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

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

2022 - 2023

BOARD OF STUDIES

IN

B.Sc BOTANY 2022-2023

SYLLABUS FOR B.Sc BOTANY

Approved in B.O.S for the Academic Year 2022-2023

(Dt : 26 - 09 – 2022)

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
8th Board of Studies Meeting 2022

DEPARTMENT OF BOTANY
BOS COMMITTEE 2022

Subject: 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 (1) /Dr.V.S.Krishna College(A)/2022 dt.03.08.2022 of The Vice-Chancellor, Andhra University, Visakhapatnam, the **8th Board of Studies in Botany** Subject is conducted on 29th at 10.30 AM with the following members. The changes in the syllabus will be implemented from 2022-23 academic year onwards.

MEMBER	NAME & DESIGNATION	SIGNATURE
Head of the Department (Chairman)	Dr.P.Sreevani	
Faculty Members	Dr.TMA.Niveditha Dr.D.Apparao Dr.K.Vijayalakshmi Dr.D.S.MadhavaRao Dr.S.Padmavathi	
Subject Expert (University Nominee)	Prof.S.B.Padal Department of Botany Andhra University	
Subject Experts (from outside the parent university)	Dr.S. Radha Lecturer in Botany, GDC(M), Srikakulam	
	Dr.P.Sara Lecturer in Botany PR GDC (A), Kakinada	
Member from Industry	Dr. P. V Ramana Associate Prof, AMC, Vishakapatnam	
Member from Alumni	D.Lalitha Virajitha BZC (EM)	
Coordinator, IQAC	Dr.Ch.Lalitha	
Academic Coordinator & Member Secretary, Academic Council	Dr.P.Latha	
Principal & Chairperson, Academic Council	Dr.I.Vijaya Babu	29/9/2022

Ph.No.: 0891-2553262 visakhapatnam.gdcollege@gmail.com Fax.No.: 0891-2558123

Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE(A)

(NAAC REACCREDITED A GRADE INSTITUTION & DISTRICT IDENTIFIED COLLEGE)

CENTRE FOR RESEARCH STUDIES

Maddilapalem, VISAKHAPATNAM 530 013, Andhra Pradesh

Visakhapatnam
Date: 26-09-2022

To
Dr./Sri/Smt.

Sir/Madam

Sub:-Dr.V.S.Krishna Govt. Degree College, (Autonomous), Visakhapatnam - **8th Board of Studies Meeting** in BOTANY - Invitation to attend – Request - Regarding.

Ref:- Proceedings No. C-II (1) /Dr.V.S.Krishna College(A)/2022 dt.03.08.2022 of The Vice-Chancellor, Andhra University, Visakhapatnam

* * *

I am pleased to inform you that the **Board of Studies Meeting** in Dept. of BOTANY of Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam is scheduled on 26-09-22 at 10:30 **AM**.

In this context I would like to request you to kindly make it convenient to attend the Board of Studies Meeting in the Dept. of BOTANY at Dr.V.S.Krishna Govt. Degree College (A), Visakhapatnam and the curriculum is redesigned as per the guidelines of NEP-2020.

Agenda:

1) Approval and Ratification of changes/modifications in curriculum design for 1,2,3,4,5 & 6 semesters under Choice Based Credit System from 2022-23 academic year onwards.
2) Approval of new employable and skill based programmes from 2022-23.
3) Approval of value added certificate courses for 2022-23.
4) Approval of Life skill courses and Skill development courses for 2022-23.
5) Suggestions for innovative teaching and evaluation techniques.
6) Suggestions for students' seminars, workshops and student-centered activities.
7) Suggestions for research and extension activity/start-ups.
8) Suggestions for value added certificate courses to be introduced.
9) Approval of Question Paper Blueprint and Model Question Paper for 75 External Marks and 25 Internal marks for core and language courses.
10) Approval of Question Paper Blueprint and Model Question Paper for 50 External Marks for life skill and skill development courses.
11) List of examiners.
12) Any other relevant matter.

Thanking you

Yours faithfully,

XXXXXX
PRINCIPAL

PHONE: 0891 2553262 visakhapatnam.idcollege@gmail.com FAX: 0891 2558123
Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE(AUTONOMOUS)
(NAAC REACCREDITED "B"GRADE INSTITUTION (2.94CGPA) & DISTRICT IDENTIFIED COLLEGE
DISTRICT RESOURCE CENTRE & CENTRE FOR RESEARCH STUDIES
Maddilapalem, Visakhapatnam 530 013, Andhra Pradesh

Board of Studies Resolutions Adopted

The 8th Board of Studies of Department of BOTANY met on 26.09.2022 and resolved the following.

Resolved to

1. Implement the Autonomous Education System as per the Staff councils proceedings commencing from this academic year 2022-2023 for the admitted batch of Istyear degree students of 2022-23 only.

2. To implement guidelines of the academic council.

3. Approve and introduce the newly framed syllabus (modified and approved by the Board of Studies (BOS) for the first, second and final year B.Sc. Degree course in Botany. The newly framed syllabus is oriented in such a way that it caters the needs of the student and to meet the present day job employability and to develop professionalism in the fields of Botany.

4. Approve and ratify the 1st and 2nd year semester syllabus of Ist year B. Sc Degree for the admitted batch of 2020-21. Also approve and ratify the 3rd,4th,5th and 6th semesters syllabus for the academic year 2021-22 and 2022-23.

5. Ratify and introduce semester mode pattern of exam for the 1st year students Further it is approved and ratified the model question papers submitted by the concerned faculty members for all the semesters. The evaluation of internal marks is will be done for 25 marks. Mid I & Mid II will be for 50 Marks each Out of 50marks, Assignment, Seminar/Quiz, Field trips, NCC/NSS/ Clean & Green for each 10 marks, 20 marks evaluation of conducting one mid-semester examination and another Mid II for 50 marks which will be scaled down to 25 marks.

6. Conduct of remedial coaching to the slow learners.

7. To take up innovative teaching (ICT mode of teaching) wherein the method of teaching is based on audio visual lessons, Digital classroom. A separate E-class room is established in the department of Botany for this purpose.

8. To approve and ratify the Skill Development Courses, Life Skill Course and Value added Certificate add-on Course.

9. Develop infrastructure facilities to the department in order to meet SEC, SDCs and LSC.

10. Encourage young faculty members to take-up research studies and to conduct research activities

11. Adapt quality based curriculum as per the norms of the NAAC.

12. Encourage students to join JKC to equip with communication skills and improve their

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Department of Botany

S. No.	Semester	Title of the Paper	Hours /week	Max. Marks	Marks in CIA	Credits
1.	Sem.-I/ Course-1	Fundamentals of Microbes and Non-vascular Plants	04	75	25	04
	Course -1 Practical	Fundamentals of Microbes and Non-vascular Plants SDC: Plant Nursery	03	Max. Marks-50 Internal assessment at Semester end		01
2.	Sem.-II/ Course -2	Basics of Vascular plants and Phytogeography CSP-I	04	75	25	04 04
	Course -2 Practical	Basics of Vascular plants and Phytogeography SDC: Fruit and Vegetable Preservation LSC: Environmental Education	03	Max. Marks-50 External assessmentat Semester end		01
3.	Sem.-III/ Course -3	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	04	75	25	04
	Course -3 Practical	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	03	Max. Marks-50 Internal assessment at Semester end		01
4.	Sem.-IV Course -4	Plant Physiology and Metabolism Internship	04	75	25	04
	Course -4 Practical	Plant Physiology and Metabolism	03	Max. Marks-50 External assessmentat Semester end		01
5.	Sem.- IV Course - 5	Cell Biology, Genetics and Plant Breeding	04	75	25	04
	Course -5 Practical	Cell Biology, Genetics and Plant Breeding	03	Max. Marks-50 External assessmentat Semester end		01
6.	Sem– V Course - – 6 & 7	Domain related Skill Enhancement Courses (02) - Three (3) pairs of courses (each pair has 2 related courses) will be offered, student has to choose a pair ofcourses.	03	75	25	04
			03	Max.Marks-50 Internal assessment at Semester end		01
			03	75	25	04
			03	Max. Marks-50 Internal assessment at Semester end		01

Skill Enhancement Course s(SECs) forSemesterV from2022-23 *(Syllabuswith Learning Outcomes, References, Co-curricular Activities & Model Q.P. Pattern)*

Structure of SECs for Semester–V

(To choose One pair from the Four alternate pairs of SECs)

Univ. Code	Course NO. 6&7	NameofCourse	Th. Hrs./ Week	IE Mar-ks	EE Mar-ks	Credits	Prac. Hrs./ Wk	Mar-ks	Credits
	6A	Plant Propagation	3	25	75	4	3	50	1
	7A	Gardening and Landscaping	3	25	75	4	3	50	1
		OR							
	6B	VegetableCrops– Cultivation Practices	3	25	75	4	3	50	1
	7B	VegetableCrops–PostHarvest Practices	3	25	75	4	3	50	1
		OR							
	6C	PlantTissueCulture	3	25	75	4	3	50	1
	7C	MushroomCultivation	3	25	75	4	3	50	1
		OR							
	6D	Seed Technology	3	25	75	4	3	50	1
	7D	Agroforestry	3	25	75	4	3	50	1

Note-1: For Semester–V, for the domain subject Botany, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

Note-2: *One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.*

Note3: For Semester-VI Internship for all the final year students to learn more about the skills related to the domain subject. It is onjob training (OJT).

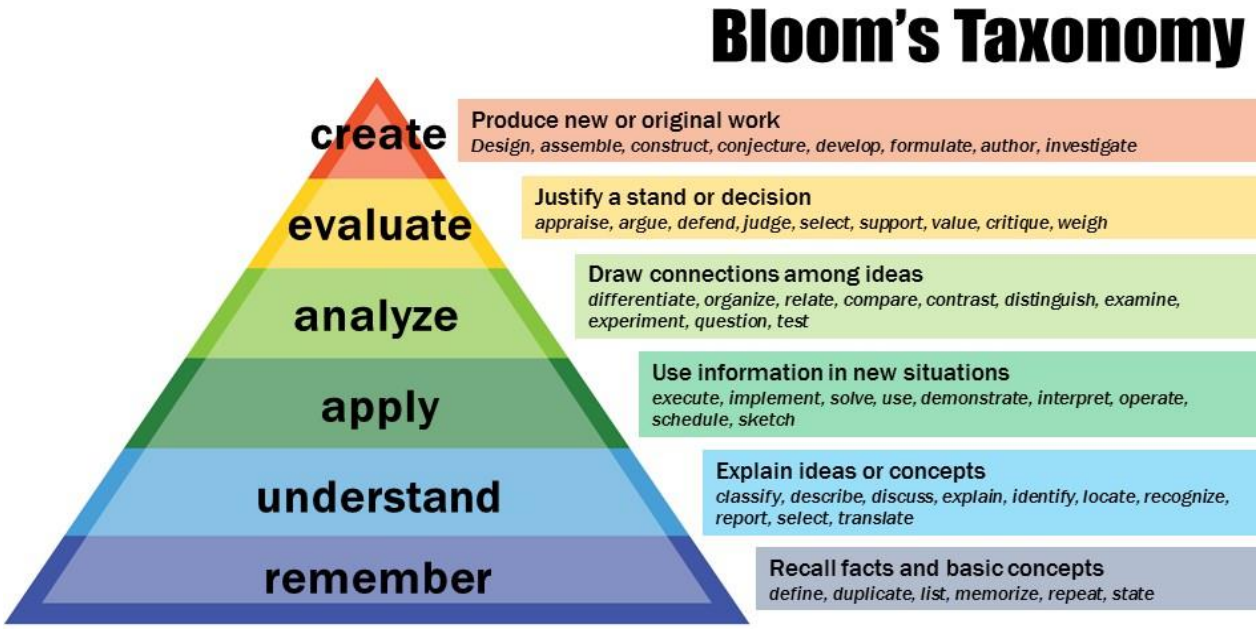
Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE
(AUTONOMOUS)
NODAL RESOURCE CENTRE & AU CENTRE FOR RESEARCH
Maddilapalem, Visakhapatnam – 530013, Andhra Pradesh.
0891-2553262, https://www.drvskrishnagdc.edu.in

DEPARTMENT OF BOTANY
POs & COs MAPPING
2022--2023

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	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.

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

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 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**	**1**	**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**

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: the students learn abot Diversified plant groups in vascular plants
CO2:understand the flowering seeded classification & Nomen clature
CO3: they get complete knowledge about important families like ASTERACEAE &POACEAE
CO4: Create knowledge about the plant groups & eco types
CO5: The students will understand about the phytogeographical zones

Learning Outcomes: On Completion of the course, the students will be able to	Knowledgelevel(Bloom's Taxonomy)	averag e
CO1: the students learn abot Diversified plant groups in vascular plants	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: understand the flowering seeded classification& Nomen clature	Level1(Knowledge) Level2(Understanding)	**1.5**
CO3: they get complete knowledge about important families like ASTERACEAE &POACEAE	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO-4 : Create knowledge about the plant groups & eco types	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
Co5:The studenwill understand about the phytogeographical zones	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	**3.5**

COs-POs Mapping

1-Low, 2-Moderate ,3-High, '-' No Correletion

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

COs-PSOs Mapping

1-Low, 2-Moderate ,3-High, '-' No Correletion

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	**3**	**2**	**3**	**1**	**1**	**2**	**3**
CO2	**2**	**3**	**1**	**2**	**3**	**2**	**1**
CO3	**2**	**1**	**2**	**1**	**1**	**2**	**2**
CO4	**3**	**3**	**2**	**2**	**1**	**3**	**3**
CO5	**3**	**3**	**2**	**1**	**2**	**1**	**1**

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

P-III: Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

CO1: they get knowledge about the basic anatomical features of plants
Co2 understand the embryological developments in plants
Co3: learn about the concept s of population e cology
Co4: learn about causes for loss of biodiversity
Co5 : analyse the biodiversity conservation methods

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: : they get knowledge about the basic anatomical features of plants	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: understand the embryological developments in plants	Level1(Knowledge) Level2(Understanding)	**1.5**
CO3: learn about the concept s of population e cology	Level1(Knowledge) Level2(Understanding) Level3(Application) Level4(Analysing	**2.5**
CO-4 : learn about causes for loss of biodiversity	Level3(Application) Level4(Analysing) Level5(Evaluation)	**4**
Co5: analyse the biodiversity conservation methods	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**	**0**	**1**	**2**	**1**
CO3	**1**	**1**	**0**	**2**	**1**	**1**	**1**	**0**	**2**
CO4	**1**	**1**	**0**	**1**	**1**	**2**	**1**	**0**	**2**
CO5	**3**	**2**	**2**	**2**	**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**	**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**

Semester/BotanyCore Course-3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Unit–1:AnatomyofAngiosperms

Organizationofapicalmeristems: Tunica-carpustheoryandHistogen theory.

1. Tissuesystems–Epidermal,groundandvascular.
2. Anomaloussecondarygrowthin*Boerhaavia*and*Dracaena.*
3. Studyoftimbersofeconomic importance-Teak,Redsandersand Rosewood.

Unit–2:Embryologyof Angiosperms

1. Structureofanther,antherwall,typesoftapetum.Microsporogenesisand development of male gametophyte.
2. Structureofovule,megasporogenesis;monosporic(*Polygonum*),bisporic(*Allium*) and tetrasporic (*Peperomia*) types of embryo sacs.
3. Outlinesofpollination,pollen–pistilinteractionand fertilization.
4. Endosperm-Typesandbiologicalimportance-Freenuclear,cellular,helobialand ruminate.
5. DevelopmentofDicot(*Capsellabursa-pastoris*)embryo.

Unit– 3:Basics ofEcology

1. Ecology:definition,branchesandsignificanceofecology.
2. Ecosystem:Conceptandcomponents,energyflow,foodchain,foodweb, ecologicalpyramids.
4. Plantsandenvironment:Climatic(lightandtemperature),edaphicandbiotic factors.
5. Ecologicalsuccession:HydrosereandXerosere

Unit–4:Population,CommunityandProductionEcology

Populationecology:Natality,mortality,growthcurves,ecotypes,ecads

1. Communityecology:Frequency,density,cover,lifeforms,biological spectrum
2. Conceptsofproductivity: GPP,NPP andCommunityRespiration
3. Secondaryproduction,P/R ratioandEcosystemsUnit–5:Basicsof Biodiversity
1. Biodiversity:Basicconcepts,ConventiononBiodiversity-EarthSummit.
2. ValueofBiodiversity;typesandlevels ofbiodiversityand Threatsto biodiversity
3. BiodiversityHotspotsinIndia.BiodiversityinNorthEasternHimalayasandWestern Ghats.
4. Principlesofconservation: IUCNthreat-categories,REDdata book
5. RoleofNBPGRandNBAintheconservationof Biodiversity.

SEMESTER – 4

P-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
CO4 ; 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) Level4(Analysing)	**3.2**
CO2: The students can understand about the mechanism of water in plants	Level1(Knowledge) Level2(Understanding) Level5(Evaluation)	**2.3**
CO3: aware with the mechanism of photosynthesis, respiration in plants	Level1(Knowledge) Level2(Understanding) Level3(Application) Level4(Analysing	**2.5**
CO-4 : knowledge developed about phytoharmonal 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, '-' 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**	**2**	**0**	**2**	**2**	**1**	**1**	**0**	**2**
CO4	**1**	**1**	**0**	**1**	**1**	**2**	**0**	**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**	**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. 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: Cell Biology, Genetics and Plant Breeding

CO1: detailed study about ultra-structure of cell is possible
CO2: the student 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) Level5(Evaluation)	**2.3**
CO3: detailed study about ultra-structure of cell is possible	Level1(Knowledge) Level2(Understanding) Level3(Application) Level4(Analysing)	**2.5**
CO-4 : plant genome study in structural and functional aspect is possible	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
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, '-' 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**	**1**	**1**	**1**	**0**	**2**
CO4	**1**	**2**	**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**

III B. Sc - SEMESTER- V: BOTANY SYLLABUS
THEORY PAPE–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 PlantBreeding:

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-5

PAPER-VI, Elective-1: PLANT PROPAGATION

CO1: understand the Basic concepts of plant Propagation

CO2: the student will understand the advantages of apomixes in plant propagation

CO3: Analyse the propagation by cuttings

CO-4 : explain about propagation by layering

CO5: explain about propagation bygrafting and budding

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: understand the Basic concepts of plant Propagation	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: the student will understand the advantages of apomixes in plant propagation	Level1(Knowledge) Level2(Understanding) Level5(Evaluation)	**2.3**
CO3: Analyse the propagation by cuttings	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO-4 : explain about propagation by layering	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
CO5: explain about propagation bygrafting and budding	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**	**1**	**2**	**1**	**1**	**0**	**2**
CO4	**1**	**1**	**0**	**1**	**1**	**2**	**1**	**0**	**2**
CO5	**3**	**1**	**2**	**2**	**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**	**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**

SEMESTER-5

PAPER-VI, Elective-1: PLANT PROPAGATION

Unit– 1:Basicconcepts ofpropagation

1. Propagation:Definition,needandpotentialitiesforplantmultiplication;asexual and sexual methods of propagation - advantages and disadvantages.
2. Propagationfacilities:Mistchamber,humidifiers,greenhouses,glasshouses,coldframes, hot beds, poly-houses, phytotrons nursery - tools and implements.
3. Identificationandpropagationbydivisionandseparation:Bulbs,pseudobulbs,corms, tubers and rhizomes; runners, stolons, suckers and offsets.

Unit–2:Apomictics in plant propagation

1. Apomixis:Definition,facultativeandobligate;types–recurrent,non-recurrent, adventitious and vegetative; advantages and disadvantages.
2. Polyembryony:Definition,classification,horticulturalsignificance;chimeraandbud sport.
3. Propagationofmango, *Citrus*and *Allium*usingapomicticembryos.

Unit– 3:Propagation by cuttings

1. Cuttings:Definition,differentmethodsofcuttings;rootandleaf cuttings.
2. Stem cuttings: Definition of stem tip and section cuttings; plant propagation by herbaceous,softwood,semihardwood,hardwooda ndconiferousstemcuttings.
3. Physiologicalandbiochemicalbasisofrooting;factorsinf luencingrootingofcuttings; Use of plant growth regulators in rooting of cuttings.

Unit– 4:Propagation by layering

1. Layering:Definition,principleandfactorsinfluencinglayering.
2. Plantpropagationbylayering:Groundlayering– tiplayering,simplelayering,trench layering, mound (stool) layering and compound (serpentine layering).
3. Airlayeringtechnique–application inwoodytrees.

Unit– 5: Propagation by grafting and budding

1. Grafting:Definition,principle,types,graftincompatib ility,collectionofscionwood stick, scion-stock relationship, and their influences, bud wood certification; micrografting.
2. Propagationbyveneer, whip, cleft,side and barkgraftingtechniques.
3. Budding:Definition;techniquesof‘T’,inverted‘T’,patchandchi

Semester-V
P-VII: Course 6D: Gardening and Landscaping

CO1: Understand the Basic concepts ofGardening methods
CO2: learn about the Graden opertions
CO3: analyse about different types of Ornamntal plants
CO-4 : learn about the propagation techniues
CO5: explain about Land scaping methods

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average Level weightage
CO1: Understand the Basic concepts ofGardening methods	Level1(Knowledge) Level2(Understanding)	**1.5**
CO2: learn about the Graden opertions	Level1(Knowledge) Level2(Understanding) Level5(Evaluation)	**2.3**
CO3: analyse about different types of Ornamntal plants	Level1(Knowledge) Level2(Understanding) Level3(Application)	**2**
CO4 : learn about the propagation techniues	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	**3.5**
CO5: explain about Land scaping methods	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	1	1	1	3
CO2	2	0	0	0	1	2	1	2	1
CO3	1	2	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	2	1
CO3	2	1	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

Semester-V
Course 6D: Gardening and Landscaping

Unit-1: Basics of Gardening

1. Gardenandgardening:Definitions,objectivesandscope;typesofgardens(domestic garden, flower garden, woodland garden, rock garden, water garden and herb and vegetable garden).
2. Specialitygardens(verticalgarden,roofgardenandscentedgarden);principlesof gardening; garden components and adornments;
3. Stylesof garden:formal,informal,freestyleand wild;somefamousgardensof India.

Unit-2:Garden operations

1. Bio-aestheticplanning,eco-tourism,themeparks,indoorgardening,therapeutic gardening.
2. Gardeningoperations:soillaying,manuring,watering,managementofpestsanddiseases and harvesting.
3. Lawnmaking,methods ofdesigningrockeryandwater garden.

Unit-3:Ornamentalplants

1.Ornamental plants: flowering annuals and perennials; climbers and creepers; shade and ornamental trees.

1. Bulbous andfoliageornamentalplants;cactiandsucculents;palms,ferns.

2. Bonsai:definition,typesandstyles, artofmaking bonsai.

Unit-4:Propagation techniques

1. Propagationofornamental plantsbyrhizomes, cormstubers, bulbs and bulbils.
2. Vegetativepropagationtechniques–abriefaccountofcuttings,layeringand grafting.
3. Typesofseedbeds;sowingofseedsandraisingseedlings,transplantingofseedlings; growing plants in pots, potting and repotting.

Unit-5: Landscaping

1. Landscaping:definition,landscapingofparksandpublic gardens.
2. Urbanplanningandplantingavenues;Landscapinghighwaysandeducational institutions; beautifying villages and colonies.
3. ComputerAidedDesigning(CAD)foroutdoor and indoor-scaping.