultural Forestry 3d:Forest research education and Training institutions 3e:Forest Acts 3f: Different Plant as a forest products.	10
4	Herbal Technology 4a:Pharmacognosy-Definition and Techniques 4b:Phytochemicals–Alkaloids and Phenols 4c:Drug- types and adulteration 4d:Scope of Pharmacognosy	08

References:

- 1) Bose T.K and Mukherjee D(1972)Gardening in India, Oxford and IBH Publishing Co, New Delhi.
- 2) Capon B.(2010)Botany for Gardeners. 3rdEdition.Timber Press Portl and,Oregon.
- 3) Chopra R.N, Nayar S.L.and Chopral.C. (1956), Glossary of Indian Medicinal Plants, C.S.I.R, New Delhi.
- 4) Edmond Musser and Andres, Fundamentals of Horticulture. Mc Graw Hill Book Co, New Delhi.
- 5) Kumar N.(1997),Introduction to Horticulture, Rajalakshmi Publications. Nagercoil.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Semester V: SEC (F)

Title: “Techniques in Plant Diversity and Crop Improvement”

Course Outcomes: On completion of the course, students will be able to:

CO 1: Familiar with identification, classification & nomenclature of plants.

CO 2: Familiar with conservation of useful & endangered plants.

CO 3: Learn breeding techniques for improvement of crop diseases.

CO 4: Get employment opportunities to studying different horticultural technique.

“Techniques in Plant Diversity and Crop Improvement”

- 1) Identification of genus and species with the help of Cook’s Flora.
- 2) Study of pollen viability and pollen germination.
- 3) Study of herbarium technique.
- 4) Method of emasculation and bagging(demonstration only)
- 5) Study of breeding technique in suitable material (Malvaceae/ Fabaceae/Poaceae)
- 6) Common plants use for ethanobotanical purpose by Tribals.
- 7) Economic botany: a)Cereals, Legumes, Vegetables, b)Spices, Beverages, Dye
c)Fiber and oil yielding plants
- 8) Ethnic foodc rops
- 9) Ethno veterinary medicine.
- 10) Study of implements used in Nursery and gardening.



Title: “Techniques in Plant Diversity and Crop Improvement”

- 11) Propagation by layering/ Grafting.
- 12) Identification and description of Herbs (Annuals), Perennials (Shrubs, Trees).
- 13) Identification and description of climbers, creepers, indoor plants andl awns.
- 14) Study of forest products.
- 15) Study of Biodiversity ,composition of different types of forests in India
(Tropical, subtropical and Temperate).

References:

- 1) Bose T. K and Mukherjee D. Gardening in India,Oxford and IBH Publishing Co, New Delhi.
- 2) Capon B. Botany for Gardeners. 3rdEdition.Timber Press Portl and,Oregon.
- 3) Kumar N.Introduction to Horticulture, Rajalakshmi Publications. Nagercoil.
- 4) Randhawa G. S.and Mukhopadhyay A. Horticulture in India, Allied Publishers.
- 5) Sporne K. R.. The morphology of Angiosperms. B. I. Publication, Bombay.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Practical Syllabus

Practical: I	(DSE7E1)	Section: I	Cytology and Research Techniques in Life Sciences
		Section: II	Microbiology, Plant Pathology and Bio fertilizers
Practical: II	(DSE7E2)	Section: I	Plant Biochemistry and Stress physiology
		Section: II	Plant systematic and Paleobotany
Practical: III	(DSE7F1)	Section : I	Genetics and Plant Breeding
		Section: II	Biostatistics, Economic Botany and Ethnobotany
Practical: IV	(DSE7F2)	Section: I	Molecular Biology and Biotechnology
		Section: II	Horticulture, Forestry and Herbal Technology



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Practical - I

Based on Section I and Section II of DSE E1

- 1) Study of Micrometry technique.
- 2) To study of prokaryotic cell (Bacteria), viruses, eukaryotic cell with the help of electron micrograph.
- 3) Study of the photomicrographs of cell organelle.
- 4) Study of special chromosome (Polytene and Lampbrush) either by slides or photographs.
- 5) Separation and identification of amino acid by TLC.
- 6) Onion peel to study the plant cell.
- 7) Cytological techniques – preparation of fixatives, preparation of stains (Acetocarmine and Acetoorcein)
- 8) To study the different types of microscope and its parts.
- 9) To study principles and applications of Spectrophotometer, Calorimeter, Electrophoresis, Liquid Scintillation counting.
- 10-12) Study of Plant diseases as per theory
 - a) Rust of Jowar b) Red rot of Sugarcane c) Rust of Soybean
 - d) Wilt of Gram e) Leaf spot of Turmeric / Leaf spot of Peeper
 - f) O n i o n S m u t g) Apple Scab
- 13) Preparation of PDA (slants and plates) and Sterilization.
- 14) Inoculation of Fungi on slants and plates.
- 15) Isolation and separation of soil fungi by dilution method.
- 16) Study of fermentation by yeast.
- 17) Staining technique - Gram's staining.
- 18) Study of important stains of microbiology.
- 19) Study of typical virus (Plant virus, Bacteriophage) by using photograph.
- 20) Study of Bio fertilizers –*Nostoc*, *Trichoderma*, *Anabaena*, *Rhizobium*, VAM.
- 21) Study of organic products- Jeevamruth, Dashparniark
- 22) To study various tools and instruments required in the lab- Autoclave, Laminar flow, Incubator, Water bath, P^h meter, Oven.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Practical - II

Based on Section I and Section II of DSC E2

1. Qualitative test for sugar, starch and cellulose in plant material.(Any two test for each)
2. Qualitative test for proteins and lipids in plant material.(Any two test for each)
3. Determination of fatty acid value of oil sample.
4. Estimation of proteins from plant samples by biuret method.
5. Separation of amino acid by circular paper chromatography.
6. Comparative phytochemical studies in healthy and stressed plants.
9. Comparative study of chlorophyll content in healthy and senescence leaf.
- 10 to16. Study of following plant families.
 - a) Anacardiaceae
 - b)Fabaceae
 - c)Apiaceae
 - d)Rubiaceae
 - e)Acanthaceae
 - e)Euphorbiaceae
 - f)Poaceae
17. Study of types of fossils.

Impression, Compression, Pterification, Cast, Coal ball, Amber.

Study of fossil genera- *Enigmocarpon*, *Lyginopteris*

18. Identification of genus and species with the help of Cook's Flora.
19. Study of pollen viability and pollen germination
20. Study of herbarium technique.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Practical - III

Based on Section I and Section II of DSE F1

1. Genetic examples - Mendalian Laws.
2. Genetic examples - linkage and cross-over.
3. Genetic examples - Polygen inheritance.
4. Study of meiosis in *Allium* and preparation of permanent cytological slide.
5. Preparation of karyotypes- Preparation of ideogram by using photo graphs.
6. Study of various stages of mitosis in root tip cells.
7. Genetic examples on multiple alleles.
8. Camera Lucida drawing.
9. Method of emasculation and bagging (demonstration only).
10. -12Study of breeding technique in suitable material (Malvaceae / Fabaceae / Poaceae).
13. Measure of central tendency of giving data.
14. Analysis of the giving data using computer/ study of frequency distribution and its graphics presentation.
15. Study of ethno medicinal plants.
 - a) *Achyranthes aspera* b) *Adathoda vasica* c) *Asparagus racemosus*
 - d) *Calatropics procera*
 - e) *Andrographis paniculata* f) *Datura metal* g) *Tribulus terrestris* h) *Moringa oleferia*
16. Documentation technique of Ethenobotany.
- 17) to 19) Economic botany. a) Cereals, Legumes, Vegetables b) Spices, Beverages, Dye
c) Fiber and oil yielding plants
- 20) Ethnic food crops
- 21) Ethno veterinary medicine.
- 22) Documentation of ethno medicinal plants of college campus.



CHOICE BASED CREDIT SYSTEM

B.Sc. - III: Botany

Practical - IV

Based on Sec I and Sec II of DSC F2

- 1) Study of basic equipment's used in tissue culture and Sterilization.
- 2) Preparation of tissue culture medium (MS) and its sterilization.
- 3) To 5) In vitro culture of suitable plant material, anther culture, embryo culture and micro propagation.
- 6) Study of method of gene transfer in Prokaryotic.
- 7) Study of method of gene transfer in Eukaryotic.
- 8) Study of PCR and Electrophoresis techniques.
- 9) Study of instruments used in Nursery and gardening.
- 10) to 12) Study of layering and grafting .
- 13) Identification and description of Herbs (Annuals), Perennials (Shrubs, Trees).
- 14) Identification and description of climbers, creepers, indoor plants and lawns.
- 15) Study of non timber forest products.
- 16) Chemical tests for Tannin (*Terminalia chebula*) and Alkaloid (*Catharanthu roseus*).
- 17) Detection of adulterants of market samples of mustard seeds, coriander powder, pepper, tea dust, coffee powder, chilli powder, turmeric powder.
- 18) Study of fiber separation .
- 19) Preparation of organic compost.
- 20) Visit to Nursery/ Submission of PPT on the basis of gene transfer methods.



CHOICE BASED CREDIT SYSTEM

B.Sc. III (Sem. V & VI) Botany

Evaluation Pattern

With effect from 2023-24

Semester	Title of the paper	Course Code	Semester End Examination	Continuous Internal Evaluation Marks	Total Marks
V	Cytology and Research Techniques in Life Sciences	DSE 1007E1	35	15	50
V	Microbiology, Plant Pathology and Bio fertilizers	DSE 1007E2	35	15	50
V	Biochemistry and Stress Physiology	DSE1007E3	35	15	50
V	Plants Systematics and Pale botany	DSE1007E4	35	15	50
VI	Genetics and Plant Breeding	DSE1007F1	35	15	50
VI	Biostatistics, Economic Botany and Ethno botany	DSE1007F2	35	15	50
VI	Genetics and Plant Breeding	DSE1007F3	35	15	50
VI	Biostatistics, Economic Botany and Ethno botany	DSE1007F4	35	15	50



CHOICE BASED CREDIT SYSTEM
B.Sc. III (Sem. V & VI) Botany
Semester End Examination
Structure of Question Paper

Total Marks: 35

Time: 2 hours

Question No.	Question Pattern	Marks
Q.1	A) Select correct alternative. (MCQ).	05
	B) Fill in the blanks.	02
Q.2	Attempt any two. (Long answer questions).	16
Q.3	Attempt any four. (Short notes).	12
	Total	35

B.Sc. III (Sem. V & VI) Botany
Continuous Internal Evaluation (CIE)

Evaluation Type	Marks
Home Assignment/Book Review/ Student Project/Test/PPT Presentation	15

