

**DR. V. S. KRISHNA GOVT. DEGREE COLLEGE (A)  
VISAKHAPATNAM**

**DEPARTMENT OF BOTANY**

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

**2021 - 2022**

**BOARD OF STUDIES**

**IN**

**B.Sc BOTANY 2021-2022**

**SYLLABUS FOR B.Sc BOTANY**

**Approved in B.O.S for the Academic Year 2021-2022**

**( Dt : 26 - 09 - 2022 )**



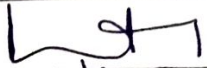
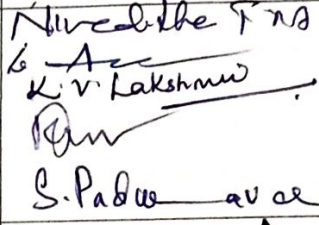


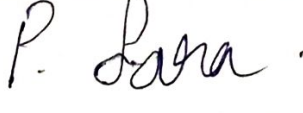

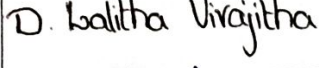
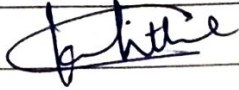


**Dr.V.S.Krishna Govt. Degree College (Autonomous),**  
(Accredited with 'A' Grade by NAAC )  
**Visakhapatnam**  
530013, ANDHRA PRADESH

**Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam**  
**8<sup>th</sup> 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 **8<sup>th</sup> Board of Studies in Botany** Subject is conducted on 29<sup>th</sup> 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<br>(Chairman)                            | Dr.P.Sreevani  |    |
| Faculty Members   | Dr.TMA.Niveditha<br>Dr.D.Apparao<br>Dr.K.Vijayalakshmi<br>Dr.D.S.MadhavaRao<br>Dr.S.Padmavathi |   |
| Subject Expert<br>(University Nominee)                          | Prof.S.B.Padal<br>Department of Botany<br>Andhra University                                    |  |
| Subject Experts<br>(from outside the parent university)         | Dr. <del>G.</del> Radha<br>Lecturer in Botany,<br>GDC(M), Srikakulam                           |  |
|   | Dr.P.Sara<br>Lecturer in Botany<br>PR GDC (A), Kakinada  |  |
| Member from Industry  | Dr. P. V Rayana<br>Associate Prof., AMC,<br>Visakhapatnam                                      |  |
| Member from Alumni  | D.Lalitha Virajitha<br>BZC (EM)  |  |
| Coordinator, IQAC   | Dr.Ch.Lalitha  |  |
| Academic Coordinator &<br>Member Secretary,<br>Academic Council | Dr.P.Latha   |  |
| Principal & Chairperson,<br>Academic Council                    | Dr.I.Vijaya Babu   |  |



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**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 -  
**8<sup>th</sup> 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

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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





**Board of Studies Resolutions Adopted**

The 8<sup>th</sup> 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 1<sup>st</sup> year 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 1<sup>st</sup> and 2<sup>nd</sup> year semester syllabus of 1<sup>st</sup> year B. Sc Degree for the admitted batch of 2020-21. Also approve and ratify the 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> semesters syllabus for the academic year 2021-22 and 2022-23.
5. Ratify and introduce semester mode pattern of exam for the 1<sup>st</sup> 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/<br>Course-1               | Fundamentals of Microbes and Non-vascular Plants  | 04          | 75   | 25           | 04              |
|        | Course -1<br>Practical            | Fundamentals of Microbes and Non-vascular Plants <i>SDC: Plant Nursery</i>  | 03          | Max. Marks-50<br>Internal assessment at Semester end |              | 01              |
| 2.     | Sem.-II/<br>Course -2             | Basics of Vascular plants and Phytogeography<br><i>CSP - I</i>  | 04          | 75   | 25           | 04<br><i>04</i> |
|        | Course -2<br>Practical            | Basics of Vascular plants and Phytogeography<br><i>SDC: Fruit and Vegetable Preservation</i><br><i>LSC: Environmental Education</i> | 03          | Max. Marks-50<br>External assessment at Semester end |              | 01              |
| 3.     | Sem.-III/<br>Course -3            | Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity   | 04          | 75   | 25           | 04              |
|        | Course -3<br>Practical            | Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity   | 03          | Max. Marks-50<br>Internal assessment at Semester end |              | 01              |
| 4.     | Sem.-IV<br>Course -4              | Plant Physiology and Metabolism<br><i>Internship</i>  | 04          | 75   | 25           | 04              |
|        | Course -4<br>Practical            | Plant Physiology and Metabolism   | 03          | Max. Marks-50<br>External assessment at Semester end |              | 01              |
| 5.     | Sem.- IV<br>Course - 5            | Cell Biology, Genetics and Plant Breeding   | 04          | 75   | 25           | 04              |
|        | Course -5<br>Practical            | Cell Biology, Genetics and Plant Breeding   | 03          | Max. Marks-50<br>External assessment at Semester end |              | 01              |
| 6.     | Sem- V<br><br>Course - -<br>6 & 7 | Domain related Skill Enhancement Courses (02)   | 03          | 75   | 25           | 04              |
|        |                                   | - Three (3) pairs of courses (each pair has 2 related courses) will be offered, student has to choose a pair of courses.            | 03          | Max.Marks-50<br>Internal assessment at Semester end  |              | 01              |
|        |                                   |   | 03          | 75   | 25           | 04              |
|        |                                   |   | 03          | Max. Marks-50<br>Internal assessment at Semester end |              | 01              |



**Skill Enhancement Course s(SECs) for Semester V, from 2022-23 (Syllabus with 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 | Name of Course            | 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 | Vegetable Crops- Cultivation Practices | 3 | 25 | 75 | 4 | 3 | 50 | 1 |
|  | 7B | Vegetable Crops-Post Harvest Practices | 3 | 25 | 75 | 4 | 3 | 50 | 1 |

OR

|  |    |                      |   |    |    |   |   |    |   |
|--|----|----------------------|---|----|----|---|---|----|---|
|  | 6C | Plant Tissue Culture | 3 | 25 | 75 | 4 | 3 | 50 | 1 |
|  | 7C | Mushroom Cultivation | 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.

**Note-3:** For Semester-VI Internship for all the final year students to learn more about the skills related to the domain subject. It is on job 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.drskrishnagdc.edu.in>



### DEPARTMENT OF BOTANY

### POs & COs MAPPING

2021-2022

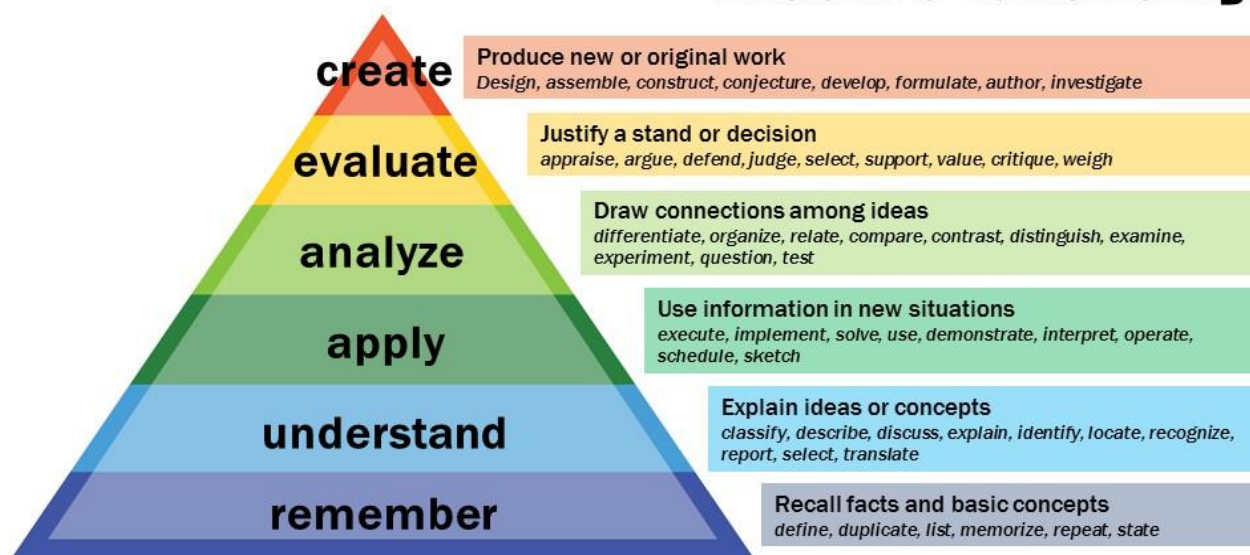
#### Department of Botany

Programme Name: BSc. BZC

#### Levels of Bloom's Taxonomy

|         |                    |
|---------|--------------------|
| Level-1 | Knowledge/Remember |
| Level-2 | Understand         |
| Level-3 | Application        |
| Level-4 | Analyze            |
| Level-5 | Evaluation         |
| Level-6 | Create             |

## Bloom's Taxonomy



| POs        | Programme Outcomes   |
|------------|--|
| <b>PO1</b> | <b>Critical Thinking:</b><br>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. |
| <b>PO2</b> | <b>Effective Communication:</b><br>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.  |
| <b>PO3</b> | <b>Social Interaction:</b><br>Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings.   |
| <b>PO4</b> | <b>Effective Citizenship:</b><br>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.   |
| <b>PO5</b> | <b>Ethics:</b><br>Ability to recognize different value systems including our own, understand the moral dimensions of your decisions, and accept responsibility for them.   |
| <b>PO6</b> | <b>Environment and Sustainability:</b><br>Ability to understand the issues of environmental contexts and sustainable Development.  |
| <b>PO7</b> | <b>Employability skills:</b><br>Equipping graduates with the essential abilities and knowledge to excel in their chosen careers.   |
| <b>PO8</b> | <b>Entrepreneurship skills:</b><br>Seeks to empower students with the competencies needed to be successful entrepreneurs, enabling them to launch, operate, and innovate in their own businesses or entrepreneurial ventures.  |
| <b>PO9</b> | <b>Self-directed and Life-long Learning:</b><br>Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.   |



| <b>PSOs</b>  | <b>Program Specific Outcomes (PSOs)</b>  |
|--------------|--|
| <b>PSO1</b>  | Analyze the relationships among animals, plants and microbes   |
| <b>PSO2.</b> | Understand the nature and basic concepts of anatomy, embryology And Plant Ecology.   |
| <b>PSO3</b>  | Understand structure of Cell and functions of cell organelles. Plant breeding ; Biochemistry , Plant Physiology and Plant Biotechnology; Economic Botany.                  |
| <b>PSO4</b>  | Understand the concept of gene, Heredity and Hybridization   |
| <b>PSO5</b>  | Know and understand different Physiological functions and Biochemical pathways in Plants and cell.   |
| <b>PSO6</b>  | Understand, identify and utilize different Economically useful Plants in life.   |
| <b>PSO7</b>  | Perform procedures as per laboratory standards in the areas of plant Anatomy, Embryology, Ecology, Cell Biology, 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 analyse 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 |
|--|--|-------------------------|
| <b>CO1:</b> 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 )<br>Level2(Understanding)  | <b>1.5</b>              |
| CO2:Awareness created on diversity on Algae Fungi& lichens   | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>              |
| CO3: knowledge created on microbial diversity  | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                    | <b>2</b>                |
| CO-4: compare and analyse the difference between Eubacteria, archi bacteria and cyano bacteria   | Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation)                       | <b>4</b>                |
| CO5: The students get knowledge about economic importance of microbes  | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |

**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    |



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

### **FUNDAMENTAL OF MICROBES AND NON- VASCULAR PLANTS**

#### **UNIT – I: ORIGIN OF LIFE AND VIRUSES 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 of diseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids.
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

#### **UNIT – II: SPECIAL GROUPS OF BACTERIA AND EUBACTERIA 12 Hrs.**

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
2. Cell structure and nutrition of Eubacteria.
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 and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

#### **UNIT – 3: FUNGI & LICHENS 12 Hrs.**

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

#### **UNIT – 4: ALGAE 12 Hrs.**

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

#### **UNIT – 5: BRYOPHYTES 12 Hrs.**

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

General account on evolution of sporophytes in Bryophyta

**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

| <b>Learning Outcomes: On Completion of the course, the students will be able to</b> | <b>Knowledge level (Bloom's Taxonomy)</b>  | <b>Average level weightage</b> |
|---|--|--------------------------------|
| <b>CO1: Diversified plant groups in vascular plants</b>                             | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>                     |
| <b>CO2: Deals with flowering seeded classification and Nomenclature</b>             | Level1(Knowledge )<br>Level2(Understanding)<br>Level3(Application)                       | <b>2</b>                       |
| <b>CO3: Create knowledge about important families like ASTERACEAE &amp; POACEAE</b> | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                        | <b>2</b>                       |
| <b>CO4: Create knowledge about the plant groups &amp; ecotypes</b>                  | Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation)                           | <b>4</b>                       |
| <b>CO5: The students will understand about the phytogeographical zones</b>          | Level 2(Understanding)<br>Level 3(Applying)<br>Level 4(Analysing)<br>Level 5(Evaluation) | <b>4.5</b>                     |

**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    |



**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) into divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium (Lycopodiopsida) and (b) Marsilea (Filicopsida).
3. Stelar evolution in Pteridophytes;
4. Heterospory and seed habit.

**UNIT –II: GYMNOSPERMS**

1. General characteristics of Gymnosperms; Sporne classification up to 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 on Cycadeoidea.

**UNIT – III: BASIC ASPECTS OF TAXONOMY**

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

**UNIT – IV: SYSTEMATIC TAXONOMY**

1. Systematic description and economic importance of the following families:  
(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, discontinuous species)
2. Endemism – types and causes.
3. Phytogeographic regions of World.
4. Phytogeographic regions of India.
5. Vegetation types in Andhra Pradesh.

### 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 monocots and Monoclamydae

| Learning Outcomes: On Completion of the course, the students will be able to              | Knowledge level (Bloom's Taxonomy)  | Average level weightage |
|---|---|-------------------------|
| <b>CO1: fundamental components of taxonomical study</b>                                   | Level1(Knowledge )<br>Level2(Understanding)<br>Level3(Application)                      | <b>2</b>                |
| <b>CO2: Nomenclature of flowering plants and their distribution</b>                       | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO3: Complete knowledge about important families like Cucurbitaceae, Rutaceae, etc</b> | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                       | <b>2</b>                |
| <b>CO4: Total awareness gained from plant embryology</b>                                  | Level2(Understanding)<br>Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>4.5</b>              |
| <b>Co5: They analyse the differences between monocots and Monoclamydae</b>                | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation)    | <b>4.5</b>              |

**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    |



## **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 & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access.
3. Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication).

#### **UNIT –II: CLASSIFICATION**

1. Types of classification- Artificial, Natural and Phylogenetic.
2. Bentham & Hooker's system of classification- merits and demerits.
3. Engler & Prantle's system of classification- merits and demerits
4. Phylogeny – origin and evolution of Angiosperms

#### **UNIT –III: SYSTEMATIC TAXONOMY-I**

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

#### **UNIT –IV: SYSTEMATIC TAXONOMY-II**

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

#### **UNIT –V: EMBRYOLOGY**

1. Anther structure, microsporogenesis and development of male gametophyte.
2. Ovule structure and types; Megasporogenesis, development of Monosporic
3. Bisporic and Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryosacs.
4. Pollination and Fertilization (outline) Endosperm development and types.
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 phytohormonal regulations and photo periodism

CO5: The students can differentiate CO<sub>2</sub> fixation in C<sub>3</sub> & C<sub>4</sub> cycles

| <b>Learning Outcomes: On Completion of the course, the students will be able to</b>                            | <b>Knowledge level (Bloom's Taxonomy)</b>  | <b>Average level weightage</b> |
|--|--|--------------------------------|
| <b>CO1: knowledge about the metabolism of plant</b>  | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>                     |
| <b>CO2: The students can understand about the mechanism of absorption of water in plants</b>                   | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>                     |
| <b>CO3: aware with the mechanism of photosynthesis, respiration in plants</b>                                  | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)<br>Level4(Analysing) | <b>2.5</b>                     |
| <b>CO4: knowledge developed about phytohormonal regulations and photo periodism</b>                            | Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation)                         | <b>4</b>                       |
| <b>CO5: The students can differentiate CO<sub>2</sub> fixation in C<sub>3</sub> &amp; C<sub>4</sub> cycles</b> | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation)   | <b>3.5</b>                     |

**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    |

**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 of sap.
4. Transpiration –Definition, types of transpiration, structure and opening and closing mechanism of stomata.

**UNIT –II: Mineral nutrition&Enzymes**

1. Mineral Nutrition: Essential elements (macro and micronutrients) and their role in plant metabolism, deficiency symptoms.
2. Mineral ion uptake (active and passive transport).
3. Nitrogen metabolism- biological nitrogen fixation in *Rhizobium*, outlines of protein synthesis (transcription and translation).
4. Enzymes: General characteristics, mechanism of enzyme action and factors regulating enzyme action.

**UNIT–III:PHOTOSYNTHESIS**

1. Photosynthesis: Photosynthetic pigments, photosynthetic light reactions, photo- phosphorylation, carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub>, and CAM (brief account)
2. Photorespiration and its significance.
3. Translocation of organic solutes: mechanism of phloem transport, source- sink relationships.

**UNIT – IV:RESPIRATION&LIPIDMETABOLISM**

1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electron transport system. Mechanism of oxidative phosphorylation.
2. Lipid Metabolism: Types of lipids, Beta-oxidation.

**UNIT –V: GROWTH AND DEVELOPMENT**

1. Growth and development: definition, phases and kinetics of growth.
2. Physiological effects of phytohormones - Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassinosteroids
3. Physiology of flowering - photoperiodism, role of phytochrome in flowering; Vernalization.
4. Physiology of Senescence and Ageing.



## 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 |
|--|--|-------------------------|
| <b>CO1: Detailed study about ultra-structure of cell is possible</b>                     | Level1 (Knowledge)<br>Level2 (Understanding)   | <b>1.5</b>              |
| <b>CO2: the student will understand the structure of DNA &amp; RNA</b>                   | Level1 (Knowledge)<br>Level2 (Understanding)<br>Level4 (Analysing)                       | <b>3.3</b>              |
| <b>CO3: detailed study about ultra-structure of cell is possible</b>                     | Level1 (Knowledge)<br>Level2 (Understanding)<br>Level3 (Application)                     | <b>2</b>                |
| <b>CO4: plant genome study in structural and functional aspect is possible</b>           | Level3 (Application)<br>Level4 (Analysing)<br>Level5 (Evaluation)                        | <b>4</b>                |
| <b>Co5: the students can analyse the significance of mutations in molecular breeding</b> | Level2 (Understanding)<br>Level3 (Applying)<br>Level4 (Analysing)<br>Level5 (Evaluation) | <b>3.5</b>              |

**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    |

### **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 cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes: morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

##### **UNIT – II Genetic Material:**

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

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 and function.

##### **UNIT – III Mendelian Inheritance:**

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

##### **UNIT – IV Plant Breeding:**

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outline only).

##### **UNIT – V Breeding, Crop Improvement and Biotechnology:**

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

## SEMESTER-V,

### PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPY

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 |
|--|---|-------------------------|
| <b>CO1: knowledge created about ecological plant species, ecotypes</b>       | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO2: awareness created about thy geographical distribution</b>            | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO3 :Analyse the bio geo chemical cycles</b>                              | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                       | <b>2</b>                |
| <b>Co4 They can learn about the concepts of population ecology</b>           | Level2(Understanding)<br>Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |
| <b>Co5: they can understand about the bio diversity conservation methods</b> | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation)    | <b>3.5</b>              |

| 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    |



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

#### **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 and animals.

#### **UNIT– II. Ecosystem Ecology**

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

#### **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 a community.

#### **UNIT –IV Phytogeography**

Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)

1. Phytogeographic regions of India.
2. Phytogeographic regions of World.
3. Endemism – types and causes

#### **UNIT- V: Plant Biodiversity and its importance**

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

## SEMESTER – 6 SEMESTER- VI PAPER

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

CO1: students understand different vegetative propagative methods

CO2: they develop skill towards floriculture

CO3: they learn about Nursery management methods

CO4: Ornamental plants study is possible

CO5: different landscaping methods

| Learning Outcomes: On Completion of the course, the students will be able to | Knowledge level (Bloom's Taxonomy)   | Average level weightage |
|--|--|-------------------------|
| <b>CO1: students understand different vegetative propagative methods</b>     | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>              |
| <b>CO2: they develop skill towards floriculture</b>                          | Level1(Knowledge )<br>Level2(Understanding)<br>Level3(Application)                   | <b>2</b>                |
| <b>CO3 : they learn about Nursery management methods</b>                     | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                    | <b>2</b>                |
| <b>CO4 : Ornamental plants study is possible</b>                             | Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation)                       | <b>4</b>                |
| <b>CO5: : Different landscaping methods</b>                                  | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |

**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    |

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

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

**Unit I: Nursery:**

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

1. Planning and seasonal activities - Planting - direct seeding and transplants.
2. Nursery Management and Routine Garden Operations.

**Unit III: Gardening**

1. Definition, objectives and scope - different types of gardening.
2. Landscape and home gardening - parks and its components, plant materials and design. Computer applications in landscaping 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 – Hardening of plants.

Propagation of ornamental plants by rhizomes, corms, tubers, bulbs and bulbils.

Green house - mist chamber, shed root, shade house and glasshouse for

Propagation

**Unit IV: Floriculture:**

1. Ornamental Plants: Flowering annuals; herbaceous, perennials; Divine vines; Shade and ornamental trees.
2. Ornamental bulbous and foliage plants; Cacti and succulents.
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, Anthuriums, 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:Analyse 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 |
|--|---|-------------------------|
| <b>CO1: understand the significance of plants in human welfare</b>           | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO2: learn about bio diversity conservation</b>                           | Level1(Knowledge )<br>Level2(Understanding)<br>Level4(Analysing)                        | <b>2.3</b>              |
| <b>CO3 : Analyse the commercial importance of wood</b>                       | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                       | <b>2</b>                |
| <b>Co4 : understand the sustainable methods and their significance</b>       | Level2(Understanding)<br>Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |
| <b>Co5: Analyse the concept of ecological foot print</b>                     | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation)    | <b>3.5</b>              |



**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    |

**CLUSTER ELECTIVES**  
**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, wild taxa.

a) Values and uses of biodiversity: Ethical and aesthetic

ii. values, Methodologies for valuation, Uses of plants.

**Unit -II: Loss of biodiversity:**

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

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

Biodiversity legislation and conservations, Biodiversity information management and communication.

**Unit-III: Contemporary practices in resource management:**

i. Environmental Impact Assessment (EIA), Geographical Information System GIS, Participatory resource appraisal, Ecological footprint with emphasis on carbon footprint, Resource accounting;

ii. Solid and liquid waste management

**Unit -IV: Conservation of biodiversity**

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

ii. Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

**Unit- V: Role of plants in relation to Human Welfare**

Importance of forestry, their utilization and commercial aspects-

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

c) Alcoholic beverages 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 |
|--|--|-------------------------|
| <b>CO1: understand the significance of Medicinal plants</b>                          | Level1(Knowledge )<br>Level2(Understanding)  | <b>1.5</b>              |
| <b>CO2: learn about the concepts of Ayurveda sidda</b>                               | Level1(Knowledge )<br>Level2(Understanding)<br>Level3(Application)                   | <b>2</b>                |
| <b>CO3 : traditional medicinal practice systems</b>                                  | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                    | <b>2</b>                |
| <b>Co4 : understand the conept of Ttraditional knowledge and IPR</b>                 | Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation)                       | <b>4</b>                |
| <b>Co5: Analyse the importance of botanical garden in bio diversity conservation</b> | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |

**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    |

### 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 miscellaneous uses.

##### Unit -II: Role of ethnobotany in modern Medicine:

- i. Role of ethnobotany in modern medicine with special example  
*Rauvolfia serpentina, Trichopus zeylanicus, Artemisia annua, Withania somnifera.*
- ii. Medico-ethnobotanical sources in India
- iii. Significance of the following plants in ethnobotanical practices (along with their habitat and morphology)  
  
a) *Azadirachta indica*, b) *Ocimum sanctum*, c) *Vitex negundo*,  
d) *Gloriosa superba*, e) *Tribulus terrestris*, f) *Phyllanthus niruri*,  
g) *Cassia auriculata*, h) *Indigofera tinctoria*, i) *Senna auriculata*, 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 from India.
- ii. Biopiracy, Intellectual Property Rights and Traditional Knowledge

##### Unit -IV: History, Scope and Importance of Medicinal Plants. indigenous Medicinal Sciences

- i. Definition and Scope-**Ayurveda**: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
- ii. **Siddha**: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine.
- iii. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations (in brief).

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

- i. Definition: endemic and endangered medicinal plants,
- ii. Red list criteria  
*In situ* conservation: Biosphere reserves, sacred groves, National Parks  
*Ex situ* conservation: Botanical Gardens.



**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 evaluation 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 |
|---|---|-------------------------|
| <b>CO1: understand the significance of secondary metabolites</b>  | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO2: learn about the Drug evaluation methods</b>   | Level1(Knowledge )<br>Level2(Understanding)   | <b>1.5</b>              |
| <b>CO3 : understand about different medicinal plants and their significance</b>                               | Level1(Knowledge)<br>Level2(Understanding)<br>Level3(Application)                       | <b>2</b>                |
| <b>Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity</b>                             | Level2(Understanding)<br>Level3(Application)<br>Level4(Analysing)<br>Level5(Evaluation) | <b>3.5</b>              |
| <b>Co5: Analyse the Pharmacological action of plant drugs-tumor inhibitors, PAF antagonists, antioxidants</b> | Level2(Understanding)<br>Level3(Applying)<br>Level4(Analysing)<br>Level5(Evaluation)    | <b>3.5</b>              |

**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    |

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 and microscopic studies:**

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants
2. *Adhatodavasica* (leaf), *Strychnos nuxvomica* (seed), *Rauwolfia serpentina* (root) and *Zinziber officinalis Catharanthus roseus*.

**Unit-III: Secondary Metabolites:**

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

**UNIT-IV: Phytochemistry:**

1. Biosynthesis and sources of drugs:
2. Phenols and phenolic glycosides : structural types, biosynthesis, importance of simple phenolic compounds, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins and lignans).
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 of action.
3. Pharmacological action of plant drugs – tumor inhibitors, PAF antagonists, antioxidants, phytoestrogen and others.
4. Role of different enzyme inhibitors