DR. V. S. KRISHNA GOVT. DEGREE COLLEGE (A)
VISAKHAPATNAM
DEPARTMENT OF BOTANY

PROPOSED SYLLABUS FOR B.Sc BOTANY
IN UNDERGRADUATE DEGREE PROGRAMME
UNDER AUTONOMY

2018 - 2019

BOARD OF STUDIES

IN

B.Sc BOTANY 2018-2019

SYLLABUS FOR B.Sc BOTANY

Approved in B.O.S for the Academic Year 2018-2019

(Dt : 10 - 10 – 2018)

Dr.V.S.Krishna Govt. Degree College (Autonomous),
(Accredited with 'A' Grade by NAAC)
Visakhapatnam
530013, ANDHRA PRADESH

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Resolutions/Minutes of the 5th Board of Studies-October 2018

Subject: **BOTANY** **Department: BOTANY**

In pursuance of conferment of Autonomous status to Dr.V.S.Krishna Govt. Degree College(A), Visakhapatnam by the UGC vide letter No.F22-1/2011(AC) dated 20.07.2011 from Dr. Manju Singh, Joint Secretary, UGC, New Delhi and Proceedings No. C-II (CDC) /Dr.VSK.Govt.College/BOS/2018 dt. 27-07-2017 of The Vice-Chancellor, Andhra University, Visakhapatnam, the **5th Board of Studies in Boany** Subject is conducted on 10.10.2018 at 10:00 AM with the following members. The Changes will be implemented from 2019-20 academic year onwards.

MEMBER	NAME & DESIGNATION	SIGNATURE
Head of the Department (Chairman)	**Dr.P.Sreevani**	
Faculty Members	**Dr.TMA. Niveditha** **Dr.D.Appa Rao** **Dr.K.Vijaya Lakshmi** **Dr.D.S. Madhava Rao**	
Subject Expert (University Nominee)	**Prof.B.Sujatha** Department of Botany Andhra University Visakhapatnam	10/10/18
Subject Experts (from outside the parent university)	**Dr.B.Seetha Lakshmi** Reader in Botany GDC (W), Srikakulam Dr.B.R.Ambedkar University	10/10/18
	Dr.N.S.N.Swamy Reader in Botany GDC (M), Srikakulam Dr.B.R.Ambedkar University	10.10.18
	Dr.Srinivasa Rajamani UNDP Co-ordinator, GVMC Visakhapatnam	
Representative Member From Industry / Corporate / Allied Area relating to placement	**Dr.Ch.K.V.Hari** Lecturer in Computer Science	
Member from Alumni	**Dr.D.Sravan Kumar** Reader In Physics	
Coordinator, Academic Council	**Dr.V.Chandra Sekhar** Principal	

B.Sc., BOTANY SEMESTER-WISE SYLLABUS THEORY, PRACTICALS AND MODEL QUESTION PAPERS (AS PER CBCS AND SEMESTER SYSTEM)

I, II & III YEARS

w.e.f. 2017-18

AP STATE COUNCIL OF HIGHER EDUCATION
CBCS - PATTERN FOR BOTANY

DR. V. S. KRISHNA GOVT DEGREE & PG COLLEGE (A)

Structure of B.Sc Botany under CBCS

w.e.f. 2017-18 (Revised in April, 2016)

Year	*Semester*	*Paper*	*Title*	*Hours*	*Marks*	*Credits*
I	I	I	Microbial Diversity , Algae and Fungi	4	100	03
			Practical –I	2	50	02
	II	II	Diversity Of Archaegoniates & Anatomy	4	100	03
			Practical –II	2	50	02
II	III	III	Plant taxonomy &Embryology	4	100	03
			Practical –III	2	50	02
	IV	IV	Plant physiology & Metabolism	4	100	03
			Practical –IV	2	50	02
III	V	V	Cell Biology, Genetics &Plant breeding	3	100	03
			Practical –V	2	50	02
		VI	Plant Ecology & Phytogeography	3	100	03
			Practical –VI	2	50	02
	*Any one paper from (A), (B) and (C) can be selected VI **Any one cluster (Set of Three Papers) from 8-A or 8-B can be selected	VII (A)*	**Elective :** Nursery, Gardening and Flouriculture	3	100	03
			Lab	2	50	02
		VII (B)*	**Elective** : Organic farming and sustainable agriculture			
			Lab			
		VII (C)*	**Elective** :plant tissue culture and its biotechnological application			
			Lab			
		** 8A	**Cluster Elective-A**	3	100	03
			8A-1: Plant diversity	3	100	03
			and human welfare	3	100	03
			8A-2 :	2	50	02
			Ethnobotany	2	50	02
			andMedicinal	2	50	02
			botany			
			8A-3:			
			Pharmacognosy			
			and			
			phytochemistry			
			Or			
		** 8B	**Cluster Elective-B VIII-B-1 VIII-B-2 VIII-B-3**			

Andhra Pradesh State Council of Higher Education

Structure of B.Sc Botany under CBCS

w.e.f. 2017-18

Year	*Semester*	*Paper*	*Title*	*Hours*	*Marks*	*Credits*	Paper Code
I	I	I	Microbial Diversity , Algae and Fungi	4	100	03	1
			Practical –I	2	50	02	2
	II	II	Diversity Of Archaegoniates & Anatomy	4	100	03	
			Practical –II	2	50	02	
II	III	III	Plant taxonomy &Embryology	4	100	03	3
			Practical –III	2	50	02	
	IV	IV	Plant physiology & Metabolism	4	100	03	4
			Practical –IV	2	50	02	
III	V	V	Cell Biology, Genetics &Plant breeding	3	100	03	5
			Practical –V	2	50	02	
		VI	Plant Ecology & Phytogeography	3	100	03	6
			Practical –VI	2	50	02	
	*Any one paper from (A), (B) and (C) can be selected (7)	VII (B)*	Elective Organic farming &	3	100	03	7B
			Lab Sustainable Agriculture	2	50	02	
		VII (A)*	Elective Nursery, Gardening				7A
			Lab Apiculture				
		VII (C)*	Elective Plant tissue Culture				7C
			Lab and its biotechnological application				
	VI **Any one cluster (Set of Three Papers) (8) from VIII-A or VIII-B can be selected	** VIII-A	**Cluster Elective-A**	3	100	03	
			VIII-A-1 Plant Diversity & Human welfare	3	100	03	A1
		8 A-1	VIII-A-2 Ethnobotany & Medical Botany	3	100	03	8 A2
		A-2	VIII-A-3	2	50	02	A3
		A-3	Or Pharmacognosy & Phytochemistry	2	50	02	
		** VIII-B	**Cluster Elective-B**				
			VIII-B-1				B1
			VIII-B-2				8 B2
			VIII-B-3				B3

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0891-2553262, https://www.drvskrishnagdc.edu.in

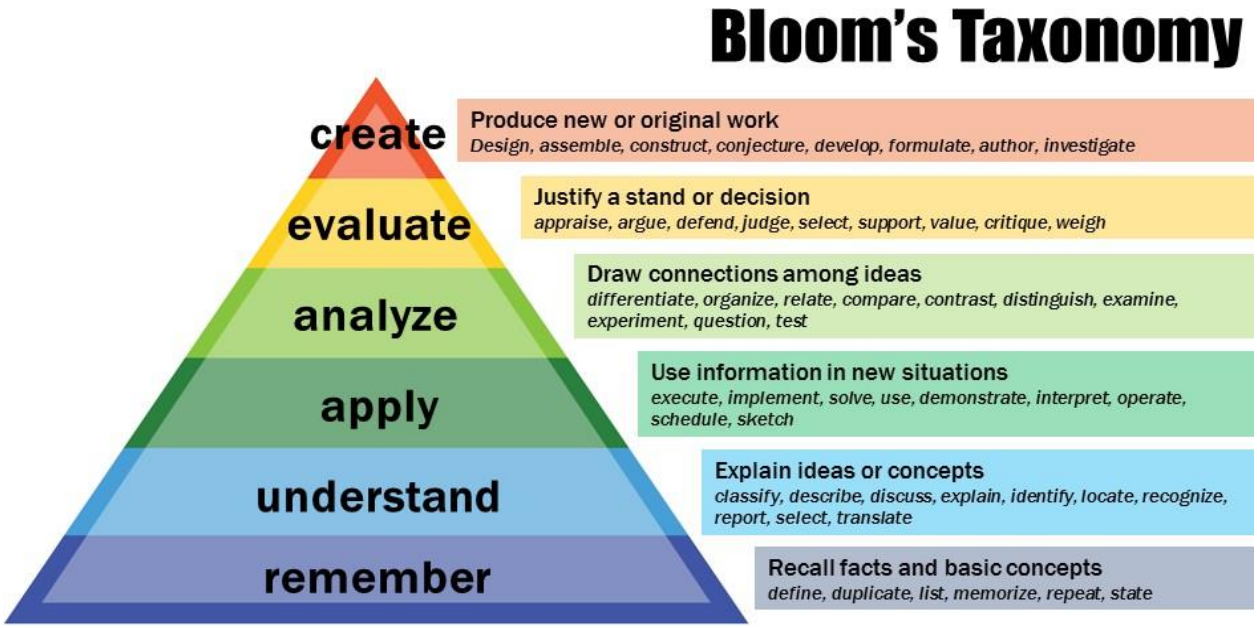
DEPARTMENT OF BOTANY

2018-2019
POs & COs MAPPING

Department of Botany-
Programme Name: **BSc. CBZ**

Levels of Bloom's Taxonomoy

Level-1	**Knowlede/Remember**
Level-2	**Understand**
Level-3	**Application**
Level-4	**Analyze**
Level-5	**Evaluation**
Level-6	**Create**



POs	Programme Outcomes
PO1	**Critical Thinking:** Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid,and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO2	**Effective Communication:** Ability to speak, read, write, and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.
PO3	**Social Interaction:** Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO4	**Effective Citizenship:** Ability to demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO5	**Ethics:** Ability to recognize different value systems includingy our own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO6	**Environment and Sustainability:** Ability to understand the issues of environmental contexts and sustainable Development.
PO7	**Employabilityskills:** Equipping graduates with the essential abilities and knowledge to excel in their choosen careers.
PO8	**Entrepreneurships kills:** Seeks to empower students with the competencies needed to be successful entrepreneours, enabling themto launch, operate,and innovate in their own businesses or entrepreneurial ventures.
PO9	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

Program Specific Outcomes (PSOs)

PSOs	Program Specific Outcomes (PSOs)
PSO1	Analyze the relationships among animals, plants and microbes
PSO2.	Understand the nature and basic concepts of anatomy, embryology And Plant Ecology.
PSO3	Understand structure of Cell and functions of cell organelles. Plant breeding ; Biochemistry , Plant Physiology and Plant Biotechnology; EconomicBotany.
PSO4	Undertand the concept of gene, Heridity and Hybridization
PSO5	Know and understand different Physiological functions and Biochemical pathways in Plants and cell.
PSO6	Understand, identify and utilize different Economically useful Plants in life.
PSO7	Perform procedures as per laboratory standards in the areas of plant Anatomy, Embryology, Ecology, CellBiology, Plant Breeding, Plant Physiology and Plant Biotechnology.

SEMESTER – I
Paper – I : Microbial Diversity, Algae and Fungi

CO1: The structure in relation to function of cells the fundamental unit of life, are concerned in this course along with molecular present in cells and the flow they make the basic framework of cells and their continuity
CO2: awareness created on diversity on Algae, Fungi
CO3: knowledge created on microbial diversity
Co4: they can differentiate the plant viral diseases and bacterial diseases
Cos5: analyse the economic importance of microbes

Learning Outcomes: On Completion of the course, the students will be able to	**Knowledge level (Bloom's Taxonomy)**	**Average level weightage**
CO1:The structure in relation to function of cells the fundamental unit of life, are concerned in this course along with molecular present in cells and the flow they make the basic framework of cells and their continuity	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2:Awareness created on diversity on Algae Fungi& lichens	Level1(Knowledge) Level3(Application)	**2**
CO3: knowledge created on microbial diversity	Level1(Knowledge) Level2(Understanding) Level4(Analysing)	**3.5**
CO4: compare and anlyse the difference between Eubacteria, archi bacteria and cyano bacteria	Level3(Application) Level4(Analysing) Level5(Evaluation)	**4**
CO5: the students get knowledge about economic importance of microbes	Level1(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**4.2**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**0**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**0**	**0**	**0**	**1**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**0**	**0**	**2**
CO4	**1**	**1**	**0**	**1**	**1**	**2**	**1**	**0**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**1**	**1**
CO3	**2**	**2**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**1**	**1**	**1**
CO5	**2**	**2**	**1**	**1**	**1**	**3**

I B.Sc., -Botany-I/ I Semester
MICROBIAL DIVERSITY, ALGAE AND FUNGI

UNIT-I: MICROBIAL WORLD (Origin and Evolution of Life, Microbial diversity

1. Discovery of microorganisms, origin of life, spontaneous, biogenesis, Pasteur experiments, germ theory of disease.
2. Classification of microorganisms – R.H. Whittaker's five kingdom concept.
3. Brief account of special groups of bacteria- Archaebacteria, Mycoplasma, Chlamydia, Actinomycetes and Cyanobacteria.

UNIT-II: VIRUSES

1. Viruses- Discovery, general account, structure& replication of –T4 Phage (Lytic, Lysogenic) and TMV, Viroid's.
2. Plant diseases caused by viruses – Symptoms, transmission and control measures (Brief account only).
3. Study of Tobacco Mosaic, Bhendi Vein clearing and Papaya leaf curl diseases.

UNIT-III: BACTERIA

1. Bacteria: Discovery, General characteristics, cell structure and nutrition
2. Reproduction- Asexual and bacterial recombination (Conjugation, Transformation, Transduction).
3. Economic importance of Bacteria.

UNIT-IV: Algae

1. General account - thallus organization and reproduction in Algae.
2. Fritsch classification of Algae (up to classes only) and economic importance.
3. Structure, reproduction and life history of *Oedogonium, Ectocarpus* and Polysiphonia.

UNIT-V: FUNGI

1. General characteristics and outline classification (Ainsworth).
2. Structure, reproduction and life history of *Rhizopus* (Zygomycota), *Pencillium* (Ascomycota), and *Puccinia* (Basidiomycota).
3. Lichens-Structure and reproduction; ecological and economic importance.

SEMESTER – 2
DIVERSITY OF ARCHAEGONIATES & PLANT ANATOMY

CO1: Diversified plant groups in vascular cryptogams
CO2: Deals with flowering seeded plants with economic importance
CO3: Analyze the tissue systems and their structural and functional role
CO4: deals with secondary growth of some important plants
Co5: undertsabd about the economic importance of gymnosperms

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: Diversified plant groups in vascular plants	Level1(Knowledge) Level2(Understanding)	**1.5**
Co2 : Deals with flowering seeded classification and Nomen clture	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
Create knowledge about important families like ASTERACEAE&POACEAE	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO4: Create knowledge about the plant groups& eco types	Level3(Application) Level4(Analysing) Level6(create)	**4.3**
CO5: The students will understand about the phytogeographical zones	Level 2(Understanding) Level 3(Applying) Level 4(Analysing) Level 5(Evaluation)	**4.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	-	1	1	-	2	1	1	3
CO2	-	-	-	-	-	2	1	2	1
CO3	1	2	-	2	2	-	-	-	2
CO4	1	1	-	1	-	2	1	-	2
CO5	3	2	0	2	1	2	3	2	2

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	3	1
CO2	1	2	1	1	1	1
CO3	2	1	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

I B.Sc., -Botany-II/ II Semester

DIVERSITY OF ARCHAEGONIATES & PLANT ANATOMY

UNIT – I: BRYOPHYTES

1. General characters, Classification (up to classes)
2. Structure, reproduction and Life history of *Marchantia,* and *Funaria.*
3. Evolution of Sporophyte in Bryophytes.

UNIT - II: PTERIDOPHYTES

1. General characters, classification (up to Classes)
2. Structure, reproduction and life history of *Lycopodium,* and *Marsilea.*
3. Heterospory and seed habit.
4. Stelar evaluation in Pteridophytes.

UNIT – III: GYMNOSPERMS

1. General characters, classification (up to classes)
2. Morphology, anatomy**,** reproduction and life history of *Pinus and Gnetum*
3. Economic importance.

UNIT –IV: Tissues and Tissue systems

1. Meristems - Root and Shoot apical meristems and their histological organization.
2. Tissues – Meristematic and permanent tissues (simple, complex, secretory)
3. Tissue systems–Epidermal, ground and vascular.

UNIT – V: Secondary growth

1. Anomalous secondary growth in *Achyranthes, Boerhaavia* and *Dracaena.*
2. Study of local timbers of economic Importance-Teak, Rosewood, Arjuna (Tellamaddi) Red sander.

SEMESTER-3

III Paper-III : Plant Taxonomy and Embryology

CO1: fundamental components of taxonomical study

CO2: Nomenclature of flowering plants and their distribution

CO3: Complete knowledge about important families like Cucurbitaceae, Rutaceae, etc.

CO4: Total awareness gained from plant embryology

Co5: they analyse the differences between monocots and Monoclamydae

Learning Outcomes:On Completion of the course, the students will be able to	**Knowledge level (Bloom's Taxonomy)**	**Average level weightage**
CO1: fundamental components of taxonomical study	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: Nomenclature of flowering plants and their distribution	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO3: Complete knowledge about important families like Cucurbitaceae, Rutaceae, etc	Level1(Knowledge), Level2(Understanding) Level3(Application)	**2**
CO4: Total awareness gained from plant embryology	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
Co5: They analyse the differences between monocots and Monoclamydae	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**1**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**0**	**0**	**1**	**1**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**1**	**0**	**1**	**1**
CO4	**1**	**1**	**0**	**1**	**0**	**2**	**1**	**0**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**1**	**1**
CO3	**2**	**2**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

II B. Sc - SEMESTER –III: BOTANY THEORY PAPER –
III Paper-III : Plant Taxonomy and Embryology)

UNIT – I: INTRODUCTION TO PLANT TAXONOMY

1.Fundamental components of taxonomy (identification, nomenclature,classification)

2. Taxonomic resources: Herbarium- functions& importantherbaria, Botanical gardens, Flora, Keys- single access andmulti-access.

3.Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principleof priority, binomial system; type method, author citation,valid-publication).

UNIT –II:CLASSIFICATION

1. Types of classification- Artificial, Natural andPhylogenetic.

2. Bentham & Hooker's system of classification- merits and demerits.

3. Engler&Prantle's system of classification- merits anddemerits

4. Phylogeny – origin and evolution ofAngiosperms

UNIT –III: SYSTEMATIC TAXONOMY-I

1. Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcurbitaceae, and Apiaceae.

UNIT –IV:SYSTEMATIC TAXONOMY-II

1. Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae,Arecaceae,andPoaceae.

UNIT –V:EMBRYOLOGY

1. Anther structure, microsporogenesis and development of malegametophyte.

2. Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporicand Tetrasporic types (*Peperomia ,Drusa, Adoxa*) of embryosacs.

3. Pollination and Fertilization (out lines) Endosperm development andtypes.

4. Development of Dicot and Monocot embryos,Polyembryony.

SEMESTER – 4

Paper IV : Plant Physiology and Metabolism

CO1: knowledge about the metabolism of plant

CO2: The students can understand about the mechanism of absorption of water in plants

CO3: aware with the mechanism of photosynthesis, respiration in plants

CO4: knowledge developed about phytoharmonal regulations and photo periodism

CO5 ; The students can differentiate co2 fixation in c3&c4 cycles

Learning Outcomes: On Completion of the course, the students will be able to	**Knowledge level (Bloom's Taxonomy)**	**Average level weightage**
CO1: knowledge about the metabolism of plant	Level1(Knowledge) Level2(Understanding) Level5(Evaluation)	**2.6**
CO2: The students can understand about the mechanism of absorption of water in plants	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO3: aware with the mechanism of photosynthesis, respiration in plants	Level1(Knowledge), Level2(Understanding) Level4(Analysing)	**2.3**
CO4: knowledge developed about phyto-harmonal regulations and photo periodism	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
CO5 ; The students can differentiate co2 fixation in c3&c4 cycles	Level2(Understanding) Level4(Analysing) Level5(Evaluation)	**3.6**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	1	0	1	1	0	2	1	2	1
CO3	1	1	0	2	2	0	0	0	2
CO4	1	1	0	1	2	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	1
CO2	1	2	1	2	2	1
CO3	2	1	1	3	1	1
CO4	1	1	1	1	1	1
CO5	2	1	1	1	1	3

II B.Sc. BOTANY, SEMESTER- IV, Paper-IV: THEORY

SYLLABUS PAPER –IV: Plant Physiology and Metabolism

UNIT – I: Plant –Water relations

1. Physical properties of water, Importance of water to plant life.
2. Diffusion, imbibition and osmosis; concept & components of Waterpotential.
3. Absorption and transport of water and ascent ofsap.
4. Transpiration –Definition, types of transpiration, structure and openingand closing mechanism ofstomata.

UNIT –II: Mineral nutrition&Enzymes

1. Mineral Nutrition**:** Essential elements (macro and micronutrients) and their rolein plant metabolism, deficiencysymptoms.
2. Mineral ion uptake (active and passivetransport).
3. Nitrogen metabolism- biological nitrogen fixation in *Rhizobium*, outlines ofprotein synthesis (transcription and translation).
4. Enzymes**:** General characteristics, mechanism of enzyme actionand factors regulating enzymeaction.

UNIT–III:PHOTOSYNTHESIS

1. Photosynthesis: Photosynthetic pigments, photosynthetic light reactions, photo- phosphorylation, carbon assimilation pathways: C3, C4, and CAM (briefaccount)
2. Photorespiration and itssignificance.
3. Translocation of organic solutes: mechanism of phloem transport,source- sinkrelationships.

UNIT – IV:RESPERATION&LIPIDMETABOLISM

1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electrontransport system. Mechanism of oxidativephosphorylation.
2. Lipid Metabolism**:** Types of lipids,Beta-oxidation.

UNIT –V: GROWTH AND DEVELOPMENT

1. Growth and development: definition, phases and kinetics ofgrowth.
2. Physiological effects of phytohormones - Auxins, Gibberellins,Cytokinins, ABA, Ethylene andBrassinosteroids.
3. Physiology of flowering -photoperiodism, role of phytochromein flowering;Vernalization.
4. Physiology of Scenescence andAgeing.

SEMESTER -5 paper-V

Paper-V: Cell Biology, Genetics and Plant Breeding

CO1: detailed study about ultra-structure of cell is possible
CO2: thestudent will understand the structure of DNA &RNA
CO3: detailed study about ultra-structure of cell is possible

CO4: plant genome study in structural and functional aspect is possible

Co5: the students can analyse the significance of mutations in molecular breeding.

Learning Outcomes:On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: detailed study about ultra-structure of cell is possible	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: the student will understand the structure of DNA &RNA	Level1(Knowledge) Level2(Understanding) Level4(Analysing)	**2.3**
CO3: detailed study about ultra structure of the cell	Level1(Knowledge), Level2(Understanding) Level4(Analysing)	**2.3**
CO4: plant genome study in structural and functional aspect is possible	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
Co5: the students can analyse the significance of mutations in molecular breeding	Level2(Understanding) Level3(Application), Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**1**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**0**	**0**	**1**	**1**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**1**	**0**	**2**
CO4	**1**	**1**	**1**	**1**	**0**	**2**	**1**	**0**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**1**	**2**
CO3	**2**	**1**	**1**	**3**	**2**	**1**
CO4	**1**	**1**	**2**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

III B. Sc - SEMESTER- V: BOTANY SYLLABUS
THEORY PAPE–V
Paper-V: Cell Biology, Genetics and Plant Breeding

UNIT – ICellBiology:

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells;Eukaryotic cellcomponents.
2. Ultra structure and functions of cell wall and cellmembranes.
3. Chromosomes**:** morphology, organization of DNA in achromosome (nucleosome model), Euchromatin andheterochromatin.

UNIT – II GeneticMaterial:

DNA as the genetic material: Griffith's and Avery'stransformation experiment, Hershey – Chase bacteriophageexperiment.

1. DNA structure (Watson & Crick model) and replication of DNA(semi-conservative)
2. Different forms of DNA (A-DNA, B-DNA,Z-DNA)
3. Types of RNA (mRNA, tRNA, rRNA), their structure andfunction.

UNIT – IIIMendelianInheritance:

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcrossand testcross.
2. Chromosome theory ofInheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage mapsbased on two and three factorcrosses.
4. Crossing Over: concept &significance.

UNIT – IVPlantBreeding:

1. Introduction and Objectives of plantbreeding.
2. Methods of crop improvement: Procedure, advantages andlimitations of Introduction, Selection, and Hybridization (outlinesonly).

UNIT – V Breeding, Crop ImprovementandBiotechnology:

1. Role of mutations in cropimprovement.
2. Role of somaclonal variations in cropimprovement.
3. Molecular breeding – use of DNA markers in plant breeding and cropimprovement (RAPD,RFLP).

SEMESTER-V

PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPHY

CO1: knowledge created about ecological plant species, ecotypes
CO2: awareness created about geographical distribution of plant species
CO3 :Analyse the bio geo chemical cycles.
Co4 They can learn about the concepts of population ecology
Co5: they can understand about the bio diversity conservation methods

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: knowledge created about ecological plant species, ecotypes	Level1(Knowledge) Level2(Understanding)	**1.5**
CO1: knowledge created about ecological plant species, ecotypes	Level1(Knowledge) Level2(Understanding) Level3(Application), Level4(Analysing)	**2.5**
CO3 :Analyse the bio geo chemical cycles.	Level1(Knowledge), Level2(Understanding) Level4(Analysing)	**2.3**
Co4 They can learn about the concepts of population ecology	Level4(Analysing) Level5(Evaluation)	**4.5**
Co5: they can understand about the bio diversity conservation methods	Level2(Understanding) Level3(Application), Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**0**	**1**	**1**	**1**	**2**	**1**	**1**	**3**
CO2	**1**	**0**	**1**	**0**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**2**	**2**	**2**	**0**	**0**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**0**	**3**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**1**	**1**	**1**
CO3	**2**	**1**	**2**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**2**	**3**

III B. Sc - SEMESTER- V: BOTANY THEORY SYLLABUS PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPHY

UNIT – I. ElementsofEcology

Climatic Factors: Light, Temperature,precipitation.

1. Edaphic Factor: Origin, formation, composition and soil profile.
2. Biotic Factor: Interactions between plants andanimals.

UNIT– II.EcosystemEcology

1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecologicalpyramids.
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen andPhosphorous.

UNIT – II Population&CommunityEcology

1. Population -definition, characteristics and importance, outlines–ecotypes.
2. Plant communities- characters of a community, outlines – Frequency,density, cover, life forms,competition.
3. Interaction between plants growing in acommunity.

UNIT –IV Phytogeography

Principles of Phytogeography, Distribution (wides, endemic, discontinuousspecies)

1. Phytogeographic regions ofIndia.
2. Phytogeographic regions ofWorld.
3. Endemism – types andcauses

UNIT- V: Plant Biodiversity andits importance

1. Definition, levels of biodiversity-genetic, species andecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots ofIndia.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ*methods).
4. Seed banks - conservation of genetic resources and theirimpor

SEMESTER – 6

Paper VII-(B): Nursery, Gardening and Floriculture.

CO1: students understand different vegetative propagagtive methods
CO2: they develop skill towars floriculture
CO3: they learn about Nursery management methods
CO4: Ornamental plants study is possible
Co5: different land scapeing methods.

Learning Outcomes:On Completion of the course, the students will be able to	**Knowledge level (Bloom's Taxonomy)**	**Average level weightage**
CO1: students understand different vegetative propagagtive methods	Level1(Knowledge) Level2(Understanding) Level3(Application),	**2**
CO2: they develop skill towars floriculture	Level1(Knowledge) Level2(Understanding) Level3(Application), Level4(Analysing)	**2.5**
CO3: they learn about Nursery Management Methods	Level1(Knowledge), Level2(Understanding) Level4(Analysing)	**2.3**
CO4: Ornamental plants study is possible	Level4(Analysing) Level5(Evaluation)	**4.5**
Co5: different land scapeing methods	Level2(Understanding) **Level3(Application),** Level4(Analysing) Level5(Evaluation) Level6 (create)	**4.2**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1	1	1	0	2	1	1	3
CO2	1	0	0	1	1	2	1	2	1
CO3	1	1	1	2	2	1	0	0	2
CO4	1	1	0	1	1	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	1
CO2	1	2	1	1	1	1
CO3	2	1	1	3	1	1
CO4	1	1	1	2	3	1
CO5	2	1	1	1	1	3

B. Sc - BOTANY SYLLABUS SEMESTER- VI PAPER – VII – ELECTIVE

Paper VII-(B): Nursery, Gardening and Floriculture.

UnitI: Nursery**:**

Definition, objectives, scope and building up of infrastructure for nursery.

1. Planning and seasonal activities - Planting - direct seeding andtransplants.
2. Nursery Management and Routine GardenOperations.

UnitIII:Gardening

1. Definition, objectives and scope - different types ofgardening.
2. Landscape and home gardening - parks and its components, plantmaterials and design.Computer applications inlandscaping and design..
3. Gardening operations: soil laying, manuring,watering.
4. Landscaping Places of Public Importance: Landscaping highways and Educational Institutions)
5. Some Famous gardens of India.

Unit III: Propagation methods

1.seedlings, transplanting of seedlings.
2. layering, cutting, selection of cutting ,propagule collecting season,
3.cutting rooting medium and planting of cuttings – Hardeningofplants.
4. Propagation of ornamental plants by rhizomes, corms tubers, bulbs andbulbils.
5. Green house - mist chamber, shed root, shade house and Glasshouse for propagation.

UnitIV:Floriculture:

1.Ornamental Plants: Flowering annuals; herbaceous, perennials; Divinevines; Shade and ornamentaltrees.

1. Ornamental bulbous and foliage plants; Cacti andsucculents.

2. Ornamentals-palms.

3. Cultivation of plants in pots; Indoor gardening;Bonsai.

Unit V:CommercialFloriculture

1. Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life of flowers

3. Cultivation of Important cut flowers (Carnation, Aster,Dahlia, Gerbera, Anthuriams, Gladiolous, Marigold, Rose,Lilium)

4. Management of pests, diseases and harvesting.

Semester-VI Paper VIII, CLUSTER ELECTIVE, Cluster-A,

Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

CO1:understand the significance of plants in human welfare
CO2: learn about bio diversity conservation
Co3:anlyse the commercial importance of wood
Co4 understad the sustainable methods and their significance
Co5: anlyse the concept of ecological foot print

Learning Outcomes:On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1:understand the significance of plants in human welfare	Level1(Knowledge) Level2(Understanding) Level3(Application),	**2**
CO2: learn about bio diversity conservation	Level1(Knowledge) Level2(Understanding) Level4(Analysing) Level5(Evaluation)	**3**
Co3:anlyse the commercial importance of wood	Level1(Knowledge), Level2(Understanding) Level4(Analysing)	**2.3**
Co4 understad the sustainable methods and their significance	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
Co5: anlyse the concept of ecological foot print	Level2(Understanding) **Level3(Application),** Level4(Analysing) Level5(Evaluation) Level6 (create)	**4.2**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**1**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**0**	**2**	**1**	**1**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**1**	**2**	**2**	**0**	**0**	**3**	**2**
CO4	**1**	**1**	**0**	**1**	**1**	**2**	**1**	**0**	**2**
CO5	**3**	**1**	**2**	**1**	**2**	**1**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**1**	**1**	**2**	**1**	**1**
CO3	**2**	**2**	**1**	**2**	**1**	**1**
CO4	**1**	**1**	**1**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**2**	**3**

CLUSTERELECTIVES

III B.Sc.: BOTANY SYLLABUS SEMESTER- VI

Paper VIII, CLUSTER ELECTIVE, Cluster-A,
Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

Unit- I: Plant diversity and its scope:

i. Genetic diversity, Species diversity, Plant diversity at the level ecosystem Agro biodiversity and cultivated plant taxa, wildtaxa.

a) Values and uses of biodiversity: Ethical andaesthetic

ii. values, Methodologies for valuation, Uses ofplants.

Unit -II: Loss of biodiversity:

i. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projectedscenario for biodiversity loss

ii. Management of plant biodiversity: Organizations associated withbiodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF,NBPGR;

Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit-III: Contemporary practices inresource management:

i. Environmental Impact Assessment (EIA), GeographicalInformation System GIS, Participatory resourceappraisal, Ecologicalfootprint with emphasis on carbonfootprint,Resourceaccounting;

ii. Solid and liquid wastemanagement

Unit -IV: Conservation ofbiodiversity

i. Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ*conservation,

ii. Social approaches to conservation,Biodiversity awareness programmes, Sustainabledevelopment.

Unit- V: Role of plants in relation toHuman Welfare

Importance of forestry, their utilization and commercialaspects-

a)Avenue trees, b) ornamental plants of India.

c) Alcoholicbeverages through ages.

i. Fruits and nuts: Important fruit crops their commercial importance. Wood, fiber and their uses.

Semester-VI cluster-A2

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY

CO1:understand the significance ofMedicinal plants
CO2: learn about the concepts of Ayurveda sidda traditional medicinal practice syatems
Co3:understand about different medicinal plants and their significance
Co4 understad the conept of Ttraditional knowledge and IPR
Co5: analyse the importance of botanical garden in bio diversity conservation

Learning Outcomes:On Completion of the course, the students will be able to	**Knowledge level (Bloom's Taxonomy)**	**Average level weightage**
CO1:understand the significance of Medicinal plants	Level1(Knowledge) Level2(Understanding) Level3(Application),	**2**
CO2: learn about the concepts of Ayurveda sidda	Level1(Knowledge) Level2(Understanding) Level4(Analysing) Level5(Evaluation)	**3**
Co3:understand about different medicinal plants and their significance	Level1(Knowledge), Level2(Understang) Level3(Application), Level4(Analysing)	**2.5**
Co4 understad the conept of Ttraditional knowledge and IPR	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
Co5: analyse the importance of botanical garden in bio diversity conservation	Level2(Understanding) **Level3(Application),** Level4(Analysing) Level5(Evaluation) Level6 (create)	**4.2**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**0**	**1**	**1**	**1**	**2**	**1**	**1**	**3**
CO2	**1**	**0**	**0**	**1**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**1**	**2**	**2**	**0**	**0**	**1**	**2**
CO4	**1**	**1**	**0**	**1**	**0**	**2**	**1**	**1**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, ‘-‘ No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**2**	**1**	**1**	**1**
CO3	**2**	**2**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**1**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

III B. Sc - BOTANY SYLLABUS SEMESTER- VIII :
CLUSTER ELECTIVE -A

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY

Unit –I:Ethnobotany

i. Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany inthe present context

ii. Major and minor ethnic groups or Tribals of India, and their lifestyles.

iii. Plants used by the tribal populations: a) Food plants, b) intoxicants and beverages, c) Resins and oils and miscellaneoususes.

Unit -II: **Role of ethnobotany inmodern Medicine**:

i. Role of ethnobotany in modern medicine with special example

Rauvolfiasepentina, Trichopuszeylanicus, Artemisia annua, Withaniasomnifera.

ii. Medico-ethnobotanical sources in India

iii. Significance of the following plants in ethnobotanical practices (along with their habitat andmorphology)

a) *Azadirachtaindica*, b) *Ocimum sanctum*, c) *Vitexnegundo*, d)*Gloriosasuperba*, e) *Tribulusterrestris*,f)*Phyllanthusniruri* ,g)*Cassauriculata*, h) *Indigoferatinctoria* , i) *Sennauriculata*j).*Curcuma longa*

iv. Role of ethnic groups in the conservation of plant genetic resource

Unit-III: Ethnobotany as a tool to protect interests of ethnic

i. Sharing of wealth concept with few examples fromIndia.

Biopiracy, Intellectual Property Rights and TraditionalKnowledge.

Unit -IV: History, Scope and Importance of Medicinal Plants. indigenousMedicinalSciences

i. Definition and Scope-**Ayurveda**: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedictreatments.

ii. **Siddha**: Origin of Siddha medicinal systems, Basisof Siddha system, plants used in Siddhamedicine.

iii. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations (inbrief).

Unit -V: Conservation of endangered and endemic medicinal plants:

i. Definition: endemic and endangered medicinalplants,

ii. Red listcriteria

iii. *In situ* conservation: Biosphere reserves,sacred groves, NationalParks

iv. *Ex situ* conservation: BotanicalGardens.

Semester-VI cluster-A3

Paper VIII-A-3: Pharmacognosy and Phytochemistry

CO1:understand the significance of secondary metabolites
CO2: learn about the Drug evalution methods
Co3:understand about different medicinal plants and their significance
Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity.
Co5: analyse the Pharmacological action of plant drugs – tumor inhibitors,PAF antagonists, antioxidants

Learning Outcomes:On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1:understand the significance of secondary metabolites	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: learn about the Drug evalution methods	Level1(Knowledge) Level2(Understanding) Level4(Analysing) Level5(Evaluation)	**3**
Co3:understand about different medicinal plants and their significance	Level2(Understang) Level3(Application), Level4(Analysing)	**3**
Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity.	Level3(Application), Level4(Analysing) Level5(Evaluation)	**4**
Co5: analyse the Pharmacological action of plant drugs – tumor inhibitors,PAF antagonists, antioxidants	Level2(Understanding) **Level3(Application),** Level4(Analysing) Level5(Evaluation) Level6 (create)	**4.2**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	**2**	**0**	**1**	**1**	**1**	**2**	**1**	**1**	**3**
CO2	**0**	**1**	**2**	**1**	**0**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**0**	**1**	**2**
CO4	**1**	**1**	**2**	**1**	**1**	**2**	**1**	**0**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**2**	**1**
CO3	**2**	**1**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**3**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**2**	**3**

III B. Sc - BOTANY SYLLABUS
SEMESTER- VIII CLUSTER
ELECTIVE, Paper VIII-A-3

Paper VIII-A-3: Pharmacognosy and Phytochemistry

Unit-I:Pharmacognosy

Definition, Importance, Classification of drugs - Chemical and Pharmacological, Drug evaluation methods

Unit –II: Organoleptic andmicroscopicstudies:

Organoleptic and microscopic studies with reference to nature of active principles and common adulterants

Adhatodavasica(leaf),*Strychnosnuxvomica*(seed),R*auwolfiaserpentina*(root) and

Zinziberofficinalis C*atharanth us roseus.*

Unit-III:SecondaryMetabolites:

i. Definition of primary and secondary metabolites and their differences, majortypes - terpenes, phenolics, alkaloids, terpenoids, steroids.

ii. A brief idea about extraction of alkaloids.Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway, shikimatepathway.

UNIT-IV:Phytochemistry:

Biosynthesis and sources of drugs:

(i) Phenols and phenolic glycosides : structural types, biosynthesis, importanceof simple phenolic compounds, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins andlignans).

(ii) Steroids, sterols, saponins, withanolides, ecdysones,cucurbitacins:

(iii) Alkaloids: Different groups, biosynthesis, bioactivity.

(v) Volatile oils,aromatherapy.

UNIT-V: Enzymes, proteins and amino acidsasdrugs:

i. Vaccines, toxins and toxoids, antitoxins, immune globulins,antiserums,

ii. Vitamins, Antibiotics – chemical nature, mode ofaction.

iii. Pharmacological action of plant drugs – tumor inhibitors,PAF antagonists, antioxidants, phytoestrogen andothers.

iv. Role of different enzymeinhibitors.