Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE
(AUTONOMOUS)
NODAL RESOURCE CENTRE & AU CENTRE FOR RESEARCH
Maddilapalem, Visakhapatnam – 530013, Andhra Pradesh.
0891-2553262, https://www.drvskrishnagdc.edu.in

DEPARTMENT OF BOTANY

CO – PO ATTAINMENT METHODOLOGY

- Step 1

Calculation of Course Outcome Weighted Average (COWA)

The performance of the students assessed by two methods

(a) Direct Assessment: The weightage for internal exams is 30% and for semester end exams is 60%
(b) Indirect assessment: 5% weightage for exit survey and 5% for extracurricular activities

The performance of the student is categorised in four levels

S,No	Percentage obtained by the student in DA and IDA	Level weightage
1	Less than 35%	0
2	Between 35% and 50%	1
3	Between 51% and 70%	2
4	Above 70%	3

The average level of all students for a particular course is found. It is called as course outcome weighted average (COWA).

$$\mathbf{COWA} = \frac{\boldsymbol{some\ of\ the\ level\ weitage\ of\ all\ students\ of\ a\ course}}{\boldsymbol{total\ number\ of\ students}}$$

- Step 2:

Calculation of Course outcome level index (COLLI):

To Map the course outcomes (COs) of a course with Blooms levels (1 to 6) by using action verbs used in CO's. A course outcome may be mapped to multiple Blooms levels; hence we need to calculate the average Blooms level weightage (ABLW).

$$\mathbf{COLLI} = \frac{\boldsymbol{Sum\ of\ the\ weigtages\ of\ \ blooms\ levels\ mapped}}{\boldsymbol{number\ of\ levels\ mapped}}$$

- Step 3:

CO-PO mapping and CO-PSO mapping

Map each course outcome with POs and PSOs in levels 0,1,2,3. A CO may be mapped to multiple POs or PSOs with different levels 1,2,3. The weighted average of each PO is to be calculated.

- Step 4:

Calculation of CO attainment:

The formula for Course Outcome Attainment (CO Attainment) can be calculated by using below formula

$$\textbf{CO attainment} = \textbf{COWA} + \left\{(\mathbf{3} - \boldsymbol{COWA}) \times \left(\mathbf{1} - \frac{\boldsymbol{COLLI}}{\mathbf{3.5}}\right)\right\}$$

(Blooms Level Weighted Average value $= 3.5$)

- Step 5:

Calculation of PO attainment:

The formula for Programme Outcome Attainment (PO Attainment) can be calculated by using below formula

$$\textbf{PO Attainment} = \frac{\boldsymbol{\Sigma(CO\ attainment)(PO\ level\ mapped\ with\ CO)}}{\boldsymbol{Sum\ of\ the\ PO\ levels\ mapped\ with\ CO}}$$

PSO attainment:

The formula for Programme Specific Outcome Attainment (PSO Attainment) can be calculated by using below formula

$$\textbf{PSO Attainment} = \frac{\boldsymbol{\Sigma(CO\ attainment)(PSO\ level\ mapped\ with\ CO)}}{\boldsymbol{Sum\ of\ the\ PSO\ levels\ mapped\ with\ CO}}$$

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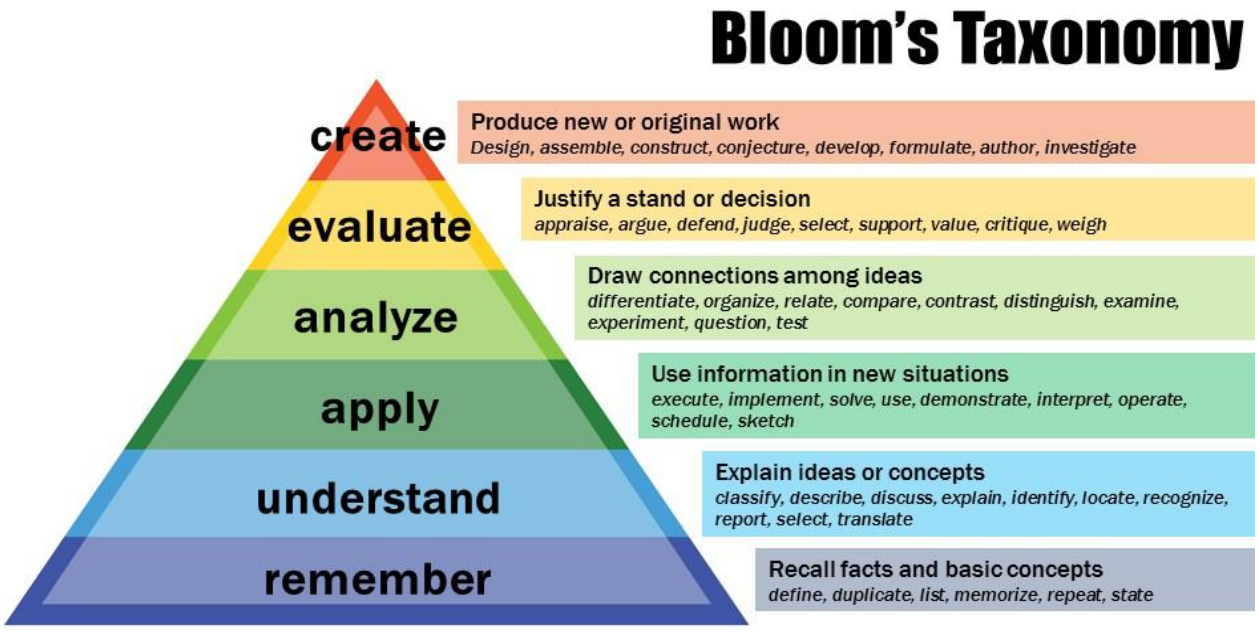
DEPARTMENT OF BOTANY

POs & COs MAPPING
2020-2021

Department of Botany
Programme Name: **BSc. BZC**

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.

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	Understand the concept of gene, Heredity 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.

COURSE OUTCOMES

SEMESTER – 1
P-I: FUNDAMENTAL OF MICROBES AND NON- VASCULAR PLANTS

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 & lichens Fungi & lichens

CO3: knowledge created on microbial diversity

CO4: compare and anlyse the difference between Eubacteria,archi bacteria and cyano bacteria

Co5: the students get knowledge about 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) Level2(Understanding)	**1.5**
CO3: knowledge created on microbial diversity	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO-4: 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	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**	**0**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**2**	**0**	**0**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**1**	**1**	**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**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.305714	0	2.652857	2.652857	0	5.305714	2.652857	2.652857	7.958571
CO2	5.305714	0	0	0	2.652857	5.305714	2.652857	5.305714	2.652857
CO3	2.537143	2.537143	0	5.074286	5.074286	2.537143	2.537143	0	5.074286
CO4	2.074286	2.074286	0	2.074286	2.074286	4.148571	2.074286	0	4.148571
CO 5	6.57	4.38	4.38	4.38	4.38	4.38	6.57	4.38	4.38
FINAL ATTAINMENT	**2.421429**	**2.247857**	**2.344286**	**2.363571**	**2.363571**	**2.408571**	**2.355306**	**2.467714**	**2.421429**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	7.958571	7.958571	2.652857	5.305714	5.305714
CO2	2.652857	5.305714	2.652857	5.305714	2.652857
CO3	5.074286	5.074286	2.537143	7.611429	2.537143
CO4	2.074286	2.074286	2.074286	4.148571	2.074286
CO 5	4.38	2.19	2.19	2.19	2.19
FINAL ATTAINMENT	**2.46**	**2.511429**	**2.421429**	**2.456143**	**2.46**

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

FUNDAMENTAL OF MICROBES AND NON- VASCULAR PLANTS

UNIT – I: ORIGIN OF LIFEANDVIRUSES 12 Hrs.

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory ofdiseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions andViroids.
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and theircontrol.
5. Significance of viruses in vaccine production, bio-pesticides and as cloningvectors.

UNIT – II: SPECIAL GROUPS OF BACTERIAANDEUBACTERIA 12 Hrs.

1. Brief account of Archaebacteria, Actinomycetes andCyanobacteria.
2. Cell structure and nutrition ofEubacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation,Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation andmedicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citruscanker.

UNIT – 3: FUNGI&LICHENS 12 Hrs.

1. General characteristics of fungi and Ainsworth classification (uptoclasses).
2. Structure, reproduction and life history of (a) Rhizopus (Zygomycota) and (b) Puccinia (Basidiomycota).
3. Economic uses of fungi in food industry, pharmacy andagriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast ofRice.
5. Lichens- structure and reproduction; ecological and economicimportance.

UNIT –4:ALGAE 12 Hrs.

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (uptoclasses).
2. Thallus organization and life cycles inAlgae.
3. Occurrence, structure, reproduction and life cycle of (a) Spirogyra (Chlorophyceae)and (b) Polysiphonia (Rhodophyceae).
4. Economic importance ofAlgae.

UNIT –5:BRYOPHYTES 12 Hrs.

1. General characteristics of Bryophytes; classification uptoclasses.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Marchantia (Hepaticopsida) and (b)Funaria(Bryopsida).

General account on evolution of sporophytes inBryophyta

SEMESTER – 2

P-II: BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

COURSE OUTCOMES

CO1: Diversified plant groups in vascular plants

CO2: Deals with flowering seeded classification & Nomenclature

CO3:complete knowledge about important families like ASTERACEAE & POACEAE

CO4: Create knowledge about the plant groups & ecotypes

CO5: The students will understand about the phytogeographical zones

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**
CO3: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) Level5(Evaluation)	**4**
CO5: The students will understand about the phytogeographical zones	Level 2(Understanding) Level 3(Applying) Level 4(Analysing) Level 5(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	**0**	**1**	**1**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**0**	**1**	**2**
CO4	**1**	**1**	**2**	**1**	**1**	**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**	**2**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**2**	**1**
CO3	**2**	**1**	**1**	**2**	**1**	**1**
CO4	**1**	**1**	**1**	**2**	**2**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.051278	0	2.525639	2.525639	2.525639	5.051278	2.525639	2.525639	7.576917
CO2	0	2.367519	2.367519	0	2.367519	4.735038	2.367519	4.735038	2.367519
CO3	2.367519	2.367519	0	4.735038	4.735038	0	0	2.367519	4.735038
CO4	1.735038	1.735038	3.470075	1.735038	1.735038	3.470075	1.735038	1.735038	3.470075
CO 5	4.730752	3.153835	3.153835	3.153835	3.153835	3.153835	4.730752	3.153835	3.153835
FINAL ATTAINMENT	**1.983512**	**1.924782**	**1.919511**	**2.024925**	**2.073867**	**2.051278**	**1.893158**	**2.073867**	**2.130338**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	7.576917	5.051278	2.525639	5.051278	5.051278
CO2	2.367519	4.735038	2.367519	4.735038	4.735038
CO3	4.735038	2.367519	2.367519	4.735038	2.367519
CO4	1.735038	1.735038	1.735038	3.470075	3.470075
CO 5	3.153835	1.576917	1.576917	1.576917	1.576917
FINAL ATTAINMENT	**2.174261**	**2.209398**	**2.114526**	**2.174261**	**2.150103**

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

BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

UNIT –I: PTERIDOPHYTES

1. General characteristics of Pteridophyta; classification of Smith (1955) uptodivisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium (Lycopsida) and (b) Marsilea(Filicopsida).
3. Stelar evolution inPteridophytes;
4. Heterospory and seedhabit.

UNIT –II:GYMNOSPERMS

1. General characteristics of Gymnosperms; Sporne classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Cycas (Cycadopsida) and (b) Gnetum(Gnetopsida).
3. Outlines of geological timescale.
4. A brief account onCycadeoidea.

UNIT – III: BASIC ASPECTSOFTAXONOMY

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genusand family.
2. Plant nomenclature: Binomial system, ICBN- rules fornomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system ofclassification;
5. Systematic description and economic importance of the followingfamilies:
   (a) Annonaceae (b)Curcurbitaceae

UNIT – IV:SYSTEMATICTAXONOMY

1. Systematic description and economic importance of the followingfamilies:
   (a) Asteraceae (b) Asclepiadaceae (c) Amaranthaceae (d)Euphorbiaceae
   (e) Arecaceae and (f) Poaceae
2. Outlines of Angiosperm Phylogeny Group (APGIV).

UNIT –V:PHYTOGEOGRAPHY

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuousspecies)
2. Endemism – types andcauses.
3. Phytogeographic regions ofWorld.
4. Phytogeographic regions ofIndia.
5. Vegetation types in AndhraPradesh.

SEMESTER-3

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 momcots and Monoclamydae

LearningOutcomes:On Completion of thecourse, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: fundamental components of taxonomical study	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO2: Nomenclature of flowering plants and their distribution	Level1(Knowledge) Level2(Understanding)	**1.5**
CO3: Complete knowledge about important families like Cucurbitaceae, Rutaceae, etc	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO4: Total awareness gained from plant embryology	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
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**	**0**	**1**	**1**	**1**	**2**	**1**	**1**	**3**
CO2	**1**	**0**	**1**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**1**	**0**	**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**	**1**	**1**
CO2	**1**	**3**	**1**	**2**	**1**	**1**
CO3	**1**	**2**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.616807	0	2.808403	2.808403	2.808403	5.616807	2.808403	2.808403	8.42521
CO2	2.856303	0	2.856303	0	2.856303	5.712605	2.856303	5.712605	2.856303
CO3	2.808403	2.808403	0	5.616807	5.616807	0	2.808403	0	5.616807
CO4	2.664706	2.664706	0	2.664706	0	5.329412	2.664706	2.664706	5.329412
CO 5	7.994118	5.329412	5.329412	5.329412	5.329412	5.329412	7.994118	5.329412	5.329412
FINAL ATTAINMENT	**2.742542**	**2.70063**	**2.748529**	**2.736555**	**2.768487**	**2.748529**	**2.733133**	**2.752521**	**2.755714**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	8.42521	8.42521	2.808403	5.616807	2.808403
CO2	2.856303	8.568908	2.856303	5.712605	2.856303
CO3	2.808403	5.616807	2.808403	8.42521	2.808403
CO4	2.664706	2.664706	5.329412	5.329412	2.664706
CO 5	5.329412	2.664706	2.664706	2.664706	2.664706
FINAL ATTAINMENT	**2.760504**	**2.794034**	**2.744538**	**2.774874**	**2.760504**

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

3. Bisporicand Tetrasporic types (*Peperomia ,Drusa, Adoxa*) of embryosacs.

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

5. 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)	**1.5**
CO2: The students can understand about the mechanism of absorption of water in plants	Level1(Knowledge) Level2(Understanding)	**1.5**
CO3: aware with the mechanism of photosynthesis, respiration in plants	Level1(Knowledge) Level2(Understanding) Level3(Application) Level4(Analysing)	**2.5**
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) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High,‘-‘NoCorrelation

	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	0	2	2	0	0	0	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, ‘-‘NoCorrelation

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

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.578571	0	2.789286	2.789286	2.789286	5.578571	2.789286	2.789286	8.367857
CO2	2.789286	0	2.789286	0	0	5.578571	2.789286	5.578571	2.789286
CO3	2.64881	2.64881	0	5.297619	5.297619	0	0	0	5.297619
CO4	2.438095	2.438095	0	2.438095	0	4.87619	2.438095	2.438095	4.87619
CO 5	7.525	5.016667	5.016667	5.016667	5.016667	5.016667	7.525	5.016667	5.016667
FINAL ATTAINMENT	2.62247	2.525893	2.64881	2.590278	2.620714	2.63125	2.590278	2.637103	2.634762

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	5.578571	8.367857	2.789286	5.578571	5.578571
CO2	2.789286	5.578571	2.789286	5.578571	5.578571
CO3	5.297619	2.64881	2.64881	7.946429	2.64881
CO4	2.438095	2.438095	2.438095	4.87619	7.314286
CO 5	5.016667	2.508333	2.508333	2.508333	2.508333
FINAL ATTAINMENT	2.64003	2.692708	2.634762	2.64881	2.625397

II B.Sc. BOTANY, SEMESTER- IV,

Paper-IV: THEORY : 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 and Ageing.

SEMESTER -5

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

LearningOutcomes:OnCompletionofthe course, the students will be able to	Knowledgelevel(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 cell is possible	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
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(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-'NoCorrelation

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

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.571429	0	2.785714	2.785714	2.785714	5.571429	2.785714	2.785714	8.357143
CO2	2.671429	2.671429	0	0	0	5.342857	2.671429	5.342857	2.671429
CO3	2.714286	2.714286	0	5.428571	5.428571	2.714286	0	0	5.428571
CO4	2.428571	2.428571	0	2.428571	2.428571	4.857143	2.428571	0	4.857143
CO 5	7.5	5	5	5	5	5	7.5	5	5
FINAL ATTAINMENT	**2.610714**	**2.562857**	**2.595238**	**2.607143**	**2.607143**	**2.609524**	**2.564286**	**2.625714**	**2.631429**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	5.571429	8.357143	2.785714	5.571429	5.571429
CO2	2.671429	5.342857	2.671429	5.342857	2.671429
CO3	5.428571	2.714286	2.714286	8.142857	2.714286
CO4	2.428571	2.428571	2.428571	4.857143	2.428571
CO 5	5	2.5	2.5	2.5	5
FINAL ATTAINMENT	**2.6375**	**2.667857**	**2.62**	**2.641429**	**2.626531**

III B. Sc - SEMESTER- V:

Paper-V: Cell Biology, Genetics and Plant Breeding

UNIT – I Cell Biology:

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 Genetic Material:

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 – III Mendelian Inheritance:

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 – IV Plant Breeding:

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**
CO2: awareness created about thy geographical distribution	Level1(Knowledge) Level2(Understanding)	**1.5**
CO3 :Analyse the bio geo chemical cycles	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO4: They can learn about the concepts of population ecology	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
Co5: they can understand about the bio diversity conservation methods	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

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

4.

	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**	**0**	**2**	**2**	**0**	**1**	**0**	**2**
CO4	**1**	**1**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-'NoCorrelation

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

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	6	0	3	3	3	6	3	3	9
CO2	3	0	3	0	0	6	3	6	3
CO3	3	3	0	6	6	0	3	0	6
CO4	3	3	6	3	6	6	3	3	6
CO 5	9	6	6	6	6	6	9	6	6
FINAL ATTAINMENT	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	6	9	3	6	6
CO2	3	6	3	3	3
CO3	6	3	3	9	3
CO4	3	3	3	6	3
CO 5	6	3	3	3	3
FINAL ATTAINMENT	**3**	**3**	**3**	**3**	**3**

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

UNIT – I. Elements of Ecology

Climatic Factors: Light, Temperature,precipitation.

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

UNIT– II.Ecosystem Ecology

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 & Community Ecology

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 and its 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 SEMESTER- VI PAPER

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

CO1: students understand different vegetative propagagtive methods
CO2: they develop skill towards floriculture
CO3: they learn about Nursery management methods
CO4: Ornamental plants study is possible
CO5: different landscapeing methods

Learning Outcomes: On Completion of thecourse, 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)	**1.5**
CO2: they develop skill towards floriculture	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO3 : they learn about Nursery management methods	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO4 : Ornamental plants study is possible	Level3(Application) Level4(Analysing) Level5(Evaluation)	**4**
CO5: : Different landscapeing methods	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

CO-PO Mapping
1-Low, 2-Moderate, 3-High, '-' NoCorrelation

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

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.869643	0	2.934821	2.934821	2.934821	5.869643	2.934821	2.934821	8.804464
CO2	0	2.913095	0	2.913095	0	5.82619	2.913095	5.82619	2.913095
CO3	2.913095	2.913095	2.913095	5.82619	5.82619	2.913095	0	2.913095	5.82619
CO4	2.82619	2.82619	0	2.82619	2.82619	5.652381	2.82619	0	5.652381
CO 5	8.54375	5.695833	5.695833	5.695833	5.695833	5.695833	8.54375	5.695833	5.695833
FINAL ATTAINMENT	**2.878954**	**2.869643**	**2.885938**	**2.885162**	**2.880506**	**2.884127**	**2.869643**	**2.89499**	**2.889196**

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	5.869643	8.804464	2.934821	5.869643	5.869643
CO2	2.913095	5.82619	2.913095	2.913095	2.913095
CO3	5.82619	5.82619	2.913095	5.82619	5.82619
CO4	2.82619	2.82619	2.82619	5.652381	2.82619
CO 5	2.847917	2.847917	2.847917	2.847917	2.847917
FINAL ATTAINMENT	**2.897577**	**2.903439**	**2.887024**	**2.888653**	**2.897577**

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

seedlings, transplanting of seedlings.

layering, cutting, selection of cutting ,propagule collecting season, cutting rooting medium and planting of cuttings – Hardeningofplants.

Propagation of ornamental plants by rhizomes, corms tubers, bulbs andbulbils.

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.
2. Ornamental bulbous and foliage plants; Cacti andsucculents.
3. Ornamentals-palms.
4. Cultivation of plants in pots; Indoor gardening;Bonsai.

Unit V:Commercial Floriculture

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.

III B.Sc.: BOTANY SYLLABUS 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)	**1.5**
CO2: learn about bio diversity conservation	Level1(Knowledge) Level2(Understanding) Level4(Analysing)	**2.3**
CO3 : Anlyse the commercial importance of wood	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
Co4 : understand the sustainable methods and their significance	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
Co5: Anlyse the concept of ecological foot print	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**	**0**	**1**	**1**	**1**	**2**	**1**	**1**	**3**
CO2	**1**	**0**	**0**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**1**	**0**	**0**	**2**
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**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	6	0	3	3	3	6	3	3	9
CO2	3	0	0	0	3	6	3	6	3
CO3	3	3	0	6	6	3	0	0	6
CO4	3	3	0	3	0	6	3	0	6
CO 5	9	6	6	6	6	6	9	6	6
INAL TTAI IMEN T	3	3	3	3	3	3	3	3	3

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	9	9	3	6	6
CO2	3	6	3	6	3
CO3	6	6	3	9	3
CO4	3	3	3	6	3
CO 5	6	3	3	3	3
FINAL ATTAINMENT	3	3	3	3	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.

III B. Sc - BOTANY SYLLABUS SEMESTER- VI
VIII : CLUSTER ELECTIVE –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 systems
Co3:understand about different medicinal plants and their significance
Co4 : understand 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)	**1.5**
CO2: learn about the concepts of Ayurveda sidda	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO3 : traditional medicinal practice systems	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
Co4 : understand 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(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**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**2**	**0**	**1**	**0**	**2**
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**	**2**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**2**	**1**
CO3	**2**	**1**	**1**	**2**	**1**	**1**
CO4	**1**	**1**	**1**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**3**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.926786	2.963393	2.963393	2.963393	0	5.926786	2.963393	2.963393	8.890179
CO2	0	0	2.95119	0	2.95119	5.902381	2.95119	5.902381	2.95119
CO3	2.95119	2.95119	0	5.902381	5.902381	0	2.95119	0	5.902381
CO4	2.902381	2.902381	0	2.902381	0	5.804762	2.902381	0	5.804762
CO 5	8.74375	5.829167	5.829167	5.829167	5.829167	5.829167	8.74375	5.829167	5.829167
FINAL ATTAINMENT	2.932015	2.929226	2.935938	2.932887	2.936548	2.932887	2.930272	2.938988	2.937768

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	8.890179	5.926786	2.963393	5.926786	5.926786
CO2	2.95119	5.902381	2.95119	5.902381	5.902381
CO3	5.902381	2.95119	2.95119	5.902381	2.95119
CO4	2.902381	2.902381	2.902381	5.804762	2.902381
CO 5	5.829167	2.914583	2.914583	2.914583	2.914583
FINAL ATTAINMENT	2.9417	2.942474	2.936548	2.938988	2.942474

III B. Sc - BOTANY SYLLABUS SEMESTER-
VIII : CLUSTER ELECTIVE –A2

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 in the 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.

ii. Biopiracy, Intellectual Property Rights and Traditional Knowledge

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

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

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

Paper VIII-A-3: Pharmacognosy and Phytochemistry

Unit-I:Pharmacognosy

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

LearningOutcomes:OnCompletionofthecourse, the students will be able to	Knowledgelevel(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)	**1.5**
CO3 : understand about different medicinal plants and their significance	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
Co5: Analyse the Pharmacological action of plantdrugs-tumor inhibitors, PAF antagonists, antioxidants	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**	**0**	**1**	**1**	**0**	**2**	**1**	**1**	**3**
CO2	**0**	**0**	**0**	**0**	**1**	**2**	**1**	**2**	**1**
CO3	**1**	**1**	**1**	**2**	**2**	**0**	**0**	**1**	**2**
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**	**2**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**2**	**1**	**1**
CO3	**2**	**2**	**1**	**3**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**2**	**3**

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	5.939496	0	2.969748	2.969748	0	5.939496	2.969748	2.969748	8.909244
CO2	0	0	0	0	2.969748	5.939496	2.969748	5.939496	2.969748
CO3	2.959664	2.959664	2.959664	5.919328	5.919328	0	0	2.959664	5.919328
CO4	2.929412	2.929412	0	2.929412	0	5.858824	2.929412	0	5.858824
CO 5	8.788235	5.858824	5.858824	5.858824	5.858824	5.858824	8.788235	5.858824	5.858824
FINAL ATTAINMENT	2.945258	2.936975	2.947059	2.946218	2.94958	2.94958	2.942857	2.954622	2.951597

ATTAINMENT OF PSOs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT					
	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	8.909244	5.939496	2.969748	5.939496	5.939496
CO2	2.969748	5.939496	2.969748	5.939496	2.969748
CO3	5.919328	5.919328	2.959664	8.878992	2.959664
CO4	2.929412	2.929412	5.858824	5.858824	2.929412
CO 5	5.858824	2.929412	2.929412	2.929412	5.858824
FINAL ATTAINMENT	2.954062	2.957143	2.947899	2.954622	2.95102

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:

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants
2. *Adhatodavasica*(leaf),*Strychnosnuxvomica*(seed),R*auwolfiaserpentina*(root) and *Zinziberofficinalis* C*atharanth us roseus.*

Unit-III:SecondaryMetabolites:

1. Definition of primary and secondary metabolites and their differences, majortypes - terpenes, phenolics, alkaloids, terpenoids, steroids.
2. A brief idea about extraction of alkaloids.Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway, shikimatepathway.

UNIT-IV:Phytochemistry:

1. Biosynthesis and sources of drugs:
2. 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).
3. Steroids, sterols, saponins, withanolides, ecdysones,cucurbitacins:
4. Alkaloids: Different groups, biosynthesis, bioactivity.
5. Volatile oils,aromatherapy.

UNIT-V: Enzymes, proteins and amino acids as drugs:

1. Vaccines, toxins and toxoids, antitoxins, immune globulins,antiserums,
2. Vitamins, Antibiotics – chemical nature, mode ofaction.
3. Pharmacological action of plant drugs – tumor inhibitors,PAF antagonists, antioxidants, phytoestrogen andothers.
4. Role of different enzyme inhibito