

Dept. of Botany, Govt. City College (A), Hyderabad.

**ALLOCATION OF CREDITS AT SUBJECT LEVEL
B.Sc., (Final year)
2017-18**

College: Govt.City.College		Course: B.Sc.,		Subject: BOTANY	
S.No.	Semester	Module(Paper)	Hours	Max. Marks	Credits
1.	V Advanced	Cell Biology & Genetics	04	100	03
2.	Advanced Elective I	Ecology	03	100	02*
3.	Advanced Elective II	Seed Technology and Biodiversity	03	100	02*
4.	Practicals -5	Cell Biology & Genetics	02	50	01
5.	Practicals -6	Ecology	01	50	01*
6.	Practicals -7	Seed Technology and Biodiversity	01	50	01*
7.	VI Applied	Plant Physiology	04	100	03
8.	Applied Elective I	Plant Biotechnology and tissue culture	03	100	02*
9.	Applied Elective II	Plant growth and Horticulture	03	100	02*
10.	Practicals-8	Plant Physiology	02	50	01
11.	Practicals-9	Plant Biotechnology and tissue culture	01	50	01*
12.	Practicals-10	Plant growth and Horticulture	01	50	01*
13.	TOTAL CREDITS				30
14.	Project Work	On the given topic		100	03
	* One Elective only is compulsory in Respective Sem.				

**B.Sc (CBCS) Botany- I year
Semester-I - Paper-I
Microbial Diversity of Lower Plants**

DSC - 1A (4 hrs./week)

Theory Syllabus

**Credits- 4
(60 hours)**

UNIT - I

1. Brief account of Archaeobacteria, Actinomycetes. (4h)
2. Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to *Oscillatoria*, *Nostoc* and *Anabaena*. (6h)
3. Lichens: Structure and reproduction; ecological and economic importance. (5h)

UNIT- II

4. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro. (7h)
5. Bacteria: Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. (8h)
6. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl

UNIT-III

7. General characters, structure, reproduction and classification of algae (Fritsch) and thallus organization in algae. (3h)
8. Structure and reproduction of the following:
Chlorophyceae- *Volvox*, *Oedogonium* and *Chara*. (5h)
Phaeophyceae- *Ectocarpus* (2h)
Rhodophyceae- *Polysiphonia*. (3h)
9. Economic importance of algae in Agriculture and Industry. (2h)

UNIT-IV

10. General characters and classification of fungi (Ainsworth). (3h)
 11. Structure and reproduction of the following: (a) Mastigomycotina- *Albugo*
(b) Zygomycotina- *Mucor*
(c) Ascomycotina- *Saccharomyces* and *Penicillium*.
(d) Basidiomycotina- *Puccinia*
(e) Deuteromycotina- *Cercospora*. (10h)
 12. Economic importance of fungi in relation to mycorrhizae and mushrooms. General account of mushroom cultivation (2h)
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**B.Sc (CBCS) Botany-I year
Semester-I - Paper-I
Microbial Diversity of Lower Plants**

Practical Syllabus

(45 hours)

1. Study of viruses and bacteria using electron micrographs (photographs). (3h)
 2. Gram staining of Bacteria. (3h)
 3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi: Viruses: Tobacco mosaic
Bacteria: Angular leaf spot of cotton and Rice tungro.
Mycoplasma: Little leaf of Brinjal and Leaf curl of papaya (3h)
Fungi: White rust on Crucifers, Rust on wheat & Tikka disease of Groundnut. (6h)
 4. Vegetative and reproductive structures of the following taxa:
Algae: *Oscillatoria*, *Nostoc*, *Volvox*, *Oedogonium*, *Chara*, *Ectocarpus*
and *Polysiphonia*. (6 h)
Fungi: *Albugo*, *Mucor*, *Saccharomyces*, *Penicillium*, *Puccinia* and *Cercospora* (6h)
 5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. White rust of Crucifers, Rust on wheat & Tikka disease of Groundnut. (9h)
 6. Lichens: Different types of thalli and their external morphology (3 h).
 7. Examination of important microbial, fungal and algal products:
Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc. (3h)
 8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies). (3h)
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B.Sc (CBCS) Botany- I year
Semester-II - Paper-II
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

DSC-1B (4 hrs./week)

Theory Syllabus

Credits- 4
(60 hours)

UNIT-I

1. Bryophytes: General characters and classification. (3h)
2. Structure, reproduction, life cycle and systematic position of *Marchantia*, *Anthoceros* and *Polytrichum*. (Development stages are not required). (10h)
3. Evolution of Sporophyte in Bryophytes. (2h)

UNIT-II

4. Pteridophytes: General characters and classification (Sporne's) (3h)
5. Structure, reproduction, life cycle and systematic position of *Rhynia*, *Lycopodium*, *Equisetum* and *Marsilea*. (10h)
6. Stellar evolution, heterospory and seed habit in Pteridophytes. (2h)

UNIT-III

7. Gymnosperms: General characters, structure, reproduction and classification (Sporne's). (4h)
8. Distribution and economic importance of Gymnosperms. (3h)
9. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum* . (8 h)

UNIT-IV.

10. Palaeobotany: Introduction, Fossils and fossilization ; Importance of fossils. (8 h)
11. Geological time scale; (4 h)
12. Bennettitales: General account. (3 h)

B.Sc (CBCS) Botany- I year
Semester-II - Paper-II
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany (45 hours)

Practical Syllabus – 2016

1. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: *Marchantia*, *Anthoceros* and *Polytrichum*. (9 h)
2. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes: *Lycopodium*, *Equisetum* and *Marsilea*. (9 h)
3. Study of Anatomical features of *Lycopodium* stem, *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double stained permanent mounts. (12h)
4. Study of Morphology (vegetative and reproductive structures) of the following taxa:
Gymnosperms: *Pinus* and *Gnetum*. (6 h)
5. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double stained permanent mounts. (6h)
6. Fossil forms using permanent slides / photographs: *Rhynia* and *Cycadeoidea*. (3h)

B.Sc., (CBCS) BOTANY- II YEAR

Semester – III – Paper – III

Taxonomy of Angiosperms and Medicinal Botany

DSC-1C (4 hrs./week)

Theory Syllabus

Credit-4 (60 hours)

UNIT - I

1. Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham and Hooker and Engler&Prantle. An Introduction to Angiosperm Phylogeny Group (APG)(7h)
2. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. (4h)
3. Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code- a brief account. Herbarium: Concept, techniques and applications. (4 h)

UNIT – II

4. Systematic study and economic importance of plants belonging to the following families: Polypetalae: Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/Papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae.
5. Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae.
6. Monochlamydeae: Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae. (15 h)

UNIT – III

7. Ethnomedicine: Scope, interdisciplinary nature, distinction of Ethnomedicine from Folklore medicine. (3h)
8. Outlines of Ayurveda, Siddha, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP and CDRI. (5h)
9. Plants in primary health care: Common medicinal plants – Tippateega (*Tinospora cordifolia*), tulasi (*Ocimum sanctum*), pippallu (*Piper longum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*), Turmeric (*Curcuma longa*). ‘ Evaluation of crude drugs. (7 h)

UNIT – IV

10. Traditional medicine vs Modern medicine: Study of selected plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action of modern medicine: Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Nelausiri (*Phyllanthus amarus*), Amla (*Phyllanthus emblica*) and Brahmi (*Bacaopa monnieri*) (8h)
11. Pharmacognosy: Introduction and scope. Adulteration of plant crude drugs and methods of identification – some examples. Indian Pharmacopoeia. (4h)
12. Plant crude drugs: Types, methods of collection, processing and storage practices. (3 h)

B.Sc., (CBCS) BOTANY- II YEAR
Semester – IV Paper – IV
Plant Anatomy, Embryology and Palynology

DSC-1D (4 hrs./week)

Theory Syllabus

Credit-4 (60 hours)

UNIT - I

1. Meristems: Types, histological organization of shoot and root apices and theories(7h)
2. Tissues and Tissue Systems: Simple, Complex and special tissues (4h)
3. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths. (6h)

UNIT – II

4. Stem and root anatomy: Vascular cambium- Formation and function. (3h)
5. Anomalous secondary growth of Stem- *Achyranthes*, *Boerhaavia*, *Bignonia*, *Dracaena*; Root- *Beta vulgaris* (5h)
6. Wood structure: General account. Study of local timbers – Teak (*Tectona grandis*)
Rose wood, (*Dalbergia latefolia*), Red sanders, (*Pterocarpus santalinus*), Nallamaddi (*Terminalia tomentosa*) and Neem (*Azadirachta indica*). (7h)

UNIT – III

7. Introduction: History and importance of Embryology (2h)
8. Anther Structure, Microsporogenesis and development of male gametophyte. (6h)
9. Ovule structure and types; Megasporogenesis; types and development of female gametophyte. (7h)

UNIT – IV

10. Pollination – Types; Pollen – pistil interaction. Fertilization. (4h)
11. Endosperm – Development and types. Embryo – development and types; polyembryony and Apomixis – an outline. (5h)
12. Palynology – Pollen morphology, NPC system and application of Palynology.(6 h)

B.Sc., (CBCS) BOTANY- II YEAR
Semester – III – Paper – III
Taxonomy of Angiosperms and Medicinal Botany
Practical syllabus

(45 hrs)

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus (Minimum of one plant representative for each family) (24h)
2. Demonstration of herbarium techniques. (3h)
3. Identification, medicinal value & active principle present in the following plants :
Tulasi (*Ocimum sanctum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*)
(6h)
4. Ethnomedicinal value/Practice of the following plants:
Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). (6h)
5. Pharmacognosy: Powder analysis: Pippalu (*Piper longam*), Nelausiri (*Phyllanthus niruri*),
Study of Organoleptic (Sectional study) of the following:
Tippateega (*Tinospora cordifolia*) and Turmeric (*Curcuma longa*). (6 h)
6. Candidate has to submit at least 30 herbarium sheets.

B.Sc., (CBCS) BOTANY- II YEAR
Semester – IV Paper – IV
Plant Anatomy, Embryology and Palynology

Practical syllabus

Suggested Laboratory Exercises:	(45 hours)
1. Demonstration of double staining technique.	(3h)
2. Tissue organization in root and shoot apices using permanent slides.	(3h)
3. Preparation of double stained permanent slides	
Primary structure: Root – <i>Cicer, Canna</i> ; Stem – <i>Tridax, Sorghum</i>	(6h)
Secondary structure: Root – <i>Tridaxsp</i> ; Stem- <i>Pongamia</i>	
Anomalous secondary structure: Examples as given in theory syllabus	(6h)
4. Stomatal types using epidermal peels.	(3h)
5. Microscopic study of wood in T.S., T.L.S. and R.L.S	(6h)
6. Structure of anther and microsporogenesis using permanent slides	(3h)
7. Structure of pollen grains using whole mounts – <i>Hibiscus, Acacia and Grass</i>	(3h)
8. Pollen viability test using Evans Blue – <i>Hibiscus</i>	(3h)
9. Study of ovule types and developmental stages of embryosac.	(3h)
10. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides.	(3h)
11. Isolation and mounting of embryo (Using <i>Cymopsis/Senns/Crotalaria</i>)	(3h)

**GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year (2017-2018) Botany V semester – MODULE V**

(Cell biology, Genetics)

Cell Biology (15h)

Unit I

1. Plant cell envelopes; Ultra structure of cell wall, molecular organization of cell membranes. **(3h)**
2. Nucleus; Ultrastructure, Nucleic acids – structure and replication of DNA, types and functions of RNA.(6h)
3. Chromosomes: Morphology, organization of DNA in a chromosome((3h)
4. Chromosomes: Euchromatin and Heterochromatin. Karyotype.(3h)

Cell Biology and Genetics(15h)

Unit II

1. Special types of chromosomes: Lampbrush, polytene and B-chromosomes.(2h)
2. Cell Division: Cell cycle and its regulation; mitosis, meiosis and their significance. (5h)
3. Mendelism: Laws of inheritance. Genetic interactions – epistasis, complementary, supplementary and inhibitory genes.(4h)
4. Linkage and crossing over: A brief account, construction of genetic maps - 2 point and 3 point test cross data.(4h)

Unit III Genetics (15h)

1. Mutations: Chromosomal aberrations – structural and numerical changes; Gene mutations.(5h)
2. Gene Expression in prokaryotes: Organization of gene, transcription, translation, mechanism and regulation of gene expression in prokaryotes (Lac and Trp Operons).(7h)
3. Extra nuclear genome: Mitochondrial and plastid DNA, Plasmids. (3h)

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year- Paper V –Cell Biology & Genetics (Core)
QUESTION BANK FOR PRACTICALS
(2017-18)

Total marks: 50

I Describe the procedure of fixation of plant material and prepare a suitable cytological preparation of the given material and show any two stages----- 15M

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparation of Onion root tips.
3. Study of various stages of meiosis using cytological preparation of Onion flower buds.
4. Karyotype study using cytological preparation of dividing root tip cells of Onion/photographs/permanent slides

II Spotting and Slides of cell organelles 2X5=10M
(Nucleus, Ultrastructure of cell wall, lampbrush, polytene,) B chromosomes

III Solving genetic problems related to monohybrid, dihybrid ratio and interaction of genes (Q.N0.5-16)2x10=20 M

IV RECORD-----5 M

**GOVT. CITY COLLEGE, HYDERABAD
(AUTONOMOUS)
B.Sc., III Year (2017-2018) onwards
Botany
V semester – MODULE V- Advanced Elective I**

Ecology

Unit – I **15h**

1. Concept and components of Ecosystem. (5h)
2. Energy flow, food chains, food webs, ecological pyramids. (5h)
3. Biogeochemical cycles – Carbon, Nitrogen, Phosphorous (5h)

Unit – II **15h**

1. Plants and environment: Ecological factors – climatic (light and temperature) Edaphic and biotic. (5h)
2. Ecological adaptations of plants. (5h)
3. Population ecology: Natality, mortality, growth curves, ecotypes, ecads((5h))

Unit – III **15h**

1. Community ecology: Frequency, density, cover, life forms, biological Spectrum, (5h)
2. Ecological succession (Hydrosere, Xerosere) (5h)
3. Production ecology: Concepts of productivity, GPP, NPP, CR (Community Respiration) and secondary production, P/R ratio and ecosystems. (5h)

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year- Paper Advanced Elective 1 – Ecology
QUESTION BANK FOR PRACTICALS
(2017-18)

Total marks: 50

I. Determination of soil texture (Composition of clay, sand, silt etc.,)
and pH **10 Marks**

II Identify and describe the following ecological instruments **2X5=10 marks**

- Hygrometer
- Rain gauze
- Anemometer
- Altimeter
- Light meter
- Wet and dry bulb thermometer

III. Study of morphological and anatomical characteristics of plant communities using locally available plant species..... **3X4=12 marks**

S.No.	Specimens	Slides
24.	<i>Eichhornia,</i>	Petiole T.S
25.	<i>Hydrilla</i>	Stem T.S
26.	<i>Pistia</i>	
27.	<i>Nymphaea</i>	Petiole T.S
28.	<i>Vallisneria</i>	Leaf T.S
29.	<i>Asparagus,</i>	Cladode T.S
30.	<i>Opuntia,</i>	
31.	<i>Euphorbia antiquorum</i>	Stem T.S

- IV. Estimates of carbonates and bicarbonates in the given water**
Sample **10 Marks**
- V. Viva-Voce**..... **3 Marks**
- VI. Record** **5 Marks**

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year (2017-2018)
Botany-VI semester – MODULE VI
(Physiology)

Unit – I (20 h)

1. Water relations: Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis, water, osmotic and pressure potentials; absorption, transport of water, ascent of sap; transpiration, stomatal structure and movements.(10h)
2. Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, kinetics, factors regulating enzyme action.(6h)
3. Translocation of organic substances: Mechanism of phloem transport; Source-sink relationships.(4h)

Unit – II (20h)

1. Mineral nutrition: Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency; absorption of mineral ions; passive and active processes.(8h)
2. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation; carbon assimilation pathways C₃, C₄ and CAM; photorespiration. (12h)

Unit – III (20h)

1. Respiration: Aerobic and anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.(12h)
2. Nitrogen Metabolism; Biological nitrogen fixation, nitrate reduction, ammonia assimilation, amino acid synthesis and protein synthesis. (8h)

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year- Paper VI –Plant Physiology (Core)
QUESTION BANK FOR PRACTICALS (2017-18)

- I. **Conduct the physiology experiment allotted to you. Give procedure, results and inference15 marks**
 1. Separation of chloroplast pigments using paper chromatography technique.
 2. Determination of osmotic potential of vacuolar sap by plasmolytic method using leaves of Rheo/Tradescantia.

- II. **Conduct the physiology experiment allotted to you. Give procedure, results and inference10 marks**
 1. Estimation of protein by biuret method
 2. Determination of catalase activity using potato tubers by titration method.

- III. **Conduct the physiology experiment allotted to you. Give procedure, results and inference10 marks**
 1. Determination of rate of transpiration using cobalt chloride method.
 2. Determination of stomatal frequency using leaf epidermal peelings/impressions

- IV. **Project5 marks**

- V. **Viva.....5 marks**

- VI. **Record.....5 marks**

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year (2017-2018)
Botany-VI semester – MODULE VI
(Applied elective – I – Biotechnology & Tissue culture)

Unit I (15h)

1. Tissue culture: Introduction, sterilization procedures (5 h)
2. culture media- composition and preparation ; explants(5h)
3. Callus culture; cell and protoplast culture (5 h)

Unit II (15 h)

1. Somatic hybrids and cybrids.(5h)
2. Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants (5 h)
3. Secondary metabolites and synthetic seeds.(5h)

UNIT II (15 h)

1. Biotechnology: Introduction, history and scope.(5h)
2. rDNA technology: Vectors and gene cloning(7 h)
3. Transgenic plants.(3 h)

GOVT. CITY COLLEGE, HYDERABAD (AUTONOMOUS)
B.Sc., III Year- Applied Elective – I
(Plant Biotechnology and tissue culture)
QUESTION BANK FOR PRACTICALS
(2017-18)

I. Conduct the experiment allotted to you. Give procedure, results and inference10 marks

1. Preparation of plant tissue culture medium.
2. Isolation and estimation of DNA.
3. Demonstration of micropropagation using explants like axillary buds and shoots meristems (inoculation of explants).

II. Comment on the following spots5 * 6= 30 marks

1. Knowledge of instruments and facilities used in plant tissue culture Using equipment /photographs).
2. Study of biotechnology products: Samples of antibiotics, vaccines, biofertilizers, single cell protein, cosmetics; photographs of transgenic plants, multiple shoots and Artificial / synthetic seeds.

III. Project.....5 marks

IV. Record.....5 marks